

DEPARTMENT OF ENVIRONMENTAL QUALITY

LAND QUALITY DIVISION

CHAPTER 1

AUTHORITIES AND DEFINITIONS FOR COAL MINING OPERATIONS

Section 1. **Authority.** These rules and regulations are adopted by the Environmental Quality Council and the Administrator of the Land Quality Division pursuant to the authority granted the Council and the Administrator by the Wyoming Environmental Quality Act, Sections 35-11-101 through 35-11-1104, Wyoming Statutes, 1977, as amended. These rules and regulations are effective upon filing with the Secretary of State. They become an official part of Wyoming's coal regulatory program when approved by the U.S. Secretary of the Interior or his designee.

Section 2. **Definitions.** The definitions included in the Wyoming Environmental Quality Act, are hereby adopted by this reference. All references to the "Act" herein refer to the Wyoming Environmental Quality Act, as amended.

(a) "Acid drainage" means water with a pH of less than 6.0 and in which total acidity exceeds total alkalinity, discharged from an active or inactive mine or from an area affected by mining and reclamation operations.

(b) "Acid-forming materials" means earth materials that contain sulfide minerals or other minerals which exist in a natural state or if exposed to air, water or weathering processes, will cause acid conditions that may hinder plant establishment or create acid drainage.

(c) "Adjacent areas" means land located outside the permit area upon which air, surface water, groundwater, fish, wildlife, or other resources protected by the Act may reasonably be expected to be adversely impacted by mining or reclamation operations. Unless otherwise specified by the Administrator, this area shall be presumptively limited to lands within one-half mile of the proposed permit area.

(d) "Administrator" means the Administrator of the Division of Land Quality.

(e) "Amendment" means the addition of new lands to a previously approved permit area, as allowed by W. S. § 35-11-406(a)(xii).

(f) "Annual" means a plant which completes its life cycle in 12 months or fewer.

(g) "Applicant" means any "person" seeking a permit, permit revision, renewal, transfer, or other approval from the Administrator to conduct mining and

reclamation operations, or “person” seeking a license to explore, but does not include subsidiaries or parents of the “person”, as “person” is defined in W.S. § 35-11-103(a)(vi).

(h) “Approximate original contour” means that surface configuration achieved by backfilling and grading of the mined areas so that the reclaimed land surface closely resembles the general surface configuration of the land prior to mining and blends into and complements the drainage pattern of the surrounding terrain.

(i) “Aquifer” is a zone, stratum or group of strata that stores and transmits water in sufficient quantities for a specific use.

(j) “Augmented seeding” means reseeding in response to the unsuccessful germination, establishment or permanence of revegetation efforts. Augmented seeding resets the applicable liability period. A synonym is reseeding.

(k) “Barren” means any land unit devoid of vegetation, or practically so.

(l) “Baseline vegetation inventory” means a vegetation sampling program executed prior to any significant surface disturbance cause by proposed mining activities. The inventory will quantitatively and qualitatively classify the different plant communities to the specification of Wyoming State Law.

(m) “Belt transect” means a rectangular sampling plot used for the estimation of shrub density (premining and postmining) and postmining species diversity and species composition, each belt transect shall be at least 100 square meters and a minimum of 50 meters in length.

(n) “Best practicable Technology” means a technology based on methods and processes that are both practicable and reasonably economic and is justifiable in terms of existing performance and achievability in relation to the establishment of shrubs in the required density, aerial extent and species.

(o) “Best technology currently available” means equipment, devices, systems, methods, or techniques which, as determined by the Administrator, are currently available and practicable, and will:

(i) Prevent, to the extent possible, additional contributions of suspended solids to streamflow or runoff outside the affected land or permit area. But in no case shall contributions exceed requirements set by applicable State or Federal laws, and

(ii) Minimize, to the extent possible, disturbances and adverse impacts on fish, wildlife and related environmental values, and achieve enhancement of those resources where practicable.

(p) “Biennial” means a plant that lives for two years, producing vegetative growth the first year and usually blooming and fruiting and senescing in the second year and then dying.

(q) “Bond” means a surety or self-bond instrument by which the permit applicant assures faithful performance of all requirements of the Act, all rules and regulations promulgated thereunder, and the provisions of the permit and license to mine. This term shall also include the following, which the operator has deposited with the Department of Environmental Quality in lieu of a Surety Bond or Self-Bond Instrument:

(i) Federal insured certificates of deposit;

(ii) Cash;

(iii) Government securities;

(iv) Irrevocable letters of credit;

(v) An alternative method of financial assurance that is acceptable to the Administrator and provides for a comparable level of assurance for performance of reclamation obligations. The alternative method of financial assurance must first be approved by the Office of Surface Mining; or

(vi) A combination of any of these bonding methods.

(r) “Bond responsibility period” means the minimum 10 year period during which the bond, in part or wholly, remains in effect.

(s) “Cactus” means any member of the Cactaceae plant family. Members of the Cactaceae plant family are in the lifeform category of succulent.

(t) “Coal exploration” means either:

(i) The field gathering of surface or subsurface geologic, physical, or chemical data by mapping, trenching, drilling, geophysical or other techniques necessary to determine the quality and quantity of overburden and coal of an area. If this activity results in the extraction of coal, the coal shall not be offered for commercial sale (except for test burns); or

(ii) The gathering of environmental data to establish the conditions of an area before beginning coal mining and reclamation operations.

(u) “Coal mine waste” means coal-processing waste and underground development waste.

(v) “Coal preparation plant” means a facility where coal is subjected to chemical or physical processing or cleaning, concentrating, or other processing or preparation. It includes facilities associated with coal preparation activities, including, but not limited to the following: loading facilities; storage and stockpile facilities; sheds, shops, and other buildings; water treatment and water storage facilities; settling basins and impoundments; and coal-processing and other waste disposal areas.

(w) “Coal-processing waste” means earthen materials which are wasted or otherwise separated from product coal during cleaning, concentrating or other processing or preparation of coal.

(x) “Combustible material” means organic material that is capable of burning.

(y) “Compaction” means the reduction of pore spaces among particles of soil or rock, generally done by controlled placement and running heavy equipment over the earthen material.

(z) “Cool season” means a plant which generally makes the major portion of its growth during late fall, winter, and early spring. Cool season species generally exhibit the C3 photosynthetic pathway.

(aa) “Cover” means the percent of the ground surface which is covered by the vertical projection of objects on or above that ground surface. The objects may include standing plant material and cryptogams, litter or rock. “Absolute cover” means the percent cover of a given category independent of other categories. The following cover categories or descriptions used are:

(i) “Absolute cover of litter” means the percent of the ground surface which is overlain by litter;

(ii) “Absolute cover of rock” means the percent of the ground surface which is covered by rock;

(iii) “Absolute cover of vegetation” means the percent of the ground surface which is covered by the vertical projections of all live vascular plants;

(iv) “Absolute cover of vegetation by species” means the percent of the ground surface covered by individual live vascular plants;

(v) “Absolute cover of cryptogams” means the percent of the ground surface which is covered by cryptogams.

(vi) “Absolute cover of total ground cover” means the sum of vegetation, cryptogams, litter and rock cover.

(vii) “Absolute cover of bare ground” means the percent of the ground surface which is not covered by the vertical projection of vascular plants and cryptogams, litter or rock.

(viii) “Relative cover” means the expression of any number of cover categories in relation to each other such that the sum of the chosen relative cover values total 100 percent.

(ab) “Cover crop” means a preparatory crop of one or more species seeded and grown prior to the seeding of the permanent seed mixture, for the chief purpose of protecting the soil from erosion and also for improving the soil fertility and structure. The term is synonymous with stubble crop and is considered a type of mulch.

(ac) “Critical habitat” means those areas essential to the survival and recovery of species listed by the Secretary of the Interior as threatened or endangered under the authority of 50 CFR, Part 17.

(ad) “Crucial habitat” means those areas, designated as such by the Wyoming Game and Fish Department, which determine a population's ability to maintain and reproduce itself at a certain level over the long term.

(ae) “Cryptogam” means a plant (vascular or non-vascular) that reproduces by spores rather than seeds. A plant in any of these groups: Lichens, Bryophytes (mosses, liverworts, hornworts), Pteridophytes (ferns, moonworts, horsetail, club mosses, spike mosses, quillworts, pepperwort) will be considered cryptogams.

(af) “Density means the number of individuals per unit area.

(ag) “Designated authorized representative” means, for the purposes of issuing a cessation order, either the Administrator, the district engineer, or other qualified inspector designated by the Director.

(ah) “Developmental drilling” means drilling down to and including the lowest coal seam to be mined which occurs in or within 500 feet of an active mine pit.

(ai) “Discoverer” means any person conducting or intending to conduct any exploration by drilling. This includes locator, owner or agent thereof who will drill or has drilled the hole.

(aj) “Diversion” means a channel, embankment, device, or other man-made structure constructed for the purpose of diverting water from one area to another.

(i) “Permanent diversion” means a diversion remaining after bond release.

(ii) “Temporary diversion” means a diversion utilized during mining or reclamation operations, which must be removed and reclaimed prior to bond release.

(ak) “Dominant” means for the purpose of calculating Chapter 4 shrub restoration performance standard, the full shrub or subshrub species with the greatest relative density.

(al) “Drill site” means all areas of land that are or will be disturbed or utilized by exploration drilling. This area includes drill holes or other drilled excavations, drilling pads, and areas disturbed by mud pits, and any land over which drilling mud mixtures overflow or may disturb.

(am) “Eligible land” means all land to be affected by a mining operation after August 6, 1996 which carries the grazingland land use designation and all affected pastureland land use units which have a full shrub density greater than one full shrub per square meter. Pastureland is eligible only if the surface owner requests that the pastureland be eligible and only if the land units are included in a new permit or permit amendment application which is submitted to the Administrator after approval of this rule by the Office of Surface Mining.

(an) “Embankment” means an artificial deposit of material that is raised above the natural surface of the land and used to contain, divert, or store water, support roads or railways, or other similar purposes.

(ao) “Endangered species” means any species which is in danger of extinction throughout all or a significant portion of its range and which has been listed under the federal Endangered Species Act.

(ap) “Enhancement wetland” means a reclaimed postmining wetland which exceeds the minimum required mitigation wetlands acreage required by the Army Corps of Engineers under Section 404 of the Federal Clean Water Act.

(aq) “Ephemeral stream” means a stream which flows only in direct response to precipitation in the immediate watershed or in response to snow melt, and which has a channel bottom that is always above the prevailing water table.

(ar) “Essential hydrologic functions” means with respect to alluvial valley floors, those conditions of surface and groundwater hydrology that make water of a suitable quality and quantity usefully available for subirrigation or flood irrigation agricultural activities. These conditions may include, but are not limited to, the erosional state of the stream, the surface water balance, the groundwater balance, the physical and chemical properties of the soils, water and substrata, and topographic configuration.

(as) “Establishment practices” means practices used to facilitate actual establishment of targeted plants and are not intended to continue throughout the bond

responsibility period. These practices are acceptable practices, but delay the start of the bond responsibility period until they are discontinued.

(at) “Excess spoil” means spoil material disposed in a location other than the mined-out area, except that spoil material used to achieve the approximate original contour or to blend the mined-out area with the surrounding terrain.

(au) “Existing structure” means a structure or facility used in connection with or to facilitate coal mining and reclamation operations for which construction begins prior to the approval of a State program pursuant to Section 503 of P.L. 95-87.

(av) “Exploration area” means, for bonding purposes, one or more drill sites, comprising an integrated project conducted by a discoverer within one of the three districts presently established by the Land Quality Division of the Department of Environmental Quality.

(aw) “Exploration by drilling” means any exploration drilling for the purpose of gathering subsurface geologic, physical or chemical data to determine the location, quantity or quality of the natural mineral deposit of an area, excluding holes drilled for use as water wells.

(ax) “Farm” means, with respect to alluvial valley floors, one or more land units on which agricultural activities are conducted. A farm is generally considered to be the combination of land units with acreage and boundaries in existence prior to August 3, 1977, or, if established after August 3, 1977, with those boundaries based on enhancement of the farm's agricultural productivity and not related to surface coal mining operations.

(ay) “Flood irrigation” means, with respect to alluvial valley floors, supplying water to plants by natural overflow or the diversion of flows, so that the irrigated surface is largely covered by a sheet of water.

(az) “Forb” means any herbaceous plant species other than the members of the grass (Poaceae [Gramineae]), sedge (Cyperaceae) or rush (Juncaceae) plant families.

(ba) “Full shrub” means a perennial woody plant which differs from a tree by normally being shorter in height and by often having several stems arising near the base.

(bb) “Gel strength” means the minimum shear stress which results in permanent deformation of a gel.

(bc) “General area” means, with respect to hydrology, the topographic and groundwater basin surrounding a permit area which is of sufficient size, including areal extent and depth, to allow assessment of the impacts resulting from the mining operation

on the quality and quantity of surface water and groundwater systems in the basins, including consideration of the interaction of the impacts with adjacent mines.

(bd) “Graminoid” means a plant species of the grass (Poaceae [Gramineae]), sedge (Cyperaceae) or rush (Juncaceae) plant families.

(be) “Grass” means a plant species of the Poaceae (Gramineae) plant family.

(bf) “Grass-like” means a plant species of the sedge (Cyperaceae) or rush (Juncaceae) plant families that vegetatively resemble members of the grass family Poaceae (Gramineae).

(bg) “Grazing exclosure” means a land unit surrounded and/or covered by fencing or other materials which prevents livestock grazing in order to more accurately estimate the current year’s herbaceous production on the land unit.

(bh) “Groundwater” means subsurface water that fills available openings in rock or soil materials such that they may be considered water-saturated.

(bi) “Hazardous materials” means any material or substance which results from or is encountered in a mining operation which could reasonably be expected to cause physical harm if not controlled in an approved manner.

(bj) “Highest previous use” means a sustainable use of the land which has the greatest economic and social values to the people of the area prior to the commencement of the mining operation.

(bk) “Highwall” means the face of exposed overburden or coal in an open cut of a surface mine or entry to an underground mine.

(bl) “History of intensive agricultural use” means those lands which, if nonirrigated, have had a cultivated crop, small grains or hay crops harvested for five out of any ten year period, or if irrigated has water of sufficient quantity to sustain production of cultivated crops, small grain, or hay crops for eight out of ten years and have had a cultivated crop, small grain, or hay crop harvested for any one year.

(bm) “Husbandry practice” means, when preceded by the word “normal”, those management practices that may be used to achieve revegetation success without restarting the bond responsibility period. Normal husbandry practices are sound management techniques which are commonly practiced on native lands in the area of the mine and, if discontinued after the area is bond released, shall not reduce the probability of permanent vegetation success.

(bn) “Hydrologic balance” means the relationship between the quality and quantity of inflow to, outflow from, and storage in a hydrologic unit such as a drainage



basin, aquifer, soil zone, lake or reservoir. It encompasses the quantity and quality relationships between precipitation, runoff, evaporation, and the change in ground and surface water storage.

(bo) “Hydrologic regime” means the entire state of water movement in a given area. It is a function of the climate and includes the phenomena by which water first occurs as atmospheric water vapor, passes into a liquid or solid form and falls as precipitation, moves thence along or into the ground surface, and returns to the atmosphere as vapor by means of evaporation and transpiration.

(bp) “Imminent danger to the public” means the existence of any condition or practice, or any violation of a permit or other requirements of the Act in a coal mining and reclamation operation, which could reasonably be expected to cause substantial physical harm to persons outside the permit area before the condition, practice, or violation can be abated. A reasonable expectation of death or serious injury before abatement exists if a rational person, subjected to the same condition or practice giving rise to the peril, would avoid exposure to the danger during the time necessary for abatement.

(bq) “Important habitat” means that habitat which, in limited availability, supports or encourages a maximum diversity of wildlife species or fulfills one or more living requirements of a wildlife species. Examples of important habitat include, but are not limited to, wetlands, riparian areas, rimrocks, areas offering special shelter or protection, reproduction and nursery areas, and wintering areas.

(br) “Impoundment” means a closed basin formed naturally or artificially built which is dammed or excavated for the retention of water, slurry or other liquid or semi-liquid material. A permanent impoundment is a structure that will remain after final bond release.

(bs) “Inclusion” means, with respect to vegetation, an area no more than two acres in size, which is distinctly different from the surrounding vegetation community due to substantial, visible differences in species composition, cover, or production.

(bt) “Intermittent stream” means a stream or part of a stream that is below the local water table for some part of the year, but is not a perennial stream.

(bu) “Interseed” means a secondary seeding into established vegetation in order to improve composition, diversity or seasonality. Interseeding is done to enhance revegetation rather than to augment the revegetation that is unsuccessful in terms of germination, establishment, or permanence.

(bv) “Introduced” means a plant species that is not a component of the original flora of North America.

(bw) “Irreparable harm to the environment” means, for the purpose of W.S. § 35-11-406(o), any damage to the environment in violation of the Act or regulations, that cannot be corrected by actions of the applicant.

(bx) “Joint agency approval” means, for coal mining operations, the approval of mining or reclamation plans that would adversely affect any publicly owned park or any place included in the National Register of Historic Places by the federal, state, or local agency with jurisdiction over the park or place.

(by) “Land use” means for coal mining operations, specific uses or management-related activities, rather than the vegetation or cover of the land. Land uses may be identified in combination when joint or seasonal uses occur. Changes of land use or uses from one of the following categories to another shall be considered as a change to an alternative land use which is subject to approval by the Administrator. Land used for mine facilities in support of the operations which are adjacent to or an integral part of these operations are also included. Support facilities include, but are not limited to, parking, storage or shipping facilities.

(i) “Cropland” means land used for the production of adapted crops for harvest, alone or in a rotation with grasses and legumes, and includes row crops, small-grain crops, hay crops, nursery crops, orchard crops, and other similar specialty crops.

(ii) “Pastureland” means land used primarily for the long-term production of adapted, domesticated forage plants to be grazed by livestock or occasionally cut and cured for livestock feed. In addition, for the purpose of determining premining land use, the relative cover of introduced perennial forage species must be greater than 40% of the relative cover of total vegetation in order for the land to be pastureland. If the full shrub density is greater than one shrub per square meter on those lands and the surface owner requests the lands to be eligible, the land use is still pastureland but the land is also “eligible land” in terms of shrub reclamation.

(iii) “Grazingland” means rangelands and forest lands where the indigenous native vegetation is actively managed for grazing, browsing, and occasional hay production, and occasional use by wildlife.

(iv) “Forestry” means land used or managed for the long-term production of wood, wood fiber, or wood-derived products.

(v) “Residential” means land used for single and multiple-family housing, mobile-home parks, and other residential lodgings.

(vi) “Industrial commercial” means land used for:

(A) Extraction or transformation of materials for fabrication of

products, wholesaling of products or for long-term storage of products. This includes all heavy and light manufacturing facilities and such short-term uses as petroleum refining and oil and gas production.

(B) Retail or trade of goods or services, including hotels, motels, stores, restaurants, and other commercial establishments.

(vii) “Recreational” means land used for public or private leisure activities, including developed recreation facilities such as parks, camps, and amusement areas, as well as areas for less intensive uses such as hiking, canoeing, and other undeveloped recreational uses.

(viii) “Fish and wildlife habitat” means land dedicated wholly or partially to the production, protection or management of species of fish or wildlife.

(ix) “Developed water resources” means land used for storing water for beneficial uses such as stockponds, irrigation, fire protection, flood control, and water supply.

(x) “Undeveloped land of no current use or land management” means land that is undeveloped or, if previously developed, land that has been allowed to return naturally to an undeveloped state or has been allowed to return to forest through natural succession.

(xi) “Treated grazingland” means grazingland which has been altered to reduce or eliminate shrubs provided such treatment was applied at least five years prior to submission of the state program permit application. However, grazingland altered more than five years prior to submission of the state program permit application on which full shrubs have reestablished to a density of at least one per nine square meters does not qualify as treated grazingland.

(bz) “Lichen” means those organisms formed by the symbiotic relationship between fungal and algal species. For the purpose of estimating ground cover lichens are cryptogams.

(ca) “Life form” means the structure, form, habit, life history and physiology of an organism that display an obvious relationship to important environmental factors in its native or current habitat. For data presentation the preferred life form categories are: annual/biennial forb, annual grass, cryptogam, grass-like, native cool season perennial grass, native warm season perennial grass, introduced perennial grass, perennial forb, shrub, subshrub, succulent and tree.

(cb) “Litter” means, for the purposes of estimating ground cover, the uppermost layer of organic debris, usually considered to be the standing dead, freshly fallen or slightly decomposed vegetal material on the soil surface. Decomposing plant

material which has lost its structural integrity or which is no longer recognizable as plant tissue is not litter.

(cc) “Major species” means a plant species whose relative cover value equals or exceeds two percent as estimated by a quantitative sampling program.

(cd) “Material damage to the hydrologic balance” means a significant long-term or permanent adverse change to the hydrologic regime.

(ce) “Materially damage the quantity or quality of water” means, with respect to alluvial valley floors, changes in the quality or quantity of the water supply to any portion of an alluvial valley floor where such changes are caused by coal mining and reclamation operations and result in changes that significantly decrease the capability of the alluvial valley floor to support subirrigation or flood irrigation agricultural activities.

(cf) “Mine facilities” means those structures and areas incidental to the operation of the mine, including mine offices, processing facilities, mineral stockpiles, storage facilities, shipping, loadout and repair facilities, and utility corridors.

(cg) “Mitigation wetland” means a type of reclaimed, postmining wetland authorized and approved by the Army Corps of Engineers as replacement for jurisdictional wetlands whose disturbance was authorized by the Army Corps of Engineers under Section 404 of the Federal Clean Water Act.

(ch) “Monitor well” means a well constructed or utilized to measure static water levels or to obtain liquid, solid, or gaseous analytical samples or other physical data that would be used for controlling the operations or to indicate potential circumstances that could affect the environment.

(ci) “Monitoring” means the collection of environmental and hydrological data by either continuous or periodic sampling methods.

(cj) “Moss” means a member of the Bryophyte plant group, including liverworts and hornworts, which have a comparatively small, simple growth form and which lack true xylem and phloem tissue. For the purposes of estimating ground cover, mosses are cryptogams.

(ck) “Mulch” means plant residue or other suitable materials placed upon the soil surface to aid in soil stabilization and soil moisture conservation.

(cl) “Native” means a plant species which is a component of the original flora of North America.

(cm) “Noxious weed” means an undesirable, troublesome, aggressive or difficult to control plant species whose seeds are severely limited in or totally excluded

from commercial seed sales. The Wyoming Department of Agriculture exclusively makes the noxious weed designation, which includes both “designated” and “prohibited” noxious weeds, under the Wyoming Weed and Pest Control Act. This definition does not include “declared weeds” published by individual Wyoming counties.

(cn) "Outslope" means the face of the spoil or embankment sloping downward from the highest elevation to the toe.

(co) “Perennial” means a plant which takes at least three years to complete its life cycle and usually persists after flowering and producing seed.

(cp) “Perennial stream” means a stream or part of a stream that flows continuously during all of the calendar year as a result of groundwater discharge or surface runoff.

(cq) “Permit area” means the area of land and water within the boundaries of the approved permit or permits during the entire life of the operation and includes all affected lands and water.

(cr) “Permit transfer” means a change in ownership or control over the right to conduct mining operations under a permit or license to mine.

(cs) “Plant species inventory” means a list of plant species, organized by life form and scientific binomial, obtained by conducting a field reconnaissance of a specific land unit.

(ct) “Plotless Sampling” means estimation of vegetation without the use of two-dimensional areal reference units.

(cu) “Point intercept” means a cover estimation method based upon the vertical projection of a point through the vegetation. The point may be an ocular sighting device, a sharpened rod or a series of sharpened rods on a point frame or a handheld sharpened rod. The ocular sighting devices may be either crosshairs or a laser source and shall be mounted on a frame which ensures that each estimation point is projected from above the canopy (maximum of one meter) to the ground surface without bias. Each pin shall be a rod with a sufficiently small or sharpened point which ensures unbiased visual determination of each object intercepted by the pin’s vertical movement from above the canopy to the ground surface. Under the point intercept method, absolute cover at each sample point is determined as follows:

$$\% \text{ absolute cover of } A = \frac{\text{number of hits on } A}{\text{total number of hits}} \times 100$$

(cv) “Potentiometric surface” means the surface that coincides with the static level of water in an aquifer. The surface is represented by the levels to which water from

a given aquifer will rise under its full head.

(cw) “Precipitation event” means a quantity of water resulting from drizzle, rain, snow, sleet, or hail in a limited period of time. It may be expressed in terms of recurrence interval and duration.

(cx) “Primary shrub species” means, in relation to the shrub standard Option IV, each full shrub and each subshrub species which has a relative density equal to or greater than 0.1 (10 percent). Furthermore, under Option IV, the relative density of fringed sagewort (*Artemisia frigida*) must be equal to or exceed 0.2 (20 percent) of the relative density to qualify as a primary shrub species. Under shrub stand Options I, II, and III, a primary shrub species means each full shrub species which has a relative density equal to or greater than 0.1 (10 percent).

(cy) “Principal shareholder” means any person who is the owner of record of ten percent or more of any class of voting stock.

(cz) “Probable hydrologic consequences” means the projected impacts or changes to the hydrologic regime caused by the proposed coal mining and reclamation operation including the effects of adjacent mining operations.

(da) “Production” means an estimate of the total quantity of herbaceous matter produced within a growing season. The estimate includes all plant parts which remain attached to the current growing season plant and includes only above ground herbaceous material.

(db) “Property to be mined” means, for coal mining operations, both the surface estates and mineral estates within the area covered under the term of the permit and the area covered by underground workings.

(dc) “Public building” means any structure that is owned or leased, and principally used by a governmental agency for business or meetings.

(dd) “Public Parks” means an area designated by a federal, state or local agency for public recreational use.

(de) “Public road” means a road:

(i) Which has been designated as a public road pursuant to the laws of the jurisdiction in which it is located;

(ii) Which is maintained with public funds in a manner similar to other public roads of the same classification within the jurisdiction;

(iii) For which there is substantial (more than incidental) public use;

and

(iv) Which meets road construction standards for other public roads of the same classification in the local jurisdiction.

(df) “Quadrat” means a two-dimensional, rectangular, square or circular unit which is superimposed on the ground surface for the purpose of estimating cover or production. The quadrat shall be sized appropriately for the sampled vegetation community and shall be at least one half square meter but no larger than one square meter.

(dg) “Qualitative” means, in the context of a vegetation sampling program and/or evaluation of sampling data, that the program and/or evaluation process are conducted using non-numerical information derived from defined sources and/or defined field reconnaissance regimes.

(dh) “Quantitative” means, in the context of a vegetation sampling program and/or evaluation of sampling data, that the program and/or evaluation processes are conducted using statistical analyses of numerical data derived from defined sampling regimes.

(di) “Random” means every point or location in an area has an equal chance of being chosen for sampling as any other point in that area.

(dj) “Recharge capacity” means the ability of the soils and underlying materials to allow precipitation and runoff to infiltrate and reach the zone of saturation.

(dk) “Reclaimed land surface” means affected land which has been backfilled, graded, contoured, and revegetated in accordance with an approved reclamation plan.

(dl) “Reference area” means a land unit established to evaluate revegetation success. A “Reference area” is representative of a vegetation community or communities that will be affected by mining activities, in terms of physiography, soils, vegetation and land use history. The “Reference area” and its corresponding postmine vegetation community (or communities) must be approved by LQD and shall be defined in the approved Reclamation Plan. All “Reference areas” shall be managed to not cause significant changes in the vegetation parameters which will be used to evaluate Chapter 4 revegetation success performance standards. A “Reference area” can be a “Comparison area”, “Control area”, “Extended reference area”, or “Limited reference area”, depending on how it is established and used, in accordance with the following provisions:

(i) “Comparison area” means a type of “Reference area” that is established after a vegetation community has been affected. A qualitative determination shall be used to evaluate if the proposed “Comparison area” adequately represents the affected vegetation community. A “Comparison area” may be used when other types of

“Reference areas” are not available for measuring revegetation success or when other types of “Reference areas” will not be representative of revegetation success. “Comparison areas” shall be approved by the Administrator prior to their establishment. When evaluating Chapter 4 revegetation success performance standards, data from the “Comparison areas” are directly compared by statistical procedures to data from the reclaimed area.

(ii) “Control area” means a type of “Reference area” that is established during baseline sampling. Quantitative comparisons of vegetation cover, total ground cover, and production between the proposed “Control area” and the vegetation community to be affected are used to demonstrate the representative nature of the “Control area”. When evaluating revegetation success, baseline data are climatically adjusted using equations. These adjusted data are directly compared by statistical procedures to vegetation data from the reclaimed area. The Administrator may determine to make a direct comparison without the climatic adjustment between the “Control area” and the reclaimed area. Each “Control area” shall be at least two acres.

(iii) “Extended reference area” means a type of a “Reference area” that includes a major portion of one or more premine vegetation communities within the permit area. During baseline sampling, the “Extended reference area” includes areas proposed to be affected and areas that will be unaffected. Postmine, the unaffected areas constitute the “Reference area” for revegetation success evaluation. “Extended reference areas” should be established during baseline sampling, but in some circumstances, may be established after mining begins. The representative nature of the vegetation community within the “Extended reference area” is demonstrated by vegetation community mapping procedures, sampling data, soil data, physiography and land use history. To evaluate revegetation success, data from the “Extended reference area” are directly compared by the statistical procedures to data from the reclaimed area. Each “Extended reference area” will be as large as possible.

(iv) “Limited reference area” is one type of a “Reference area” that is established during baseline sampling to represent one vegetation community to be reestablished. The representative nature of the “Limited reference area” is determined by quantitative comparisons of vegetation cover, and production between the “Limited reference area” and proposed affected areas at the 90 percent confidence level. To evaluate revegetation success, data from the “Limited reference area” are directly compared by statistical procedures to data from the reclaimed area. Each “Limited reference area” shall be at least five acres.

(dm) “Regulatory categories” means the following time frames that encompass the major regulatory periods from which the different performance standards and reclamation standards for specified lands within the permit area are established:

(i) “Category 1” means those lands which were affected to conduct and/or support mining operations and were completed or substantially completed prior to



May 24, 1969 (the implementation date of the Open Cut Land Reclamation Act).

(ii) “Category 2” means those lands which were affected on or after May 24, 1969 (the implementation date of the Open Cut Land Reclamation Act) in order to conduct and/or support mining operations and were completed or substantially completed prior to or on June 30, 1973 (day prior to the effective date of the Wyoming Environmental Quality Act).

(iii) “Category 3” means those affected lands and support facilities if those lands supported operations which were not completed or substantially completed prior to July 1, 1973 (the effective date of the Wyoming Environmental Quality Act) and any affected lands or support facilities taken out of use on or after July 1, 1973 and before May 25, 1975 (the effective date of the Division’s 1975 Rules and Regulations).

(iv) “Category 4” means those affected lands if coal was removed from those land prior to May 3, 1978 and which do not qualify for any of the previous categories. It also means those affected lands and support facilities if they were taken out of use on or after May 25, 1975 (the effective date of the Division’s 1975 Rules and Regulations) and before May 3, 1978 (the effective date of the Office of Surface Mining’s (OSM) Initial Regulatory Program).

(v) “Category 5” means those affected lands and support facilities if coal was not removed from those lands prior to May 3, 1978 (the effective date of OSM’s Initial Regulatory Program) or those lands were used on or after May 3, 1978 to facilitate mining (including support facilities and associated lands constructed before May 3, 1978 but still in use on or after May 3, 1978.)

(dn) “Revised mining or reclamation operations” means mining and/or reclamation operations conducted during the term of a permit which differ from those operations described in the original mine permit application and approved under the original permit.

(do) “Road(s)” means a surface corridor of affected land associated with travel by land vehicles used in coal mining and reclamation operations or coal exploration. A road consists of the roadbed, shoulders, parking and side areas, approaches, structures, ditches, and surface. The term includes access and haulroads constructed, used, reconstructed, improved, or maintained for use in coal mining and reclamation operations or coal exploration, including use by coal hauling vehicles to and from transfer, processing, or storage areas. The term does not include ramps and routes of travel within the immediate mining area or within spoil or coal mine waste disposal areas. Immediate mining area refers to areas subject to frequent surface changes. This includes areas where topsoil and overburden are being moved and areas undergoing active reclamation.

(dp) “Rock” means, for the purposes of estimating ground cover, mineral or rock fragments which are one square centimeter in size or larger and occur on or in the

soil. A synonym is coarse fragments.

(dq) “Rough Backfilling” means replacement of sufficient material in the pit or pits including special disposal practices for toxic and acid-forming materials, special handling and placement of materials for stream reconstruction or alluvial valley floors, and compaction as required so as to render the affected area in a condition whereby the reclaimed land surface generally resembles the approved postmining contours.

(dr) “Safety factor” means the ratio of the available shear strength to the developed shear stress on a potential surface of sliding determined by accepted engineering practice.

(ds) “Sample unit” means for the purposes of verifying certain Chapter 4 performance standards and applying for Chapter 15 incremental bond release, a permanently reclaimed land unit established by mutual agreement between the permittee and the Administrator. The unit constitutes the fundamental unit for revegetation success verification. The unit may contain portions of one or more vegetation communities.

(dt) “Seasonal variety” means the characteristic or normal season of growth of a plant species where season of growth is described as cool-season or warm-season.

(du) “Sedimentation pond” means a sediment control structure designed, constructed, and maintained to slow down or impound precipitation runoff to reduce sediment concentrations in a point source discharge, including dams or excavated depressions. The term does not include straw dikes, riprap, check dams, mulches, collection ditches, toe ditches, vegetative buffers, gabions, contour furrows and other traditional soil conservation techniques and non-point source runoff controls.

(dv) “Self-renewing” means a plant species which has a demonstrated capacity to germinate, establish, grow, flower and produce viable seed and/or mature and produce vegetative reproductive structures under the climatic regime which prevails on the reclaimed lands.

(dw) “Semi-quantitative” means, in the context of a vegetation sampling program and/or evaluation of sampling data that the program and/or evaluation process is/are conducted using a non-statistical assessment of numerical data derived from a defined field reconnaissance regime.

(dx) “Shrub” means a perennial plant with persistent, woody stems and which produces several basal shoots instead of a single main stem. Shrubs have a relatively low growth form and differ from trees by their low stature and lack of arborescent form. A synonym is full shrub.

(dy) “Shrub mosaic” means a pattern of shrub patches. The boundary of a mosaic unit encompasses the areal extent of the individual shrub patches and the

reclaimed community occupying the land among the shrub patches.

(dz) “Shrub patch” means a mapable concentration of postmining shrubs which is at least 0.05 acres in extent and which intends to fulfill the shrub density and shrub composition required by Chapter 4 shrub restoration performance standard.

(ea) “Significant, imminent environmental harm to land, air or water resources” means:

(i) An environmental harm is an adverse impact on land, air, or water resources which resources include, but are not limited to, plant and animal life.

(ii) An environmental harm is imminent, if a condition, practice, or violation exists which:

(A) Is causing such harm; or

(B) May reasonably be expected to cause such harm at any time before the end of the reasonable abatement time.

(iii) An environmental harm is significant if the harm is appreciable, not contemplated in the approved permit application, and not immediately repairable.

(eb) “Soil Horizons” means contrasting layers of soil material approximately parallel to the land surface and differing from adjacent layers in physical, chemical and biological properties or characteristics.

(i) “A Horizon” means the uppermost mineral or organic layer, often referred to as the surface soil. It is the part of the soil in which organic matter is most abundant and leaching of soluble or suspended particles is typically the greatest.

(ii) “E Horizon” means the layer commonly near the surface below the A Horizon and above the B Horizon. An E Horizon is the most commonly differentiated from an overlying A Horizon by lighter color and generally, has measurably less organic matter, and from the underlying B Horizon in the same sequum by color of higher value or lower chroma, by coarser texture, or by a combination of these properties.

(iii) “B Horizon” means the layer that typically is immediately beneath the E Horizon and often called the subsoil. This middle layer commonly contains more clay, iron, and aluminum than the A, E or C Horizons.

(iv) “C Horizon” means the deepest layer of soil profile. It consists of loose material or weathered rock that is relatively unaffected by biological activity, and is often called the subsoil.

(ec) “Soil survey” means a field and other investigation which results in a map showing the geographic distribution of different kinds of soils based on taxonomic characteristics and includes a report that describes, classifies and interprets such soils for use in reclamation.

(ed) “Species composition” means number, kinds and amount of species.

(ee) “Species diversity” means number of species per unit area.

(ef) “Species lacking creditable value” means the cover and production of these species will be estimated but will not be credited or counted towards meeting the revegetation success standards for cover, production or species diversity and composition. Species lacking creditable value include noxious weeds listed under the Wyoming Weed and Pest Control Act, *Bromus japonicus*, *Bromus tectorum*, *Taeniatherum caput-medusae*, *Halogeton glomeratus*, *Kochia scoparia* and *Salsola tragus* and all synonyms for these species as listed in the Natural Resources Conservation Service’s Plants Database.

(eg) “Species of Special Concern” means those plant species required to be surveyed by the U.S. Fish and Wildlife Service, U.S. Forest Service, and Bureau of Land Management.

(eh) “Spoil” means overburden removed during the mining operation to expose the mineral and does not include the marketable mineral, subsoil or topsoil.

(ei) “Stabilize” means to control movement of spoil, spoil piles, or areas of disturbed earth by modifying the geometry of the mass, adding control structures, or by otherwise modifying physical or chemical properties.

(ej) “Stagnant water” means naturally or artificially impounded water which, because of its poor quality or shallow depth, is unusable for livestock or wildlife watering, wildlife habitat, or recreational uses.

(ek) “Steep slope” means any slope of more than 20 degrees or such lesser slope as may be designated by the Administrator after consideration of soil, climate, and other characteristics of the area.

(el) “Study area” means the land surface area which was mapped and quantitatively sampled during the baseline vegetation inventory. The study area generally coincides with the permit area (or amendment area) but may exceed those boundaries with prior approval from the Administrator.

(em) “Subirrigation” means, with respect to alluvial valley floors, the supplying of water to plants from underneath or from a semi-saturated or saturated subsurface zone where water is available for use by vegetation.

(en) “Subirrigation or flood irrigation agricultural activities” means the past and present use of any tract of land for the successful production of animal or vegetable life, based on regional agricultural practices, where the use is enhanced or facilitated by subirrigation or flood irrigation. These uses include, but are not limited to, the pasturing, grazing, and the cropping, cultivation, or harvesting of agriculturally useful plants whose production is enhanced or facilitated by the availability of water from subirrigation or flood irrigation. These uses do not include agricultural practices which do not benefit from the availability of water from subirrigation or flood irrigation.

(eo) “Subshrub” means a perennial plant with a persistent, woody base and which produces several basal shoots or stems. The upper stems die back at the end of each growing season. Half-shrub is a synonym.

(ep) “Subsidence” means the measurable lowering of a portion of the earth's surface or substrata.

(eq) “Subsoil” means the B and C Horizons excluding consolidated bedrock material.

(er) “Substantially affect” means to conduct activity which, in the determination of the Administrator will significantly impact land, air or water resources so as to disturb the natural land surface.

(es) “Substantially complete” means, for the purposes of determining the appropriate regulatory category of affected lands, the overburden was removed above the coal and some recoverable tons were removed from those lands.

(et) “Substantially disturb” means, for purposes of coal exploration, to significantly impact land or water resources by blasting; by destruction of the vegetative cover or removal of topsoil, subsoil or overburden; by drilling coal exploratory holes; by digging pits; by construction of roads or other access routes; by placement of excavated earthen or waste material on the natural land surface or by other such activities; or to remove more than 250 tons of coal.

(eu) “Succulent” means a plant species with one or more of its morphological parts exhibiting fleshy or juicy characteristics.

(ev) “Surface water” means water, either flowing or standing, on the surface of the earth.

(ew) “Suspended solids” means organic or inorganic material carried or held in suspension in water which are retained by a standard glass fiber filter in the procedure outlined by Environmental Protection Agency's regulations for waste water analyses (40 CFR 136).

(ex) “Systematic sampling” means a sampling design where sample locations are selected using uniform spatial pattern, such as a grid, that covers the entire sample population area, and where all locations are sampled. The first sample point is randomly selected, and the locations of all other sample points are determined by the initial location. Calculations for systematic sampling may be done by assuming the sample is random.

(ey) “Technical revegetation success standard” means a set of quantitative data which are representative of the absolute cover of total vegetation and annual herbaceous production of one or more premining vegetation communities affected by the mining operation. Each technical standard shall be assembled from quantitative data collected from vegetation communities within a permit area and/or from adjacent lands and shall be based upon a minimum of five independent sampling programs executed over a minimum of five years. The Administrator shall approve the specific data sets and the quantitative treatment of the data sets used to establish each technical standard.

(ez) “Threatened species” means any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range and which has been listed under the Federal Endangered Species Act.

(fa) “Topsoil” means the A and E Horizons or any combination thereof.

(fb) “Toxic materials” means earthen materials or refuse which, if acted upon by air, water, weather, or microbiological processes, are likely to produce chemical or physical conditions in soils or water that are detrimental to biota or would restrict the common uses of water.

(fc) “Toxic mine drainage” means water that is discharged from active or abandoned mines and other areas affected by coal mining operations and which contains a substance which through chemical action or physical effects is likely to kill, injure, or impair biota commonly present in the area that might be exposed to it.

(fd) “Trade secret” means, for purposes of coal mining or exploration operations:

(i) Information pertaining to the analyses of the chemical and physical properties of the coal (excepting information regarding such mineral or elemental content which is potentially toxic in the environment) may be kept confidential in accordance with W.S. § 35-11-1101(a);

(ii) Information pertaining to the coal seam itself, except as to any person who demonstrates to the satisfaction of the Director an interest which is or may be adversely affected by the decision to hold such information confidential; and

(iii) Information relating to coal exploration operations which concerns privileged commercial or financial information relating to the competitive rights of the person intending to conduct the coal exploration operations.

(fe) “Transect” means a sampling method which involves the establishment of a long, continuous line or strip. The starting point and orientation of the line should be randomly established.

(ff) “Tree” means a woody, perennial plant which usually has a single trunk or stem and a defined crown shape and which has the potential to reach a mature height of at least four meters in optimal conditions.

(fg) “Unconsolidated streamlaid deposits” means earthen material transported and deposited within a body of water flowing downslope along a definite path. Flood plains and terraces located in the lower portions of topographic valleys are generally composed of unconsolidated streamlaid deposits.

(fh) “Underground development waste” means earthen materials excavated, moved, and disposed of from underground workings in connection with mining activities.

(fi) “Underground mining activities” means a combination of:

(i) Underground operations necessary for the extraction of solid minerals by man-made excavations underneath the surface of the earth; and

(ii) For the extraction of coal, surface operations incident to the underground operation such as construction, use, maintenance, and reclamation of roads, surface repair shops, storage areas, etc., and areas on which materials incident to underground operations are placed.

(fj) “Undeveloped rangeland” means unimproved land, the use of which is generally limited to grazing of livestock. Undeveloped rangeland does not include areas within the alluvial valley floor where cultivated crops, small grains, and hay crops have been successfully grown, the land has been improved by the introduction of certain vegetation for enhanced agricultural utility, or native vegetation on the alluvial valley floor contributes substantially to the carrying capacity of a specifically controlled or managed grazing unit.

(fk) “Upland areas” means those geomorphic features located outside the area of unconsolidated streamlaid deposits and may include isolated higher terraces, alluvial fans, pediment surfaces, landslide deposits, and surfaces covered with residuum, mud flows or debris flows, as well as highland areas underlain by bedrock and covered by residual weathered material or debris deposited by sheetwash, rillwash, or windblown material.

(fl) “Valid existing rights” means:

(i) Except for haul roads, that a person possesses valid existing rights on August 3, 1977, if the application of any of the prohibitions contained in Chapter 12, Section 1(a)(v) to the property interest that existed on that date would effect a taking of the person's property which would entitle the person to just compensation under the fifth and fourteenth amendments to the United States Constitution;

(ii) For haul roads, valid existing rights means:

(A) A recorded right-of-way, recorded easement or a permit for a coal haul road recorded as of August 3, 1977, or

(B) Any other road in existence as of August 3, 1977.

(iii) A person possesses valid existing rights if the person proposing to conduct coal mining operations can demonstrate that the coal is both needed for, and immediately adjacent to, an ongoing coal mining operation which existed on August 3, 1977. A determination that coal is "needed for" will be based on a finding that the extension of mining is essential to make the coal mining operation as a whole economically viable;

(iv) Where an area comes under the protection of Chapter 12, Section 1(a)(v) after August 3, 1977, valid existing rights shall be found if:

(A) On the date the protection comes into existence, a validly authorized coal mining operation exists on that area; or

(B) The prohibition, if applied to the property interest that exists on the date the protection comes into existence would effect a taking of the person's property which would entitle the person to just compensation under the fifth and fourteenth amendments to the United States Constitution.

(v) Interpretation of the terms of the document relied upon to establish valid existing rights shall be based either upon applicable Wyoming case law concerning interpretation of documents conveying mineral rights or, where no applicable case law exists, upon the usage and custom at the time and place where it came into existence.

(fm) “Vegetation community” means a recognizable group of species growing together.

(fn) “Warm season” means a plant, which makes most or all its growth during the spring, summer, or fall and is usually dormant during the winter. Warm season plants usually exhibit the C-4 photosynthetic pathway.



(fo) “Water table” means the upper surface of a zone of saturation, where the body of groundwater is not confined by an overlying impermeable zone.

### Section 3. **Applicability.**

(a) All mining operations or operations by which solid minerals are intended to be extracted from the earth, which are commenced or conducted after the effective date of these rules and regulations, shall comply with the requirements hereof, except as specific exemptions are allowed by the Act.

(b) The discretionary exemptions shall be limited as follows:

(i) W.S. § 35-11-401(g), (h) and (j) shall not apply to coal mining operations.

(ii) In order to qualify for the exemption provided for in W.S. § 35-11-401(e)(ii), approval must be obtained from the Administrator for the extraction of any coal after a finding that:

(A) The extraction is necessary to enable the construction to be accomplished and occurs within the right-of-way or boundary of the area directly affected by the construction;

(B) The construction is funded 50 percent or more by funds appropriated or obtained from a government financing agency's budget or general revenue bonds; and

(C) The person agrees to possess on-site documents which show a description of the project, its exact location, and information showing the source, kind and amount of public financing, including the percentage of the entire construction costs represented by the government financing.

(c) If any provision of these regulations or the applicability thereof to any person or circumstances related to coal mining operations is held invalid, the provision or its applicability to other mining operations or circumstances shall not be affected thereby.

DEPARTMENT OF ENVIRONMENTAL QUALITY

LAND QUALITY DIVISION

CHAPTER 2

PERMIT APPLICATION REQUIREMENTS

Section 1. **General Requirements.**

(a) All applications shall be filed in a format required by the Administrator and shall include, at a minimum, all information required by the Act and, for coal mining operations, all the applicable information required under Sections 2 through 5 of this Chapter.

(b) Information set forth in the application shall be current, presented clearly and concisely, and supported or authenticated, when appropriate, by references to technical material, persons, or public or private organizations which were used, consulted, or were responsible for collecting and analyzing the data.

(c) Maps submitted with the application shall be, or be the equivalent of a U.S. Geological Survey topographic map at a scale determined by the Administrator. All maps shall contain a title relative to the subject matter of the map, a map number, legend, and show the limits of the permit area. The maps shall distinguish among the following phases of the operation:

- (i) Prior to August 3, 1977;
- (ii) After August 3, 1977 and prior to May 3, 1978;
- (iii) After May 3, 1978 and prior to approval of the State Program;
- (iv) After the estimated date of issuance of the permit; and
- (v) The five regulatory periods as defined in Chapter 1, Section 2(dm).

(d) Applicants may reference materials. If used in the application, referenced materials shall either be provided to the Division or be readily available to the Division. Relevant portions of referenced materials shall be presented briefly and concisely in the application by photocopying or abstracting and with explicit citations.

(e) The applicant may consult with the local conservation district during preparation of the reclamation plan for conformance with technical standards.

## Section 2. **Adjudication Requirements.**

(a) In addition to that information required by W.S. § 35-11-406(a), each application for a coal mining permit shall contain:

(i) A complete identification of interests, which shall include:

(A) All owners of record of the property to be mined including legal and equitable owners, holders of record of any leasehold interest, and any purchaser of record under a real estate contract for the property to be mined;

(B) The names, addresses and telephone numbers of any operators, if different from the applicant. If the applicant is a business entity other than a single proprietorship, then the names, addresses and telephone numbers of all limited and general partners, or if a corporation then the names, addresses and telephone numbers of principal shareholder, officers and director or other person performing a function similar to a director, and resident agent(s) of the applicant. This shall also include the names under which the applicant, partner or principal shareholder operates or previously operated a coal mining operation in the United States within the five years preceding the date of application;

(C) A statement and identification of any pending, current or previous coal mining permit in the United States held by the applicant, partner or principal shareholder during the five years preceding the date of the application. This shall also identify the regulatory authority with jurisdiction over the operation;

(D) A statement of all lands, interests in lands, options, or pending bids on interests held or made by the applicant for lands which are contiguous to the proposed permit area; and

(E) Legal ownership - if the operator includes roads or spur lines within the permit area but does not possess the mineral rights or the right-to-mine for these lands, the legal land description shall then be listed in the application as a separate subsection in Appendix "C". The heading of the subsection shall make it clear that the right-to-mine is not claimed on the described lands. Surface owners shall be listed for all lands crossed by spur lines and roads.

(ii) A complete statement of compliance which shall include:

(A) A brief statement, including identification and current status of the interest, identification of the regulatory authority, and description of any proceedings and their current status, of whether the applicant or entities controlled by or under common control with the applicant has:

(I) Had any Federal or State coal mining permit

suspended or revoked in the five years preceding the date of application; or

(II) Forfeited a Federal or State coal mining performance bond or similar security deposited in lieu of bond.

(B) The listing of notices of violation required by W. S. § 35-11-406(a)(xiv) shall describe or identify the violation, when it occurred, any abatement action taken, the issuing regulatory authority, and any proceedings initiated concerning the violation. This listing shall include only notices issued to the applicant and any subsidiaries, affiliates, or persons controlled by or under common control with the applicant.

(iii) The right of entry statements and documents required by W.S. § 35-11-406(a)(ii) and (b)(xi) shall clearly explain and support the legal rights claimed by the applicant and shall also include whether that right is the subject of pending litigation;

(iv) A statement on whether the proposed area to be mined during the term of the permit is within an area designated unsuitable for coal mining operations pursuant to W.S. § 35-11-425, under study for any designation, or within an area where mining is prohibited pursuant to Chapter 12, Section 1(a)(v), Land Quality Rules and Regulations. This shall also include the basis on which the applicant claims any available exemption so as to obtain the permit to mine;

(v) A list identifying the Mine Safety and Health Administration identification number for all mine facilities that require MSHA approval and licenses, permits or approvals needed by the applicant to conduct the proposed operation, whether and when they have been issued, the issuing authority, and the steps to be taken to comply with the requirements. To the extent possible, the Administrator and Director shall advise, consult and cooperate with the identified authorities so as to provide for the coordination of review and issuance of these licenses, permits or approvals with the permit to mine. This list shall contain:

(A) Copies or identifying numbers of all permits obtained from the State Engineer or from any other division of the Department, including Solid Waste Management, together with the following:

(I) Water Quality Information. The information from the application for the approved Water Quality permit which affirmatively demonstrates:

(1.) There is a detailed plan, with appropriate maps and cross-sections, for the construction and operation of any mine facility capable of causing or contributing to pollution of surface and groundwater. The plan shall be in accordance with Chapters III and XI, and as applicable Chapter X, of the Water Quality Division Rules and Regulations. As applicable, any plans shall include a copy of the NPDES permit granted by the Water Quality Division and quantitative limits on

pollutants in discharges of water from all point sources.

(2.) There is a plan for the collection, recording, and reporting of groundwater quality and surface water quality according to Chapter II, Section 12, Water Quality Rules and Regulations. This plan shall, at a minimum, be adequate to measure accurately and record water quantity and quality of the discharges from the permit area in order to plan for modification of mining activities, if necessary, to minimize adverse effects on the water of the State.

(II) Solid Waste Information. The information from the application for the approved permit(s) for any Solid Waste Management Facility(ies) located within the proposed permit area. Note that a Solid Waste Management Facility, as defined by W.S. § 35-11-103(d)(ii), is a facility that receives solid waste which is generated outside the proposed permit area by any activity other than a mine mouth power plant or mine mouth coal drier. Solid Waste Management Facilities are subject to the permitting, bonding and performance standards of Article 5 of the Environmental Quality Act.

(III) State Engineer Information. The information from the application for the approved permit to construct a reservoir to store or impound water which affirmatively demonstrates that the reservoirs will be constructed and maintained in accordance with the requirements set out in Chapter V, Section 8, State Engineer Rules and Regulations. In addition, if the application includes a proposed transfer of a well for use as a water well, the application shall contain information from the approved application for a permit to appropriate groundwater which affirmatively demonstrates a plan for construction, completion and removal of wells in accordance with requirements which are at least as stringent as those governing wells drilled in conjunction with coal mining or exploration operations.

(B) For any permits or approvals which have not been obtained, the information required by (A) above which has been or will be submitted to the agencies involved, including a description of the steps to be taken to comply with the relevant requirements.

### **Section 3 Vegetation Baseline Requirements.**

(a) The plan for a baseline vegetation study to establish baseline conditions shall be submitted to the Administrator prior to the field sampling season for review and approval, prior to implementation, unless otherwise approved by the Administrator.

(b) If baseline information was previously collected in the area for a different permit or project, then the Administrator may require resampling. The Administrator's determination as to whether resampling is required, and to what extent, will be based upon:

- (i) Differences in scope between the permits or project;
- (ii) Differences in existing and historic conditions;
- (iii) Improvements in sample collection techniques;
- (iv) The elapsed time since the last evaluation of the presence of threatened and endangered species; or
- (v) Concerns with sampling methodology.

(c) The applicant shall map the vegetation communities within the permit area and adjacent area and shall sample and describe the characteristics of vegetation communities within the permit area, to include:

(i) The map shall show the vegetation communities in the permit and adjacent lands. Communities that are 2 acres and larger shall be mapped. Inclusions within larger communities do not need to be mapped as separate vegetation communities. The applicant may use the terminology used by the NRCS in naming vegetation communities;

(ii) The map shall be of a scale approved by the Administrator and use an aerial mosaic or USGS topographic , or equivalent, map as a base;

(iii) The vegetation community map shall identify:

(A) Sample locations for cover and shrub density;

(B) Reference Areas unless a technical success standard is proposed for evaluation of revegetation;

(C) Areas to be affected by mining and associated activities:

(D) The locations and orientations of all photographs provided with the descriptions of the vegetation communities and Reference Areas, as required in Chapter 2, Section 3(j);

(E) The general location of trees;

(F) The location and extent of designated and/or prohibited noxious weeds per Chapter 2, Section 3(l); and

(G) Extent of existing disturbance.

(iv) The vegetation communities in the study area may be mapped any

time the ground is clear of snow, but must be field checked and verified prior to the sampling.

(d) Percent cover, by vegetation community, shall be estimated using either:

(i) Quantitative methods, as approved by the Administrator, when the applicant intends to develop a technical standard or when the Administrator determines the study area is in a location that baseline vegetation has not been adequately described.

(ii) With approval of the Administrator, semi-quantitative methods as outlined below shall be used when the applicant does not intend to use a technical standard or those areas where the Administrator determines there is sufficient quantitative vegetation baseline in the general areas.

(A) The quadrat or point intercept method shall be used except there is not a sample adequacy requirement. The number of samples per vegetation community and reference area shall be:

<u>Vegetation Community size</u>	<u>No. of samples</u>
0 to 5 acres	3
>5 to 50 acres	5
>50 acres	10

(e) If the applicant intends to propose a technical success standard, annual herbaceous production, by community, shall be estimated using quantitative methods. Annual herbaceous production shall also be quantitatively estimated when the Administrator determines that previously collected baseline vegetation data inadequately describes the proposed permit area. If semi-quantitative methods are approved for baseline, no production for baseline is necessary.

(f) A “Reference area”, as defined in Chapter 1, Section 2(dl), shall be established for each vegetation community which will be disturbed unless a technical success standard is proposed for evaluation of revegetation.

(g) Shrub density sampling shall use the quantitative methods as approved by the Administrator unless the applicant commits to the maximum shrub reestablishment performance standard of one full shrub per square meter within shrub patches distributed over 20 percent of the eligible land for Option II. If the applicant accepts this maximum shrub reestablishment performance standard, the applicant shall use the following provisions to complete the calculations in Appendix 4A, Tables 1 and 2.

(i) For Option II, the full shrub with the highest baseline relative cover value across all premining vegetation communities shall be listed as the dominant premine full shrub species and the target postmine species. No calculations for Appendix 4A, Table 1 or Table 2, shall be performed. In Table 2, the Density of the Dominant

Postmining (Full) Shrub shall be 0.5 per square meter, and the Density of Residual (Full) Shrubs shall be 0.25 per square meter and the Density of Approved Subshrubs shall be 0.25 per square meter.

(h) If trees are present within the proposed permit area, then the description shall include the number, general distribution, and species.

(i) The applicant shall compile an inventory, by vegetation community, of all plants species observed within the study area and corresponding Reference Areas, in accordance with the following requirements:

(i) The plant species shall be listed:

(A) By life forms as described in Chapter 1, Section 2(ca).

(B) By scientific binomial (with reference to the botanic key used);

(C) By common name; and

(D) Identified as a native (native to North America) or introduced species.

(ii) The plant inventory shall be field checked and updated at least three times from April through September during the baseline sampling year to capture the phenological expression of species that do not express themselves every month. The plant inventory shall not be compared to any qualitative, semi-quantitative or quantitative criteria.

(iii) The plant inventory shall note the names and field locations of:

(A) Any herbarium samples collected;

(B) Any Designated Noxious Weeds or Prohibited Noxious Weeds defined by the State of Wyoming;

(C) Any plant species or habitat of special concern at the time of sampling; and

(D) Any species not previously recorded in Wyoming or outside its known range.

(j) Each baseline vegetation study shall present descriptions of the vegetation communities and, unless a technical success standard is proposed for evaluation of revegetation, present descriptions of the Reference Areas/Unit. The descriptions shall



include:

- (i) The general vegetation composition;
  - (ii) The major species in each life form;
  - (iii) The characteristic topography, including overall slope and aspect;
  - (iv) The characteristic soil types;
  - (v) The number, sizes, and types of inclusions;
  - (vi) The degree of interspersion between communities;
  - (vii) A summary of the quantitative, semi-quantitative, and qualitative vegetation information for each community;
  - (viii) The presence of Designated Noxious Weeds or Prohibited Noxious Weeds identified in Chapter 2, Section 3(k), the description shall include information on the present and historical weed treatment; and
- (iv) A three-inch by five-inch (or larger) color photograph, color copy or digital photograph panorama, showing the general features of each “Vegetation community” and “Reference area”.
- (k) Each baseline vegetation study shall include documentation of the presence or absence of Designated Noxious Weeds or Prohibited Noxious Weeds as defined by the State of Wyoming, Department of Agriculture.
- (i) If any Designated Noxious Weeds or Prohibited Noxious Weeds are present within the proposed permit area, the description shall include a list of their names, either common or scientific, and a visual estimate of their relative cover.
  - (ii) If any Designated Noxious Weeds or Prohibited Noxious Weeds are estimated to comprise more than 25% of the relative vegetation cover on two or more contiguous acres, that acreage shall be identified on the vegetation community map.
- (l) If any State or Federally listed endangered or threatened plant species are known to exist within the permit area or in adjacent areas, their location shall be described and an evaluation provided on potential habitats within the permit area and in adjacent areas.
- (m) Cropland, either as a vegetation community and/or a land use category, is exempt from Chapter 2, Sections 3 (d) through (g), (i) and (j).

#### Section 4 **Other Baseline Requirements.**

(a) A description of the lands to be affected within the permit area, how these lands will be affected, for what purpose these areas will be used during the course of the mining operation, and a time schedule for affecting these lands. This description shall include a description of:

(i) The major past and present uses of the proposed permit area and adjacent lands. Previous uses of affected lands must be ranked on an individual basis according to the overall economic or social value of the land use to the landowner, community, or area in which these lands are found. The Administrator of the Land Quality Division shall bear the responsibility of making the final decision on the ranking of land uses in a particular area. This decision must be based on information concerning the economy, historical use of the area and the needs and desires of the landowner. The Land Quality Advisory Board may be consulted for suggestions or recommendations on the ranking of land uses in a given area. The present land uses shall be listed using the definitions of Chapter 1, and the vegetation communities which comprise each land use shall be presented.

(ii) The capability of the land prior to mining to support a variety of uses, giving consideration to soil and foundation characteristics, topography, vegetative cover, and the land's history of previous mining, if any, and the uses of the land preceding mining; as well as the land use classification under local law, if any, of the proposed permit area and adjacent areas.

(iii) Annual precipitation - the operator shall submit an estimated total annual precipitation for the proposed permit area. Data from the nearest official weather reporting station may be used. Operations more than 50 miles from an official weather station that are permanently staffed may be required to keep precipitation records.

(iv) Average wind direction and velocity - the operator shall submit the average wind direction and velocity recorded at the nearest official weather station or as measured at the site.

(v) Prime farmland information, which shall include, after a preapplication investigation of the proposed permit area, either:

(A) A request for a determination that the land not be considered prime farmland on the basis that either the land has not had a history of intensive agricultural use; or there are no soil map units that have been designated prime farmland by the Natural Resource Conservation Service in accordance with 7 CFR 657 (Federal Register Vol. 43, No. 21) and the Memorandum of Understanding between the Conservation Districts and the Soil Conservation Service, or

(B) Where prime farmland occurs on proposed affected land,

an application which shall be submitted in accordance with Chapter 3.

(vi) Studies of fish, wildlife, and their habitats, in the level of detail and for those areas as determined by the Administrator, after consultation with the Wyoming Game and Fish Department in accordance with the Memorandum of Understanding between the two agencies; and Federal agencies having responsibilities for the management or conservation of such environmental values, including:

(A) A list of indigenous vertebrate wildlife species within and adjacent to the permit area by common and scientific names. The area of survey for the possible presence of threatened or endangered species shall be on or within one mile of the permit area.

(B) If critical habitat disruption is likely, the U.S. Fish and Wildlife Service and Wyoming Game and Fish Department shall be contacted by the Administrator. If crucial or important habitat or migration route disruption is likely, the Wyoming Game and Fish Department shall be contacted by the Administrator. Contacting the appropriate agency(ies) is required in order to determine the types and numbers of wildlife likely to be disturbed or displaced.

(vii) A detailed description, prepared or certified by a licensed professional geologist, or other qualified professional (as required by W.S. § 33-41-101 through 121), of the geology within the proposed permit area down to and including any aquifer to be adversely affected by mining below the lowest coal seam to be mined. The description shall include the aerial and structural geology of the permit area and, by extrapolation, adjacent areas, including geologic parameters which influence the required reclamation, and the occurrence, availability, movement, quantity, and quality of potentially affected surface and groundwaters.

(viii) For the proposed permit area and, by extrapolation, adjacent areas, characterization of the geologic strata down to and including the deeper of either the stratum immediately below the lowest coal seam to be mined, or any aquifer below the lowest coal seam to be mined which may be adversely impacted by mining. This information shall include a statement of the results of test borings or core samples which have been collected and analyzed to show:

(A) Location of any groundwater;

(B) Lithologic characteristics and thickness of each stratum and each coal seam;

(C) Physical and chemical properties including the toxic and acid-forming properties of each stratum within the overburden; and

(D) Chemical analyses for acid or toxic-forming substances of

the coal seam, including the total sulphur and pyritic sulphur content. The Administrator may waive in whole or in part the requirements of these paragraphs if he makes a written finding that the testing is unnecessary because other equivalent information is available to him in a satisfactory form.

(ix) Maps and cross-sections of the area, certified by a registered professional engineer, licensed professional geologist, or other qualified professional (as required by W.S. § 33-29-139 and 33-41-101 through 121), showing:

(A) Nature, depth and thickness of any coal seams to be mined or above those to be mined, each stratum of the overburden, and the stratum below the lowest coal seam to be mined;

(B) All coal crop lines and the strike and dip of the coal to be mined within the proposed permit area;

(C) Location and extent of existing or previously surface mined or underground mined areas within the proposed permit area and adjacent areas;

(D) Sufficient slope measurements of the proposed permit area measured and recorded at such distances as the Administrator determines to be representative of the premining configuration and reflect geomorphic differences of the land to be mined;

(E) The location of water supply intakes for current users of surface water flowing into, out of and within a hydrologic area defined by the Administrator, and those surface waters which will receive discharges from affected areas in the proposed permit area;

(F) The location of areas on which mining is limited or prohibited within or adjacent to the permit area, pursuant to Chapter 12, Section 1(a)(v), Land Quality Rules and Regulations;

(G) Elevations and locations of test borings and core samplings;

(H) Elevations and locations of monitoring stations used to gather data for water quality and quantity, fish and wildlife, and air quality in preparation of the application; and

(I) Other relevant information required by the Administrator.

(x) Overburden, topsoil, subsoil, mineral seams or other deposits.

(A) Overburden - the operator shall submit a description including the thickness, geological nature (rock type, orientation, etc.), the presence of

toxic, acid-forming, or vegetative-retarding substances, or any other factor that will influence the mining or reclamation activities.

(B) Topsoil and subsoil information including a soil survey of the affected lands conducted in accordance with the standards of the National Cooperative Soil Survey of the U.S. Department of Agriculture. If alternative materials are proposed to be used as a supplement to or substitute for topsoil, their suitability shall be demonstrated in accordance with Chapter 4, Section 2(c)(ix).

(I) Topsoil - the operator shall submit a description of the thickness and nature of the topsoil, if any, over the proposed affected lands. A soils survey and soil analyses conducted in accordance with standard methods acceptable to the Administrator, may be required to show variations in topsoil depth and suitability.

(II) Subsoil - the nature, thickness and distribution of the subsoil, if any, shall be described over the proposed affected lands. Detailed analyses of the subsoil may be required, if there is reason to suspect it may be of better quality for revegetation than the topsoil, or if it is to function as a topsoil supplement in reclamation efforts. If the subsoil is suspected of containing substances that might cause pollution or hinder reclamation, analyses will provide a basis for determining how to handle this material during reclamation.

(C) Mineral seams or other deposits - the operator shall submit a description of the mineral seams in the proposed permit area, including, but not limited to, their depth, thickness, orientation (strike and dip), and rock or mineral type. Maps or geologic cross-sections may be used to illustrate the description of the mineral seams.

(xi) Complete information on surface water for the permit area and adjacent areas. This shall include the following:

(A) The operator shall list and describe the name and location for the present surface waters in and adjacent to the proposed permit area. The list shall include, but not be limited to, rivers, creeks, lakes, reservoirs, springs and marshes. Streams shall be classified as ephemeral, intermittent or perennial;

(B) The operator shall submit a description of the immediate drainage area which includes the proposed permit area. Surface water use shall be identified as to domestic, municipal, industrial, agricultural, and wildlife;

(C) Baseline monitoring information of surface water quantity within the permit area which is representative of the surface hydrologic system. Water quantity descriptions shall include, at a minimum, baseline information on seasonal flow rates, and identification of drainage area acreage; and

(D) Water quality data sufficient to identify seasonal variation.

All surface water-quality sampling and analyses performed to meet the requirements of this Section shall be conducted according to the methodology in the 20th edition of "Standard Methods for the Examination of Water and Wastewater," or the methodology in 40 CFR Part 136 - "Guidelines Establishing Test Procedures for the Analysis of Pollutants," as amended on January 16, 2001. Contact the Land Quality Division for information on how to obtain a copy of either reference materials. The data shall include at a minimum:

- (I) Total dissolved solids (mg/l);
- (II) Total suspended solids (mg/l);
- (III) pH (standards units);
- (IV) Total and dissolved iron (mg/l); and
- (V) Total manganese (mg/l).

(E) Baseline alkalinity and acidity information shall be provided if there is a potential for acid drainage from the proposed mining operation.

(xii) Complete information on groundwater which may be affected in the permit area and adjacent areas. This shall include the following:

(A) The operator shall submit an estimate of the depth and quantity of any groundwater existing in the proposed permit area down to and including the strata immediately below the lowest mineral seam to be mined. The operator may be required to conduct test drilling and monitoring in order to determine the exact depth, quantity and quality of groundwater in geological formations affected by the mining operations. Such drilling will require permits from the State Engineer's Office;

(B) The lithology and thickness of all known aquifers;

(C) All water-quality sampling and analyses performed to meet the requirements of this Section shall be conducted according to the methodology in the 20th edition of "Standard Methods for the Examination of Water and Wastewater" or the methodology in 40 CFR Part 136 - "Guidelines Establishing Test Procedures for the Analysis of Pollutants," as amended on January 16, 2001. Contact the Land Quality Division for information on how to obtain a copy of either reference materials. The data shall include at a minimum:

- (I) Total dissolved solids (mg/l);
- (II) Total and dissolved iron (mg/l);

(III) Total manganese (mg/l); and

(IV) pH (standard units).

(D) According to the parameters and in the detail required by the Administrator, the recharge, storage, and discharge characteristics of the groundwater.

(xiii) Water rights.

(A) The operator shall list by name and owner all known adjudicated and permitted water rights on the proposed permit area and adjacent lands.

(B) The operator shall submit a list by name and owner of all existing water wells on the proposed permit area and adjacent lands, including all wells filed with the State Engineer's Office three miles or less from the proposed permit area. A survey of the premining water levels in the above wells may be required.

(xiv) A description of the surface water and groundwater and related geology in the permit area and general area sufficient to assess the probable hydrologic consequences (PHC). If the determination of the PHC required by Chapter 19, Section 2(a)(i) indicates that adverse impacts on or off the proposed permit area may occur to the hydrologic balance, or that acid-forming or toxic material is present that may result in the contamination of groundwater or surface water supplies, then information supplemental to that required under (a)(xi) and (a)(xii) of this Section shall be provided to evaluate such PHC and to plan remedial and reclamation activities. Such supplemental information may be based upon drilling, aquifer tests, hydrogeologic analysis of the water-bearing strata, flood flows, or analysis of other water-quality or quantity characteristics.

(xv) Information concerning the presence or absence of an alluvial valley floor within the permit area or on adjacent areas in accordance with Chapter 3.

(xvi) The location of existing man-made features to include roads, railroads, reservoirs, public or private rights-of-way and easements, utility lines, pipelines, oil wells, gas wells, and water wells.

(xvii) Boundaries and descriptions of all cultural, historic and archaeological resources listed on, or eligible for listing on, the National Register of Historic Places. In compliance with the Archaeological Resources Protection Act of 1979 (P.L. 96-95), this information shall not be placed on display at the county clerk's office (as required by W.S. § 35-11-406(d)) where such resources occur on lands owned by the United States. This information shall be clearly labeled as "Confidential" and submitted separately from the remainder of the application materials. Requests to disclose confidential information shall be administered under the Department of Environmental Quality, Rules of Practice and Procedure, the Wyoming Public Records

Act (W.S. §§ 16-4-2001 thru 16-4-2005 (2007)) and the Wyoming Environmental Quality Act (2007).

(xviii) A description of any significant artifacts, fossil or other article of cultural, historical, archaeological or paleontological value. Upon recommendation by a qualified archaeologist or a qualified paleontologist, the Administrator may require an evaluation of the proposed permit area prior to the time that a permit or license is issued.

#### Section 5 **Mine Plan.**

(a) In addition to that information required by W.S. § 35-11-406(b), each application for a surface coal mining permit shall contain:

(i) A complete operations plan proposed to be conducted during the life of the mine including:

(A) A narrative description of the type and method of mining, the number of acres that will be affected annually, overburden and mineral removal and transport, anticipated annual and total production by tonnage, and the major equipment to be used for all aspects of the operations.

(B) A map showing the estimated orderly progression of mining and reclamation on all proposed affected lands.

(C) The size, sequence and timing of the areas for which it is anticipated that renewed permits for mining will be requested over the estimated total life of the proposed operation.

(D) Cross-sections, and/or maps and plans of the area to be mined during the term of the permit, unless required for the permit area by the Administrator or as specified below, certified by a registered professional engineer or professional geologist, showing:

(I) Location of proposed water treatment control and monitoring facilities;

(II) Location of each proposed explosive storage and handling facility;

(III) Location and construction of each proposed waste disposal facility relating to coal processing or pollution control;

(IV) Location of and typical design for surface water and groundwater hydrologic control methods including proposed temporary impoundments, sedimentation ponds, diversions, stream channels, erosion control methods, and water



treatment, water storage, water collection and discharge facilities. The location and typical design of permanent impoundments and general location of the above described hydrologic control methods shall be provided for the permit area;

(V) The location, construction and maintenance of coal stockpiles, temporary and excess spoil piles shall be provided for the permit area;

(VI) Location of permanently fixed signs and markers in accordance with and meeting the requirements of Chapter 4, Section 2(o); and

(VII) Location and description of any undisturbed natural barrier which is proposed to be provided to prevent slides and erosion, in accordance with the requirements of Chapter 4, Section 2(s).

(ii) A narrative and a map of the permit area identifying the location of existing structures, a description of their use and maintenance, and an explanation of whether they meet the requirements of Chapter 4 or the plan for removal, if required, or modification to comply with those standards in a manner which protects the environment and public health and safety.

(iii) A description of the measures to be used to maximize the use and conservation of the coal resource as required in Chapter 4, Section 2(v).

(iv) A description of the contingency plans which have been developed to preclude sustained combustion of any materials constituting a fire hazard.

(v) A description, plans, and drawings for each mine facility to be constructed, used, or maintained within the proposed permit area. The plans and drawings shall include a map, appropriate cross-sections, design drawings, and specifications sufficient to demonstrate compliance with section 2(n) of Chapter 4 for each facility.

(vi) A map of the permit area which clearly shows that a railroad spur(s) which provides exclusive service to that particular permit is being included within the permit boundary from the point that it provides such service. This spur(s) shall be covered by a reclamation bond.

(vii) A blasting plan for the area to be mined during the term of the permit, which shall include:

(A) Proposed compliance with limitations on ground vibration and airblast, the basis for those limitations, and methods to be applied in controlling the adverse effects of blasting operations. The applicant should also include:

(I) A blasting plan which depicts the worst-case

scenario (i.e., the maximum probable amount of explosives to be detonated in any eight millisecond period).

(II) The identification, direction and distance, in feet to the nearest dwelling, public building, school, church, and community or institutional building from any blasting area during the term of the permit. This paragraph shall not apply if the building is owned by the operator and not leased to another or, if leased, the lessee signs a waiver relieving the operator from meeting the limitations in Chapter 6.

(B) If blasting operations will be conducted within 1,000 feet of any building used as a dwelling, public building, school, church, and community or institutional building outside the permit area, or within 500 feet of an active or abandoned underground mine, an anticipated blast design, prepared and signed by a certified blaster. The design shall contain sketches of the drill patterns, delay periods, and decking and shall indicate the type and amount of explosives to be used, critical dimensions, and the location and general description of structures to be protected, as well as a discussion of design factors to be used which protect the public and meet the applicable airblast, flyrock and ground vibration standards in Chapter 6. This paragraph shall not apply if the building is owned by the operator and not leased to another or, if leased, the lessee signs a waiver relieving the operator from meeting the limitations in Chapter 6.

(C) Description and location of blasting monitoring, warning and site access control equipment and procedures proposed to be used pursuant to Chapter 6, Section 4.

(D) Description of procedures and plans for recording and retaining information required by Chapter 6, Section 5.

(E) A sample copy of the public notices required by Chapter 6, Section 3.

(F) Other information requested by the Administrator which he determines necessary to ensure compliance with Chapter 6.

(viii) A plan for minimizing adverse impacts to fish, wildlife and related environmental values within and adjacent to the permit area during the operation, including:

(A) Whether such resources will be enhanced through successful revegetation in accordance with Chapter 4, Section 2(r);

(B) A statement of how the applicant will utilize monitoring methods as specified in Appendix B of these rules and regulations, and impact control measures and management techniques to protect or enhance the following, if they are likely to be affected by the proposed operation:

(I) Threatened or endangered species of plants or animals listed by the Secretary under the Endangered Species Act of 1973, as amended (16 U.S.C. Section 1531 et seq.) and their critical habitats;

(II) Species identified through the consultation process described in Section 2(a)(vi)(G); and

(III) Important habitats for fish and wildlife, such as wetlands, riparian areas, rimrocks, areas offering special shelter or protection, reproduction and nursery areas, and wintering areas.

(C) Upon request, the Administrator shall provide the resource information required under paragraph (B) of this Section and that required by Section 2(a)(vi)(G) of this Chapter to the U.S. Department of the Interior, Fish and Wildlife Service regional or field office for their review. This information shall be provided within 10 days of receipt of the request from the Service.

(ix) A plan to ensure the protection of the quantity and quality of, and rights to, surface water and groundwater both within and adjacent to the permit area, which shall include:

(A) A plan and timetable for control and treatment of surface water and groundwater in accordance with Chapter 4, Section 2(e)-(h);

(B) A plan for sediment removal and disposal;

(C) A plan to restore the approximate recharge capacity of the permit area in accordance with Chapter 4, Section 2(h);

(D) A plan to collect, record and report water quantity and quality data according to Chapter 4, Section 2(i); and

(I) Surface water monitoring plan.

(1.) The application shall include a monitoring plan based upon the PHC determination required under subsection 2(b)(xii) of this Chapter and the analysis of all baseline hydrologic, geologic, and other information in the permit application. The plan shall provide for the monitoring of parameters that relate to the suitability of the surface water for current and approved postmining land uses and to the objectives for protection of the hydrologic balance as set forth in subsection 2(b)(xi) of this Chapter.

(2.) The plan shall identify the surface water quantity and quality parameters to be monitored, sampling frequency, and site locations.

At a minimum, the parameters specified in Section 2(a)(vi)(L)(III) and (IV) of this Chapter shall be measured. Results of monitoring shall be available for inspection at the mine and available to the Director's designated authorized representative, and shall be reasonably current. Surface water monitoring shall be conducted quarterly unless an alternate frequency, appropriate to the monitored site, is approved by the Administrator. Results of monitoring shall be submitted in the annual report for each monitoring location.

(3.) The plan shall describe how the data may be used to determine the impacts of the operation upon the hydrologic balance.

(II) Groundwater monitoring plan.

(1.) The application shall include a groundwater monitoring plan based upon the PHC determination required under subsection 2(b)(xii) of this Chapter and the analysis of all baseline hydrologic, geologic, and other information in the permit application. The plan shall provide for the monitoring of parameters that relate to the suitability of the groundwater for current and approved postmining land uses and to the objectives for protection of the hydrologic balance set forth in subsection 2(b)(xi) of this Chapter.

(2.) The plan shall identify the quantity and quality parameters to be monitored, sampling frequency, and site locations. It shall describe how the data may be used to determine the impacts of the operation upon the hydrologic balance. At a minimum, the parameters specified in Section 2(a)(vi)(M)(III) of this Chapter and water levels shall be measured. Groundwater monitoring shall be conducted quarterly unless an alternate frequency, appropriate to the monitored site, is approved by the Administrator. Results of monitoring shall be available for inspection at the mine and available to the Director's designated authorized representative, and shall be reasonably current. Results of monitoring shall be submitted in the annual report for each monitoring location.

(E) A plan to provide alternative sources of water in accordance with W.S. § 35-11-415(b)(xii), where the protection of quantity or quality cannot be ensured as determined under the requirements of (x) below.

(x) Probable hydrologic consequences determination (PHC). A determination of the PHC of the proposed operation on the hydrologic regime and the quantity and quality of surface water and groundwater systems within the permit area and the general area consistent with the information required in Chapter 19, Section 2 of these regulations. The PHC determination shall be based on baseline hydrologic, geologic and other information collected for the permit application and may include data statistically representative of the site. This determination shall specifically address potential adverse hydrologic consequences and describe preventive and remedial measures.

(xi) An evaluation of the impact of the proposed mining activities that may result in contamination, diminution, or interruption of the quality and quantity of groundwater or surface water within the proposed mine permit area or adjacent areas that are used for domestic, agricultural, industrial, or other legitimate purposes. If contamination, diminution, or interruption may result, then the application shall identify the alternative sources of water supply that could be developed to replace the existing sources in accordance with State law.

(xii) A general plan for each coal-processing waste bank. It shall contain a description, map, and cross-section of the structure and its location, preliminary hydrologic information required to assess the hydrologic impact of the bank, and any additional information the Administrator may deem necessary to show compliance with Chapter 4, Section 2(c). Where the applicant proposes to return coal-processing waste to abandoned underground workings, the application shall:

(A) Describe the design, operation and maintenance of any proposed coal-processing waste disposal facility, including flow diagrams and any other necessary drawings and maps, for the approval of the Administrator and the Mine Safety and Health Administration;

(B) Describe the sources and quality of waste to be stowed, area to be backfilled, percent of the mine void to be filled, method of constructing underground retaining walls, influence of the backfilling operation on active underground mine operations, surface area to be supported by the backfill and the anticipated occurrence of surface effects following backfilling;

(C) Describe the source of the hydraulic transport mediums, method of dewatering the placed backfill, retainment of water underground, treatment of water if released to surface streams, and the effect on the hydrologic regime;

(D) Describe each permanent monitoring well to be located in the backfilled area, the stratum underlying the mined coal, and gradient from the backfilled area except where pneumatic backfilling operations are exempted from hydrologic monitoring; and

(E) Be approved by MSHA as well as the Administrator prior to implementation.

(xiii) For surface mining activities to be conducted within 500 feet of an underground mine, measures to be used to comply with Chapter 4, Section 2(t).

(xiv) Plans describing the measures to be taken to obtain permit approval regarding areas where mining would be otherwise limited or prohibited pursuant to Chapter 12, Section 1(a)(v).

(xv) Descriptions, including appropriate maps and cross-sections of any proposed excess spoil disposal site and design of the spoil piles in accordance with the requirements of Chapter 4, Section 2(c). This shall contain the results of a geotechnical investigation of the proposed excess spoil disposal site, including the following:

(A) The character of bedrock and any adverse geologic conditions in the disposal area;

(B) A survey identifying all springs, seepage, and groundwater flow observed or anticipated during wet periods in the area of the disposal site;

(C) Where applicable, an evaluation of the potential effects of subsidence of the subsurface strata due to past and future mining operations;

(D) A stability analysis including, but not limited to, strength parameters, pore pressures and long-term seepage conditions. These data shall be accompanied by a description of all engineering design assumptions and calculations and the alternatives considered in selecting the specific design specifications and methods; and

(E) If, under Chapter 4, Section 2(c)(xi)(F), special structural provisions are required for spoil disposal on overall slopes greater than 20 degrees, information on:

(I) The number, location and depth of borings or test pits which shall be determined with respect to the size of the spoil disposal structure and subsurface conditions; and

(II) The engineering designs, design rationale and design calculations for the special structural provisions, which are based on the information required in paragraph (D) above.

(xvi) Road Systems.

(A) Each applicant shall submit plans and drawings for each road as defined in Chapter 1 to be constructed, used, or maintained within the proposed permit area. The plans and drawings shall:

(I) Include a map, appropriate cross-sections, design drawings and specifications for road widths, gradients, surfacing materials, cuts, fill embankments, culverts, bridges, drainage ditches, drainage structures and low-water crossings;

(II) Contain the drawings and specifications of each proposed road that is located in the channel of an ephemeral stream that has the potential

for sufficient flow to cause substantial environmental harm unless a downstream sediment control structure exists within the permit boundaries, any intermittent or any perennial stream, as necessary for approval of the road by the Administrator in accordance with Chapter 4, Section 2(j)(iv)(A);

(III) Contain the drawings and specifications for each proposed ford of intermittent or perennial streams that is used as a temporary route, as necessary for approval of the ford by the Administrator in accordance with Chapter 4, Section 2(j)(vii)(C)(II);

(IV) Contain a description of measures to be taken to obtain approval from the Administrator for alteration or relocation of a natural stream channel under Chapter 4 Section 2(j)(vii)(D)(IV);

(V) Contain the drawings and specifications for each low-water crossing of an ephemeral stream channel that has the potential for sufficient flow to cause substantial environmental harm unless a downstream sediment control structure exists within the permit boundaries, any intermittent stream channel or any perennial stream channel so that the Administrator can maximize the protection of the stream in accordance with Chapter 4, Section 2(j)(vii)(D)(VI); and

(VI) Describe the plans to remove and reclaim each road that would not be retained under an approved postmining land use, and the schedule for this removal and reclamation.

(B) The plans and drawings for each primary road (as defined in Chapter 4, Section 2(j)(i)(B)) shall be prepared by, or under the direction of, and certified by a qualified registered professional engineer as meeting the requirements of this Chapter and current, prudent engineering practices.

(xvii) Plans for compliance with the temporary and permanent cessation of operations requirements contained in Chapter 4, Section 2(k) and (u).

(xviii) Plans of mine facilities (including overstrip areas) that are to be shared by two or more separately permitted mining operations may be included in one permit application and referenced in the other application(s). Each permittee shall bond the mine facilities unless the permittees sharing it agree to another arrangement for assuming their respective responsibilities. If such agreement is reached, the application shall include a copy of the agreement between or among the parties setting forth the respective bonding responsibilities of each party for the mine facilities. The agreement shall demonstrate to the satisfaction of the Administrator that all responsibilities under the Act and regulations for the mine facilities will be met.

(xix) A Cultural Resources Management Plan which:

(A) Describes the measures to be used to prevent impacts to public parks or places listed on the National Register of Historic Places or, in cases of valid existing rights or where joint agency approval has been obtained, to minimize impacts to such parks or places;

(B) Provides for the mitigation of adverse effects to historic or archaeological properties eligible for listing on the National Register of Historic Places; and

(C) Ensures that the appropriate treatment measures or mitigation will be undertaken prior to the commencement of any specific mining operation that would affect such parks, places or properties.

(xx) A plan for the management and disposal within the proposed permit area of industrial solid wastes generated by the operation (such as, but not limited to, grease, lubricants, paints, flammable liquids, garbage, trash, discarded mining machinery, lumber and other combustible material), in accordance with Chapter 4, Section 2(c) and with those provisions of the Solid Waste Management Rules and Regulations deemed appropriate by the Administrator.

(xxi) Plans for the management and disposal within the permit area of any solid wastes generated by a mine mouth power plant or mine mouth coal drier, in accordance with Chapter 4, Section 2(c) and with provisions of the Solid Waste Management Rules and Regulations deemed appropriate by the Administrator.

#### **Section 6 Reclamation Plan.**

(a) The reclamation plan shall include a time schedule for each major step in the reclamation which coordinates the operator's reclamation plan with the mining plan in such a manner so as to facilitate reclamation at the earliest possible time consistent with Chapter 4, Section 2(k) and the orderly development of the mining property.

(b) The reclamation plan shall also describe how the operator will reclaim the affected lands to the proposed postmining land use in accordance with Chapter 4, Section 2(a) which shall include:

(i) A plan for topsoil and subsoil removal, storage, protection, and replacement; and for handling and disposal of all toxic, acid-forming, or otherwise hazardous materials, in accordance with Chapter 4, Section 2(c). This shall include a description with location maps and, where appropriate, typical topographic profiles of the mine facility area, mineral stockpiles, spoil piles, and topsoil and subsoil stockpiles. The location, and where required, the capacity of each stockpile shall be described and shown on a map. The application shall also explain how the topsoil will be replaced on the affected land during reclamation, including a description of the thickness of topsoil to be replaced and procedures that will be followed to protect the topsoil from excessive



compaction and wind and water erosion until vegetation has become adequately established.

(ii) A plan for backfilling, grading and contouring of all affected lands in accordance with Chapter 4, Section 2(b). The plan shall include:

(A) A description of the reclaimed land surface with contour maps or cross-sections that show the final surface configuration of the affected lands.

(B) Where terraces or benches are proposed, detailed drawings shall be provided which show dimension and design of the terraces, check dams, any erosion prevention techniques and slopes of the terraces and their interval.

(C) Where permanent water impoundments are proposed, contour maps and cross-sections which show slope conditions around the impoundment and the anticipated high and low postmining water level. The plan shall contain a description of erosion control techniques and such other design criteria and water quality and quantity conditions to comply with Chapter 4, Section 2(g)(ii).

(D) Maps and descriptions necessary to demonstrate that the slopes of the reclaimed land surface do not exceed the approximate premining slopes.

(E) Procedures for assuring stability of the reclaimed land surface.

(iii) A plan to assure revegetation of all affected land in accordance with Chapter 4, Section 2(d). The plan shall include:

(A) The method and schedule of revegetation, including but not limited to species of plants, seeding rates, seeding techniques, mulching requirements and other erosion control techniques, and seeding times to be used in a given area for reclamation purposes.

(B) For crucial habitat and critical habitat, consultation with and approval obtained from the Wyoming Game and Fish Department for tree and shrub species composition and ground cover for minimum stocking and planting arrangements of trees and shrubs. Crucial habitat must be declared as such prior to the submittal of a permit application or any subsequent amendment.

(C) For important habitat, consultation with and recommendations obtained from the Wyoming Game and Fish Department for tree and shrub species composition and ground cover for minimum stocking and planting arrangements.

(D) The tree species, the number per species, and the location

of tree plantings.

(E) A separate seed mix(es) shall be developed for each approved postmining land use, considering the dominant postmining topographic features and landowner desires.

(I) The species shall be described in the reclamation plan indicating the composition of seed mixtures and the amount of seed to be distributed on the area on a per acre basis.

(II) The species and varieties shall depend upon the climatic and soil conditions prevailing in the permit area and the proposed postmining landuses.

(III) The species shall be self-renewing;

(IV) Seeding rates shall depend upon seed types, climatic conditions and the techniques to be used in seeding;

(V) The seed mix shall contain introduced species only if:

or

(1.) Additional herbaceous species are needed;

(2.) Suitable, native species are unavailable; or

(3.) For cropland or pastureland or;

(4.) Needed to achieve a quick, temporary, stabilizing cover to control erosion; or

(5.) Conducive to achieve a postmining land use approved by the Administrator.

(VI) The operator shall document, unless otherwise authorized by the Administrator, the suitability of introduced species using data from published literature, from experimental test plots, from on-site experience, or from other information sources.

(VII) For grazingland, the seed mix shall contain full shrub and/or subshrub species when these species will support the postmining land uses. To increase postmining species diversity and establish shrub mosaics, shrub mixtures shall be developed and seeded separately from the herbaceous mixtures.

(VIII) For federally owned surface, the federal land managing agency shall be consulted for mulching requirements and seeding requirements for cover crops, temporary and permanent reclamation.

(IX) The proposed postmining location of each seed mixture shall be illustrated on a post mining contour map.

(F) Locations and/or conditions where the operator specifically requests approval not to use mulch.

(G) A weed control plan for State of Wyoming Designated Noxious and Designated Prohibited Weeds and, on federal surface, any additional weeds listed by the federal land managing agency.

(H) An explanation of any plans for irrigation.

(I) An explanation of pest and disease control measures, if appropriate;

(J) A plan for monitoring permanent revegetation on reclaimed areas, specifically including quantitative sampling, as required by Chapter 4, Section 2(d)(i)(J).

(iv) A plan for measurement of revegetation success to include:

(A) How a "Reference area" shall be used for cover and production, unless technical standards for cover and production have been approved for a projected postmine community. A "Reference area" is defined in Chapter 1, Section 2(dl).

(B) The methods to be used for measuring the shrub density standard as approved by the Administrator.

(C) The methods to be used for evaluating the shrub density goal as approved by the Administrator, where applicable.

(D) The procedures to be used for measuring species diversity and composition as approved by the Administrator.

(E) If proposed, a technical success standard for a specified vegetation parameter. The technical success standard:

(I) Is derived from a sufficient number of years of baseline data so the standard value can be considered representative over a range of climatic conditions or a relationship between the parameter and climatic variables can be

determined. For technical standards for cover and production, a minimum of five years of baseline data is necessary; and

(II) May be extended to an amendment area if the baseline information indicates the standard is applicable in that area.

(F) The procedures to be used as approved by the Administrator for the evaluation of restored postmining vegetation communities which carry the Cropland or Pastureland land use designation.

(G) If reforestation for commercial harvest is the method of revegetation, reforestation shall be deemed to be complete when a reasonable population density as established in the reclamation plan has been achieved, the trees have shown themselves capable of continued growth for a minimum period of five years following planting, and the understory vegetation is adequate to control erosion and is appropriate for the land use goal.

(v) Descriptions, including maps and cross-sections, of the surface water diversion systems which meet the requirements of Chapter 4, Section 2(e). Monitoring of surface and groundwater conditions may be required during the course of the operation based on the existing water conditions and the nature of the proposed operation. If so required, the application shall include a description of the location, construction, maintenance, and removal, where necessary, of such monitoring stations.

(vi) Where a permanent water impoundment is proposed as final reclamation, the application shall include:

(A) Written consent from the surface landowner if different than the mineral owner.

(B) A description of the proposed use of the impoundment.

(C) A statement of the source, quality and quantity of water available for impoundment and a statement regarding its suitability for recreational, irrigation, livestock or wildlife watering. If, upon review of this information, water quality and quantity are not reasonably demonstrated to be suitable for the postmining use, the applicant shall be so notified in writing and shall be allowed to submit further documentation in support of the proposed impoundment to reasonably satisfy the Administrator. If the applicant is unable to demonstrate to the satisfaction of the Administrator that the water quality and quantity will be suitable for the postmining land use, the applicant shall provide an alternate plan.

(D) The operator may be required to monitor surface and groundwaters in order to determine that upon completion of the operation, the water quality and quantity will be consistent with the approved postmining use.

(E) A description of the construction of the impoundment so as to meet the requirements of Chapter 4, Section 2(g)(ii).

(vii) A plan to assure proper construction and reclamation of any tailings impoundments in accordance with the Act and these regulations.

(viii) A plan for the disposal of mine facilities, erected, used or modified by the applicant in accordance with the requirements of Chapter 4, Section 2(m).

(ix) A description of the measures to be used to seal or manage mine openings in accordance with Chapter 4, Section 2(p), and to cap, plug and seal all exploration holes, bore holes, wells and other openings, excepting developmental drill holes which will be mined through within one year, within the area to be mined during the term of the permit in accordance with Chapter 14. For developmental drilling the application shall contain general descriptions relating to spacing, data collection, and techniques which will be employed, including those which may be needed to comply with the plugging and sealing requirements of W.S. § 35-11-404.

(x) A postmining land use plan, including:

(A) The necessary support and maintenance activities that may be needed to achieve the proposed land use.

(B) Where a land use is proposed different from the premining land use:

(I) A discussion of the utility and capacity of the reclaimed land to support a variety of uses and the relationship of the proposed use to existing land use policies and plans; and

(II) A comparison of the premining and postmining land uses. The premining uses of land to which the postmining land use is compared shall be those uses which the land previously supported, if the land has not been previously mined and has been properly managed.

(1.) The postmining land use for land that has been mined and not reclaimed shall be judged on the basis of the highest and best use that can be achieved and is compatible with surrounding areas without requiring unreasonable disturbance of areas previously unaffected by mining.

(2.) The postmining land use for land that has received improper management shall be judged on the basis of the premining use of surrounding lands that have received proper management.

(3.) If the premining use of the land was changed within five years of the beginning of the mining, the comparison of postmining use to premining use shall include a comparison with the historic use of the land as well as its use immediately preceding mining.

(C) Approval of alternative land uses shall require a demonstration that:

(I) The alternative land use is equal to or greater than the highest previous use;

(II) There is reasonable likelihood for achievement of the use;

(III) The use does not present any actual or probable hazard to public health or safety, or threat of water diminution or pollution; and

(IV) The use will not:

(1.) Be impractical or unreasonable;

(2.) Be inconsistent with applicable land use policies or plans;

(3.) Involve unreasonable delay in implementation; or

(4.) Cause or contribute to violation of Federal, State, or local law.

DEPARTMENT OF ENVIRONMENTAL QUALITY

LAND QUALITY DIVISION

CHAPTER 4

ENVIRONMENTAL PROTECTION PERFORMANCE STANDARDS

FOR COAL MINING OPERATIONS

Section 1. **General.**

This Chapter sets forth the environmental protection performance standards applicable to all coal mining operations. No mining operation shall be conducted except in compliance with the requirements hereof.

Section 2. **General Environmental Protection Performance Standards**

(a) Land uses.

(i) Reclamation shall restore the land to a condition equal to or greater than the "highest previous use." The land, after reclamation, must be suitable for the previous use which was of the greatest economic or social value to the community area, or must have a use which is of more economic or social value than all of the other previous uses.

(ii) Operators are required to restore wildlife habitat, whenever the Administrator determines that this restoration is possible, on affected land in a manner commensurate with or superior to habitat conditions which existed before the land became affected, unless the land is private and the proposed use is for a residential or agricultural purpose which may preclude its use as wildlife habitat.

(iii) Water impoundments used for recreational purposes shall be constructed in accordance with the statutes and (g) of this Section. Recreational lands, other than water impoundments, represent changes in the land which may or may not be suitable for wildlife habitat.

(b) Backfilling, grading and contouring.

(i) Rough backfilling and grading shall follow coal removal as contemporaneously as possible based upon the mining conditions. The operator shall include within the application for a permit to mine a proposed schedule for backfilling and grading with supporting analysis.

(ii) Backfilled materials shall be replaced in a manner which

minimizes water pollution on and off the site and supports the approved postmining land use. Preparation of final graded surfaces shall be conducted in a manner that minimizes erosion and provides a surface for replacement of topsoil that will minimize slippage.

(iii) All affected lands shall be returned to their approximate original contour, except as authorized by a variance or exemption under Chapter 5, Sections 6 and 7, or Chapter 8, or Chapter 9.

(iv) All spoil shall be transported, backfilled, compacted (where necessary to insure stability or to prevent leaching) and graded to eliminate all highwalls, spoil piles, and depressions, except that:

(A) Soil conservation techniques and or small depressions may be employed to retain moisture, minimize erosion, create and enhance wildlife habitat or assist revegetation.

(B) Incomplete elimination of highwalls may be authorized in accordance with Chapter 5, Section 7.

(C) Retention of selected portions of a highwall or other steep feature created during the mining operation may be approved by the Administrator to remain as replacement for natural features that were mined out or are planned to be mined out under the current Mine Plan if the operator demonstrates that the retained highwall will:

(I) Have a static safety factor of 1.3 or greater and be of similar erosive resistance;

(II) Not pose a hazard to people using the area;

(III) Be backfilled to cover the uppermost mineable coal seam to a minimum depth of 4 feet;

(IV) Not exceed the length and height of the premine feature it is replacing;

(V) Be contoured into the surrounding terrain; and

(VI) Enhance or restore important wildlife habitat or hydrologic conditions.

(D) Spoil may be placed on an area outside the mined-out area to restore the approximate original contour by blending the spoil into the surrounding terrain if the following requirements are met.

(I) All vegetative and organic material shall be



removed from the area.

(II) The topsoil on the area shall be handled in accordance with Section 2(c) of this Chapter.

(III) The spoil shall be backfilled and graded on the area in accordance with the requirements of this subsection 2(b).

(v) Postmining slopes shall not exceed a slope necessary to achieve a minimum long-term static safety factor of 1.3, to prevent slides and restore stable drainages and hillslopes.

(vi) Thin overburden. Where surface coal mining operations are proposed to be carried out continuously in the same limited pit area for more than one year from the day coal removal operations begin and where the volume of all available spoil and suitable waste materials over the life of the mine is demonstrated to be insufficient to achieve the approximate original contour considering bulking factor and coal removal, surface mining activities shall be conducted to use all available spoil and suitable waste materials to attain the lowest practicable stable grade, but not more than the angle of repose, and to meet the requirements of paragraphs (ii) and (iv) above.

(vii) Thick overburden. Where the volume of spoil over the life of the mine is demonstrated to be more than sufficient to achieve the approximate original contours considering bulking factor, coal removal and subsidence of backfilled material, excess spoil may be placed outside the pit area in accordance with the requirements of subsection (c).

(viii) Permanent Impoundments: Where permanent impoundments are authorized in accordance with Chapter 2, Section 6(b)(vi), spoil that may result from the impoundment will be handled in accordance with the requirements of this subsection.

(c) Topsoil, subsoil, overburden, spoil, excess spoil, refuse, coal mine waste, acid-forming materials, toxic materials and other wastes.

(i) Topsoil.

(A) All topsoil or approved surface material shall be removed from all areas to be affected in the permit area prior to these areas being affected unless otherwise authorized by the Administrator. The topsoil may be mixed with the subsoil but shall be segregated so as not to become mixed with spoil or waste material, stockpiled in the most advantageous manner and saved for reclamation purposes. The Administrator may authorize topsoil to remain on areas where minor disturbance will occur such as signs, power poles, light traffic, fence lines, monitoring stations or drilling provided that the minor disturbance will not destroy the protective vegetative cover and will not increase erosion.

(B) When topsoil is not promptly redistributed, the topsoil or approved surface material shall be stockpiled on stable areas within the permit area in such a manner so as to minimize wind and water erosion and unnecessary compaction. In order to accomplish this, the operator shall establish, through planting or other acceptable means, a quick growing cover of vegetation on the topsoil stockpiles. The topsoil shall also be protected from acid or toxic materials, and shall be preserved in a usable condition for sustaining vegetation when placed over affected land. Provided however, where long-term disturbance will occur, the Administrator may authorize the temporary distribution of topsoil to enhance stabilization of affected lands within the permit area. Where this is authorized, the Administrator shall find that the topsoil or subsoil capacity and productive capabilities are not diminished, that the topsoil is protected from erosion, and will be available for reclamation.

(C) Reclamation shall follow mining as soon as is feasible so as to minimize the amount of time topsoil must be stockpiled. Where topsoil has been stockpiled for more than one year, the operator may be required to conduct nutrient analyses to determine if soil amendments are necessary.

(D) Topsoil stockpiles shall be marked with a legible sign containing letters not less than six inches high on all approach roads to such stockpiles. Said signs shall contain the word "Topsoil" and shall be placed not more than 150 feet from any and all stockpiles of topsoil. Such signs must be in place at the time stockpiling is begun.

(E) If abundant topsoil is present, and it is not all needed to accomplish the reclamation required in the approved reclamation plan, the Administrator may approve of use of this topsoil by this or another operator in another area for reclamation purposes.

(F) Trees, large rocks and other waste material which may hinder redistribution of topsoil shall be separated from the topsoil before stockpiling.

(ii) Subsoil.

(A) Except as provided in (B), all subsoil determined by field methods or chemical analysis to be suitable as a plant-growth medium shall be removed from all areas to be affected and handled in accordance with the topsoil requirements of this Section.

(B) Upon an adequate demonstration by the operator that all or a portion of the subsoil material is not needed to meet the revegetation and land use requirements of these regulations, the Administrator may authorize all or a portion of the subsoil to not be used for reclamation. The unused subsoil may then be regarded as overburden material and handled in accordance with the requirements of this Section.

(iii) The topsoil (A and E horizons) shall be segregated from the subsoil (B and C horizons) where the Administrator determines that this practice is necessary to achieve the revegetation requirements of these regulations.

(iv) Before redistribution of topsoil or subsoil the regraded land shall be treated, if necessary, to reduce potential for slippage and encourage root penetration.

(v) Topsoil, subsoil, and/or an approved topsoil substitute shall be redistributed in a manner that:

(A) Achieves an approximate uniform, stable thickness consistent with the approved permit and the approved postmining land uses, contours and surface water drainage system;

(B) Prevents compaction which would inhibit water infiltration and plant growth;

(C) Protects the topsoil from wind and water erosion before and after it is seeded until vegetation has become adequately established; and

(D) Conserves soil moisture and promotes revegetation.

(vi) All rills and gullies which either preclude achievement of the approved postmining land use or the reestablishment of the vegetative cover, or cause or contribute to a violation of water quality standards for the receiving stream, shall be regraded or otherwise stabilized. Topsoil shall be replaced and the areas shall be reseeded or replanted.

(vii) Nutrients and soil amendments in the amounts determined necessary by soil test or field trials shall be applied to the replaced topsoil, subsoil or substitute material so that adequate nutrient levels are available to establish the vegetative cover. Fertilizer shall be applied at appropriate seasons and in amounts that will minimize pollution of surface waters or groundwaters.

(viii) The Administrator may not require topsoil or subsoil replacement on structures or within impoundments where replacement of this material is inconsistent with the intended use and the structures are otherwise stable.

(ix) If a sufficient volume of suitable topsoil or subsoil is not available for salvage or redistribution, then selected spoil material may be used as a topsoil or subsoil substitute or supplement. The operator shall demonstrate that the resulting plant growth medium is equal to, or more suitable for sustaining vegetation than the existing topsoil or subsoil and that it is the best available in the permit area to support revegetation. A demonstration of the suitability of the substitutes or supplements shall be based upon analysis of the texture, percent coarse fragments and pH. The Administrator

may require other chemical and physical analyses, field site trials, or greenhouse tests if determined to be necessary or desirable to demonstrate the suitability of the topsoil or subsoil substitutes or supplements.

(x) Topsoil and subsoil substitutes.

(A) Topsoil substitute stockpiles shall be segregated from topsoil and overburden piles and shall be identified as substitute material. Identification signs shall be placed not more than 150 feet from all stockpiles of substitute material. Such signs shall be in place at the time stockpiling is begun.

(B) If overburden is to be used in reclamation as a substitute for topsoil, all large rocks and other waste material which may hinder redistribution shall be separated before stockpiling.

(xi) Overburden, spoil, excess spoil, and refuse.

(A) All overburden, spoil material and refuse shall be segregated from the topsoil and subsoil and stockpiled in such a manner to facilitate the earliest reclamation consistent with the approved reclamation plan.

(B) Except where diversions are authorized by these regulations, all overburden, spoil material, and refuse piles must be located to avoid blocking intermittent or perennial drainages and flood plains in order to minimize loss and spread of material due to water erosion. Ephemeral drainages may be blocked if environmentally sound methods for dealing with runoff control and sedimentation are approved by the Administrator.

(I) For temporary stockpiles, material should be replaced in pits as soon as possible consistent with the approved reclamation plan to minimize the amount of time material is stockpiled.

(C) All topsoil shall be removed from areas to be used for piling spoil material prior to the beginning of piling this material.

(D) The operator may be required to have analyses made of spoil material in order to determine if it will be a source of water pollution through reaction with leaching by surface water. If it is determined that this condition may exist, the operator shall describe proposed procedures for eliminating this condition.

(E) All overburden and spoil material that is determined to be toxic, acid-forming or will prevent adequate reestablishment of vegetation on the reclaimed land surface, unless such materials occur naturally on the land surface, must be properly disposed of during the mining operation.

(F) All temporary overburden and spoil piles shall be located, designed and constructed using prudent engineering practices. Slopes shall be stable and temporary piles shall not be located or placed on slopes that exceed 20 degrees unless the Administrator authorizes such placement based upon demonstrations that the pile will have a safety factor of 1.5 or better, and/or other precautionary design factors are provided to mitigate the steepness of the slope.

(G) Excess Spoil. In addition to the requirements provided in subsections (xi)(A) through (xi)(D) above (with the exception of (xi)(B)(I)), excess spoil piles shall be located, designed, constructed and inspected as prescribed below.

(I) Location Requirements:

(1.) All excess spoil shall be placed in approved excess spoil disposal sites located within the permit area. They shall be:

a. Located on moderately sloping and naturally stable areas where placement provides for stability and prevents mass movement.

b. Located in areas which do not contain springs, seeps, natural or man-made drainages (excluding rills and gullies), croplands, or important wildlife habitat.

(2.) Excess spoil may be returned to underground mine workings in accordance with the plan approved by the Administrator and by MSHA.

(II) Design Standards:

(1.) All excess spoil shall be:

a. Designed, graded and contoured so as to blend in with the topography of the surrounding terrain. Excess spoil pile sites shall not be located on an overall slope that exceeds 20 degrees unless keyway cuts (excavations to stable bedrock), rock toe buttresses or other special structural provisions are constructed to ensure fill stability. The operator must demonstrate to the satisfaction of the Administrator that this material will be stable and can be revegetated as required by this Section.

b. Designed so that all slopes will be stabilized against wind and water erosion. After the grading and contouring of these stockpiles, topsoil or approved subsoil must be distributed over them in preparation for the revegetation procedure. Revegetation must be completed in accordance with requirements of this Chapter. A permanent drainage system must be established

consistent with these regulations.

c. Designed using current, prudent professional standards and certified by a qualified registered professional engineer. All piles shall be designed and constructed in accordance with the standards of this subsection. Special structural provisions shall be designed using prudent current engineering practices, in accordance with Chapter 2, Section 5(b)(xv)

(2.) The foundation and abutments of the fill shall be stable under all conditions of construction. Sufficient foundation investigation and any necessary laboratory testing of foundation materials shall be performed in order to determine the design requirements for foundation stability. Analyses of foundation conditions shall include the effect of underground mine workings, if any, upon the stability of the structure.

(3.) The Administrator may specify additional design criteria on a case-by-case basis as necessary to meet the general requirements of this subsection.

(III) Construction Standards:

(1.) Excess spoil shall be placed in a controlled manner to:

a. Prevent pollution from leachate and surface runoff from the fill on surface water or groundwater of the State.

b. Ensure mass stability and prevent mass movement during and after construction and provide for stable drainages and hillslopes.

c. Ensure that the land mass designated as the disposal site is suitable for reclamation and revegetation compatible with the natural surroundings and approved postmining land use.

(2.) The spoil pile shall be transported and placed in horizontal lifts in a controlled manner, concurrently compacted as necessary to ensure mass stability and prevent mass movement, covered, and graded to allow surface and subsurface drainage to be compatible with the natural surroundings and ensure a minimum long-term static safety factor of 1.5. The Administrator may limit the horizontal lifts to four feet or less as necessary to ensure the stability of the fill or to meet other applicable requirements.

(3.) No water impoundments or large depressions shall be constructed on the fill. Soil conservation techniques may be approved if they are needed to minimize erosion, enhance wildlife habitat or assist

revegetation, as long as they are not incompatible with the stability of the fill.

(4.) Slope protection shall be provided to minimize surface erosion at the site. Diversion of surface water runoff shall conform with the requirements of subsection (e) of this Section. All disturbed areas, including diversion ditches that are not ripped, shall be vegetated upon completion of construction.

(5.) Terraces may be constructed on the outslope of the fill if required for stability, control of erosion, to conserve soil moisture, or to facilitate the approved postmining land use. The grade of the outslope between terrace benches shall not be steeper than 2h:lv (50 percent).

(6.) Excess spoil that is toxic, acid-forming or combustible shall be adequately covered with suitable material or treated to prevent pollution of surface and groundwater, to prevent sustained combustion, and to minimize adverse affects on plant growth and the approved postmining land use.

(IV) Inspection of excess spoil piles.

(1.) The fill shall be inspected for stability by a qualified registered professional engineer or other qualified professional specialist under the direction of a professional engineer experienced in the construction of earth and rockfill embankments at least quarterly throughout construction and during the following critical construction periods:

- a. foundation preparation, including the removal of all organic material and topsoil;
- b. placement of diversion systems;
- c. installation of final surface drainage systems; and
- d. final grading and revegetation.

(2.) Regular inspections by the engineer or specialist shall be conducted during placement and compaction of the fill materials. The registered professional engineer shall promptly provide certified reports to the Administrator which demonstrate that the fill has been maintained and constructed as specified in the design contained in the approved mining and reclamation plan. The report shall discuss appearances of instability, structural weakness, and other hazardous conditions. A copy of all inspection reports shall be retained at the mine site.

(xii) Coal mine waste.

(A) Coal mine waste shall be disposed only in existing or, if new, in an approved disposal site within a permit area. Coal mine wastes shall not be used in the construction of dams, embankments, or diversion structures. The disposal area shall be designed, constructed and maintained:

(I) In accordance with the excess spoil disposal requirements of (xi)(F)-(I), and (K)-(O) above; and

(II) To prevent combustion and not create a public health hazard.

(B) Disposal of coal mine waste in excess spoil piles may be approved if such waste is:

(I) Placed in accordance with the excess spoil requirements of (xi) above;

(II) Demonstrated to be nontoxic and nonacid-forming (or properly treated); and

(III) Demonstrated to be consistent with the design stability of the fill.

(C) In addition to (A) above, coal mine waste piles shall meet the following requirements:

(I) The disposal facility shall be designed to attain a minimum static safety factor of 1.5. The foundation and abutments must be stable under all conditions of construction.

(II) Following final grading of the waste pile, the site shall be covered with a minimum of four feet of the best available, nontoxic, nonacid-forming and noncombustible material, in a manner that directs runoff away from the waste pile. The site shall be revegetated in accordance with this Chapter. The Administrator may allow less than four feet of cover material based on physical and chemical analyses which show that the revegetation requirements will be met.

(III) Surface drainage from above the pile and from the crest and face of the pile shall be permanently diverted around the waste in accordance with subsection (e) of this Section.

(IV) All coal mine waste piles shall be inspected in accordance with the excess spoil requirements of (xi) above. More frequent inspections shall be conducted if a danger or harm exists to the public health and safety or the



environment. Inspections shall continue until the waste pile has been finally graded and revegetated or until later time as required by the Administrator. If any inspection discloses that a potential hazard exists, the Administrator shall be notified immediately, including notification of any emergency protection and remedial procedures which will be implemented. If adequate procedures cannot be formulated or implemented, the Administrator shall inform the appropriate emergency agencies of the hazard to protect the public from the area.

(V) All coal mine waste piles shall meet the requirements of 30 CFR §§ 77.214 and 77.215.

(D) Dams and embankments constructed to impound coal mine waste shall comply with the following:

(I) Each impounding structure shall be designed, constructed and maintained in accordance with the requirements applicable to temporary impoundments. Such structures may not be retained permanently as part of the approved postmining land use. Approval by the State Engineer's Office is not required.

(II) If the impounding structure meets the criteria of 30 CFR § 77.216(a), the combination of principal and emergency spillways shall be able to safely pass or control runoff from the probable maximum precipitation of a 6-hour precipitation event or a storm duration having a greater peak flow, as may be required by the Administrator.

(III) Spillways and outlet structures shall be designed to provide adequate protection against erosion and corrosion. Inlets shall be protected against blockage.

(IV) Be designed so that 90 percent or more of the water stored during the design precipitation event can be removed within ten days and at least 90 percent of the water stored during the design precipitation event shall be removed within the ten day period following the design precipitation event.

(V) Runoff from areas above the disposal facility or runoff from the surface of the facility that may cause instability or erosion of the impounding structure shall be diverted into stabilized diversion channels designed to meet the requirements for diversions, and designed to safely pass the runoff from a 100-year, 6-hour design precipitation event or a storm duration having a greater peak flow.

(E) The Administrator may specify additional design criteria for waste piles or impounding structures on a case-by-case basis as necessary to meet the general performance standards of this subsection.

(F) Coal mine waste fires shall be extinguished by the operator

in accordance with a plan approved by the Administrator and the Mine Safety and Health Administration. The plan shall contain, at a minimum, provisions to ensure that only those persons authorized by the operator, and who have an understanding of the procedures to be used, shall be involved in the extinguishing operations. No burning or burned coal mine waste may be removed from a permitted disposal area without a removal plan approved by the Administrator. Consideration shall be given to persons working or living in the vicinity of the structure.

(G) Coal preparation plants shall be included within a permit area. Refer to Chapter 3, Section 6 for requirements applicable to coal preparation plants.

(xiii) Acid-forming and toxic materials, and other waste.

(A) All exposed coal seams remaining after mining and any acid-forming, toxic, and combustible materials, or any waste materials that are exposed, used or produced during mining shall be adequately covered, within 30 days of its exposure with nontoxic, nonacid-forming and noncombustible material, or treated. Compaction followed by burial or treatment shall be provided to prevent pollution of surface and groundwater quality, prevent sustained combustion and to minimize adverse effects on plant growth and postmining land uses. Such materials may be stored in a controlled manner until final burial and/or treatment first becomes feasible as long as storage will not result in any risk of water pollution or other environmental or public health and safety damage. Storage, final burial and treatment shall be done in accordance with all local, State and Federal requirements.

(B) Acid-forming or toxic material, or any other waste material capable of polluting water, shall not be buried or stored in the proximity of a drainage channel or its flood plain so as to cause or pose a threat of water pollution.

(C) Final burial of noncoal mine waste materials (such as grease, lubricants, paints, flammable liquids, garbage, trash, abandoned mining machinery, lumber and other combustible materials) and any wastes classified as hazardous shall be in a designated disposal site authorized by the Solid Waste Management Section of the Department.

(D) Management and final burial on the permit area of solid wastes generated by a mine mouth power plant or mine mouth coal drier shall be in accordance with this Section and with provisions of the Solid Waste Management Rules and Regulations deemed appropriate by the Administrator.

(d) Revegetation.

(i) General Revegetation Performance Standards

(A) The operator shall establish on all affected lands a diverse,

permanent vegetative cover of the same seasonal variety native to the area or a mixture of species that will support the approved postmining land use in a manner consistent with the approved reclamation plan. This cover shall be self-renewing, and capable of stabilizing the soil.

(B) Land which did not support vegetation prior to becoming affected because of natural soil conditions need not be revegetated unless subsoil from such affected land will support vegetation. The operator shall demonstrate to the Administrator's satisfaction that revegetation or reforestation is not possible if he seeks to proceed under the provisions of the subsection.

(C) After backfilling, grading, contouring, and the replacement of topsoil and/or approved substitutes, revegetation shall be commenced in such a manner so as to most efficiently retain moisture and control erosion on all affected lands to be revegetated. In addition, any fertilizer requirements based on previous analysis must be fulfilled.

(D) Mulch or other equivalent procedures which will control erosion and enhance soil moisture conditions shall be used on all retopsoiled areas.

(E) Any tillage and/or drill seeding shall be on the topographic contour, unless for safety reasons it is not practicable, or perpendicular to the prevailing wind on flat areas. Seeding of affected lands shall be conducted during the first normal period for favorable planting conditions after final preparation unless an alternative plan is approved.

(F) Any rills or gullies that would preclude successful establishment of vegetation or achievement of postmining land use shall be removed or stabilized.

(G) The bond for revegetation shall be retained for not less than ten years after the operator has completed seeding, fertilizing, irrigation, or other work to ensure revegetation. The bond responsibility period shall not be affected where normal husbandry practices are being followed as described in Chapter 4, Section 2(d)(i)(M). The success of revegetation shall be determined in accordance with Chapter 4, Section 2(d)(ii).

(H) The Administrator shall not release the entire bond of any operator until such time as revegetation is completed, if revegetation is the method of reclamation as specified in the operator's approved reclamation plan.

(I) Trees shall be returned to a number equal to the premining number. On affected lands, the total number of postmining trees shall be at least equal to the premining total number on those lands. The Reclamation Plan shall specify the tree species, the number per species and the location of tree plantings. The operator may also

receive credit for tree species which invade the reclaimed lands if those tree species support the postmining land use and are approved by the Administrator. Planted trees counted to meet the approved stocking rate shall be healthy, and at least 80 percent shall have been planted for at least eight years. All planted trees must have been in place at least two growing seasons. Invaded trees that are counted to meet the approved stocking rate shall be healthy and may be of any age.

(J) Monitoring of permanent revegetation on reclaimed areas before and after grazing shall be conducted at intervals throughout the bond responsibility period in accordance with the plan required by Chapter 2, Section 6(b)(iv). Monitoring results shall be presented in the annual report.

(K) The operator must protect young vegetative growth from being destroyed by livestock by fencing or other approved techniques for a period of at least two years, or until the vegetation is capable of renewing itself with properly managed grazing and without supplemental irrigation or fertilization. The Administrator, operator, and the landowner or land managing agency shall determine when the revegetated area is ready for livestock grazing.

(L) The operator must control and minimize the introduction and/or spread of noxious weeds on all affected lands in accordance with Federal and State requirements throughout the entire bond responsibility period.

(M) The following is a list of normal husbandry practices which, if conducted in a prudent manner, will not restart the minimum ten-year bond responsibility period for re-establishing vegetation.

(I) The operator may interseed species contained in the approved seed mix over established revegetation, but not within 6 years before the end of the bond responsibility period. The operator may add mulch to an interseeded area to facilitate plant establishment. Augmented seeding (reseeding) is not considered normal husbandry practice.

(II) Using approved species, the operator may transplant tree and shrub stock and/or plant containerized or bare root tree or shrub stock into reclamation provided the performance standards of Chapter 4 Section 2(d)(i)(H) for trees, and Chapter 4 Section 2(d)(ii)(A)(II)(2) for shrubs are not compromised.

(III) Grazing of reclamation is a normal husbandry practice.

(IV) For trees and shrubs planted in an approved shelterbelt, the practices of fertilization, irrigation and rototilling may be used as normal husbandry/nursery practices in accordance with standard practices.

(V) Beyond establishment, fertilization is a normal husbandry practice for cropland and pastureland throughout the bond responsibility period. Irrigation is a normal husbandry practice beyond establishment for cropland and pastureland, provided the approved postmine land use is irrigated cropland or irrigated pastureland.

(VI) Mechanical husbandry practices such as selective cutting, mowing, combining, aerating, land imprinting, raking, or harrowing to stimulate permanent vegetation establishment, increase decomposition of organic matter, control weeds, harvest hay, and/or reduce standing dead vegetation and litter are considered normal husbandry practices. Other mechanical practices may be used if approved by the Administrator prior to their application.

(VII) Tillage and replanting are considered normal husbandry practices for croplands.

(VIII) Acceptable weed and pest control techniques representing normal husbandry practices include manual or mechanical removal, controlled burning, biological controls, and herbicide/pesticide applications. The operator may reseed treated areas of less than five acres per year as a component of this husbandry practice without restarting the bond responsibility period.

(IX) Controlled burning may be used to reduce the buildup of litter, weed seeds, and to control undesirable species. The operator may interseed any portion of the treated area, or reseed up to five acres, as a component of this husbandry practice without restarting the bond responsibility period.

(X) Subsidence, settling, and erosional features, such as rills, gullies, or headcuts less than five acres in size may be repaired as a normal husbandry practice. Repairs considered to be normal husbandry practices include hand work, mechanical manipulation, installation of erosion-control matting, silt fences, straw bales, or other similar work. The operator may reseed treated areas of less than five acres as a component of this husbandry practice without restarting the bond responsibility period.

(XI) Removal of pipelines, small culverts, and small sediment control measures, such as traps, riprap, rock or straw bale check dams, small sediment ponds, and silt fences are considered normal husbandry practices. The operator may reseed treated areas of less than five acres as a component of this husbandry practice without restarting the bond responsibility period, provided the structures are reclaimed at least two years prior to the end of the bond responsibility period.

(N) The following actions have been administratively identified as those which qualify as routine land management activities; implementing these actions will not restart the bonding liability period:

- (I) Installation and/or removal of power lines and substations;
- (II) Installation and/or removal of fences;
- (III) Installation and/or removal of any monitoring equipment or features;
- (IV) Establishment and/or reclamation of two-track trails; and
- (V) Emplacement and/or removal of above-ground pipelines.

(ii) Revegetation Success Standards

(A) Success standards vary by land use. Where standards for cover, production, and shrub density apply, they are quantitative and must be demonstrated to equal or exceed the success standards using methods and statistical analyses approved and published by the Administrator as required by OSM rules (CFR §816.116 (a)(1), August 30, 2006). Statistical analyses must use a 90-percent statistical confidence interval.

(B) Grazingland and Pastureland

(I) Revegetation shall be deemed to be complete when: (1) the vegetation cover of the affected land is shown to be capable of renewing itself under natural conditions prevailing at the site, and the absolute total vegetative cover is at least equal to the cover on the reference area or technical standard, (2) the annual herbaceous production is at least equal to the annual herbaceous production on the reference area or technical standard, (3) the species diversity and composition are suitable for the approved postmining land use, and (4) the requirements in (1), (2) and (3) are all met during the same two out of four years beginning no sooner than year seven of the bond responsibility period. Species diversity and composition suitable to the postmine land use must be demonstrated using methods approved by the Administrator. The following reference area type options are available:

(1.) The operator may choose to use control areas for lands where control areas were originally selected for revegetation success evaluation. Control areas will not be approved for new amendments or permits, after (date of rule approval

(2.) The operator shall choose one type of “Reference area” as defined in Chapter 1, Section 2(dl). The “Reference area” shall be approved by the Administrator.

(3.) The Administrator may set or approve quantitative technical success standards for cover and/or production based on data collected from undisturbed portions of the permit area or adjacent areas during a minimum of five independent sampling programs over a minimum of five years. The technical success standards may be approved for a single mine or a group of mines in the same geographical area.

(II) The shrub standard for grazingland shall include the postmining density, composition, and distribution of shrubs, and shall be based upon site-specific evaluation of premining vegetation and wildlife use. Shrub reclamation procedures shall be conducted through the application of best technology currently available as approved in the permit.

(1.) For lands affected between May 3, 1978 and August 6, 1996, a goal of a minimum of one shrub (full shrubs plus subshrubs) per square meter within a mosaic of shrub patches shall be restored using the best practicable technology. These shrub patches shall: cover a minimum of 10 percent of the postmining (affected area) landscape; be no smaller than 0.05 acres; and be arranged in a mosaic that will optimize interspersions and edge effect.

a. Acreage from permit-wide shrub goal mosaics that is in excess of the required acreage may be banked for credit toward shrub standard lands provided (1) the shrub goal requirement for all shrub goal lands is met, and (2) the methods used to evaluate the shrub goal lands meet the methods and statistical analyses required to achieve the shrub standard.

(2.) Except where a lesser density is justified from premining conditions in accordance with Appendix 4A of Chapter 4, at least 20 percent of the eligible lands shall be restored to shrub patches supporting an average density of one shrub per square meter. Patches shall be no less than 0.05 acres each and shall be arranged in a mosaic that will optimize habitat interspersions and edge effect. Criteria and procedures for establishing the standard are specified in Appendix 4A of Chapter 4. This standard shall apply to all lands affected after August 6, 1996. For bond release purposes, the average postmine total density and species specific density(ies) shall be at least 90 percent of the calculated criteria for the applicable standard.

a. The shrub density standard requires a statistical test using a 90% confidence interval to demonstrate achievement of the standard. The standard must be demonstrated for one year, the last year of the bond responsibility period. At least 80% of the shrubs shall have been planted for at least 60% of the ten-year bond responsibility period, and all planted shrubs shall have been in place for at least two years.

b. Approved shrub species and seeding techniques shall be applied to all remaining grazingland.

c. Shrub mosaic patches must pass the standard for shrub density, based on the shrub option chosen from Appendix 4A of Chapter 4. Shrub patches must also be included in the Sample Unit for evaluation of the standards for total absolute vegetative cover and species diversity and composition. Shrub patches are exempt from the production standard. The operator may change the selected shrub option during the bond responsibility period, if baseline data support the new shrub option, and subject to Administrator approval.

d. For areas designated as crucial or critical habitat, consultation and approval by the Wyoming Game and Fish Department shall be required for minimum stocking rates and planting arrangements of shrubs, including species composition. The approved shrub success standards shall be specified in the Reclamation Plan. Habitat shall be designated as crucial prior to the submittal of a permit application or any subsequent amendment. For areas determined to be important habitat, the Wyoming Game and Fish Department shall be consulted for recommended minimum stocking and planting arrangements of shrubs, including species composition, that may exceed the programmatic standard discussed above. Approval of shrub stocking plans by the Wyoming Game and Fish Department is not required for areas designated as important habitat.

(C) Cropland

(I) When the approved postmining land use is cropland, the reclaimed area shall be stabilized and revegetated to control erosion unless cropping shall immediately occur. The bond responsibility period shall begin the first season a crop is planted.

(II) Reclamation shall be deemed complete when productive capability is equivalent to an approved reference area (Chapter 1 Section 2(d1)) or published county production data collected the same years the crops are harvested. This standard shall be demonstrated for the two out of four years of the bond responsibility period, starting no sooner than year seven.

(1.) When using a reference area comparison, the operator may choose a reference area under operator control or on a nearby property. The comparison may be made using production quadrats or total field harvest. Appropriate statistical tests will be used for quantitative production quadrat comparisons. Total field harvest comparisons do not require a statistical test. The Administrator shall approve the reference area.

(2.) When using county production data, the total field harvest will be used for a comparison. No statistical test will be required for this comparison.



(D) Fish and Wildlife Habitat. The operator shall gain approval from the Administrator and Wyoming Game and Fish for development of permit-specific performance standards for fish and/or wildlife habitat. These standards shall be stated in the reclamation plan. Specific information shall include:

(I) Which vegetation parameters are used in the standard (e.g. cover, shrubstocking, species diversity and composition);

(II) If shrub stocking is required, then the standards Section 2(d)(ii)(A)(II)(2.) (a.) of this chapter apply; and

(III) Indicate if the standards require a statistical test, a numerical comparison with no statistical test, or a qualitative comparison.

(E) Postmining Wetlands

(I) Reclamation plans for postmining mitigation wetlands shall be reviewed and approved by the Army Corps of Engineers and the Administrator and incorporated into the Land Quality Division permit. Wetland mitigation shall be considered successful when the Army Corps of Engineers determines that mitigation was successful.

(1.) The operator may create and receive success credit for up to 25 percent additional acreage over the Army Corps of Engineers' required mitigation acreage for each mitigation wetland type.

(2.) The minimum bond responsibility period for areas containing mitigation wetlands is ten years and no request for Phase 3 Incremental Bond release shall be made earlier than the last year of the bond responsibility period. A statement of successful mitigation from the Army Corps of Engineers shall be submitted by the operator to the Administrator as demonstration of successful mitigation. If successful mitigation is approved by the Army Corps of Engineers prior to the last year of the bond responsibility period, then the wetland will be evaluated as part of the surrounding area using the standards applied to that area.

(II) Reclamation plans and success standards for postmining enhancement wetlands shall be reviewed and approved by the Administrator and the Game and Fish Department as a type of wildlife habitat and incorporated into the Land Quality Division permit. The reclamation plan and success standards shall be determined by the postmining land use, and fish and wildlife habitat standards in Section 2(d)(ii)(C) of this chapter apply. The minimum bond liability period for enhancement wetlands is ten years and no demonstration of successful reclamation shall be made earlier than the last year of the bond responsibility period.

(F) Industrial, Commercial, and Residential. When the

approved postmining land use is residential or industrial/commercial, the reclaimed area shall be stabilized and revegetated to control erosion unless development shall immediately occur.

(I) Industrial, commercial and residential areas may be released from area and all incremental bond costs as soon as the area is reclaimed to a condition that is ready for the approved land use. The exact criteria will vary with the postmine land use, and shall be specified in the approved Reclamation Plan.

(G) Developed water resource. For lands within the high water line of a developed water resource there are no revegetation reclamation standards.

(H) Recreational. The operator shall gain approval from the Administrator and the appropriate agency for development of permit-specific performance standards. The standards and the reclamation plan shall be included in the permit. If the reclamation plan includes stocking of trees or shrubs approved by Wyoming Game and Fish, then successful tree/shrub establishment must be demonstrated for one year, the last year of the bond responsibility period. At least 80% of the trees/shrubs shall have been planted for at least 60% of the last ten years of the bond responsibility period, and all planted trees/shrubs shall have been in place for at least two years.

(I) Forestry. Standards for the success of reforestation for commercial harvest shall be established in consultation with and approval from forest management agencies, prior to approval of any mining and reclamation plan that proposes reforestation. The quality and quantity of trees, and the cover of the understory vegetation community shall be not less than that required to achieve the postmining land use and shall be determined in accordance with scientifically acceptable sampling procedures approved by the Administrator. Successful tree establishment must be demonstrated for one year, the last year of the bond responsibility period. At least 80% of the trees shall have been planted for at least 60% of the last ten years of the bond responsibility period, and all planted trees shall have been in place for at least two years.

(J) Special Success Standards.

(I) For areas previously disturbed by mining and not reclaimed to the requirements of these regulations, the areas shall, at a minimum, be revegetated to a ground cover and productivity level existing before redisturbance and shall be adequate to control erosion.

(II) For lands and facilities that were affected prior to May 3, 1978, and continuously used by the mining operation since that date, the areas shall be reclaimed to the performance standards that were in effect in Rule and Regulation at the time of initial disturbance. At a minimum, the area must be revegetated to a ground cover adequate to control erosion.

(e) Diversion systems and drainage control.

(i) Diversion of streams.

(A) All diversions shall be designed to assure public safety, prevent material damage outside the permit area, and minimize adverse impacts to the hydrologic balance.

(B) All diversions and associated structures shall be designed, constructed, maintained and used to ensure stability, prevent, to the extent possible using best technology currently available, additional contribution of suspended solids to streamflow outside the permit area, and comply with all applicable local, State and Federal rules.

(C) Permanent diversions of intermittent and perennial streams shall be designed and constructed so as to be erosionally and geomorphically compatible with the natural drainage system.

(D) The design and construction of all diversions for perennial or intermittent streams shall be certified by a qualified registered professional engineer as meeting the diversion standards of these regulations and the approved permit.

(E) When permanent diversions are constructed or stream channels restored after temporary diversions, the operator shall:

(I) Restore, enhance where practicable, or maintain natural riparian vegetation on the banks and flood plain of the stream;

(II) Establish or restore the stream characteristics, including aquatic habitats to approximate premining stream channel characteristics; and

(III) Establish and restore erosionally stable stream channels and flood plains.

(F) The operator shall renovate all permanent diversions in accordance with the approved reclamation plan prior to abandonment of the permit area.

(G) When no longer needed to achieve the purpose for which they were authorized, all temporary diversions shall be removed and the affected land regraded and revegetated, in accordance with this Chapter. Before diversions are removed, downstream water treatment facilities previously protected by the diversion shall be modified or removed, as necessary, to prevent overtopping or failure of the facilities. This requirement shall not relieve the operator from maintaining water treatment facilities as otherwise required.

(ii) Control of discharge or drainage.

(A) Discharge from sedimentation ponds, permanent and temporary impoundments, coal-processing waste dams and embankments, and diversions shall be controlled, by energy dissipators, riprap channels, and other devices, where necessary, to reduce erosion, to prevent deepening or enlargement of stream channels, and to minimize disturbance of the hydrologic balance. Discharge structures shall be designed according to standard engineering design procedures.

(B) Drainage from acid-forming and toxic-forming material into ground and surface water shall be avoided by:

(I) Identifying, burying, and treating where necessary, material which, in the judgment of the Administrator may adversely affect water quality if not treated or buried;

(II) Preventing water from coming into contact with acid-forming and toxic-forming material and other measures as required by the Administrator; and

(III) Complying with the requirements of subsection (c)(xiii) of this Section and such other measures deemed necessary by the Administrator to protect surface water and groundwater.

(C) Surface water shall not be diverted or otherwise discharged into underground mine workings unless specifically authorized by the Administrator per the requirements of Chapter 19, Section 2(a) of these regulations.

(iii) In addition to meeting the standards of this Section, all diversions of groundwater discharge flows shall meet the standards of Section 2(e).

(iv) Diversion systems - Unchannelized surface water and ephemeral streams.

(A) Surface water shall be diverted around the operation for the following purposes:

(I) To control water pollution.

(II) To control unnecessary erosion.

(III) To protect the on-going operation.

(IV) To protect the water rights of downstream users.

(B) Temporary diversion of surface runoff or diversions used for erosion control shall meet the following standards:

(I) In soils or other unconsolidated material, the sides of diversion ditches shall be no steeper than 1½:1.

(II) In rock, the sides of diversion ditches shall not overhang.

(III) In soils or unconsolidated materials, the sides and, in ditches carrying intermittent discharges, the bottom shall be seeded with approved grasses so as to take advantage of the next growing season.

(IV) Rock riprap, concrete, soil cement or other methods shall be used where necessary to prevent unnecessary erosion.

(V) Culverts or bridges shall be installed where necessary to allow access by the surface owner for fire control and other purposes.

(VI) Diversion ditches shall in a nonerosive manner pass the peak runoff from a 2-year, 6-hour precipitation event, or a storm duration that produces the largest peak flow, as specified by the Administrator.

(C) In no case shall diversion ditches discharge upon topsoil storage areas, spoil or other unconsolidated material such as newly reclaimed areas.

(D) Permanent diversion structures shall be designed to be erosionally stable during the passage of the peak runoff from a 100-year, 6-hour precipitation event, or a storm duration that produces the largest peak flow, as specified by the Administrator.

(v) Diversion of intermittent and perennial streams.

(A) In no case shall spoil, topsoil, or other unconsolidated material be pushed into, or placed below the flood level of a perennial or intermittent stream except during the approved construction of the diversion of said stream.

(B) The Wyoming Game and Fish Department shall be consulted prior to the approval of a diversion of a perennial or intermittent stream.

(C) The banks of a diverted perennial or intermittent stream shall be protected by vegetation by planting approved species to take advantage of the next growing season.

(D) The banks and channel of a diverted perennial or intermittent stream shall be protected where necessary by rock, riprap or similar measures to minimize erosion and degradation of water quality. Permanent diversions shall be designed and constructed to be erosionally stable. The design of the permanent diversion shall also be consistent with the role of the fluvial system.

(E) Mining on the flood plain of a perennial or intermittent stream shall not be permitted if it would cause the uncontrolled diversion of the stream during periods of high water.

(F) Waters flowing through or by the mining operation shall meet the standards set by the U.S. Environmental Protection Agency and the Wyoming Water Quality Division in regard to the effect of the operation upon such waters.

(G) If temporary, the channel and flood plain shall be designed to pass, in a nonerosive manner, the 10-year, 6-hour precipitation event, or the capacity of the unmodified stream channel immediately above and below the diversion, whichever capacity is greater, or a duration having a greater peak flow, as specified by the Administrator. Cross-sections of the existing stream above, below and within the disturbed area may be used to determine the flow capacities, channel configuration and shape.

(H) If permanent, the channel and flood plain shall be designed to pass, in a nonerosive manner, the 100-year, 6-hour precipitation event, or a duration having a greater peak flow, as specified by the Administrator. Cross-sections of the existing stream above, below and within the disturbed area may be used to determine the flow capacities, channel configuration and shape.

(f) Sedimentation ponds.

(i) All surface drainage from affected lands excluding sedimentation ponds, diversion ditches, and road disturbances, shall pass through a sedimentation pond(s) before leaving the permit area. Sedimentation control devices shall be constructed prior to disturbance. The Administrator may grant exemptions to the use of sedimentation ponds where, by the use of alternative sediment control measures, the drainage will meet effluent limitation standards or will not degrade receiving waters.

(ii) Where the sedimentation pond(s) results in the mixing of drainage from affected lands with the drainage from undisturbed areas, the permittee shall comply with the applicable effluent limitation standards for all of the mixed drainage where it leaves the permit area.

(iii) Sedimentation ponds shall be designed and constructed to comply with the applicable requirements of subsection (g)(iv-vii) of this Chapter. They shall be located as near as possible to the affected lands and out of intermittent or perennial streams; unless approved by the Administrator.

(iv) Sedimentation ponds shall be operated and maintained to comply with the requirements of the Water Quality Division and the State Engineer's Office and satisfy the following requirements:

(A) Chemicals that will harm fish, wildlife, and related environmental values shall not be used for flocculation or other water treatments or if used these ponds will be protected.

(B) Sedimentation ponds shall be designed and maintained to contain adequate sediment storage as determined by acceptable empirical methods.

(C) Sluicing of collected sediments shall be prevented for the design precipitation event.

(D) All areas disturbed by the construction of the sedimentation pond shall be revegetated as soon as practicable to reduce erosion.

(v) The design, construction, and maintenance of a sedimentation pond or other sediment control measures in accordance with this subsection shall not relieve the operator from compliance with applicable effluent limitation standards of the Water Quality Division.

(vi) Sediment ponds shall be maintained until removal is authorized by the Division and the affected lands have been stabilized and initial vegetation established in accordance with the approved reclamation plan and the requirements of this Chapter. In no case shall sediment ponds treating reclaimed lands be removed sooner than two years after the last augmented seeding.

(vii) Sediment control measures for affected lands. Appropriate sediment control measures shall be designed, constructed, and maintained using the best technology currently available to prevent additional contributions of sediment to streamflow or to runoff outside the affected land. Such measures may consist of limiting the extent of disturbed land and stabilizing, diverting, treating or otherwise controlling runoff.

(g) Permanent and temporary water impoundments.

(i) Permanent water impoundments are prohibited unless authorized by the Administrator on the basis that:

(A) The impoundment and its water quality and quantity will support or constitute a postmining use equal to or greater than the highest previous use of the land.

(B) Discharge of water, if any, from the impoundment shall not

degrade the quality of receiving waters.

(C) The surface landowner, if different from the mineral owner, has consented to the impoundment.

(ii) Permanent water impoundments. Permanent water impoundments shall be constructed in accordance with the following requirements:

(A) Dams must contain an overflow notch and spillway so as to prevent failure by overfilling and washing. Overflow notches and spillways must be riprapped with rock or concrete to prevent erosion.

(B) The slopes around all water impoundments must be gentle enough so as not to present a safety hazard to humans or livestock and so as to accommodate revegetation. Variations from this procedure may be approved by the Administrator based on the conditions present at the individual locality.

(C) Mineral seams and other sources of possible water contamination within the impoundment area must be covered with overburden or stabilized in such a manner to prevent contamination of the impounded water.

(D) Bentonite or other mire-producing material within the impoundment basin shall be removed or covered with materials which will prevent hazards to man or beast.

(iii) The phrase "major impoundment" shall mean any structure impounding water, sediment or slurry:

(A) To an elevation of 20 feet or more above the upstream toe to the crest of the emergency spillway; or

(B) To an elevation of five feet above the upstream toe of the structure and has a storage volume of 20 acre-feet or more; or

(C) Which will be retained as part of the postmining land use, and:

(I) Has an embankment height greater than 20 feet as measured from the downstream toe of the embankment to the top of the embankment; or

(II) Has an impounding capacity of 20 acre-feet or greater.

(iv) The design, construction and maintenance of permanent and temporary impoundments shall be approved by the State Engineer's Office. In addition,



the following design and construction requirements shall be applicable:

(A) The design of impoundments shall be certified by a qualified registered professional engineer as designed to meet the requirements of this part and the applicable requirements of the State Engineer, using current, prudent engineering practices. For major impoundments, the certification also shall be filed with the State Engineer.

(B) The vertical portion of any remaining highwall shall be located far enough below the low water line along the full extent of highwall to provide adequate safety and access for the proposed water users.

(C) Faces of embankments and surrounding areas shall be vegetated, except that faces where water is impounded may be riprapped or otherwise stabilized in accordance with accepted design practices, or where appropriate, Water Quality Division rules and regulations.

(D) The embankment, foundation, and abutments for all impoundments shall be designed and constructed to be stable. For any major impoundment or any impoundment which may present a danger to life, property or the environment, the Administrator shall require sufficient foundation investigations and laboratory testing to demonstrate foundation stability, and shall require a minimum static safety factor of 1.5 for the normal pool with steady seepage saturation conditions, and a seismic safety factor of at least 1.2.

(E) All vegetative and organic materials shall be removed and foundations excavated and prepared to resist failure. Cutoff trenches shall be installed if necessary to ensure stability.

(F) All impoundments shall be inspected regularly during construction and immediately after construction by a qualified registered professional engineer or qualified professional specialist under the direction of a qualified professional engineer. These individuals shall be experienced in impoundment construction. Immediately following each inspection a report shall be prepared and certified by the engineer describing the construction work observed and its conformance with the approved designs. All inspection reports shall be retained at the mine site and submitted in the annual report to the Administrator.

(G) After completion of construction and until final bond release or removal, all impoundments shall be inspected annually by a qualified registered professional engineer, or by a qualified professional specialist under the direction of the qualified professional engineer. These individuals shall be experienced in impoundment construction. Immediately following each inspection a report shall be prepared and certified by the engineer describing:

instrumentation;

(I) Existing and required monitoring procedures and

(II) Depth and elevation of any impounded water;

(III) Existing storage capacity;

(IV) Aspects of the dam that may affect its stability or present any other hazardous condition; and

(V) If the impoundment is being maintained in accordance with the approved design and this Chapter. All annual inspection reports shall be retained at the mine site and annually submitted to the Administrator.

(H) In addition to the post-construction annual inspection requirements contained in paragraph (G) immediately above, all impoundments must be inspected during each of the intervening calendar quarters by a qualified individual designated by the operator. These inspections shall look for appearances of structural weakness and other hazardous conditions.

(I) Those impoundments subject to 30 CFR § 77.216 shall also be inspected in accordance with 30 CFR § 77.216-3.

(J) If any examination of inspection discloses that a potential hazard exists, the operator shall promptly inform the Administrator of the finding and of the emergency procedures formulated for public protection and remedial action. If adequate procedures cannot be formulated or implemented the Administrator shall be notified immediately. The Administrator shall then notify the appropriate agencies that other emergency procedures are required to protect the public.

(K) Impoundments meeting the criteria of 30 CFR § 77.216(a) shall comply with the requirements of 30 CFR § 77.216. The plan required to be submitted to the District Manager of MSHA under 30 CFR § 77.216 shall also be submitted to the Administrator as part of the permit application.

(L) Impoundments shall include either a combination of principal and emergency spillways or a single open channel spillway designed to pass the design precipitation events discussed in subsection (v) below at non-erosive velocities.

(M) In lieu of meeting the requirements in section (L) above, the Administrator may approve a temporary impoundment that relies primarily on storage to control the runoff from the design precipitation event when it is demonstrated by the operator and certified by a qualified registered professional engineer or qualified registered professional land surveyor that the impoundment will safely control the design precipitation event, the water from which could be safely removed in accordance with

current, prudent, engineering practices. Such an impoundment shall be located where failure would not be expected to cause loss of life or serious property damage.

(v) The design precipitation event for the spillways for temporary water impoundments shall be a 25-year, 6-hour precipitation event, or a storm duration having a greater peak flow, as may be required by the Administrator or as specified below:

(A) The design precipitation event for spillways on temporary impoundments which meet the criteria of 30 CFR § 77.216(a) shall be a 100-year, 6-hour precipitation event, or a storm duration having a greater peak flow, as may be required by the Administrator; and

(B) Temporary impoundments which meet the criteria of 30 CFR § 77.216(a) and that are intended to impound coal mine waste shall have sufficient spillway and/or storage capacity to safely pass or control runoff from the probable maximum precipitation of a 6-hour precipitation event, or a storm duration having a greater flow, as may be required by the Administrator.

(vi) The design precipitation event for the spillways for a permanent impoundment shall be a 100-year, 6-hour precipitation event, or a storm duration having a greater peak flow, as may be required by the Administrator.

(vii) Before abandoning an area or seeking bond release, the operator shall ensure that all temporary structures are removed and reclaimed, and that all permanent structures are renovated, if necessary to meet the requirements of this subsection and to conform to the approved reclamation plan.

(viii) Tailings impoundments.

(A) Impoundments to contain mill tailings or slurry tailings shall be constructed in accordance with established engineering principles and shall be approved by the Wyoming State Engineer's Office. A copy of the State Engineer's approval shall be attached to the application.

(B) Reclamation of tailings impoundments shall be accomplished by removal and storage of all topsoil present within the tailings basin. After termination of operations, the topsoil shall be replaced and revegetated in accordance with these rules and regulations. If other methods of reclamation and stabilization against wind and water erosion are found to be necessary because of natural conditions, this must be stated and described subject to the Administrator's approval.

(h) Protection of Groundwater Recharge Capacity - The recharge capacity of the reclaimed lands shall be restored to a condition which:

- (i) Supports the approved postmining land use;
- (ii) Minimizes disturbances to the prevailing hydrologic balance in the permit area and in adjacent areas; and
- (iii) Provides a rate of recharge that approximates the premining recharge rate.

(i) Surface water and groundwater quality and quantity shall be monitored until final bond release to determine the extent of the disturbance to the hydrologic balance. Monitoring shall be adequate to plan for modification of surface mining activities, if necessary, to minimize adverse affects on the water of the State. The operator is responsible for properly installing, operating, maintaining and removing all necessary monitoring equipment. In addition, the operator is responsible for conducting monitoring in accordance with the requirements of Chapter 2, Section 5(a)(xv) and the approved monitoring plan. Noncompliance results for NPDES discharges shall be promptly reported by the operator to the Water Quality Division Administrator. The operator shall promptly report all other noncompliance results to the Land Quality Division Administrator and shall, after consultation with the Administrator, implement appropriate and prompt mitigative measures for those noncompliance situations determined to be mining caused. The monitoring system shall be based on the results of the probable hydrologic consequences assessment and shall include:

- (i) A groundwater monitoring program to determine:
  - (A) Infiltration rates, subsurface flows, and storage characteristics of the reclaimed land and adjacent areas; and
  - (B) The effects of reclamation on the recharge capacity of the reclaimed lands.

(ii) A surface water monitoring program which includes monitoring of surface water flow and quality from affected lands including those that have been graded and stabilized. Results of the monitoring will be used to demonstrate that the quality and quantity of runoff from affected lands with or without treatment will minimize disturbance to the hydrologic balance. Water quality monitoring results for discharges other than those authorized by Water Quality Division shall be reported whenever results indicate noncompliance with effluent limitation standards or degradation of the quality of receiving water shall be reported immediately. Monitoring results shall be available for inspection at the mine site.

(j) Roads.

- (i) Road classification system.

(A) Each road, as defined in Chapter 1, shall be classified as either a primary road or an ancillary road.

(B) A primary road is any road which is:

(I) Used for transporting mineral or spoil;

(II) Frequently used for access or other purposes for a period in excess of six months; or

(III) To be retained for an approved postmining land use.

(C) An ancillary road is any road not classified as a primary road.

(ii) General performance standards. Each road shall be located, designed, constructed, reconstructed, used, maintained and reclaimed so as to:

(A) Control or prevent erosion, siltation, and the air pollution attendant to erosion, including road dust as well as dust occurring on other exposed surfaces, by measures such as vegetating, watering, using chemical or other dust suppressants, or otherwise stabilizing all exposed surfaces in accordance with current, prudent engineering practices;

(B) Control or prevent damage to fish, wildlife, or their habitat and related environmental values;

(C) Control or prevent additional contributions of suspended solids to stream flow or runoff outside the permit area;

(D) Neither cause nor contribute to, directly or indirectly, the violation of State or Federal water quality standards applicable to receiving waters;

(E) The normal flow of water in streambeds and drainage channels shall not be seriously altered;

(F) Prevent or control damage to public or private property, including the prevention or mitigation of adverse effects on lands listed in Chapter 12, Section 1(a)(v)(A); and

(G) Use nonacid- and nontoxic-forming substances in road surfacing.

(iii) Design and construction limits and establishment of design criteria. To ensure environmental protection appropriate for their planned duration and use,

including consideration of the type and size of equipment used, the design and construction or reconstruction of roads shall incorporate appropriate limits for grade, width, surface materials, surface drainage control, culvert placement, and culvert size, in accordance with current, prudent engineering practices.

(iv) Location.

(A) No part of any road shall be located in the channel of an ephemeral stream that has the potential for sufficient flow to cause substantial environmental harm unless a downstream sediment control structure exists within the permit boundaries, any intermittent stream channel or any perennial stream channel unless specifically approved by the Administrator in accordance with subsections 2(c), 2(e), 2(f), 2(h), 2(i), 2(r)(ii) and 2(w) of this Chapter and Section 2(a)(i) of Chapter 19.

(B) Roads shall be located to minimize downstream sedimentation and flooding.

(v) Maintenance.

(A) A road shall be maintained to meet the performance standards of this Chapter.

(B) A road damaged by a catastrophic event, such as a flood or earthquake, shall be repaired as soon as is practicable after the damage has occurred.

(vi) Reclamation. A road not to be retained under an approved postmining land use shall be reclaimed in accordance with the approved reclamation plan as soon as practicable after it is no longer needed for mining and reclamation operations. This reclamation shall include:

(A) Closing the road to traffic;

(B) Removing all bridges unless approved as part of the postmining land use and removing all culverts unless approved as part of the postmining land use or approved for burial in place;

(C) Removing or otherwise disposing of road-surfacing materials that are incompatible with the postmining land use and revegetation requirements;

(D) Reshaping cut-and-fill slopes as necessary to be compatible with the postmining land use and to complement the natural drainage pattern of the surrounding terrain;

(E) Protecting the natural drainage patterns by installing dikes

or cross drains as necessary to control surface runoff and erosion; and

(F) Scarifying or ripping the roadbed, replacing topsoil, subsoil or substitute material and revegetating disturbed surfaces in accordance with subsections 2(c)(i) through 2(c)(x) and 2(d) of this Chapter.

(vii) Primary roads.

(A) Certification. The construction or reconstruction of primary roads shall be certified in a report to the Administrator by a registered professional engineer. The report shall indicate that the primary road has been constructed or reconstructed as designed and in accordance with the approved plan. The report shall be available for review at the mine site within 30 days following the completion of construction of each primary road.

(B) Each primary road embankment shall have a minimum static safety factor of 1.3 or meet the requirements established under Chapter 2, Section 5(a)(xvi)(B).

(C) Location.

(I) To minimize erosion, a primary road shall be located, insofar as is practicable, on the most stable available surface.

(II) Fords of intermittent or perennial streams by primary roads are prohibited unless they are specifically approved by the Administrator as temporary routes during periods of road construction.

(D) Drainage control. In accordance with the approved plan:

(I) Each primary road shall be constructed or reconstructed and maintained to have adequate drainage control, using structures such as, but not limited to, bridges, ditches, cross drains, and ditch relief drains. The drainage control system shall be designed to safely pass the peak runoff from a 10-year, 6-hour precipitation event, or greater event as specified by the Administrator;

(II) Drainage pipes and culverts shall be installed as designed, and maintained in a free and operating condition and to prevent or control erosion at inlets and outlets;

(III) Drainage ditches shall be constructed and maintained to prevent uncontrolled drainage over the road surface and embankment;

(IV) Culverts shall be installed, and maintained to sustain the vertical soil pressure, passive resistance of the foundation, and the weight of

vehicles using the road;

(V) Natural stream channels shall not be altered or relocated without the prior approval of the Administrator in accordance with applicable Sections 2(c), 2(e), 2(f), 2(h), 2(i), 2(r)(ii) and 2(w) of this Chapter and Section 2(a)(i) of Chapter 19; and

(VI) Except as provided in (vii)(C)(II) of this section, structures for channel crossings of ephemeral streams that have the potential for sufficient flow to cause substantial environmental harm unless a downstream sediment control structure exists within the permit boundaries, any intermittent stream or any perennial stream shall be made using bridges, culverts, low-water crossings or other structures designed, constructed, and maintained using current, prudent engineering practices. The Administrator shall ensure that low-water crossings are designed, constructed and maintained to prevent erosion of the structure or streambed and additional contributions of suspended solids to streamflow.

(E) Surfacing: Primary roads shall be surfaced with material approved by the Administrator as being sufficiently durable for the anticipated volume of traffic and weight and speed of vehicles using the road.

(viii) Exemptions concerning roads.

(A) If approval is obtained from the surface landowner to leave a road unreclaimed, an operator may request in writing to the Land Quality Division that a road be permitted to remain unreclaimed. The operator must furnish proof of the surface landowner's approval. Final decision of road reclamation will be made by the Land Quality Division Administrator.

(B) In the event that the surface landowner, a city or town, another agency of the State of Wyoming or an agency of the United States government has requested that a road not be reclaimed, no bond shall be required of the applicant for the reclamation of the road and reclamation of the road shall not be required; provided, however, that the Administrator receives a copy of the written request from the surface owner, city or town, or agency of the State or Federal Government, for retention of the road.

(k) Time schedule.

(i) Reclamation must begin as soon as possible after mining commences and must continue concurrently until such time that the mining operation is terminated and all of the affected land is reclaimed. If conditions are such that final reclamation procedures cannot begin until the mining operation is completed, this must be explained in the reclamation plan. A detailed time schedule for the mining and reclamation progression must be included in the reclamation plan. This time schedule shall:



(A) Apply to reclamation of all lands to be affected in the permit area;

(B) Designate times for backfilling, grading, contouring and reseeded;

(C) Be coordinated with a map indicating the areas of progressive mining and reclamation;

(D) Establish reclamation concurrently with mining operations, whenever possible. If not possible, the schedule shall provide for the earliest possible reclamation consistent with the orderly and economic development of the property; and

(E) If the Administrator approves a schedule where reclamation follows the completion of mining, describe the conditions which will constitute completion or termination of mineral production.

(l) Unanticipated conditions.

(i) An operator encountering unanticipated conditions shall notify the Administrator as soon as possible and in no event more than five days after making the discovery.

(ii) An unanticipated condition is any condition encountered in a mining operation and not mentioned by the operator in his mining or reclamation plan which may seriously affect the procedures, timing, or outcome of mining or reclamation. Such unanticipated conditions include but are not limited to the following:

(A) The uncovering during mining operations of any acid-forming, radioactive, inflammable, or toxic materials which must be burned, impounded, or otherwise disposed of in order to eliminate pollution or safety hazards.

(B) The discovery during mining operations of a significant flow of groundwater in any stratigraphic horizon.

(C) The occurrence of slides, faults, or unstable soil and overburden materials which may cause sliding or caving in a pit which could cause problems or delays with mining or reclamation.

(D) The occurrence of uncontrolled underground caving or subsidence which reaches the surface, causing problems with reclamation and safety hazards.

(E) A discovery of significant archaeological or paleontological

importance.

(iii) In the case of the uncovering of hazardous materials, the operator shall take immediate steps to notify the Administrator and comply with any required measures to eliminate the pollution or safety hazard. Under all conditions the operator must take appropriate measures to correct, eliminate, or adapt to an unanticipated condition before mining resumes in the immediate vicinity of that condition.

(m) Disposal of mine facilities.

(i) All mine facilities constructed, used or improved by the operator must be removed or dismantled and shall be reclaimed in accordance with the requirements of this Chapter when no longer needed for the operation unless it can be demonstrated to the Administrator's satisfaction that the buildings or structures will be of beneficial use in accomplishing the proposed use of the land after reclamation or for environmental monitoring.

(ii) If the operator does not wish to remove certain mine facilities, the operator must obtain the written consent of the surface landowner to leave the mine facilities intact. The operator must make a request in writing, providing written proof of the above to the Land Quality Division, that the mine facilities be permitted to remain intact.

(n) Mine Facilities.

(i) Mine facilities shall be operated in accordance with the permit issued for the mine or coal preparation operation to which it is incident or from which its operation results.

(ii) In addition to the other provisions of this Chapter, mine facilities shall be located, maintained, and used in a manner that:

(A) Prevents or controls erosion and siltation, water pollution, and damage to public or private property;

(B) To the extent possible using the best technology currently available;

(1.) Minimizes damage to fish, wildlife, and related environmental values; and

(2.) Minimizes additional contributions of suspended solids to streamflow or runoff outside the permit area. Any such contributions shall not be in excess of limitations of State or Federal law.

(o) Signs and markers. Uniform and durable signs and markers of an

adequate size shall be posted by the operator at those points applicable to the areas or activities to which they pertain. Such signs and markers shall include mine and permit identification signs, perimeter markers, buffer zone markers, blasting signs and soil markers. The operator shall place and maintain all signs and markers prior to commencement and until the completion of the activities to which they pertain, which, for mine and permit identification signs, shall be at the time the bond is released.

(p) Drilled holes and other exposed underground openings: Plugging, sealing and capping of all drilled holes except those used solely for blasting or developmental drill holes which will be mined through within one year shall meet the requirements of Chapter 14. Developmental drilling shall meet the plugging and sealing requirements of W.S. § 35-11-404, where necessary. Temporary sealing and use of protective devices may be approved by the Administrator if the hole will be used for returning coal-processing waste or water to underground workings or monitoring groundwater conditions, and shall be used, at a minimum, for developmental drilling. Other exposed underground openings shall be properly managed as required by the Administrator to prevent access to mine workings and to keep acid or other toxic drainage from entering ground or surface water.

(i) With the prior approval of the Administrator and the State Engineer, wells may be transferred to another party for further use. The permittee shall remain responsible for the proper management of the well until final bond release.

(q) Air resources protection. All exposed surface areas shall be protected and stabilized to effectively control erosion and air pollution attendant to erosion.

(r) Fish and wildlife performance standards.

(i) An operator shall, to the extent possible using the best technology currently available and consistent with the approved postmining land use, minimize disturbance and adverse impacts on fish, wildlife, and related environmental values, and achieve enhancement of such resources where practicable, which activities shall include:

(A) Properly construct, locate and operate roads and powerlines, including proper design of powerlines to avoid electrocution of raptors.

(B) Prevent access to areas such as roadways or ponds with hazardous materials, to avoid damage to wildlife without limiting access to known important routes.

(C) Afford protection, restore and enhance where practicable important habitats to fish and wildlife. This shall include, but is not limited to, wetlands and riparian vegetation along rivers and streams and bordering ponds and lakes.

(D) Select plant species with shrubs well represented, which

will enhance the nutritional and cover aspects of fish and wildlife habitat, where such habitat is identified as part of the postmining use, and distribute the reestablished habitat in a manner which includes a diversity and interspersion of habitats, optimizes edge effect, cover and other benefits for fish and wildlife, and is consistent with Section 2(d)(x)(E).

(E) Promptly report to the regulatory authority any species or critical habitat of such species listed as threatened or endangered, or any golden or bald eagle nest in or adjacent to the permit area, which was not reported or investigated in the permit application. Upon notification the Administrator shall consult with the Wyoming Game and Fish Department and the U.S. Fish and Wildlife Service and, after consultation, shall identify whether and under what conditions the operator may proceed.

(F) Where the postmining land use is for cropland, to the extent not inconsistent with this intended use, operators shall restore habitat types to break up large blocks of monocultures.

(ii) Stream buffer zone.

(A) No land within 100 feet of a perennial or intermittent stream shall be affected unless the Administrator specifically authorizes such activities closer to or through such a stream upon a finding that:

(I) Surface mining activities will not cause or contribute to the violation of applicable state or federal water quality standards, and will not adversely affect the water quantity and quality or other environmental resources of the stream; and

(II) If there will be a temporary or permanent stream-channel diversion, it will comply with all stream diversion requirements.

(B) The area not to be affected shall be designated a buffer zone, marked in the field and on the mine plan map.

(iii) No surface mining activity shall be conducted which is likely to jeopardize the continued existence of endangered or threatened species listed by the State or the Secretary of the Interior or which will result in the destruction or adverse modification of designated critical habitats of such species in violation of the Endangered Species Act (16 U.S.C. 1531 et seq.). No surface mining activity shall be conducted in a manner which would result in the unlawful taking of a bald or golden eagle, its nest, or any of its eggs. The Administrator shall consult with the State and Federal Fish and Wildlife Agencies to identify whether and under what conditions the operation may continue under this provision.

(iv) The operator shall perform periodic surveys, in the level of detail

and for those areas as determined by the Administrator, in accordance with Appendix B of these rules and regulations.

(s) Slides and other damage. Where instability may exist in backfill materials, an undisturbed natural barrier shall be provided to prevent slides and erosion, beginning at the elevation of the lowest coal seam to be mined and extending from the outslope for such distance as may be determined by the Administrator.

(t) Only those operations designed to protect disturbed surface areas and which result in improved resource recovery, abatement of water pollution, or elimination of hazards to the public shall be conducted within 500 feet of an active or abandoned underground mine. Approval for such operation shall be obtained from MSHA for operations proposed to be conducted within 500 feet of an active underground mine. The Administrator shall specifically approve operations proposed to be conducted within 500 feet of an abandoned underground mine.

(u) Cessation of operations. When it is known that a temporary cessation of operations will extend beyond 30 days, the operator shall submit to the Administrator that information required in an annual report.

(v) The operator shall conduct operations so as to maximize the utilization and conservation of the solid fuel resource being recovered so that re-affecting the land in the future can be minimized.

(w) The operator shall conduct all operations in such a manner as to minimize disturbance of the hydrologic balance within the permit and adjacent areas, to prevent material damage to the hydrologic balance outside the permit area, to assure the protection or replacement of water rights, and to support approved postmining land uses in accordance with the terms and conditions of the approved permit and the performance standards of this Chapter. The Administrator may require additional preventative, remedial, or monitoring measures to assure that material damage to the hydrologic balance outside the permit area is prevented. Mining and reclamation practices that minimize water pollution and changes in flow shall be used in preference to water treatment.

(x) Utility installations which are not part of the surface coal mining operation. All operations shall be conducted in a manner which minimizes damage, destruction, or disruption of services provided by oil, gas, and water wells; oil, gas, and coal-slurry pipelines; railroads; electric and telephone lines; and water and sewage lines which pass over, under or through the permit area, unless otherwise approved by the Administrator or owner of the utility installation.

DEPARTMENT OF ENVIRONMENTAL QUALITY

LAND QUALITY DIVISION

CHAPTER 4, APPENDIX 4A

**A. Evaluation of Shrub Density**

Introduction

All “eligible lands”, as defined in Chapter 1, Section 2(am), shall be subject to the standard. Except where a lesser density is justified by premining conditions, at least 20 percent of the eligible land shall be restored to shrub patches supporting an average density of one shrub per square meter.

The postmining areal extent of shrub patches and specific shrub density(ies) shall be based on the original premining shrub densities in each vegetation community and the percentage each community contributes to the total eligible land existing in the original permit area and any lands added to the permit area through the amendment process.

Premine community(ies) identified and sampled during the baseline studies shall serve as the target for bond release unless otherwise approved by the Administrator.

For bond release purposes, the average postmine total density and species specific density(ies) shall be at least 90 percent of the calculated criteria for the applicable standard.

**CALCULATING THE REQUIRED POSTMINE DENSITY AND SPECIES COMPOSITION**

In order to calculate density and composition, the following must be identified:

1. Areal extent and premining total density of eligible land by vegetation community;
2. Relative density for each species;
3. Dominant premine species which then becomes the target postmine species;
4. Density of target postmine species using the formula  $D[1/(N + 1)]$ ;
5. Allowable density of postmining residual species; and
6. Acceptable residual species.

\* D is the postmining total shrub density. When D is less than 1.00, the density of

the target postmining species is reduced proportionately. N is the number of primary premining shrub and subshrub species.

Identification of available options

Option	Identification	Premine
I	Reduced permit-wide full shrub standard	$< 20\% @ \geq 1/M^2$
II	Permit-wide full shrub standard	$\geq 20\% @ \geq 1/M^2$
III	Community-specific full shrub standard	No restrictions
IV	Community-specific full and subshrub standard	No restriction – add subshrubs

The operator shall select one option only for bond release purposes within each permit or amendment area.

Option I: Permit-wide full shrub density standard; reduction in areal extent; composition based on premining full shrub density only (see Figure 1 for an illustration of this Option). For bond release purposes, no more than two separate acreage/density standards shall be used.

1. Reductions in areal extent and shrub density shall be appropriate when the premining vegetation community(ies) supporting at least one shrub per square meter comprised less than 20 percent of the eligible land. The percentage this community contributed to the total eligible land would then become the percentage of the postmining landscape that is required to support one shrub per square meter. The remainder of the postmining 20 percent areal extent of shrub patches shall be required to support shrubs at a density equaling the next highest density existing in a premining community.

2. Compute the relative premining dominance of full shrub species based on a weighted average of the percent areal extent of all vegetation communities and their associated full shrub species present within the eligible land. In this instance, one shrub patch seed mixture will be developed for the entire 20 percent areal extent.

3. From the information calculated in step 2. above, identify the dominant premine full shrub species. This species then becomes the target postmine species within the postmine shrub patches.

4. Compute the minimum density that the postmining target shrub (identified in step 3. above) must meet in order to achieve bond release under the standard. This is accomplished by applying the following equation:

$$D[1/(N + 1)]$$

D is the postmining total shrub density (D is always  $\leq 1.00$ ). N is the number of primary shrub species existing in the premining communities as identified in step 2. above. Primary shrub species shall be defined as full shrub species which comprise at least 10 percent of the relative density of full shrubs.

All primary shrub species shall be included in the shrub patch seed mixture.

5. The postmining residual density is calculated by subtracting the minimum required density of the target species from the total required density.

6. Residual density may be comprised of any premining primary species and any other approved full shrub species. In addition, the following subshrub species may be counted towards up to one half of the residual density.

<i>Artemisia frigida</i>	fringed sagewort
<i>Atriplex gardneri/gordonii</i>	Gardners saltbush
<i>Ceratoides lanata</i>	winterfat
<i>Artemisia pedatifida</i>	birdfoot sagewort
<i>Artemisia spinescens</i>	bud sagewort



**FIGURE 1**

**OPTION I: PERMIT-WIDE SHRUB DENSITY, REDUCTION OF DENSITY  
POSSIBLE COMPOSITION BASED ON FULL SHRUBS**

Note: No reduction of density is possible when 20 percent or more of the eligible acreage supports a premining total shrub density of over 1 shrub per square meter.

**TABLE 1**

Vegetation Community	Number of Acres Affected Following Rule Approval	Percent Eligible Acreage	Premining Total Shrub Density per m <sup>2</sup> (1)	Premining Total Shrub Number
Mixed Shrubland	364.00	18.2	1.20	1,767,730
Upland Grassland	1506.00	75.3	0.80	4,875,826
Scoria Grassland	80.00	4.0	0.30	97,128
Drainage Bottomland	50.00	2.5	0.20	40,470
Pastureland (2)	300.00	n/a	n/a	n/a
<b>Total Eligible Acreage</b>	<b>2000.00</b>			
<b>Total Acreage</b>	<b>2300.00</b>		<b>Premining No. of Shrubs</b>	<b>6,781,153</b>
<b>% Eligible/Total</b>	<b>86.96</b>			

(1) When the permit-wide standard is applied, premining density may be calculated from full shrubs only.  
 (2) Pastureland excluded by regulation

**TABLE 2**

Relative Premining Density for Primary Shrubs (≥ 10% Relative Density)			Postmining Total Shrub Density m <sup>2</sup> D*	N	D* (1/N+1) Density of Dominant per m <sup>2</sup>	Density of Residual Shrubs per m <sup>2</sup>	Density of Approved Subshrubs per m <sup>2</sup>	20% Acreage Reclaimed with Shrubs	Number of Shrubs Established
<b>Big Sagebrush</b>	<b>Rubber Rabbitbrush</b>	<b>Douglas Rabbitbrush</b>							
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>0.43</b>	<b>0.13</b>	<b>0.21</b>	← Numbers are weighted average relative density from Table 3						
<b>Dominant Species for this Option:</b>			<b>BIG SAGEBRUSH</b>						
<b>Reduced Permit-wide Standard</b>									
18.2% at 1/m <sup>2</sup>			1.00	3	0.25	0.375	0.375	364.00	1,473,108
1.8% at 0.8/m <sup>2</sup>			0.80	3	0.20	0.300	0.300	36.00	116,554
20 percent of eligible lands								400.00	
Postmining No. of Shrubs								1,589,662	

\* D = Postmining Total Shrub Density (e.g. 0.8 \* [1/(3+1)] = 0.20)

**TABLE 3 – Option I, Figure 1 continued**

<b>Relative Density Information for Species</b>					
Note: Relative density is calculated by number of individuals of each species divided by total number of individuals.					
The value of the dominant species for each type is shaded <span style="display: inline-block; width: 10px; height: 10px; background-color: #cccccc; border: 1px solid black;"></span>					
	Mixed Shrubland	Upland Grassland	Scoria Grassland	Drainage Bottomland	Weighted Average Relative Density**
Silver sagebrush	0.06			0.28	0.02
Big sagebrush	0.63	0.39	0.35	0.11	0.43
Fourwing saltbush		0.03			0.02
Black sagebrush		0.06	0.18		0.05
Rubber rabbitbrush	0.19	0.13			0.13
Douglas rabbitbrush		0.27	0.18		0.21
Wax currant			0.05		0.00
Skunkbrush sumac	0.12		0.20		0.03
Greasewood				0.61	0.02
Common snowberry		0.12	0.04		0.09
Full Shrub Total	1.00	1.00	1.00	1.00	1.00
Fringed sagewort*	0.21	0.03			0.06
Gardner's saltbush*		0.28			0.21
Winterfat*				0.08	0.00
<b>All Full Shrubs/m<sup>2</sup>*</b>	1.20	0.80	0.30	0.20	

\* excludes these subshrubs, which are not allowed to be included in Option I, II or III.

\*\* Calculated by summing across communities the individual species density times the percent eligible acreage of each community divided by 100

Option II: Permit-wide full shrub density standard, no reduction in areal extent or density, composition based on premining full shrub density only (see Figure 2 for an illustration of this Option II).

1. If 20 percent or more of the premine eligible land supports at least 1 shrub per square meter, no reduction in shrub density or areal extent shall be permitted.
2. Compute the relative premining density of full shrub species based on a weighted average of the percent areal extent of all vegetation communities and their associated full shrub species present on eligible land. In this instance, one shrub patch seed mixture will be developed for the entire 20 percent areal extent.
3. From the information calculated in step 2. above, identify the dominant premine full shrub species. This species then becomes the target postmine species within the postmine shrub patches.
4. Compute the minimum density that the postmining target shrub (identified in step 3. above) must meet in order to achieve bond release under the standard. This is accomplished by applying the following equation:

$$D[1/(N + 1)]$$

D is the postmining total shrub density (D is always  $\leq 1.00$ ). N is the number of primary shrub species existing in the premining communities as identified in step 2. above. Primary shrub species shall be defined as full shrub species which comprise at least 10 percent of the relative density of full shrubs.

All primary shrub species shall be included in the shrub patch seed mixture.

5. The postmining residual density is calculated by subtracting the minimum required density of the target species from 1.00.
6. Residual density may be comprised of any premining primary species and other approved full shrub species. In addition, the following subshrub species may be counted towards up to one half of the residual density.

<i>Artemisia frigida</i>	fringed sagewort
<i>Atriplex gardneri/gordonii</i>	Gardners saltbush
<i>Ceratoides lanata</i>	winterfat
<i>Artemisia pedatifida</i>	birdfoot sagewort
<i>Artemisia spinescens</i>	bud sagewort

**FIGURE 2**

**OPTION II: PERMIT-WIDE SHRUB DENSITY, NO DENSITY REDUCTION POSSIBLE  
COMPOSITION BASED ON FULL SHRUBS**

Note: No reduction of density is possible when 20 percent or more of the eligible acreage supports a premining total shrub density of over 1 shrub per square meter

**TABLE 1**

Vegetation Community	Number of Acres Affected Following Rule Approval	Percent Eligible Acreage	Premining Total Shrub Density per m <sup>2</sup> (1)	Premining Total Shrub Number
Mixed Shrubland	444.00	22.2	1.20	2,156,242
Upland Grassland	1426.00	71.3	0.80	4,616,818
Scoria Grassland	80.00	4.0	0.30	97,128
Drainage Bottomland	50.00	2.5	0.20	40,470
Pastureland (2)	300.00	n/a	n/a	n/a
<b>Total Eligible Acreage</b>	<b>2000.00</b>		<b>Premining No. of Shrubs</b>	<b>6,910,657</b>
<b>Total Acreage</b>	<b>2300.00</b>			
<b>% Eligible/Total</b>	<b>86.96</b>			

(1) When the permit-wide standard is applied, premining density may be calculated from full shrubs only.  
 (2) Pastureland excluded by regulation

**TABLE 2**

Relative Premining Density for Primary Shrubs (≥ 10% Relative Density)			Postmining Total Shrub Density m <sup>2</sup> D*	N	D* (1/N+1) Density of Dominant per m <sup>2</sup>	Density of Residual Shrubs per m <sup>2</sup>	Density of Approved Subshrubs per m <sup>2</sup>	20% Acreage Reclaimed with Shrubs	Number of Shrubs Established
<b>Big Sagebrush</b>	<b>Rubber Rabbitbrush</b>	<b>Douglas Rabbitbrush</b>							
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>0.43</b>	<b>0.13</b>	<b>0.21</b>	← Numbers are weighted average relative density from Table 3						
<b>Dominant Species for this Option:</b>					<b>BIG SAGEBRUSH</b>				
<b>Reduced Permit-wide Standard</b>									
<b>100% at 1/m<sup>2</sup></b>			<b>1.00</b>	<b>3</b>	<b>0.25</b>	<b>0.375</b>	<b>0.375</b>	<b>400.00</b>	<b>1,618,800</b>
								<b>20 percent of eligible lands</b>	<b>400.00</b>
								<b>Postmining No. of Shrubs</b>	<b>1,618,800</b>

\* D = Postmining Total Shrub Density (e.g. 1.0 \* [1/(3+1)] = 0.25)

**TABLE 3 – Option II, Figure 2 continued**

Relative Density Information for Species					
Note: Relative density is calculated by number of individuals of each species divided by total number of individuals.					
The value of the dominant species for each type is shaded ■					
	Mixed Shrubland	Upland Grassland	Scoria Grassland	Drainage Bottomland	Weighted Average Relative Density**
Silver sagebrush	0.06			0.28	0.02
Big sagebrush	0.63	0.39	0.35	0.11	0.43
Fourwing saltbush		0.03			0.02
Black sagebrush		0.06	0.18		0.05
Rubber rabbitbrush	0.19	0.13			0.13
Douglas rabbitbrush		0.27	0.18		0.21
Wax currant			0.05		0.00
Skunkbrush sumac	0.12		0.20		0.03
Greasewood				0.61	0.02
Common snowberry		0.12	0.04		0.09
Full Shrub Total	1.00	1.00	1.00	1.00	1.00
Fringed sagewort*	0.21	0.03			0.07
Gardner's saltbush*		0.28			0.20
Winterfat*				0.08	0.00
All Full Shrubs/m <sup>2</sup> *	1.20	0.80	0.30	0.20	

\* excludes these subshrubs, which are not allowed to be included in Option I, II or III.  
 \*\* Calculated by summing across communities the individual species density times the percent eligible acreage of each community divided by 100

Option III: Community-specific full shrub density standard (see Figure 3 for an illustration of this Option).

1. Each eligible premining vegetation community serves as the basis for developing the required postmine density and areal extent. The percentage each community contributes to the total eligible land is multiplied by 20 percent to establish the number of acres required on the postmining landscape. The average number of full shrubs each community supported premine serves as the postmine average density for that particular community.

2. Compute the relative premining dominance of all full shrub species within each eligible vegetation community. In this instance, one shrub patch seed mixture will be developed for each eligible vegetation community.

3. From the information calculated in step 2. above, identify the dominant premine full shrub species within each eligible vegetation community. This species then becomes the target postmine species within a particular shrub patch corresponding to a specific vegetation community.

4. Compute the minimum density that the postmining target shrub (identified in step 3. above) must meet in order to achieve bond release under the standard. This is accomplished by applying the following equation:

$$D[1/(N + 1)]$$

D is the postmining total shrub density (D is always  $\leq 1.00$ ). N is the number of primary shrub species existing in the premining communities as identified in step 2. above. Primary shrub species shall be defined as full shrub species which comprise at least 10 percent of the relative density of full shrubs.

All primary shrub species shall be included in the respective shrub patch seed mixtures.

5. The postmining residual density is calculated by subtracting the minimum required density of the target species with each vegetation community from the total required density for that community.

6. Residual density may be comprised of any premining primary species and any other approved full shrub species. In addition, the following subshrub species may be counted towards up to one half of the residual density with each community.

<i>Artemisia frigida</i>	fringed sagewort
<i>Atriplex gardneri/gordonii</i>	Gardners saltbush
<i>Ceratoides lanata</i>	winterfat
<i>Artemisia pedatifida</i>	birdfoot sagewort
<i>Artemisia spinescens</i>	bud sagewort

**OPTION III: COMMUNITY SPECIFIC SHRUB DENSITY – COMPOSITION BASED ON FULL SHRUBS ONLY**

**TABLE 1**

Vegetation Community	Number of Acres Affected Following Rule Approval	Percent Eligible Acreage	Premining Total Shrub Density per m <sup>2</sup>	Premining Total Shrub Number	Postmining Total Shrub Density m <sup>2</sup> "D"	N	Dominant Species	D x (1/N+1) Density of Dominant per m <sup>2</sup>	Density of Residual Shrubs per m <sup>2</sup>	Approved Subshrubs per m <sup>2</sup>	20% Acreage Reclaimed with Shrubs	Number of Shrubs Established		
Mixed Shrubland	364	18.2	1.20	1,767,730	1.00	3	Big Sagebrush	0.25	0.38	0.38	72.80	294,622		
Upland Grassland	1506	75.3	0.80	4,875,826	0.80	4	Big Sagebrush	0.16	0.32	0.32	301.20	975,165		
Scoria Grassland	80	4.0	0.30	97,128	0.30	4	Big Sagebrush	0.06	0.12	0.12	16.00	19,426		
Drainage Bottomland	50	2.5	0.20	40,470	0.20	3	Greasewood	0.05	0.08	0.08	10.00	8,094		
Pastureland (1)	300	n/a	n/a											
<b>Total Postmining Shrub Acres</b>											<b>400.00</b>			
<b>Total Eligible Acreage</b>				<b>2000</b>	<b>Premining No. of Shrubs</b>		<b>6,781,153</b>					<b>Postmining No. of Shrubs</b>		<b>1,297,306</b>
<b>Total Acreage</b>		<u><b>2300</b></u>												
<b>% Eligible/Total</b>		<b>87.0</b>												
<p>(1) pastureland excluded by regulation                  * D = Postmining Total Shrub Density (e.g. <math>0.8 \times [1/(4+1)] = 0.16</math>)</p>														

**TABLE 2 – Option 3, Figure 3 continued**

<b>Relative Density Information for Species – Full Shrub Only</b>				
The value of the dominant species for each type is shaded. ■				
	<b>Mixed Shrubland</b>	<b>Upland Grassland</b>	<b>Scoria Grassland</b>	<b>Drainage Bottomland</b>
<b>Silver sagebrush</b>	<b>0.06</b>			<b>0.38</b>
<b>Big sagebrush</b>	<b>0.63</b>	<b>0.39</b>	<b>0.35</b>	<b>0.11</b>
Fourwing saltbrush		0.03		
Black sagebrush		0.06	0.18	
Rubber rabbitbrush	0.19	0.13		
Douglas rabbitbrush		0.27	0.18	
Wax currant			0.05	
Skunkbrush sumac	0.12		0.20	
Greasewood				0.51
Common snowberry		0.12	0.04	
<b>Full Shrub Total</b>	1.00	1.00	1.00	1.00
Fringed sagewort*	0.21	0.03		
Gardner's saltbush*		0.28		
Winterfat*				0.08
Number shrubs $\geq$ .1	3	4	4	3
All Full Shrubs/m <sup>2</sup>	1.20	0.80	0.30	0.20
*excludes these subshrubs, which are not allowed to be included in Option I, II or III.				



Option IV: Community-specific full shrub and approved subshrub density standard (see Figure 4 for an illustration of this Option)

1. Each eligible premining vegetation community serves as the basis for developing the required postmine density and areal extent. The percentage each community contributes to the total eligible land is multiplied by 20 percent to establish the number of acres required on the postmining landscape. The average number of full shrubs and approved subshrubs each community supported premine serves as the postmine average density for that particular community.

The following are the approved subshrubs which shall be included in calculating the premining density within each community:

Artemisia frigida	fringed sagewort
Atriplex gardneri/gordonii	Gardners saltbush
Ceratoides lanata	winterfat

2. Compare the relative premining dominance of full shrub and approved subshrub species within each eligible vegetation community. In this instance, one shrub patch seed mixture will be developed for each eligible vegetation community.

3. From the information calculated in step 2. above, identify the dominant premine full shrub or approved subshrub species with each eligible vegetation community. This species then becomes the target postmine species within a particular shrub patch corresponding to a specific vegetation community.

4. Compute the minimum density that the postmining target shrub/approved subshrub (identified in step 3. above) must meet in order to achieve bond release under the standard. This is accomplished by applying the following equation:

$$D[1/(N + 1)]$$

D is the postmining total shrub density (D is always  $\leq 1.00$ ). N is the number of primary shrub/approved subshrub species existing in the premining communities as identified in step 2. above. Primary shrub/approved subshrub species shall be defined as full shrub/approved subshrub species which comprise at least 10 percent of the relative density of full shrubs. However, in order to be considered primary species, fringed sagewort must comprise at least 20 percent of the relative shrub/approved subshrub composition.

All primary shrub/approved subshrub species shall be included in the respective shrub patch seed mixtures.

5. The postmining residual density is calculated by subtracting the minimum required density of the target species within each vegetation community from the total required density for that community.

6. Residual density may be comprised of any premining primary full shrub/approved subshrub species and any other approved full shrub species. In addition, the following subshrub species may be counted towards up to one half of the residual density within each community.

<i>Artemisia frigida</i>	fringed sagewort
<i>Atriplex gardneri/gordonii</i>	Gardners saltbush
<i>Ceratoides lanata</i>	winterfat
<i>Artemisia pedatifida</i>	birdfoot sagewort
<i>Artemisia spinescens</i>	bud sagewort

**OPTION IV: COMMUNITY SPECIFIC SHRUB DENSITY – COMPOSITION BASED ON FULL SHRUBS AND APPROVED SUBSHRUBS**

**TABLE 1**

Vegetation Community	Number of Acres Affected Following Rule Approval	Percent Eligible Acreage	Premining Total Shrub Density per m <sup>2</sup>	Premining Total Shrub Number	Postmining Total Shrub Density m <sup>2</sup> "D"	N	Dominant Species	D x (1/N+1) Density of Dominant per m <sup>2</sup>	Density of Residual Shrubs per m <sup>2</sup>	Approved Subshrubs per m <sup>2</sup>	20% Acreage Reclaimed with Shrubs	Number of Shrubs Established	
Mixed Shrubland	364	18.2	1.40	2,062,351	1.00	3	Big Sagebrush	0.25	0.38	0.38	72.80	294,622	
Upland Grassland	1506	75.3	1.10	6,704,260	1.00	3	Big Sagebrush	0.16	0.32	0.32	301.20	975,165	
Scoria Grassland	80	4.0	0.30	97,128	0.30	4	Big Sagebrush	0.06	0.12	0.12	16.00	19,426	
Drainage Bottomland	50	2.5	0.20	40,470	0.20	3	Greasewood	0.05	0.08	0.08	10.00	8,094	
Pastureland (1)	300	n/a	n/a										
										<b>Total Postmining Shrub Acres</b>		<b>400.00</b>	
<b>Total Eligible Acreage</b>	<b>2000</b>	<b>Premining Number of Shrubs</b>		<b>8,904,209</b>							<b>Postmining No. of Shrubs</b>		<b>1,297,306</b>
<b>Total Acreage</b>	<b>2300</b>												
<b>% Eligible/Total</b>	<b>87.0</b>												
<b>(1) pastureland excluded by regulation</b>													
<b>* D = Postmining Total Shrub Density (e.g. 0.3 x [1(4+1)] = 0.06)</b>													

A complete proposal for evaluation of postmining shrub density should include:

1. A commitment to provide a brief history of the methods employed to implant shrubs and the husbandry practices specifically related to shrub establishment and maintenance.
2. Methods to identify shrub patches and to determine their areal distribution and extent.
3. Proposed sampling methods for the determination of shrub density within the patches. This discussion should include number of samples.
4. Proposed methods for documenting the presence and distribution of shrub species on all other lands jointly used by livestock and wildlife.

DEPARTMENT OF ENVIRONMENTAL QUALITY

LAND QUALITY DIVISION

CHAPTER 5

PERFORMANCE STANDARDS FOR SPECIAL CATEGORIES

OF COAL MINING

Section 1. **Applicability.** The requirements of this Chapter, together with the general performance standards in Chapter 4, apply to all operations described herein. If a conflict occurs between any particular requirements of this Chapter and any other Chapter of Land Quality Division Rules and Regulations, this Chapter shall be controlling.

Section 2. **Prime Farmlands.**

(a) Prime farmland soil removal, stockpiling and replacement.

(i) Soil materials to be used in the reconstruction of the prime farmland shall be removed before drilling, blasting, or mine related disturbances in a manner that prevents mixing or contaminating these materials with undesirable material.

(ii) The A soil horizon, then the B and C soil horizons, either separately or in combination, or other suitable material that will allow for reconstruction of a root zone of greater productive capability to that existing prior to mining must be separately removed and segregated. Where it is impractical to immediately replace the soil horizon material or other suitable materials, each horizon separately removed must be separately stockpiled and properly identified. The Administrator may approve a plan which does not provide for the separation of soil horizons if the application can document by acceptable scientific procedures that removal of all topsoil in one step would not diminish prime farmland restoration objectives.

(iii) During reconstruction of prime farmland soil, the C horizon material and then the B horizon material or a combination thereof shall be replaced first. The A horizon material shall be replaced as the surface layer unless the Administrator has approved an alternative segregation plan. Reconstruction of prime farmland soil shall include:

(A) Replacement of a minimum depth of 48 inches of soil and other approved plant growth materials or a depth equal to the depth of a subsurface horizon in the natural soil that inhibits root penetration, whichever is shallower. The Administrator may require a depth greater than 48 inches whenever necessary to restore productive capacity due to uniquely favorable soil horizons at greater depths. Soil horizons shall be considered to inhibit root penetration if their densities, chemical properties, or water holding capacities

restrict or prevent penetration by roots of plants commonly grown in the vicinity of the permit area and have little or no beneficial effect on soil productive capacity.

(B) Replacement only on land which has been returned to a slope not to exceed premining conditions and scarified to reduce compaction of the graded spoil surface.

(C) Replacement in a manner that avoids excessive compaction, so that the pore space of the soil, after reconstruction, is of a size, distribution, and amount which allows a favorable rooting zone; minimizes soil erosion; and restores an available water holding capacity consistent with the premining soil condition.

(b) Prime farmland soil stabilization, productivity, and revegetation.

(i) Following soil replacement, a vegetative cover capable of stabilizing the soil surface shall be established as soon as practicable. The revegetation soil amendments and mulching requirements of Chapter 4, Section 2(d) of the regulations shall be met.

(ii) Prime farmland soil productivity shall be measured within ten years after soil replacement.

(A) Soil productivity shall be measured on a representative sample, or on all the mined and reclaimed prime farmland area, using the reference crop determined under paragraph (C) immediately below. A statistically valid sampling technique at a 90 percent or greater statistical confidence level shall be used as approved by the Administrator in consultation with the U.S. Soil Conservation Service.

(B) Restoration of soil productivity shall be considered achieved when the average yield during the measurement period equals or exceeds the average yield of the reference crop established for the same period for nonmined soils of the same or similar texture or slope phase of the soil series in the surrounding area under equivalent management practices.

(C) The reference crop on which restoration of soil productivity is proven shall be selected from the crops most commonly produced on the surrounding prime farmland. Where row crops are the dominant crops grown on prime farmland in the area, the row crop requiring the greatest rooting depth shall be chosen as one of the reference crops.

(D) Reference crop yields for a given crop season are to be determined from:

(I) The current yield records of representative local farms in the surrounding area, with concurrence by the U.S. Soil Conservation Service; or

(II) The average county yields recognized by the U.S. Department of Agriculture, which has been adjusted by the U.S. Soil Conservation Service for local yield variation within the county that is associated with differences between nonmined prime farmland soil and all other soils that produce the reference crop.

(E) Under either procedure in paragraph (D) immediately above, the average reference crop yield may be adjusted, with the concurrence of the U.S. Soil Conservation Service, for:

(I) Disease, pest, and weather-induced seasonal variations;  
or

(II) Differences in specific management practices where the overall management practices of the crops being compared are equivalent.

(iii) Areas where permits were issued prior to August 3, 1977 are exempt from the reconstruction standards of this Section.

### Section 3. **Alluvial Valley Floors.**

(a) Surface coal mining operations shall be conducted to preserve and reestablish throughout the mining and reclamation process those geologic, hydrologic and biologic characteristics that support the essential hydrologic functions, as identified during premining investigations or monitoring conducted during the surface coal mining and reclamation operation.

(b) Environmental monitoring:

(i) If environmental monitoring shows that a surface coal mining operation is interrupting, discontinuing, or precluding farming on alluvial valley floors or is causing material damage to water supplying alluvial valley floors not subject to the statutory exclusions of W.S. § 35-11-406(n)(v), the operation shall immediately take remedial measures and report this condition to the Administrator within 24 hours.

(ii) An environmental monitoring system shall be installed, maintained and operated by the operator on all alluvial valley floors during surface coal mining and reclamation operations and continued until all bonds are released. The monitoring system shall provide sufficient information to show that the essential hydrologic functions of the alluvial valley floor are being preserved or reestablished.

(iii) All monitoring data collected and analyses thereof shall be provided in the annual report.

- (c) For all operations, the operator shall:
  - (i) Restore the essential hydrologic functions of alluvial valley floors located on affected lands; and
  - (ii) Preserve the essential hydrologic functions of alluvial valley floors located outside the affected lands.

**Section 4. Coal In Situ Processing Activities.**

- (a) Coal in situ processing activities shall:
  - (i) Be planned and conducted to minimize disturbance to the prevailing hydrologic balance;
  - (ii) Avoid discharge of fluids into holes or wells, other than as approved by the Administrator;
  - (iii) Prevent discharge of process fluid into surface waters;
  - (iv) Conduct air and water quality monitoring programs as necessary to comply with appropriate Federal and State air and water quality standards; and
  - (v) Conduct all activities in accordance with the performance standards contained in Chapter 18, 4 and 7.

**Section 5. Combined Surface and Underground Mining Operations.** In addition to the requirements of Chapters 4 and 7, each operator shall ensure that the vertical distance between combined surface and underground mining activities working separate seams shall be sufficient to provide for the health and safety of the workers and to prevent surface water from entering the underground workings.

**Section 6. Auger Mining.**

- (a) Unless otherwise determined by the Administrator that the coal reserves make it impracticable to recover the remaining resource, the operator shall leave areas of undisturbed coal as approved by the Administrator to provide access for removal of those reserves by future underground mining.
- (b) Auger mining may be limited or prohibited to minimize disturbance of the prevailing hydrologic balance, unwarranted subsidence, or if the prohibition is necessary to maximize the utilization, recoverability or conservation of the solid fuel resources.
- (c) Each auger hole shall be capped, sealed, or plugged in accordance with



Chapter 14, unless other management techniques are approved by the Administrator. Each auger hole shall be plugged within 72 hours after completion if it is discharging water containing toxic-forming or acid-forming material by backfilling and compacting noncombustible and impervious material into the hole to a depth sufficient to form a water-tight seal. Auger holes shall not be sealed with an impervious material if the Administrator determines that the resulting impounded water may create a hazard to the environment or public health or safety. Auger holes that are not discharging water, or if the discharging water does not contain toxic-forming or acid-forming material and will not pose a threat of pollution to groundwater as required by Chapter 4, Section 2(c)(xiii), shall be backfilled as contemporaneously as practicable and will not require sealing with an impervious material.

(d) Subsidence control shall be provided as required by Chapter 7, Section 2.

(e) Where auger mining operations are conducted in previously mined areas that were not reclaimed to the standards of Chapter 4, Section 2(b), the reaffected lands shall be reclaimed in accordance with the requirements of Section 7 of this Chapter. Any coal seam mined shall be covered with a minimum of four feet of nonacid and nontoxic-forming material and graded to a slope which is stable, compatible with the approved postmining land use, and provides drainage. The operator shall provide the Administrator a written demonstration, prepared by a qualified registered professional engineer, showing the fill has a minimum static safety factor of 1.3.

#### Section 7. **Remining.**

(a) Under the following conditions, the requirements in Chapter 4, Section 2(b)(iv), requiring the elimination of highwalls shall not apply to operations which affect land disturbed by previous coal mining operations which were not reclaimed in accordance with the requirements of Chapter 4, Section 2(b) (i.e., State Program requirements):

(i) Where the volume of all reasonably available spoil is demonstrated in writing to the Administrator to be insufficient to completely backfill the reaffected or enlarged highwall, and this condition is documented in writing by the Administrator, the highwall shall be eliminated to the maximum extent technically practical in accordance with the following criteria:

(A) All spoil generated by the remining operation and any other reasonably available spoil shall be used to backfill the area. Under this Section, "reasonably available spoil" means spoil located in the immediate vicinity of the remining operation, which shall be included in the permit area, that is accessible and available for use and that when rehandled will not cause a hazard to public safety or significant damage to the environment.

(B) The backfill shall be graded to a slope which is compatible with the approved postmining land use and which provides adequate drainage and long-term

stability.

(C) Any portion of highwall that remains after backfilling and grading of the remaining permit area shall be stable and not pose a hazard to the public health and safety or to the environment. The operator shall demonstrate to the Administrator that the remaining highwall is stable.

(b) For revegetation success standards, as a minimum, the vegetative ground cover shall not be less than the ground cover existing before redisturbance and shall be adequate to control erosion.

DEPARTMENT OF ENVIRONMENTAL QUALITY

LAND QUALITY DIVISION

CHAPTER 1

AUTHORITIES AND DEFINITIONS FOR SURFACE COAL MINING OPERATIONS

Section 1. **Authority.** These rules and regulations are adopted by the Environmental Quality Council and the Administrator of the Land Quality Division pursuant to the authority granted the Council and the Administrator by the Wyoming Environmental Quality Act, Sections 35-11-101 through 35-11-1104, Wyoming Statutes, 1977, as amended. These rules and regulations are effective upon filing with the Secretary of State. They become an official part of Wyoming's coal regulatory program when approved by the U.S. Secretary of the Interior or his designee.

Section 2. **Definitions.** The definitions included in the Wyoming Environmental Quality Act, are hereby adopted by this reference. All references to the "Act" herein refer to the Wyoming Environmental Quality Act, as amended.

(a) "Acid drainage" means water with a pH of less than 6.0 and in which total acidity exceeds total alkalinity, discharged from an active or inactive mine or from an area affected by mining and reclamation operations.

(b) "Acid-forming materials" means earth materials that contain sulfide minerals or other minerals which exist in a natural state or if exposed to air, water or weathering processes, will cause acid conditions that may hinder plant establishment or create acid drainage.

(c) "Adjacent areas" means land located outside the permit area upon which air, surface water, groundwater, fish, wildlife, or other resources protected by the Act may reasonably be expected to be adversely impacted by mining or reclamation operations. Unless otherwise specified by the Administrator, this area shall be presumptively limited to lands within one-half mile of the proposed permit area.

(d) "Administrator" means the Administrator of the Division of Land Quality.

(e) "Amendment" means the addition of new lands to a previously approved permit area, as allowed by W. S. § 35-11-406(a)(xii).

~~(f) "Animal unit" means one mature beef cow of approximately 1,000 pounds and a calf (up to 6 months old).~~

(f) "Annual" means a plant which completes its life cycle in 12 months or fewer.

(g) "Applicant" means any "person" seeking a permit, permit revision, renewal, transfer, or other approval from the Administrator to conduct mining and reclamation operations, or "person" seeking a license to explore, but does not include subsidiaries or parents of the "person," as "person" is defined in W.S. § 35-11-103(a)(vi).

(h) "Approximate original contour" means that surface configuration achieved by backfilling and grading of the mined areas so that the reclaimed land surface closely resembles the general surface configuration of the land prior to mining and blends into and complements the drainage pattern of the surrounding terrain.

(i) "Aquifer" is a zone, stratum or group of strata that stores and transmits water in sufficient quantities for a specific use.

(j) "Augmented seeding" means reseeding in response to the unsuccessful germination, establishment or permanence of revegetation efforts. Augmented seeding resets the applicable liability period. A synonym is reseeding.

(k) "Barren" means any land unit devoid of vegetation, or practically so.

(l) "Baseline vegetation inventory" means a vegetation sampling program executed prior to any significant surface disturbance cause by proposed mining activities. The inventory will provide a verbal and mental picture of the prevailing plant communities and will quantitatively and qualitatively classify the different plant communities to the specification of Wyoming State Law.

(m) "Belt transect" means a rectangular sampling plot used for the estimation of shrub density (premining and postmining) and postmining species diversity and species composition, each belt transect shall be at least 100 square meters and a minimum of 50 meters in length.

(n) "Best practicable technology" means a technology based on methods and processes that are both practicable and reasonably economic and is justifiable in terms of existing performance and achievability in relation to the establishment of shrubs in the required density, aerial extent and species.

(o) "Best technology currently available" means equipment, devices, systems, methods, or techniques which, as determined by the Administrator, are currently available and practicable, and will:

(i) Prevent, to the extent possible, additional contributions of suspended solids to streamflow or runoff outside the affected land or permit area. But in no case shall contributions exceed requirements set by applicable State or Federal laws, and

(ii) Minimize, to the extent possible, disturbances and adverse impacts on fish, wildlife and related environmental values, and achieve enhancement of those resources where practicable.

(p) “Biennial” means a plant that lives for two years, producing vegetative growth the first year and usually blooming and fruiting and senescing in the second year and then dying.

(q k) "Bond" means a surety or self-bond instrument by which the permit applicant assures faithful performance of all requirements of the Act, all rules and regulations promulgated thereunder, and the provisions of the permit and license to mine. This term shall also include the following, which the operator has deposited with the Department of Environmental Quality in lieu of a Surety Bond or Self-Bond Instrument:

(i) Federal insured certificates of deposit;

(ii) Cash;

(iii) Government securities;

(iv) Irrevocable letters of credit;

(v) An alternative method of financial assurance that is acceptable to the Administrator and provides for a comparable level of assurance for performance of reclamation obligations. The alternative method of financial assurance must first be approved by the Office of Surface Mining; or

(vi) A combination of any of these bonding methods.

(r) “Bond responsibility period” means the minimum 10 year period during which the bond, in part or wholly, remains in effect.

(s) “Cactus” means any member of the Cactaceae plant family. Members of the Cactaceae plant family are in the lifeform category of succulent.

(t l) "Coal exploration" means either:

(i) The field gathering of surface or subsurface geologic, physical, or chemical data by mapping, trenching, drilling, geophysical or other techniques necessary to determine the quality and quantity of overburden and coal of an area. If this activity results in the extraction of coal, the coal shall not be offered for commercial sale (except for test burns); or

(ii) The gathering of environmental data to establish the conditions of an area before beginning ~~surface~~ coal mining and reclamation operations.

(u m) "Coal mine waste" means coal-processing waste and underground development waste.

(v n) "Coal preparation plant" means a facility where coal is subjected to chemical or physical processing or cleaning, concentrating, or other processing or preparation. It includes facilities associated with coal preparation activities, including, but not limited to the following: loading facilities; storage and stockpile facilities; sheds, shops, and other buildings; water treatment and water storage facilities; settling basins and impoundments; and coal-processing and other waste disposal areas.

(w o) "Coal-processing waste" means earthen materials which are wasted or otherwise separated from product coal during cleaning, concentrating or other processing or preparation of coal.

(x p) "Combustible material" means organic material that is capable of burning.

(y q) "Compaction" means the reduction of pore spaces among particles of soil or rock, generally done by controlled placement and running heavy equipment over the earthen material.

~~(r) "Comparison area" means a land unit which is representative, in terms of physiography, soils, vegetation and land use history, or a premining plant community from which no or insufficient vegetation data were collected prior to disturbance.~~

~~(s) "Complete application" means, for purposes of W.S. § 35-11-406(n)(i) and (m) and to indicate the Administrator's assessment of completeness and suitability for publication under W.S. § 35-11-406(h) and (j), an application for a permit which contains all information required by the Act and the Land Quality Division regulations that is necessary to make a decision on permit issuance.~~

~~(t) "Control area" means a land unit which is representative, in terms of physiography, soils, vegetation and land use history, of a plant community to be affected by mining activities as verified by a comparison of its quantitative and qualitative characteristics to similar information from the plant community it typifies and where a mathematical climatic adjustment is made.~~

~~(z) "Cool season" plant" means a plant which generally makes the major portion of its growth during late fall, winter, and early spring. Cool season species generally exhibit the C3 photosynthetic pathway. is a species which grows and flowers during the spring. Its growth usually slows or becomes dormant during the hotter, drier portions of the summer, but the species may resume growth in the fall with the advent of cooler temperatures and available soil moisture.~~

~~(aa u) "Cover" means vegetation, litter, and rock over the soil which intercept~~

rainfall. the percent of the ground surface which is covered by the vertical projection of objects on or above that ground surface. The objects may include standing plant material and cryptogams, litter or rock. "Absolute cover" means the percent cover of a given category independent of other categories. The following cover categories or descriptions used are:

(i) "Absolute cover of litter" means the percent of the ground surface which is overlain by litter;

(ii) "Absolute cover of rock" means the percent of the ground surface which is covered by rock;

(iii) "Absolute cover of vegetation" means the percent of the ground surface which is covered by the vertical projections of all live vascular plants;

(iv) "Absolute cover of vegetation by species" means the percent of the ground surface covered by individual live vascular plants;

(v) "Absolute cover of cryptogams" means the percent of the ground surface which is covered by cryptogams.

(vi) "Absolute cover of total ground cover" means the sum of vegetation, cryptogams, litter and rock cover.

(vii) "Absolute cover of bare ground" means the percent of the ground surface which is not covered by the vertical projection of vascular plants and cryptogams, litter or rock.

(viii) "Relative cover" means the expression of any number of cover categories in relation to each other such that the sum of the chosen relative cover values total 100 percent.

(ab) "Cover crop" means a preparatory crop of one or more species seeded and grown prior to the seeding of the permanent seed mixture, for the chief purpose of protecting the soil from erosion and also for improving the soil fertility and structure. The term is synonymous with stubble crop and is considered a type of mulch.

(ac ¶) "Critical habitat" means those areas essential to the survival and recovery of species listed by the Secretary of the Interior as threatened or endangered under the authority of 50 CFR, Part 17.

(ad ¶) "Crucial habitat" means those areas, designated as such by the Wyoming Game and Fish Department, which determine a population's ability to maintain and reproduce itself at a certain level over the long term.

(ae) "Cryptogam" means a plant (vascular or non-vascular) that reproduces by spores rather than seeds. A plant in any of these groups: Lichens, Bryophytes (mosses, liverworts, hornworts), Pteridophytes (ferns, moonworts, horsetail, club mosses, spike mosses, quillworts, pepperwort) will be considered cryptogams.

(af) "Density means the number of individuals per unit area.

(ag x) "Designated authorized representative" means, for the purposes of issuing a cessation order, either the Administrator, the district engineer, or other qualified inspector designated by the Director.

(ah y) "Developmental drilling" means drilling down to and including the lowest coal seam to be mined which occurs in or within 500 feet of an active mine pit.

(ai z) "Discoverer" means any person conducting or intending to conduct any exploration by drilling. This includes locator, owner or agent thereof who will drill or has drilled the hole.

(aj) "Diversion" means a channel, embankment, device, or other man-made structure constructed for the purpose of diverting water from one area to another.

(i) "Permanent diversion" means a diversion remaining after bond release.

(ii) "Temporary diversion" means a diversion utilized during mining or reclamation operations, which must be removed and reclaimed prior to bond release.

(ak) "Dominant" means for the purpose of calculating Chapter 4 shrub restoration performance standard, the full shrub or subshrub species with the greatest relative density.

(al) "Drill site" means all areas of land that are or will be disturbed or utilized by exploration drilling. This area includes drill holes or other drilled excavations, drilling pads, and areas disturbed by mud pits, and any land over which drilling mud mixtures overflow or may disturb.

(am) "Eligible land" means all affected land to be affected by a mining operation after August 6, 1996. ~~Cropland, pastureland or treated grazingland approved by the Administrator which is to be affected by a mining operation after August 6, 1996 is not "eligible land" which carries the grazingland land use designation and all affected pastureland land use units which have a full shrub density greater than one full shrub per square meter. Pastureland is eligible only if the surface owner requests that the pastureland be eligible and only if the land units are included in a new permit or permit amendment application which is submitted to the Administrator after approval of this rule by the Office of Surface Mining.~~



(~~adn~~) "Embankment" means an artificial deposit of material that is raised above the natural surface of the land and used to contain, divert, or store water, support roads or railways, or other similar purposes.

(~~ao~~) "Endangered species" means any species which is in danger of extinction throughout all or a significant portion of its range and which has been listed under the federal Endangered Species Act.

(~~ap~~) "Enhancement wetland" means a reclaimed postmining wetland which exceeds the minimum required mitigation wetlands acreage required by the Army Corps of Engineers under Section 404 of the Federal Clean Water Act.

(~~aeq~~) "Ephemeral stream" means a stream which flows only in direct response to precipitation in the immediate watershed or in response to snow melt, and which has a channel bottom that is always above the prevailing water table.

(~~afr~~) "Essential hydrologic functions" means with respect to alluvial valley floors, those conditions of surface and groundwater hydrology that make water of a suitable quality and quantity usefully available for subirrigation or flood irrigation agricultural activities. These conditions may include, but are not limited to, the erosional state of the stream, the surface water balance, the groundwater balance, the physical and chemical properties of the soils, water and substrata, and topographic configuration.

(~~as~~) "Establishment practices" means practices used to facilitate actual establishment of targeted plants and are not intended to continue throughout the bond responsibility period. These practices are acceptable practices, but delay the start of the bond responsibility period until they are discontinued.

(~~agt~~) "Excess spoil" means spoil material disposed in a location other than the mined-out area, except that spoil material used to achieve the approximate original contour or to blend the mined-out area with the surrounding terrain.

(~~ahu~~) "Existing structure" means a structure or facility used in connection with or to facilitate ~~surface~~ coal mining and reclamation operations for which construction begins prior to the approval of a State program pursuant to Section 503 of P.L. 95-87.

(~~aiy~~) "Exploration area" means, for bonding purposes, one or more drill sites, comprising an integrated project conducted by a discoverer within one of the three districts presently established by the Land Quality Division of the Department of Environmental Quality.

(~~ajw~~) "Exploration by drilling" means any exploration drilling for the purpose of gathering subsurface geologic, physical or chemical data to determine the location, quantity or quality of the natural mineral deposit of an area, excluding holes drilled for use as water wells.

(akx) "Farm" means, with respect to alluvial valley floors, one or more land units on which agricultural activities are conducted. A farm is generally considered to be the combination of land units with acreage and boundaries in existence prior to August 3, 1977, or, if established after August 3, 1977, with those boundaries based on enhancement of the farm's agricultural productivity and not related to surface coal mining operations.

(aly) "Flood irrigation" means, with respect to alluvial valley floors, supplying water to plants by natural overflow or the diversion of flows, so that the irrigated surface is largely covered by a sheet of water.

(az) "Forb" means any herbaceous plant species other than the members of the grass (Poaceae [Gramineae]), sedge (Cyperaceae) or rush (Juncaceae) plant families.

(ba) "Full shrub" means a perennial woody plant which differs from a tree by normally being shorter in height and by often having several stems arising near the base.

(bb am) "Gel strength" means the minimum shear stress which results in permanent deformation of a gel.

(bc an) "General area" means, with respect to hydrology, the topographic and groundwater basin surrounding a permit area which is of sufficient size, including areal extent and depth, to allow assessment of the impacts resulting from the mining operation on the quality and quantity of surface water and groundwater systems in the basins, including consideration of the interaction of the impacts with adjacent mines.

~~(ae) "Good husbandry practices" means sound land management techniques which are commonly practiced in the area of the mine considering the postmining land use and, if discontinued after the bond period ends, shall not reduce the probability of permanent vegetation success.~~

(bd) "Graminoid" means a plant species of the grass (Poaceae [Gramineae]), sedge (Cyperaceae) or rush (Juncaceae) plant families.

(be) "Grass" means a plant species of the Poaceae (Gramineae) plant family.

(bf) "Grass-like" means a plant species of the sedge (Cyperaceae) or rush (Juncaceae) plant families that vegetatively resemble members of the grass family Poaceae (Gramineae).

(bg) "Grazing enclosure" is a fence or other device utilized to prevent grazing by large herbivores in order to more accurately estimate production of a land unit. means a land unit surrounded and/or covered by fencing or other materials which prevents

livestock grazing in order to more accurately estimate the current year's herbaceous production on the land unit.

(~~bh~~ ~~ap~~) "Groundwater" ~~is~~ means subsurface water that fills available openings in rock or soil materials such that they may be considered water-saturated.

(~~bi~~ ~~aq~~) "Hazardous materials" means any material or substance which results from or is encountered in a mining operation which could reasonably be expected to cause physical harm if not controlled in an approved manner.

(~~bj~~ ~~ar~~) "Highest previous use" means a sustainable use of the land which has the greatest economic and social values to the people of the area prior to the commencement of the mining operation.

(~~bk~~ ~~as~~) "Highwall" means the face of exposed overburden or coal in an open cut of a surface mine or entry to an underground mine.

(~~bl~~ ~~at~~) "History of intensive agricultural use" means those lands which, if nonirrigated, have had a cultivated crop, small grains or hay crops harvested for five out of any ten year period, or if irrigated has water of sufficient quantity to sustain production of cultivated crops, small grain, or hay crops for eight out of ten years and have had a cultivated crop, small grain, or hay crop harvested for any one year.

(~~bm~~) "Husbandry practice" means, when preceded by the word "normal", those management practices that may be used to achieve revegetation success without restarting the bond responsibility period. Normal husbandry practices are sound management techniques which are commonly practiced on native lands in the area of the mine and, if discontinued after the area is bond released, shall not reduce the probability of permanent vegetation success.

(~~bn~~ ~~au~~) "Hydrologic balance" means the relationship between the quality and quantity of inflow to, outflow from, and storage in a hydrologic unit such as a drainage basin, aquifer, soil zone, lake or reservoir. It encompasses the quantity and quality relationships between precipitation, runoff, evaporation, and the change in ground and surface water storage.

(~~bo~~ ~~av~~) "Hydrologic regime" means the entire state of water movement in a given area. It is a function of the climate and includes the phenomena by which water first occurs as atmospheric water vapor, passes into a liquid or solid form and falls as precipitation, moves thence along or into the ground surface, and returns to the atmosphere as vapor by means of evaporation and transpiration.

(~~bp~~ ~~aw~~) "Imminent danger to the public" means the existence of any condition or practice, or any violation of a permit or other requirements of the Act in a ~~surface~~ coal mining and reclamation operation, which could reasonably be expected to cause

substantial physical harm to persons outside the permit area before the condition, practice, or violation can be abated. A reasonable expectation of death or serious injury before abatement exists if a rational person, subjected to the same condition or practice giving rise to the peril, would avoid exposure to the danger during the time necessary for abatement.

(~~bq ax~~) "Important habitat" means that habitat which, in limited availability, supports or encourages a maximum diversity of wildlife species or fulfills one or more living requirements of a wildlife species. Examples of important habitat include, but are not limited to, wetlands, riparian areas, rimrocks, areas offering special shelter or protection, reproduction and nursery areas, and wintering areas.

(~~br ay~~) "Impoundment" means a closed basin formed naturally or artificially built which is dammed or excavated for the retention of water, slurry or other liquid or semi-liquid material. A permanent impoundment is a structure that will remain after final bond release.

(~~bs~~) "Inclusion" means, with respect to vegetation, an area no more than two acres in size, which is distinctly different from the surrounding vegetation community due to substantial, visible differences in species composition, cover, or production.

(~~bt az~~) "Intermittent stream" means a stream or part of a stream that is below the local water table for some part of the year, but is not a perennial stream.

(~~bu~~) "Interseed" means a secondary seeding into established vegetation in order to improve composition, diversity or seasonality. Interseeding is done to enhance revegetation rather than to augment the revegetation that is unsuccessful in terms of germination, establishment, or permanence.

(~~bv~~) "Introduced" means a plant species that is not a component of the original flora of North America.

(~~bwa~~) "Irreparable harm to the environment" means, for the purpose of W.S. § 35-11-406(o), any damage to the environment in violation of the Act or regulations, that cannot be corrected by actions of the applicant.

(~~bxb~~) "Joint agency approval" means, for ~~surface~~ coal mining operations, the approval of mining or reclamation plans that would adversely affect any publicly owned park or any place included in the National Register of Historic Places by the federal, state, or local agency with jurisdiction over the park or place.

(~~bye~~) "Land use" means for ~~surface~~ coal mining operations, specific uses or management-related activities, rather than the vegetation or cover of the land. Land uses may be identified in combination when joint or seasonal uses occur. Changes of land use or uses from one of the following categories to another shall be considered as a change to

an alternative land use which is subject to approval by the Administrator. Land used for mine facilities in support of the operations which are adjacent to or an integral part of these operations are also included. Support facilities include, but are not limited to, parking, storage or shipping facilities.

(i) “Cropland” means land used for the production of adapted crops for harvest, alone or in a rotation with grasses and legumes, and includes row crops, small-grain crops, hay crops, nursery crops, orchard crops, and other similar specialty crops.

(ii) “Pastureland” ~~is~~ means land used primarily for the long-term production of adapted, domesticated forage plants to be grazed by livestock or occasionally cut and cured for livestock feed. In addition, for the purpose of determining premining land use, the relative cover of introduced perennial forage species must be greater than 40% of the relative cover of total vegetation in order for the land to be pastureland. If the full shrub density is greater than one shrub per square meter on those lands and the surface owner requests the lands to be eligible, the land use is still pastureland but the land is also “eligible land” in terms of shrub reclamation.

(iii) “Grazingland” ~~includes~~ means rangelands and forest lands where the indigenous native vegetation is actively managed for grazing, browsing, and occasional hay production, and occasional use by wildlife.

(iv) “Forestry” means land used or managed for the long-term production of wood, wood fiber, or wood-derived products.

(v) “Residential” ~~includes~~ means land used for single and multiple-family housing, mobile-home parks, and other residential lodgings.

(vi) “Industrial commercial” ~~is~~ means land used for: -

(A) Extraction or transformation of materials for fabrication of products, wholesaling of products or for long-term storage of products. This includes all heavy and light manufacturing facilities and such short-term uses as petroleum refining and oil and gas production.

(B) Retail or trade of goods or services, including hotels, motels, stores, restaurants, and other commercial establishments.

(vii) “Recreational” ~~is~~ means land used for public or private leisure activities, including developed recreation facilities such as parks, camps, and amusement areas, as well as areas for less intensive uses such as hiking, canoeing, and other undeveloped recreational uses.

(viii) “Fish and wildlife habitat” means land dedicated wholly or partially

to the production, protection or management of species of fish or wildlife.

(ix) “Developed water resources” includes means land used for storing water for beneficial uses such as stockponds, irrigation, fire protection, flood control, and water supply.

(x) “Undeveloped land of no current use or land management” is means land that is undeveloped or, if previously developed, land that has been allowed to return naturally to an undeveloped state or has been allowed to return to forest through natural succession.

(xi) “Treated grazingland” means grazingland which has been altered to reduce or eliminate shrubs provided such treatment was applied at least five years prior to submission of the state program permit application. However, grazingland altered more than five years prior to submission of the state program permit application on which full shrubs have reestablished to a density of at least one per nine square meters does not qualify as treated grazingland.

(bz) “Lichen” means those organisms formed by the symbiotic relationship between fungal and algal species. For the purpose of estimating ground cover lichens are cryptogams.

(ca) “Life form” is a category of growth morphology which appears to have some adaptive significance. Examples of life forms include trees, full shrubs, sub shrubs, perennial grasses, annual forbs, succulents, cushion plants, etc. means the structure, form, habit, life history and physiology of an organism that display an obvious relationship to important environmental factors in its native or current habitat. For data presentation the preferred life form categories are: annual/biennial forb, annual grass, cryptogam, grass-like, native cool season perennial grass, native warm season perennial grass, introduced perennial grass, perennial forb, shrub, subshrub, succulent and tree.

(cb) “Litter” means, means any recognizable plant parts or structure which are laying on the ground surface. for the purposes of estimating ground cover, the uppermost layer of organic debris, usually considered to be the standing dead, freshly fallen or slightly decomposed vegetal material on the soil surface. Decomposing plant material which has lost its structural integrity or which is no longer recognizable as plant tissue is not litter.

(cc) “Major species” means a plant species whose relative cover value equals or exceeds two percent as estimated by a quantitative sampling program.

(cd bd) “Material damage to the hydrologic balance” means a significant long-term or permanent adverse change to the hydrologic regime.

(ce be) “Materially damage the quantity or quality of water” means, with respect

to alluvial valley floors, changes in the quality or quantity of the water supply to any portion of an alluvial valley floor where such changes are caused by ~~surface~~ coal mining and reclamation operations and result in changes that significantly decrease the capability of the alluvial valley floor to support subirrigation or flood irrigation agricultural activities.

(~~cf~~ ~~bf~~) "Mine facilities" means those structures and areas incidental to the operation of the mine, including mine offices, processing facilities, mineral stockpiles, storage facilities, shipping, loadout and repair facilities, and utility corridors.

(~~cg~~) "Mitigation wetland" means a type of reclaimed, postmining wetland authorized and approved by the Army Corps of Engineers as replacement for jurisdictional wetlands whose disturbance was authorized by the Army Corps of Engineers under Section 404 of the Federal Clean Water Act.

(~~ch~~ ~~bg~~) "Monitor well" means a well constructed or utilized to measure static water levels or to obtain liquid, solid, or gaseous analytical samples or other physical data that would be used for controlling the operations or to indicate potential circumstances that could affect the environment.

(~~ci~~ ~~bh~~) "Monitoring" means the collection of environmental and hydrological data by either continuous or periodic sampling methods.

(~~cj~~) "Moss" means a member of the Bryophyte plant group, including liverworts and hornworts, which have a comparatively small, simple growth form and which lack true xylem and phloem tissue. For the purposes of estimating ground cover, mosses are cryptogams.

(~~ck~~ ~~bi~~) "Mulch" means plant residue or other suitable materials placed upon the soil surface to aid in soil stabilization and soil moisture conservation.

(~~cl~~) "Native" means a plant species which is a component of the original flora of North America.

(~~cm~~) "Noxious weed" means ~~are agriculturally unuseful or troublesome plants whose seeds are totally prohibited from or severely limited in any amounts in commercial crop seed offered for sale. These designations are made by State law.~~ an undesirable, troublesome, aggressive or difficult to control plant species whose seeds are severely limited in or totally excluded from commercial seed sales. The Wyoming Department of Agriculture exclusively makes the noxious weed designation, which includes both "designated" and "prohibited" noxious weeds, under the Wyoming Weed and Pest Control Act. This definition does not include "declared weeds" published by individual Wyoming counties.

(~~cn~~ ~~bj~~) "Outslope" means the face of the spoil or embankment sloping downward

from the highest elevation to the toe.

(co) “Perennial” means a plant which takes at least three years to complete its life cycle and usually persists after flowering and producing seed.

(cp bk) "Perennial stream" means a stream or part of a stream that flows continuously during all of the calendar year as a result of groundwater discharge or surface runoff.

(cq bl) "Permit area" means the area of land and water within the boundaries of the approved permit or permits during the entire life of the operation and includes all affected lands and water.

(cr bm) "Permit transfer" means a change in ownership or control over the right to conduct mining operations under a permit or license to mine.

(cs) “Plant species inventory” means a list of plant species, organized by life form and scientific binomial, obtained by conducting a field reconnaissance of a specific land unit.

(ct) “Plotless Sampling” means estimation of vegetation without the use of two-dimensional areal reference units.

(cu) “Point intercept” means a cover estimation method based upon the vertical projection of a point through the vegetation. The point may be an ocular sighting device, a sharpened rod or a series of sharpened rods on a point frame or a handheld sharpened rod. The ocular sighting devices may be either crosshairs or a laser source and shall be mounted on a frame which ensures that each estimation point is projected from above the canopy (maximum of one meter) to the ground surface without bias. Each pin shall be a rod with a sufficiently small or sharpened point which ensures unbiased visual determination of each object intercepted by the pin’s vertical movement from above the canopy to the ground surface. Under the point intercept method, absolute cover at each sample point is determined as follows:

$$\% \text{ absolute cover of A} = \frac{\text{number of hits on A}}{\text{total number of hits}} \times 100$$

(cv bn) "Potentiometric surface" means the surface that coincides with the static level of water in an aquifer. The surface is represented by the levels to which water from a given aquifer will rise under its full head.

(cw bo) "Precipitation event" means a quantity of water resulting from drizzle, rain, snow, sleet, or hail in a limited period of time. It may be expressed in terms of recurrence interval and duration.



(cx) “Primary shrub species” means, in relation to the shrub standard Option IV, each full shrub and each subshrub species which has a relative density equal to or greater than 0.1 (10 percent). Furthermore, under Option IV, the relative density of fringed sagewort (*Artemisia frigida*) must be equal to or exceed 0.2 (20 percent) of the relative density to qualify as a primary shrub species. Under shrub stand Options I, II, and III, a primary shrub species means each full shrub species which has a relative density equal to or greater than 0.1 (10 percent).

(cy bþ) "Principal shareholder" means any person who is the owner of record of ten percent or more of any class of voting stock.

(cz bñ) "Probable hydrologic consequences" means the projected impacts or changes to the hydrologic regime caused by the proposed ~~surface~~ coal mining and reclamation operation including the effects of adjacent mining operations.

(da) “Production” is an estimate of the total standing crop biomass of herbaceous species (grass, grass-like, forb and some subshrub species). The estimate is made at a time near the expected peak of the current year’s growth and is reported on a per unit area basis. means an estimate of the total quantity of herbaceous matter produced within a growing season. The estimate includes all plant parts which remain attached to the current growing season plant and includes only above ground herbaceous material.

(db bñ) "Property to be mined" means, for ~~surface~~ coal mining operations, both the surface estates and mineral estates within the area covered under the term of the permit and the area covered by underground workings.

(dc bñ) "Public building" means any structure that is owned or leased, and principally used by a governmental agency for business or meetings.

(dd bñ) "Public Parks" means an area designated by a federal, state or local agency for public recreational use.

(de bñ) "Public road" means a road:

(i) Which has been designated as a public road pursuant to the laws of the jurisdiction in which it is located;

(ii) Which is maintained with public funds in a manner similar to other public roads of the same classification within the jurisdiction;

(iii) For which there is substantial (more than incidental) public use;  
and

(iv) Which meets road construction standards for other public roads of the same classification in the local jurisdiction.

(df) "Quadrat" means a two-dimensional, areal unit which is superimposed on the ground surface for the purposes of estimating one or more vegetation parameters. rectangular, square or circular unit which is superimposed on the ground surface for the purpose of estimating cover or production. The quadrat shall be sized appropriately for the sampled vegetation community and shall be at least one half square meter but no larger than one square meter.

(dg) "Qualitative" means, in the context of a vegetation sampling program and/or evaluation of sampling data, that the program and/or evaluation process are conducted using non-numerical information derived from defined sources and/or defined field reconnaissance regimes.

(dh) "Quantitative" means, in the context of a vegetation sampling program and/or evaluation of sampling data, that the program and/or evaluation processes are conducted using statistical analyses of numerical data derived from defined sampling regimes.

(di) "Random" means every point or location in an area has an equal chance of being chosen for sampling as any other point in that area.

(dj ~~bx~~) "Recharge capacity" means the ability of the soils and underlying materials to allow precipitation and runoff to infiltrate and reach the zone of saturation.

(dk ~~bx~~) "Reclaimed land surface" means affected land which has been backfilled, graded, contoured, and revegetated in accordance with an approved reclamation plan.

(dl ~~bx~~) "Reference area" means a land unit which is representative, in terms of physiography, soils, vegetation and land use history, of a plant community to be affected by mining activities as verified by a statistical comparison of absolute values of percent cover and total herbaceous productivity between affected area and reference area data and no mathematical climatic adjustment is made. established to evaluate revegetation success. A "Reference area" is representative of a vegetation community or communities that will be affected by mining activities, in terms of physiography, soils, vegetation and land use history. The "Reference area" and its corresponding postmine vegetation community (or communities) must be approved by LQD and shall be defined in the approved Reclamation Plan. All "Reference areas" shall be managed to not cause significant changes in the vegetation parameters which will be used to evaluate Chapter 4 revegetation success performance standards. A "Reference area" can be a "Comparison area", "Control area", "Extended reference area", or "Limited reference area", depending on how it is established and used, in accordance with the following provisions:

(i) "Comparison area" a land unit which is representative, in terms of physiography, soils, vegetation and land use history, or a premining plant community from which no or insufficient vegetation data were collected prior to disturbance. means

a type of “Reference area” that is established after a vegetation community has been affected. A qualitative determination shall be used to evaluate if the proposed “Comparison area” adequately represents the affected vegetation community. A “Comparison area” may be used when other types of “Reference areas” are not available for measuring revegetation success or when other types of “Reference areas” will not be representative of revegetation success. “Comparison areas” shall be approved by the Administrator prior to their establishment. When evaluating Chapter 4 revegetation success performance standards, data from the “Comparison areas” are directly compared by statistical procedures to data from the reclaimed area.

(ii) “Control area” means a land unit which is representative, in terms of physiography, soils, vegetation and land use history, of a plant community to be affected by mining activities as verified by a comparison of its quantitative and qualitative characteristics to similar information from the plant community it typifies and where a mathematical climatic adjustment is made. means a type of “Reference area” that is established during baseline sampling. Quantitative comparisons of vegetation cover, total ground cover, and production between the proposed “Control area” and the vegetation community to be affected are used to demonstrate the representative nature of the “Control area”. When evaluating revegetation success, baseline data are climatically adjusted using equations. These adjusted data are directly compared by statistical procedures to vegetation data from the reclaimed area. The Administrator may determine to make a direct comparison without the climatic adjustment between the “Control area” and the reclaimed area. Each “Control area” shall be at least two acres.

(iii) “Extended reference area” means all the undisturbed portion of a vegetation type which has experienced disturbance by mining activities. The representative nature of the Extended Reference Area is verified by evaluation of vegetation mapping procedures, the adequacy of premining quantitative and qualitative vegetation data, soils data, physiography and land use history information. Postmining quantitative vegetation data from the Extended Reference Area are directly compared by standard statistical procedures (confidence level of 80%,  $\alpha = 0.2$ ) to data from a reclaimed vegetation type when evaluating revegetation success for full bond release. No mathematical adjustment for climatic change is made. Qualitative data are compared by standard procedures agreed to between the permittee and LQD. An Extended Reference Area should be managed in a fashion which will not cause significant changes in vegetation parameters used to evaluate revegetation success means a type of a “Reference area” that includes a major portion of one or more premine vegetation communities within the permit area. During baseline sampling, the “Extended reference area” includes areas proposed to be affected and areas that will be unaffected. Postmine, the unaffected areas constitute the “Reference area” for revegetation success evaluation. “Extended reference areas” should be established during baseline sampling, but in some circumstances, may be established after mining begins. The representative nature of the vegetation community within the “Extended reference area” is demonstrated by vegetation community mapping procedures, sampling data, soil data, physiography and land use history. To evaluate revegetation success, data from the “Extended reference

area” are directly compared by the statistical procedures to data from the reclaimed area. Each “Extended reference area” will be as large as possible.

(iv) “Limited reference area” means a land unit which is representative, in terms of physiography, soils, vegetation and land use history, of a plant community to be affected by mining activities as verified by a statistical comparison of absolute values of percent cover and total herbaceous productivity between affected area and reference area data and no mathematical climatic adjustment is made. is one type of a “Reference area” that is established during baseline sampling to represent one vegetation community to be reestablished. The representative nature of the “Limited reference area” is determined by quantitative comparisons of vegetation cover, and production between the “Limited reference area” and proposed affected areas at the 90 percent confidence level. To evaluate revegetation success, data from the “Limited reference area” are directly compared by statistical procedures to data from the reclaimed area. Each “Limited reference area” shall be at least five acres.

(dm) “Regulatory categories” means the following time frames that encompass the major regulatory periods from which the different performance standards and reclamation standards for specified lands within the permit area are established:

(i) “Category 1” means those lands which were affected to conduct and/or support mining operations and were completed or substantially completed prior to May 24, 1969 (the implementation date of the Open Cut Land Reclamation Act).

(ii) “Category 2” means those lands which were affected on or after May 24, 1969 (the implementation date of the Open Cut Land Reclamation Act) in order to conduct and/or support mining operations and were completed or substantially completed prior to or on June 30, 1973 (day prior to the effective date of the Wyoming Environmental Quality Act).

(iii) “Category 3” means those affected lands and support facilities if those lands supported operations which were not completed or substantially completed prior to July 1, 1973 (the effective date of the Wyoming Environmental Quality Act) and any affected lands or support facilities taken out of use on or after July 1, 1973 and before May 25, 1975 (the effective date of the Division’s 1975 Rules and Regulations).

(iv) “Category 4” means those affected lands if coal was removed from those land prior to May 3, 1978 and which do not qualify for any of the previous categories. It also means those affected lands and support facilities if they were taken out of use on or after May 25, 1975 (the effective date of the Division’s 1975 Rules and Regulations) and before May 3, 1978 (the effective date of the Office of Surface Mining’s (OSM) Initial Regulatory Program).

(v) “Category 5” means those affected lands and support facilities if coal was not removed from those lands prior to May 3, 1978 (the effective date of OSM’s

Initial Regulatory Program) or those lands were used on or after May 3, 1978 to facilitate mining (including support facilities and associated lands constructed before May 3, 1978 but still in use on or after May 3, 1978.)

(~~dn bz~~) "Revised mining or reclamation operations" means mining and/or reclamation operations conducted during the term of a permit which differ from those operations described in the original mine permit application and approved under the original permit.

(~~do bz~~) "Road(s)" means a surface corridor of affected land associated with travel by land vehicles used in ~~surface~~ coal mining and reclamation operations or coal exploration. A road consists of the roadbed, shoulders, parking and side areas, approaches, structures, ditches, and surface. The term includes access and haulroads constructed, used, reconstructed, improved, or maintained for use in ~~surface~~ coal mining and reclamation operations or coal exploration, including use by coal hauling vehicles to and from transfer, processing, or storage areas. The term does not include ramps and routes of travel within the immediate mining area or within spoil or coal mine waste disposal areas. Immediate mining area refers to areas subject to frequent surface changes. This includes areas where topsoil and overburden are being moved and areas undergoing active reclamation.

(~~dp~~) "Rock means, for the purposes of estimating ground cover, mineral or rock fragments which are one square centimeter in size or larger and occur on or in the soil. A synonym is coarse fragments.

(~~dq ea~~) "Rough Backfilling" means replacement of sufficient material in the pit or pits including special disposal practices for toxic and acid-forming materials, special handling and placement of materials for stream reconstruction or alluvial valley floors, and compaction as required so as to render the affected area in a condition whereby the reclaimed land surface generally resembles the approved postmining contours.

(~~dr eb~~) "Safety factor" means the ratio of the available shear strength to the developed shear stress on a potential surface of sliding determined by accepted engineering practice.

(~~ds~~) "Sample unit" means for the purposes of verifying certain Chapter 4 performance standards and applying for Chapter 15 incremental bond release, a permanently reclaimed land unit established by mutual agreement between the permittee and the Administrator. The unit constitutes the fundamental unit for revegetation success verification. The unit may contain portions of one or more vegetation communities.

(~~dt~~) "Seasonal variety" means the characteristic or normal season of growth of a plant species where season of growth is described as cool-season or warm-season.

(~~du ee~~) "Sedimentation pond" means a sediment control structure designed,

constructed, and maintained to slow down or impound precipitation runoff to reduce sediment concentrations in a point source discharge, including dams or excavated depressions. The term does not include straw dikes, riprap, check dams, mulches, collection ditches, toe ditches, vegetative buffers, gabions, contour furrows and other traditional soil conservation techniques and non-point source runoff controls.

(dv) "Self-renewing" means a plant species which has a demonstrated capacity to germinate, establish, grow, flower and produce viable seed and/or mature and produce vegetative reproductive structures under the climatic regime which prevails on the reclaimed lands.

(dw) "Semi-quantitative" means, in the context of a vegetation sampling program and/or evaluation of sampling data that the program and/or evaluation process is/are conducted using a non-statistical assessment of numerical data derived from a defined field reconnaissance regime.

(dx) "Shrub" means a perennial plant with persistent, woody stems and which produces several basal shoots instead of a single main stem. Shrubs have a relatively low growth form and differ from trees by their low stature and lack of arborescent form. A synonym is full shrub.

(dy) "Shrub mosaic" is a pattern of shrub patches designed to achieve maximum habitat interspersion and edge effect. The boundary of a mosaic encompasses the areal extent of shrub patches and other vegetation types occupying the area between the patches. means a pattern of shrub patches. The boundary of a mosaic unit encompasses the areal extent of the individual shrub patches and the reclaimed community occupying the land among the shrub patches.

(dz) "Shrub patch" refers to a continuous surface of varying shape and size (no less than 0.05 acres) that is intensively managed to support a high density of shrubs. means a mapable concentration of postmining shrubs which is at least 0.05 acres in extent and which intends to fulfill the shrub density and shrub composition required by Chapter 4 shrub restoration performance standard.

(ea ed) "Significant, imminent environmental harm to land, air or water resources" means:

(i) An environmental harm is an adverse impact on land, air, or water resources which resources include, but are not limited to, plant and animal life.

(ii) An environmental harm is imminent, if a condition, practice, or violation exists which:

(A) Is causing such harm; or

(B) May reasonably be expected to cause such harm at any time before the end of the reasonable abatement time.

(iii) An environmental harm is significant if the harm is appreciable, not contemplated in the approved permit application, and not immediately repairable.

~~(ee) "Soft rock surface mining" means surface mining of materials deposited within or as sedimentary rock formations which include: coal, uranium, sand and gravel, jade, bentonite, hot springs deposit, placer mining, clay, gypsum, oil shale, and scoria.~~

~~(eb ef)~~ "Soil Horizons" means contrasting layers of soil material approximately parallel to the land surface and differing from adjacent layers in physical, chemical and biological properties or characteristics.

(i) "A Horizon": means ~~the~~ the uppermost mineral or organic layer, often referred to as the surface soil. It is the part of the soil in which organic matter is most abundant and leaching of soluble or suspended particles is typically the greatest.

(ii) "E Horizon": means ~~the~~ the layer commonly near the surface below the A Horizon and above the B Horizon. An E Horizon is the most commonly differentiated from an overlying A Horizon by lighter color and generally, has measurably less organic matter, and from the underlying B Horizon in the same sequum by color of higher value or lower chroma, by coarser texture, or by a combination of these properties.

(iii) "B Horizon": means ~~the~~ the layer that typically is immediately beneath the E Horizon and often called the subsoil. This middle layer commonly contains more clay, iron, and aluminum than the A, E or C Horizons.

(iv) "C Horizon": means ~~the~~ the deepest layer of soil profile. It consists of loose material or weathered rock that is relatively unaffected by biological activity, and is often called the subsoil.

~~(ec eg)~~ "Soil survey" means a field and other investigation which results in a map showing the geographic distribution of different kinds of soils based on taxonomic characteristics and includes a report that describes, classifies and interprets such soils for use in reclamation.

~~(ed eh)~~ "Species composition" means number, kinds, and amount, ~~and quality~~ of species.

~~(ee ei)~~ "Species diversity" means number of species per unit area.

~~(ef) "Species lacking creditable value" means the cover and production of these species will be estimated but will not be credited or counted towards meeting the~~

revegetation success standards for cover, production or species diversity and composition. Species lacking creditable value include noxious weeds listed under the Wyoming Weed and Pest Control Act, Bromus japonicus, Bromus tectorum, Taeniatherum caput-medusae, Halogeton glomeratus, Kochia scoparia and Salsola tragus and all synonyms for these species as listed in the Natural Resources Conservation Service's Plants Database.

(eg) "Species of Special Concern" means those plant species required to be surveyed by the U.S. Fish and Wildlife Service, U.S. Forest Service, and Bureau of Land Management.

(eh ej) "Spoil" means overburden removed during the mining operation to expose the mineral and does not include the marketable mineral, subsoil or topsoil.

(ei ek) "Stabilize" means to control movement of spoil, spoil piles, or areas of disturbed earth by modifying the geometry of the mass, adding control structures, or by otherwise modifying physical or chemical properties.

(ej el) "Stagnant water" means naturally or artificially impounded water which, because of its poor quality or shallow depth, is unusable for livestock or wildlife watering, wildlife habitat, or recreational uses.

(ek em) "Steep slope" means any slope of more than 20 degrees or such lesser slope as may be designated by the Administrator after consideration of soil, climate, and other characteristics of the area.

(el) "Study area" means the land surface area which was mapped and quantitatively sampled during the baseline vegetation inventory. The study area generally coincides with the permit area (or amendment area) but may exceed those boundaries with prior approval from the Administrator.

(em en) "Subirrigation" means, with respect to alluvial valley floors, the supplying of water to plants from underneath or from a semi-saturated or saturated subsurface zone where water is available for use by vegetation.

(en eo) "Subirrigation or flood irrigation agricultural activities" means the past and present use of any tract of land for the successful production of animal or vegetable life, based on regional agricultural practices, where the use is enhanced or facilitated by subirrigation or flood irrigation. These uses include, but are not limited to, the pasturing, grazing, and the cropping, cultivation, or harvesting of agriculturally useful plants whose production is enhanced or facilitated by the availability of water from subirrigation or flood irrigation. These uses do not include agricultural practices which do not benefit from the availability of water from subirrigation or flood irrigation.

(eo) "Subshrub" is a perennial plant which is partly woody, usually at the base,



~~but also partly herbaceous. The individual plant generally dies back to the woody tissue after each year's growth.~~ means a perennial plant with a persistent, woody base and which produces several basal shoots or stems. The upper stems die back at the end of each growing season. Half-shrub is a synonym.

(~~ep eþ~~) "Subsidence" means the measurable lowering of a portion of the earth's surface or substrata.

(~~eq eþ~~) "Subsoil" means the B and C Horizons excluding consolidated bedrock material.

(~~er eþ~~) "Substantially affect" means to conduct activity which, in the determination of the Administrator will significantly impact land, air or water resources so as to disturb the natural land surface.

(~~es~~) "Substantially complete" means, for the purposes of determining the appropriate regulatory category of affected lands, the overburden was removed above the coal and some recoverable tons were removed from those lands.

(~~et eþ~~) "Substantially disturb" means, for purposes of coal exploration, to significantly impact land or water resources by blasting; by destruction of the vegetative cover or removal of topsoil, subsoil or overburden; by drilling coal exploratory holes; by digging pits; by construction of roads or other access routes; by placement of excavated earthen or waste material on the natural land surface or by other such activities; or to remove more than 250 tons of coal.

(~~eu~~) "Succulent" means a plant species with one or more of its morphological parts exhibiting fleshy or juicy characteristics.

(~~et~~) ~~"Surface coal mining and reclamation operations" means surface coal mining operations and all activities necessary or incidental to the reclamation of such operations.~~

(~~ev eþ~~) "Surface water" means water, either flowing or standing, on the surface of the earth.

(~~ew eþ~~) "Suspended solids" means organic or inorganic material carried or held in suspension in water which are retained by a standard glass fiber filter in the procedure outlined by Environmental Protection Agency's regulations for waste water analyses (40 CFR 136).

(~~ex~~) "Systematic sampling" means a sampling design where sample locations are selected using uniform spatial pattern, such as a grid, that covers the entire sample population area, and where all locations are sampled. The first sample point is randomly selected, and the locations of all other sample points are determined by the initial

location. Calculations for systematic sampling may be done by assuming the sample is random.

(ey) "Technical revegetation success standard" means a set of quantitative data which are representative of the absolute cover of total vegetation and annual herbaceous production of one or more premining vegetation communities affected by the mining operation. Each technical standard shall be assembled from quantitative data collected from vegetation communities within a permit area and/or from adjacent lands and shall be based upon a minimum of five independent sampling programs executed over a minimum of five years. The Administrator shall approve the specific data sets and the quantitative treatment of the data sets used to establish each technical standard.

(ez) "Threatened species" means any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range and which has been listed under the Federal Endangered Species Act.

(fa ew) "Topsoil" means the A and E Horizons or any combination thereof.

(fb ex) "Toxic materials" means earthen materials or refuse which, if acted upon by air, water, weather, or microbiological processes, are likely to produce chemical or physical conditions in soils or water that are detrimental to biota or would restrict the common uses of water.

(fc ey) "Toxic mine drainage" means water that is discharged from active or abandoned mines and other areas affected by coal mining operations and which contains a substance which through chemical action or physical effects is likely to kill, injure, or impair biota commonly present in the area that might be exposed to it.

(fd ez) "Trade secret" means, for purposes of surface coal mining or exploration operations:

(i) Information pertaining to the analyses of the chemical and physical properties of the coal (excepting information regarding such mineral or elemental content which is potentially toxic in the environment) may be kept confidential in accordance with W.S. § 35-11-1101(a);

(ii) Information pertaining to the coal seam itself, except as to any person who demonstrates to the satisfaction of the Director an interest which is or may be adversely affected by the decision to hold such information confidential; and

(iii) Information relating to coal exploration operations which concerns privileged commercial or financial information relating to the competitive rights of the person intending to conduct the coal exploration operations.

(fe) "Transect" is means a sampling method which involves the establishment

of a long, continuous line or strip. The starting point and orientation of the line should be randomly established.

(ff) "Tree" means a woody, perennial plant which usually has a single trunk or stem and a defined crown shape and which has the potential to reach a mature height of at least four meters in optimal conditions.

(fg da) "Unconsolidated streamlaid deposits" means earthen material transported and deposited within a body of water flowing downslope along a definite path. Flood plains and terraces located in the lower portions of topographic valleys are generally composed of unconsolidated streamlaid deposits.

(fh db) "Underground development waste" means earthen materials excavated, moved, and disposed of from underground workings in connection with mining activities.

(fi de) "Underground mining activities" means a combination of:

(i) Underground operations necessary for the extraction of solid minerals by man-made excavations underneath the surface of the earth; and

(ii) For the extraction of coal, surface operations incident to the underground operation such as construction, use, maintenance, and reclamation of roads, surface repair shops, storage areas, etc., and areas on which materials incident to underground operations are placed.

(fj dd) "Undeveloped rangeland" means unimproved land, the use of which is generally limited to grazing of livestock. Undeveloped rangeland does not include areas within the alluvial valley floor where cultivated crops, small grains, and hay crops have been successfully grown, the land has been improved by the introduction of certain vegetation for enhanced agricultural utility, or native vegetation on the alluvial valley floor contributes substantially to the carrying capacity of a specifically controlled or managed grazing unit.

(fk de) "Upland areas" means those geomorphic features located outside the area of unconsolidated streamlaid deposits and may include isolated higher terraces, alluvial fans, pediment surfaces, landslide deposits, and surfaces covered with residuum, mud flows or debris flows, as well as highland areas underlain by bedrock and covered by residual weathered material or debris deposited by sheetwash, rillwash, or windblown material.

(fl df) "Valid existing rights" means:

(i) Except for haul roads, that a person possesses valid existing rights on August 3, 1977, if the application of any of the prohibitions contained in Chapter 12, Section 1(a)(v) to the property interest that existed on that date would effect a taking of

the person's property which would entitle the person to just compensation under the fifth and fourteenth amendments to the United States Constitution;

(ii) For haul roads, valid existing rights means:

(A) A recorded right-of-way, recorded easement or a permit for a coal haul road recorded as of August 3, 1977, or

(B) Any other road in existence as of August 3, 1977.

(iii) A person possesses valid existing rights if the person proposing to conduct ~~surface~~ coal mining operations can demonstrate that the coal is both needed for, and immediately adjacent to, an ongoing ~~surface~~ coal mining operation which existed on August 3, 1977. A determination that coal is "needed for" will be based on a finding that the extension of mining is essential to make the ~~surface~~ coal mining operation as a whole economically viable;

(iv) Where an area comes under the protection of Chapter 12, Section 1(a)(v) after August 3, 1977, valid existing rights shall be found if:

(A) On the date the protection comes into existence, a validly authorized ~~surface~~ coal mining operation exists on that area; or

(B) The prohibition, if applied to the property interest that exists on the date the protection comes into existence would effect a taking of the person's property which would entitle the person to just compensation under the fifth and fourteenth amendments to the United States Constitution.

(v) Interpretation of the terms of the document relied upon to establish valid existing rights shall be based either upon applicable Wyoming case law concerning interpretation of documents conveying mineral rights or, where no applicable case law exists, upon the usage and custom at the time and place where it came into existence.

~~(fm dg)~~ "Vegetation community type" means a recognizable group of species growing together ~~due to similar requirements and tolerances.~~

~~(fn)~~ "Warm season plant" means a plant, which makes most or all its growth during the spring, summer, or fall and is usually dormant during the winter. Warm season plants usually exhibit the C-4 photosynthetic pathway is a species which produces most or all of its growth during the late spring and summer, subsequently flowering in the late summer or autumn.

~~(fo dh)~~ "Water table" means the upper surface of a zone of saturation, where the body of groundwater is not confined by an overlying impermeable zone.

Section 3. **Applicability.**

(a) All mining operations or operations by which solid minerals are intended to be extracted from the earth, which are commenced or conducted after the effective date of these rules and regulations, shall comply with the requirements hereof, except as specific exemptions are allowed by the Act.

(b) The discretionary exemptions shall be limited as follows:

(i) W.S. § 35-11-401(g), (h) and (j) shall not apply to ~~surface~~ coal mining operations.

(ii) In order to qualify for the exemption provided for in W.S. § 35-11-401(e)(ii), approval must be obtained from the Administrator for the extraction of any coal after a finding that:

(A) The extraction is necessary to enable the construction to be accomplished and occurs within the right-of-way or boundary of the area directly affected by the construction;

(B) The construction is funded 50 percent or more by funds appropriated or obtained from a government financing agency's budget or general revenue bonds; and

(C) The person agrees to possess on-site documents which show a description of the project, its exact location, and information showing the source, kind and amount of public financing, including the percentage of the entire construction costs represented by the government financing.

(c) If any provision of these regulations or the applicability thereof to any person or circumstances related to ~~surface~~ coal mining operations is held invalid, the provision or its applicability to other mining operations or circumstances shall not be affected thereby.

DEPARTMENT OF ENVIRONMENTAL QUALITY

LAND QUALITY DIVISION

CHAPTER 2

PERMIT APPLICATION REQUIREMENTS

~~FOR SURFACE COAL MINING OPERATIONS~~

Section 1. **General Requirements.**

(a) All applications shall be filed in a format required by the Administrator and shall include, at a minimum, all information required by the Act and, for ~~surface~~ coal mining operations, all the applicable information required under Sections 2 through 5 of this Chapter.

(b) Information set forth in the application shall be current, presented clearly and concisely, and supported or authenticated, when appropriate, by references to technical material, persons, or public or private organizations which were used, consulted, or were responsible for collecting and analyzing the data.

(c) Maps submitted with the application shall be, or be the equivalent of a U.S. Geological Survey topographic map at a scale determined by the Administrator, ~~but in no event smaller than 1:24,000. For surface coal mining operations, the scale shall be that specified in Part III of Division Guideline 6A.~~ All maps shall contain a title relative to the subject matter of the map, a map number, legend, and show the limits of the permit area. ~~For surface coal mining applications, T~~he maps shall distinguish among the following phases of the operation:

- (i) Prior to August 3, 1977;
- (ii) After August 3, 1977 and prior to May 3, 1978;
- (iii) After May 3, 1978 and prior to approval of the State Program; ~~and~~
- (iv) After the estimated date of issuance of the permit; and
- (v) The five regulatory periods as defined in Chapter 1, Section 2(dm).

(d) Applicants may reference materials. If used in the application, referenced materials shall either be provided to the Division or be readily available to the Division. Relevant portions of referenced materials shall be presented briefly and concisely in the application by photocopying or abstracting and with explicit citations.

(e) The applicant may consult with the local conservation district during preparation of the reclamation plan for conformance with technical standards.

Section 2. **Adjudication Requirements** ~~Application Content Requirements for Surface Coal Mining Operations.~~

(a) In addition to that information required by W.S. § 35-11-406(a), each application for a ~~surface~~ coal mining permit shall contain:

(i) A complete identification of interests, which shall include:

(A) All owners of record of the property to be mined including legal and equitable owners, holders of record of any leasehold interest, and any purchaser of record under a real estate contract for the property to be mined;

(B) The names, addresses and telephone numbers of any operators, if different from the applicant. If the applicant is a business entity other than a single proprietorship, then the names, ~~and~~ addresses and telephone numbers of all limited and general partners, or if a corporation then the names, ~~and~~ addresses and telephone numbers of principal shareholder, officers and director or other person performing a function similar to a director, and resident agent(s) of the applicant. This shall also include the names under which the applicant, partner or principal shareholder operates or previously operated a ~~surface~~ coal mining operation in the United States within the five years preceding the date of application;

(C) A statement and identification of any pending, current or previous ~~surface~~ coal mining permit in the United States held by the applicant, partner or principal shareholder during the five years preceding the date of the application. This shall also identify the regulatory authority with jurisdiction over the operation; ~~and~~

(D) A statement of all lands, interests in lands, options, or pending bids on interests held or made by the applicant for lands which are contiguous to the proposed permit area; and

(E) Legal ownership - if the operator includes roads or spur lines within the permit area but does not possess the mineral rights or the right-to-mine for these lands, the legal land description shall then be listed in the application as a separate subsection in Appendix "C:". The heading of the subsection shall make it clear that the right-to-mine is not claimed on the described lands. Surface owners shall be listed for all lands crossed by spur lines and roads.

(ii) A complete statement of compliance which shall include:

(A) A brief statement, including identification and current status of the interest, identification of the regulatory authority, and description of any

proceedings and their current status, of whether the applicant or entities controlled by or under common control with the applicant has:

(I) Had any Federal or State coal mining permit suspended or revoked in the five years preceding the date of application; or

(II) Forfeited a Federal or State coal mining performance bond or similar security deposited in lieu of bond.

(B) The listing of notices of violation required by W. S. § 35-11-406(a)(xiv) shall describe or identify the violation, when it occurred, any abatement action taken, the issuing regulatory authority, and any proceedings initiated concerning the violation. This listing shall include only notices issued to the applicant and any subsidiaries, affiliates, or persons controlled by or under common control with the applicant.

(iii) The right of entry statements and documents required by W.S. § 35-11-406(a)(ii) and (b)(xi) shall clearly explain and support the legal rights claimed by the applicant and shall also include whether that right is the subject of pending litigation;

(iv) A statement on whether the proposed area to be mined during the term of the permit is within an area designated unsuitable for ~~surface~~ coal mining operations pursuant to W.S. § 35-11-425, under study for any designation, or within an area where mining is prohibited pursuant to Chapter 12, Section 1(a)(v), Land Quality Rules and Regulations. This shall also include the basis on which the applicant claims any available exemption so as to obtain the permit to mine;

(v) A list identifying the Mine Safety and Health Administration identification number for all mine facilities that require MSHA approval and licenses, permits or approvals needed by the applicant to conduct the proposed operation, whether and when they have been issued, the issuing authority, and the steps to be taken to comply with the requirements. To the extent possible, the Administrator and Director shall advise, consult and cooperate with the identified authorities so as to provide for the coordination of review and issuance of these licenses, permits or approvals with the permit to mine. This list shall contain:

(A) Copies or identifying numbers of all permits obtained from the State Engineer or from any other division of the Department, including Solid Waste Management, together with the following:

(I) Water Quality Information. The information from the application for the approved Water Quality permit which affirmatively demonstrates:

(1.) There is a detailed plan, with appropriate maps and cross-sections, for the construction and operation of any mine facility capable



of causing or contributing to pollution of surface and groundwater. The plan shall be in accordance with Chapters III and XI, and as applicable Chapter X, of the Water Quality Division Rules and Regulations. As applicable, any plans shall include a copy of the NPDES permit granted by the Water Quality Division and quantitative limits on pollutants in discharges of water from all point sources.

(2.) There is a plan for the collection, recording, and reporting of groundwater quality and surface water quality according to Chapter II, Section 12, Water Quality Rules and Regulations. This plan shall, at a minimum, be adequate to measure accurately and record water quantity and quality of the discharges from the permit area in order to plan for modification of ~~surface~~ mining activities, if necessary, to minimize adverse effects on the water of the State.

(II) Solid Waste Information. The information from the application for the approved permit(s) for any Solid Waste Management Facility(ies) located within the proposed permit area. Note that a Solid Waste Management Facility, as defined by W.S. § 35-11-103(d)(ii), is a facility that receives solid waste which is generated outside the proposed permit area by any activity other than a mine mouth power plant or mine mouth coal drier. Solid Waste Management Facilities are subject to the permitting, bonding and performance standards of Article 5 of the Environmental Quality Act.

(III) State Engineer Information. The information from the application for the approved permit to construct a reservoir to store or impound water which affirmatively demonstrates that the reservoirs will be constructed and maintained in accordance with the requirements set out in Chapter V, Section 8, State Engineer Rules and Regulations. In addition, if the application includes a proposed transfer of a well for use as a water well, the application shall contain information from the approved application for a permit to appropriate groundwater which affirmatively demonstrates a plan for construction, completion and removal of wells in accordance with requirements which are at least as stringent as those governing wells drilled in conjunction with ~~surface~~ coal mining or exploration operations.

(B) For any permits or approvals which have not been obtained, the information required by (A) above which has been or will be submitted to the agencies involved, including a description of the steps to be taken to comply with the relevant requirements.

### **Section 3 Vegetation Baseline Requirements.**

(a) The plan for a baseline vegetation study to establish baseline conditions shall be submitted to the Administrator prior to the field sampling season for review and approval, prior to implementation, unless otherwise approved by the Administrator.

(b) If baseline information was previously collected in the area for a different

permit or project, then the Administrator may require resampling. The Administrator's determination as to whether resampling is required, and to what extent, will be based upon:

- (i) Differences in scope between the permits or project;
- (ii) Differences in existing and historic conditions;
- (iii) Improvements in sample collection techniques;
- (iv) The elapsed time since the last evaluation of the presence of threatened and endangered species; or
- (v) Concerns with sampling methodology.

(c) The applicant shall map the vegetation communities within the permit area and adjacent area and shall sample and describe the characteristics of vegetation communities within the permit area, to include:

(i) The map shall show the vegetation communities in the permit and adjacent lands. Communities that are 2 acres and larger shall be mapped. Inclusions within larger communities do not need to be mapped as separate vegetation communities. The applicant may use the terminology used by the NRCS in naming vegetation communities;

(ii) The map shall be of a scale approved by the Administrator and use an aerial mosaic or USGS topographic , or equivalent, map as a base;

(iii) The vegetation community map shall identify:

(A) Sample locations for cover and shrub density;

(B) Reference Areas unless a technical success standard is proposed for evaluation of revegetation;

(C) Areas to be affected by mining and associated activities;

(D) The locations and orientations of all photographs provided with the descriptions of the vegetation communities and Reference Areas, as required in Chapter 2, Section 3(j);

(E) The general location of trees;

(F) The location and extent of designated and/or prohibited noxious weeds per Chapter 2, Section 3(l); and

(G) Extent of existing disturbance.

(iv) The vegetation communities in the study area may be mapped any time the ground is clear of snow, but must be field checked and verified prior to the sampling.

(d) Percent cover, by vegetation community, shall be estimated using either:

(i) Quantitative methods, as approved by the Administrator, when the applicant intends to develop a technical standard or when the Administrator determines the study area is in a location that baseline vegetation has not been adequately described.

(ii) With approval of the Administrator, semi-quantitative methods as outlined below shall be used when the applicant does not intend to use a technical standard and or those areas where the Administrator determines there is sufficient quantitative vegetation baseline in the general areas.

(A) The quadrat or point intercept method shall be used except there is not a sample adequacy requirement. The number of samples per vegetation community and reference area shall be:

<u>Vegetation Community size</u>	<u>No. of samples</u>
<u>0 to 5 acres</u>	<u>3</u>
<u>&gt;5 to 50 acres</u>	<u>5</u>
<u>&gt;50 acres</u>	<u>10</u>

(e) If the applicant intends to propose a technical success standard, annual herbaceous production, by community, shall be estimated using quantitative methods. Annual herbaceous production shall also be quantitatively estimated when the Administrator determines that previously collected baseline vegetation data inadequately describes the proposed permit area. If semi-quantitative methods are approved for baseline, no production for baseline is necessary.

(f) A “Reference area”, as defined in Chapter 1, Section 2(dl), shall be established for each vegetation community which will be disturbed unless a technical success standard is proposed for evaluation of revegetation.

(g) Shrub density sampling shall use the quantitative methods as approved by the Administrator unless the applicant commits to the maximum shrub reestablishment performance standard of one full shrub per square meter within shrub patches distributed over 20 percent of the eligible land for Option II. If the applicant accepts this maximum shrub reestablishment performance standard, the applicant shall use the following provisions to complete the calculations in Appendix 4A, Tables 1 and 2.

(i) For Option II, the full shrub with the highest baseline relative cover value across all premining vegetation communities shall be listed as the dominant premine full shrub species and the target postmine species. No calculations for Appendix 4A, Table 1 or Table 2, shall be performed. In Table 2, the Density of the Dominant Postmining (Full) Shrub shall be 0.5 per square meter, and the Density of Residual (Full) Shrubs shall be 0.25 per square meter and the Density of Approved Subshrubs shall be 0.25 per square meter.

~~(h) Section 2(a)(vi)(C)(I)~~ If trees are present within the proposed permit area, then the description shall include the number, general distribution, and species ~~an estimate of the range of their heights and diameters.~~

(i) The applicant shall compile an inventory, by vegetation community, of all plants species observed within the study area and corresponding Reference Areas, in accordance with the following requirements:

(i) The plant species shall be listed:

(A) By life forms as described in Chapter 1, Section 2(ca).

(B) By scientific binomial (with reference to the botanic key used);

(C) By common name; and

(D) Identified as a native (native to North America) or introduced species.

(ii) The plant inventory shall be field checked and updated at least three times from April through September during the baseline sampling year to capture the phenological expression of species that do not express themselves every month. The plant inventory shall not be compared to any qualitative, semi-quantitative or quantitative criteria.

(iii) The plant inventory shall note the names and field locations of:

(A) Any herbarium samples collected;

(B) Any Designated Noxious Weeds or Prohibited Noxious Weeds defined by the State of Wyoming;

(C) Any plant species or habitat of special concern at the time of sampling; and

(D) Any species not previously recorded in Wyoming or

outside its known range.

(j) Each baseline vegetation study shall present descriptions of the vegetation communities and, unless a technical success standard is proposed for evaluation of revegetation, present descriptions of the Reference Areas/Unit. The descriptions shall include:

- (i) The general vegetation composition;
- (ii) The major species in each life form;
- (iii) The characteristic topography, including overall slope and aspect;
- (iv) The characteristic soil types;
- (v) The number, sizes, and types of inclusions;
- (vi) The degree of interspersion between communities;

(vii) A summary of the quantitative, semi-quantitative, and qualitative vegetation information for each community;

(viii) The presence of Designated Noxious Weeds or Prohibited Noxious Weeds identified in Chapter 2, Section 3(k), the description shall include information on the present and historical weed treatment; and

(iv) A three-inch by five-inch (or larger) color photograph, color copy or digital photograph panorama, showing the general features of each “Vegetation community” and “Reference area”.

(k) ~~Section 2(a)(vi)(C)(H)~~ Each baseline vegetation study shall include documentation of the presence or absence of Designated Noxious Weeds or Prohibited Noxious Weeds as defined by the State of Wyoming, Department of Agriculture. Noxious weeds

(i) ~~Section 2(a)(vi)(C)(H)~~ If any Designated Noxious Weeds or Prohibited Noxious Weeds or other plants listed by the local Weed and Pest Control District as harmful are present within the proposed permit area, the description shall include a list of their names, either common or scientific, and a visual estimate of their abundance relative cover.

(ii) If any Designated Noxious Weeds or Prohibited Noxious Weeds are estimated to comprise more than 25% of the relative vegetation cover on two or more contiguous acres, that acreage shall be identified on the vegetation community map.

~~(l) Section 2(a)(vi)(C)(III) Endangered or Threatened Species.~~ If any State or Federally listed endangered or threatened plant species are known to exist within the permit area or in adjacent areas, their location shall be described and an evaluation provided on potential habitats within the permit area ~~or~~ and in adjacent areas.

(m) Cropland, either as a vegetation community and/or a land use category, is exempt from Chapter 2, Sections 3 (d) through (g), (i) and (j).

#### **Section 4 Other Baseline Requirements.**

~~(a) Section 2(a)(vi)~~ A description of the lands to be affected within the permit area, how these lands will be affected, for what purpose these areas will be used during the course of the mining operation, and a time schedule for affecting these lands. This description shall include a description of:

~~(i) Section 2(a)(vi)(A)~~ The major past and present uses of the proposed permit area and adjacent lands. Previous uses of affected lands must be ranked on an individual basis according to the overall economic or social value of the land use to the landowner, community, or area in which these lands are found. The Administrator of the Land Quality Division shall bear the responsibility of making the final decision on the ranking of land uses in a particular area. This decision must be based on information concerning the economy, historical use of the area and the needs and desires of the landowner. The Land Quality Advisory Board may be consulted for suggestions or recommendations on the ranking of land uses in a given area. The present land uses shall be listed using the definitions of Chapter 1, and the vegetation communities which comprise each land use shall be presented.

~~(ii) Section 2(a)(vi)(B)~~ The capability of the land prior to mining to support a variety of uses, giving consideration to soil and foundation characteristics, topography, vegetative cover, and the land's history of previous mining, if any, and the uses of the land preceding mining; as well as the land use classification under local law, if any, of the proposed permit area and adjacent areas.

~~Section 2(a)(vi)(C) A description of vegetation types occurring on affected lands expressed as cover, productivity, species diversity, and species composition. The description shall be in accordance with the methods specified in Appendix A of these rules and regulations. A map of the location and boundaries of the proposed reference or control areas shall be provided. In addition, a delineation of existing vegetation types within the proposed permit area shall be provided. The comparison area method may be used where the native or introduced premining vegetation cannot be described due to previous disturbance. In this case, all disturbed areas shall be delineated and described.~~

~~Section 2(a)(vi)(C)(I) Grasses, forbs, trees and shrubs—the description shall include the common and/or scientific names of the predominating~~

~~species and their estimated abundance within the proposed permit area. If trees are present within the proposed permit area, then the description shall include an estimate of the range of their heights and diameters.~~

(iii) ~~Section 2(a)(vi)(D)~~ Annual precipitation - the operator shall submit an estimated total annual precipitation for the proposed permit area. Data from the nearest official weather reporting station may be used. Operations more than 50 miles from an official weather station that are permanently staffed may be required to keep precipitation records.

(iv) ~~Section 2(a)(vi)(E)~~ Average wind direction and velocity - the operator shall submit the average wind direction and velocity recorded at the nearest official weather station or as measured at the site.

(v) ~~Section 2(a)(vi)(F)~~ Prime farmland information, which shall include, after a preapplication investigation of the proposed permit area, either:

(A) ~~Section 2(a)(vi)(F)(I)~~ A request for a determination that the land not be considered prime farmland on the basis that either the land has not had a history of intensive agricultural use; or there are no soil map units that have been designated prime farmland by the ~~Soil Conservation Service~~ Natural Resource Conservation Service in accordance with 7 CFR 657 (Federal Register Vol. 43, No. 21) and the Memorandum of Understanding between the Conservation Districts and the Soil Conservation Service, or

(B) ~~Section 2(a)(vi)(F)(II)~~ Where prime farmland occurs on proposed affected land, an application which shall be submitted in accordance with Chapter 3.

(vi) ~~Section 2(a)(vi)(G)~~ Studies of fish, wildlife, and their habitats, in the level of detail and for those areas as determined by the Administrator, after consultation with the Wyoming Game and Fish Department in accordance with the Memorandum of Understanding between the two agencies; and Federal agencies having responsibilities for the management or conservation of such environmental values, including:

(A) ~~Section 2(a)(vi)(G)(I)~~ A list of indigenous vertebrate wildlife species within and adjacent to the permit area by common and scientific names. The area of survey for the possible presence of threatened or endangered species shall be on or within one mile of the permit area.

(B) ~~Section 2(a)(vi)(G)(II)~~ If critical habitat disruption is likely, the U.S. Fish and Wildlife Service and Wyoming Game and Fish Department shall be contacted by the Administrator. If crucial or important habitat or migration route disruption is likely, the Wyoming Game and Fish Department shall be contacted by the Administrator. Contacting the appropriate agency(ies) is required in order to determine

the types and numbers of wildlife likely to be disturbed or displaced.

(vii) Section 2(a)(vi)(H) A detailed description, prepared or certified by a licensed professional geologist, or other qualified professional (as required by W.S. § 33-41-101 through 121), of the geology within the proposed permit area down to and including any aquifer to be adversely affected by mining below the lowest coal seam to be mined. The description shall include the aerial and structural geology of the permit area and, by extrapolation, adjacent areas, including geologic parameters which influence the required reclamation, and the occurrence, availability, movement, quantity, and quality of potentially affected surface and groundwaters.

(viii) Section 2(a)(vi)(I) For the proposed permit area and, by extrapolation, adjacent areas, characterization of the geologic strata down to and including the deeper of either the stratum immediately below the lowest coal seam to be mined, or any aquifer below the lowest coal seam to be mined which may be adversely impacted by mining. This information shall include a statement of the results of test borings or core samples which have been collected and analyzed to show:

(A) Section 2(a)(vi)(I)(I) Location of any groundwater;

(B) Section 2(a)(vi)(I)(II) Lithologic characteristics and thickness of each stratum and each coal seam;

(C) Section 2(a)(vi)(I)(III) Physical and chemical properties including the toxic and acid-forming properties of each stratum within the overburden; and

(D) Section 2(a)(vi)(I)(IV) Chemical analyses for acid or toxic-forming substances of the coal seam, including the total sulphur and pyritic sulphur content. The Administrator may waive in whole or in part the requirements of these paragraphs if he makes a written finding that the testing is unnecessary because other equivalent information is available to him in a satisfactory form.

(ix) Section 2(a)(vi)(J) Maps and cross-sections of the area, certified by a registered professional engineer, licensed professional geologist, or other qualified professional (as required by W.S. § 33-29-139 and 33-41-101 through 121), showing:

(A) Section 2(a)(vi)(J)(I) Nature, depth and thickness of any coal seams to be mined or above those to be mined, each stratum of the overburden, and the stratum below the lowest coal seam to be mined;

(B) Section 2(a)(vi)(J)(II) All coal crop lines and the strike and dip of the coal to be mined within the proposed permit area;

(C) Section 2(a)(vi)(J)(III) Location and extent of existing or



previously surface mined or underground mined areas within the proposed permit area and adjacent areas;

(D) ~~Section 2(a)(vi)(J)(IV)~~ Sufficient slope measurements of the proposed permit area measured and recorded at such distances as the Administrator determines to be representative of the premining configuration and reflect geomorphic differences of the land to be mined;

(E) ~~Section 2(a)(vi)(J)(V)~~ The location of water supply intakes for current users of surface water flowing into, out of and within a hydrologic area defined by the Administrator, and those surface waters which will receive discharges from affected areas in the proposed permit area;

(F) ~~Section 2(a)(vi)(J)(VI)~~ The location of areas on which mining is limited or prohibited within or adjacent to the permit area, pursuant to Chapter 12, Section 1(a)(v), Land Quality Rules and Regulations;

(G) ~~Section 2(a)(vi)(J)(VII)~~ Elevations and locations of test borings and core samplings;

(H) ~~Section 2(a)(vi)(J)(VIII)~~ Elevations and locations of monitoring stations used to gather data for water quality and quantity, fish and wildlife, and air quality in preparation of the application; and

(I) ~~Section 2(a)(vi)(J)(IX)~~ Other relevant information required by the Administrator.

(x) ~~Section 2(a)(vi)(K)~~ Overburden, topsoil, subsoil, mineral seams or other deposits.

(A) ~~Section 2(a)(vi)(K)(I)~~ Overburden - the operator shall submit a description including the thickness, geological nature (rock type, orientation, etc.), the presence of toxic, acid-forming, or vegetative-retarding substances, or any other factor that will influence the mining or reclamation activities.

(B) ~~Section 2(a)(vi)(K)(II)~~ Topsoil and subsoil information including a soil survey of the affected lands conducted in accordance with the standards of the National Cooperative Soil Survey of the U.S. Department of Agriculture. If alternative materials are proposed to be used as a supplement to or substitute for topsoil, their suitability shall be demonstrated in accordance with Chapter 4, Section 2(c)(ix).

(I) ~~Section 2(a)(vi)(K)(II)(1.)~~ Topsoil - the operator shall submit a description of the thickness and nature of the topsoil, if any, over the proposed affected lands. A soils survey and soil analyses conducted in accordance with standard methods acceptable to the Administrator, may be required to show variations in topsoil

depth and suitability.

(II) ~~Section 2(a)(vi)(K)(II)(2.)~~ Subsoil - the nature, thickness and distribution of the subsoil, if any, shall be described over the proposed affected lands. Detailed analyses of the subsoil may be required, if there is reason to suspect it may be of better quality for revegetation than the topsoil, or if it is to function as a topsoil supplement in reclamation efforts. If the subsoil is suspected of containing substances that might cause pollution or hinder reclamation, analyses will provide a basis for determining how to handle this material during reclamation.

(C) ~~Section 2(a)(vi)(K)(III)~~ Mineral seams or other deposits - the operator shall submit a description of the mineral seams in the proposed permit area, including, but not limited to, their depth, thickness, orientation (strike and dip), and rock or mineral type. Maps or geologic cross-sections may be used to illustrate the description of the mineral seams.

(xi) ~~Section 2(a)(vi)(L)~~ Complete information on surface water for the permit area and adjacent areas. This shall include the following:

(A) ~~Section 2(a)(vi)(L)(I)~~ The operator shall list and describe the name and location for the present surface waters in and adjacent to the proposed permit area. The list shall include, but not be limited to, rivers, creeks, lakes, reservoirs, springs and marshes. Streams shall be classified as ephemeral, intermittent or perennial;

(B) ~~Section 2(a)(vi)(L)(II)~~ The operator shall submit a description of the immediate drainage area which includes the proposed permit area. Surface water use shall be identified as to domestic, municipal, industrial, agricultural, and wildlife;

(C) ~~Section 2(a)(vi)(L)(III)~~ Baseline monitoring information of surface water quantity within the permit area which is representative of the surface hydrologic system. Water quantity descriptions shall include, at a minimum, baseline information on seasonal flow rates, and identification of drainage area acreage; and

(D) ~~Section 2(a)(vi)(L)(IV)~~ Water quality data sufficient to identify seasonal variation. All surface water-quality sampling and analyses performed to meet the requirements of this Section shall be conducted according to the methodology in the 20th edition of "Standard Methods for the Examination of Water and Wastewater," or the methodology in 40 CFR Part 136 - "Guidelines Establishing Test Procedures for the Analysis of Pollutants," as amended on January 16, 2001. Contact the Land Quality Division for information on how to obtain a copy of either reference materials. The data shall include at a minimum:

(I) ~~Section 2(a)(vi)(L)(IV)(1.)~~ Total dissolved solids (mg/l);

(II) ~~Section 2(a)(vi)(L)(IV)(2.)~~ Total suspended solids

(mg/l);

(III) Section 2(a)(vi)(L)(IV)(3.) pH (standards units);

(mg/l); and  
(IV) Section 2(a)(vi)(L)(IV)(4.) Total and dissolved iron

(V) Section 2(a)(vi)(L)(IV)(5.) Total manganese (mg/l).

(E) Section 2(a)(vi)(L)(V) Baseline alkalinity and acidity information shall be provided if there is a potential for acid drainage from the proposed mining operation.

(xii) Section 2(a)(vi)(M) Complete information on groundwater which may be affected in the permit area and adjacent areas. This shall include the following:

(A) Section 2(a)(vi)(M)(I) The operator shall submit an estimate of the depth and quantity of any groundwater existing in the proposed permit area down to and including the strata immediately below the lowest mineral seam to be mined. The operator may be required to conduct test drilling and monitoring in order to determine the exact depth, quantity and quality of groundwater in geological formations affected by the mining operations. Such drilling will require permits from the State Engineer's Office;

(B) Section 2(a)(vi)(M)(II) The lithology and thickness of all known aquifers;

(C) Section 2(a)(vi)(M)(III) All water-quality sampling and analyses performed to meet the requirements of this Section shall be conducted according to the methodology in the 20th edition of "Standard Methods for the Examination of Water and Wastewater" or the methodology in 40 CFR Part 136 - "Guidelines Establishing Test Procedures for the Analysis of Pollutants," as amended on January 16, 2001. Contact the Land Quality Division for information on how to obtain a copy of either reference materials. The data shall include at a minimum:

(mg/l);  
(I) Section 2(a)(vi)(M)(III)(1.) Total dissolved solids

(mg/l);  
(II) Section 2(a)(vi)(M)(III)(2.) Total and dissolved iron

and  
(III) Section 2(a)(vi)(M)(III)(3.) Total manganese (mg/l);

(IV) Section 2(a)(vi)(M)(III)(4.) pH (standard units).

~~(D) Section 2(a)(vi)(M)(IV)~~ According to the parameters and in the detail required by the Administrator, the recharge, storage, and discharge characteristics of the groundwater.

(xiii) Section 2(a)(vi)(N) Water rights.

~~(A) Section 2(a)(vi)(N)(I)~~ The operator shall list by name and owner all known adjudicated and permitted water rights on the proposed permit area and adjacent lands.

~~(B) Section 2(a)(vi)(N)(II)~~ The operator shall submit a list by name and owner of all existing water wells on the proposed permit area and adjacent lands, including all wells filed with the State Engineer's Office three miles or less from the proposed permit area. A survey of the premining water levels in the above wells may be required.

~~(xiv) Section 2(a)(vi)(O)~~ A description of the surface water and groundwater and related geology in the permit area and general area sufficient to assess the probable hydrologic consequences (PHC). If the determination of the PHC required by Chapter 19, Section 2(a)(i) indicates that adverse impacts on or off the proposed permit area may occur to the hydrologic balance, or that acid-forming or toxic material is present that may result in the contamination of groundwater or surface water supplies, then information supplemental to that required under ~~(a)(vi)(L)~~ (xi) and ~~(M)~~ (a)(xii) of this Section shall be provided to evaluate such PHC and to plan remedial and reclamation activities. Such supplemental information may be based upon drilling, aquifer tests, hydrogeologic analysis of the water-bearing strata, flood flows, or analysis of other water-quality or quantity characteristics.

~~(xv) Section 2(a)(vi)(P)~~ Information concerning the presence or absence of an alluvial valley floor within the permit area or on adjacent areas in accordance with Chapter 3.

~~(xvi) Section 2(a)(vi)(Q)~~ The location of existing man-made features to include roads, railroads, reservoirs, public or private rights-of-way and easements, utility lines, pipelines, oil wells, gas wells, and water wells.

~~(xvii) Section 2(a)(vi)(R)~~ Boundaries and descriptions of all cultural, historic and archaeological resources listed on, or eligible for listing on, the National Register of Historic Places. In compliance with the Archaeological Resources Protection Act of 1979 (P.L. 96-95), this information shall not be placed on display at the county clerk's office (as required by W.S. § 35-11-406(d)) where such resources occur on lands owned by the United States. This information shall be clearly labeled as "Confidential" and submitted separately from the remainder of the application materials. Requests to disclose confidential information shall be administered under the Department of Environmental Quality, Rules of Practice and Procedure, the Wyoming Public Records

Act (W.S. §§ 16-4-2001 thru 16-4-2005 (2007)) and the Wyoming Environmental Quality Act (2007).

(xviii) Section 2(a)(vi)(S) A description of any significant artifacts, fossil or other article of cultural, historical, archaeological or paleontological value. Upon recommendation by a qualified archaeologist or a qualified paleontologist, the Administrator may require an evaluation of the proposed permit area prior to the time that a permit or license is issued.

### Section 5 **Mine Plan.**

(a) Section 2(b) In addition to that information required by W.S. § 35-11-406(b), each application for a surface coal mining permit shall contain:

(i) Section 2(b)(i) A complete operations plan proposed to be conducted during the life of the mine including:

(A) Section 2(b)(i)(A) A narrative description of the type and method of mining, the number of acres that will be affected annually, overburden and mineral removal and transport, anticipated annual and total production by tonnage, and the major equipment to be used for all aspects of the operations.

(B) Section 2(b)(i)(B) A map showing the estimated orderly progression of mining and reclamation on all proposed affected lands.

(C) Section 2(b)(i)(C) The size, sequence and timing of the areas for which it is anticipated that renewed permits for mining will be requested over the estimated total life of the proposed operation.

(D) Section 2(b)(i)(D) Cross-sections, and/or maps and plans of the area to be mined during the term of the permit, unless required for the permit area by the Administrator or as specified below, certified by a registered professional engineer or professional geologist, showing:

(I) Section 2(b)(i)(D)(I) Location of proposed water treatment control and monitoring facilities;

(II) Section 2(b)(i)(D)(II) Location of each proposed explosive storage and handling facility;

(III) Section 2(b)(i)(D)(III) Location and construction of each proposed waste disposal facility relating to coal processing or pollution control;

(IV) Section 2(b)(i)(D)(IV) Location of and typical design for surface water and groundwater hydrologic control methods including proposed

temporary impoundments, sedimentation ponds, diversions, stream channels, erosion control methods, and water treatment, water storage, water collection and discharge facilities. The location and typical design of permanent impoundments and general location of the above described hydrologic control methods shall be provided for the permit area;

~~(V) Section 2(b)(i)(D)(V)~~ The location, construction and maintenance of coal stockpiles, temporary and excess spoil piles shall be provided for the permit area;

~~(VI) Section 2(b)(i)(D)(VI)~~ Location of permanently fixed signs and markers in accordance with and meeting the requirements of Chapter 4, Section 2(o); and

~~(VII) Section 2(b)(i)(D)(VII)~~ Location and description of any undisturbed natural barrier which is proposed to be provided to prevent slides and erosion, in accordance with the requirements of Chapter 4, Section 2(s).

~~(ii) Section 2(b)(iii)~~ A narrative covering the area to be mined during the term of the permit, unless required for the permit area by the Administrator or as specified below, explaining the location and plans for modification or construction, use, and maintenance of new mine facilities, signs and markers, dams, embankments, impoundments, and soil, coal and waste removal, handling, storage, cleaning, transportation and disposal areas. In addition, the narrative shall contain a plan of operation describing methods for minimizing interference with services in accordance with Chapter 4, Section 2(n). The narrative shall also include A narrative and a map of the permit area identifying the location of existing structures, a description of their use and maintenance, and an explanation of whether they meet the requirements of Chapter 4 or the plan for removal, if required, or modification to comply with those standards in a manner which protects the environment and public health and safety.

~~(iii) Section 2(b)(viii)~~ A description of the measures to be used to maximize the use and conservation of the coal resource as required in Chapter 4, Section 2(v).

~~(iv) Section 2(b)(ix)~~ A description of the contingency plans which have been developed to preclude sustained combustion of any materials constituting a fire hazard.

~~(v) Section 2(b)(i)(E)~~ A description, plans, and drawings for each mine facility to be constructed, used, or maintained within the proposed permit area. The plans and drawings shall include a map, appropriate cross-sections, design drawings, and specifications sufficient to demonstrate compliance with section 2(n) of Chapter 4 for each facility.

~~(vi) Section 2(b)(i)(F)~~ A map of the permit area which clearly shows that a railroad spur(s) which provides exclusive service to that particular permit is being included within the permit boundary from the point that it provides such service. This spur(s) shall be covered by a reclamation bond.

~~(vii) Section 2(b)(v)~~ A blasting plan for the area to be mined during the term of the permit, which shall include:

~~(A) Section 2(b)(v)(A)~~ Proposed compliance with limitations on ground vibration and airblast, the basis for those limitations, and methods to be applied in controlling the adverse effects of blasting operations. The applicant should also include:

~~(I) Section 2(b)(v)(A)(I)~~ A blasting plan which depicts the worst-case scenario (i.e., the maximum probable amount of explosives to be detonated in any eight millisecond period).

~~(II) Section 2(b)(v)(A)(II)~~ The identification, direction and distance, in feet to the nearest dwelling, public building, school, church, and community or institutional building from any blasting area during the term of the permit. This paragraph shall not apply if the building is owned by the operator and not leased to another or, if leased, the lessee signs a waiver relieving the operator from meeting the limitations in Chapter 6.

~~(B) Section 2(b)(v)(B)~~ If blasting operations will be conducted within 1,000 feet of any building used as a dwelling, public building, school, church, and community or institutional building outside the permit area, or within 500 feet of an active or abandoned underground mine, an anticipated blast design, prepared and signed by a certified blaster. The design shall contain sketches of the drill patterns, delay periods, and decking and shall indicate the type and amount of explosives to be used, critical dimensions, and the location and general description of structures to be protected, as well as a discussion of design factors to be used which protect the public and meet the applicable airblast, flyrock and ground vibration standards in Chapter 6. This paragraph shall not apply if the building is owned by the operator and not leased to another or, if leased, the lessee signs a waiver relieving the operator from meeting the limitations in Chapter 6.

~~(C) Section 2(b)(v)(C)~~ Description and location of blasting monitoring, warning and site access control equipment and procedures proposed to be used pursuant to Chapter 6, Section 4.

~~(D) Section 2(b)(v)(D)~~ Description of procedures and plans for recording and retaining information required by Chapter 6, Section 5.

~~(E) Section 2(b)(v)(E)~~ A sample copy of the public notices required by Chapter 6, Section 3.

~~(F) Section 2(b)(v)(F)~~ Other information requested by the Administrator which he determines necessary to ensure compliance with Chapter 6.

~~(viii) Section 2(b)(vi)~~ A plan for minimizing adverse impacts to fish, wildlife and related environmental values within and adjacent to the permit area during the operation, including:

~~(A) Section 2(b)(vi)(A)~~ Whether such resources will be enhanced through successful revegetation in accordance with Chapter 4, Section 2(r);

~~(B) Section 2(b)(vi)(B)~~ A statement of how the applicant will utilize monitoring methods as specified in Appendix B of these rules and regulations, and impact control measures and management techniques to protect or enhance the following, if they are likely to be affected by the proposed operation:

~~(I) Section 2(b)(vi)(B)(I)~~ Threatened or endangered species of plants or animals listed by the Secretary under the Endangered Species Act of 1973, as amended (16 U.S.C. Section 1531 et seq.) and their critical habitats;

~~(II) Section 2(b)(vi)(B)(II)~~ Species identified through the consultation process described in Section 2(a)(vi)(G); and

~~(III) Section 2(b)(vi)(B)(III)~~ Important habitats for fish and wildlife, such as wetlands, riparian areas, rimrocks, areas offering special shelter or protection, reproduction and nursery areas, and wintering areas.

~~(C) Section 2(b)(vi)(C)~~ Upon request, the Administrator shall provide the resource information required under paragraph (B) of this Section and that required by Section 2(a)(vi)(G) of this Chapter to the U.S. Department of the Interior, Fish and Wildlife Service regional or field office for their review. This information shall be provided within 10 days of receipt of the request from the Service.

~~(ix) Section 2(b)(xi)~~ A plan to ensure the protection of the quantity and quality of, and rights to, surface water and groundwater both within and adjacent to the permit area, which shall include:

~~(A) Section 2(b)(xi)(A)~~ A plan and timetable for control and treatment of surface water and groundwater in accordance with Chapter 4, Section 2(e)-(h);

~~(B) Section 2(b)(xi)(B)~~ A plan for sediment removal and disposal;

~~(C) Section 2(b)(xi)(C)~~ A plan to restore the approximate recharge capacity of the permit area in accordance with Chapter 4, Section 2(h);



~~(D) Section 2(b)(xi)(D)~~ A plan to collect, record and report water quantity and quality data according to Chapter 4, Section 2(i); and

~~(I) Section 2(b)(xi)(D)(I)~~ Surface water monitoring plan.

~~(1.) Section 2(b)(xi)(D)(I)(1.)~~ The application shall include a monitoring plan based upon the PHC determination required under subsection 2(b)(xii) of this Chapter and the analysis of all baseline hydrologic, geologic, and other information in the permit application. The plan shall provide for the monitoring of parameters that relate to the suitability of the surface water for current and approved postmining land uses and to the objectives for protection of the hydrologic balance as set forth in subsection 2(b)(xi) of this Chapter.

~~(2.) Section 2(b)(xi)(D)(I)(2.)~~ The plan shall identify the surface water quantity and quality parameters to be monitored, sampling frequency, and site locations. At a minimum, the parameters specified in Section 2(a)(vi)(L)(III) and (IV) of this Chapter shall be measured. Results of monitoring shall be available for inspection at the mine and available to the Director's designated authorized representative, and shall be reasonably current. Surface water monitoring shall be conducted quarterly unless an alternate frequency, appropriate to the monitored site, is approved by the Administrator. Results of monitoring shall be submitted in the annual report for each monitoring location.

~~(3.) Section 2(b)(xi)(D)(I)(3.)~~ The plan shall describe how the data may be used to determine the impacts of the operation upon the hydrologic balance.

~~(II) Section 2(b)(xi)(D)(II)~~ Groundwater monitoring plan.

~~(1.) Section 2(b)(xi)(D)(II)(1.)~~ The application shall include a groundwater monitoring plan based upon the PHC determination required under subsection 2(b)(xii) of this Chapter and the analysis of all baseline hydrologic, geologic, and other information in the permit application. The plan shall provide for the monitoring of parameters that relate to the suitability of the groundwater for current and approved postmining land uses and to the objectives for protection of the hydrologic balance set forth in subsection 2(b)(xi) of this Chapter.

~~(2.) Section 2(b)(xi)(D)(II)(2.)~~ The plan shall identify the quantity and quality parameters to be monitored, sampling frequency, and site locations. It shall describe how the data may be used to determine the impacts of the operation upon the hydrologic balance. At a minimum, the parameters specified in Section 2(a)(vi)(M)(III) of this Chapter and water levels shall be measured. Groundwater monitoring shall be conducted quarterly unless an alternate frequency, appropriate to the monitored site, is approved by the Administrator. Results of monitoring shall be

available for inspection at the mine and available to the Director's designated authorized representative, and shall be reasonably current. Results of monitoring shall be submitted in the annual report for each monitoring location.

(E) ~~Section 2(b)(xi)(E)~~ A plan to provide alternative sources of water in accordance with W.S. § 35-11-415(b)(xii), where the protection of quantity or quality cannot be ensured as determined under the requirements of ~~(xi)~~ below.

(x) ~~Section 2(b)(xii)~~ Probable hydrologic consequences determination (PHC). A determination of the PHC of the proposed operation on the hydrologic regime and the quantity and quality of surface water and groundwater systems within the permit area and the general area consistent with the information required in Chapter 19, Section 2 of these regulations. The PHC determination shall be based on baseline hydrologic, geologic and other information collected for the permit application and may include data statistically representative of the site. This determination shall specifically address potential adverse hydrologic consequences and describe preventive and remedial measures.

(xi) ~~Section 2(b)(xiii)~~ An evaluation of the impact of the proposed mining activities that may result in contamination, diminution, or interruption of the quality and quantity of groundwater or surface water within the proposed mine permit area or adjacent areas that are used for domestic, agricultural, industrial, or other legitimate purposes. If contamination, diminution, or interruption may result, then the application shall identify the alternative sources of water supply that could be developed to replace the existing sources in accordance with State law.

(xii) ~~Section 2(b)(xv)~~ A general plan for each coal-processing waste bank. It shall contain a description, map, and cross-section of the structure and its location, preliminary hydrologic information required to assess the hydrologic impact of the bank, and any additional information the Administrator may deem necessary to show compliance with Chapter 4, Section 2(c). Where the applicant proposes to return coal-processing waste to abandoned underground workings, the application shall:

(A) ~~Section 2(b)(xv)(A)~~ Describe the design, operation and maintenance of any proposed coal-processing waste disposal facility, including flow diagrams and any other necessary drawings and maps, for the approval of the Administrator and the Mine Safety and Health Administration;

(B) ~~Section 2(b)(xv)(B)~~ Describe the sources and quality of waste to be stowed, area to be backfilled, percent of the mine void to be filled, method of constructing underground retaining walls, influence of the backfilling operation on active underground mine operations, surface area to be supported by the backfill and the anticipated occurrence of surface effects following backfilling;

(C) ~~Section 2(b)(xv)(C)~~ Describe the source of the hydraulic

transport mediums, method of dewatering the placed backfill, retainment of water underground, treatment of water if released to surface streams, and the effect on the hydrologic regime;

(D) ~~Section 2(b)(xv)(D)~~ Describe each permanent monitoring well to be located in the backfilled area, the stratum underlying the mined coal, and gradient from the backfilled area except where pneumatic backfilling operations are exempted from hydrologic monitoring; and

(E) ~~Section 2(b)(xv)(E)~~ Be approved by MSHA as well as the Administrator prior to implementation.

(xiii) ~~Section 2(b)(xvi)~~ For surface mining activities to be conducted within 500 feet of an underground mine, measures to be used to comply with Chapter 4, Section 2(t).

(xiv) ~~Section 2(b)(xvii)~~ Plans describing the measures to be taken to obtain permit approval regarding areas where mining would be otherwise limited or prohibited pursuant to Chapter 12, Section 1(a)(v).

(xv) ~~Section 2(b)(xviii)~~ Descriptions, including appropriate maps and cross-sections of any proposed excess spoil disposal site and design of the spoil piles in accordance with the requirements of Chapter 4, Section 2(c). This shall contain the results of a geotechnical investigation of the proposed excess spoil disposal site, including the following:

(A) ~~Section 2(b)(xviii)(A)~~ The character of bedrock and any adverse geologic conditions in the disposal area;

(B) ~~Section 2(b)(xviii)(B)~~ A survey identifying all springs, seepage, and groundwater flow observed or anticipated during wet periods in the area of the disposal site;

(C) ~~Section 2(b)(xviii)(C)~~ Where applicable, an evaluation of the potential effects of subsidence of the subsurface strata due to past and future mining operations;

(D) ~~Section 2(b)(xviii)(D)~~ A stability analysis including, but not limited to, strength parameters, pore pressures and long-term seepage conditions. These data shall be accompanied by a description of all engineering design assumptions and calculations and the alternatives considered in selecting the specific design specifications and methods; and

(E) ~~Section 2(b)(xviii)(E)~~ If, under Chapter 4, Section 2(c)(xi)(F), special structural provisions are required for spoil disposal on overall slopes greater than

20 degrees, information on:

~~(I) Section 2(b)(xviii)(E)(I)~~ The number, location and depth of borings or test pits which shall be determined with respect to the size of the spoil disposal structure and subsurface conditions; and

~~(II) Section 2(b)(xviii)(E)(II)~~ The engineering designs, design rationale and design calculations for the special structural provisions, which are based on the information required in paragraph (D) above.

(xvi) ~~Section 2(b)(xix)~~ Road Systems.

(A) ~~Section 2(b)(xix)(A)~~ Each applicant shall submit plans and drawings for each road as defined in Chapter 1 to be constructed, used, or maintained within the proposed permit area. The plans and drawings shall:

(I) ~~Section 2(b)(xix)(A)(I)~~ Include a map, appropriate cross-sections, design drawings and specifications for road widths, gradients, surfacing materials, cuts, fill embankments, culverts, bridges, drainage ditches, drainage structures and low-water crossings;

(II) ~~Section 2(b)(xix)(A)(II)~~ Contain the drawings and specifications of each proposed road that is located in the channel of an ephemeral stream that has the potential for sufficient flow to cause substantial environmental harm unless a downstream sediment control structure exists within the permit boundaries, any intermittent or any perennial stream, as necessary for approval of the road by the Administrator in accordance with Chapter 4, Section 2(j)(iv)(A);

(III) ~~Section 2(b)(xix)(A)(III)~~ Contain the drawings and specifications for each proposed ford of intermittent or perennial streams that is used as a temporary route, as necessary for approval of the ford by the Administrator in accordance with Chapter 4, Section 2(j)(vii)(C)(II);

(IV) ~~Section 2(b)(xix)(A)(IV)~~ Contain a description of measures to be taken to obtain approval from the Administrator for alteration or relocation of a natural stream channel under Chapter 4 Section 2(j)(vii)(D)(IV);

(V) ~~Section 2(b)(xix)(A)(V)~~ Contain the drawings and specifications for each low-water crossing of an ephemeral stream channel that has the potential for sufficient flow to cause substantial environmental harm unless a downstream sediment control structure exists within the permit boundaries, any intermittent stream channel or any perennial stream channel so that the Administrator can maximize the protection of the stream in accordance with Chapter 4, Section 2(j)(vii)(D)(VI); and

(VI) ~~Section 2(b)(xix)(A)(VI)~~ Describe the plans to remove

and reclaim each road that would not be retained under an approved postmining land use, and the schedule for this removal and reclamation.

(B) ~~Section 2(b)(xix)(B)~~ The plans and drawings for each primary road (as defined in Chapter 4, Section 2(j)(i)(B)) shall be prepared by, or under the direction of, and certified by a qualified registered professional engineer as meeting the requirements of this Chapter and current, prudent engineering practices.

(xvii) ~~Section 2(b)(xx)~~ Plans for compliance with the temporary and permanent cessation of operations requirements contained in Chapter 4, Section 2(k) and (u).

(xviii) ~~Section 2(b)(xxi)~~ Plans of mine facilities (including overstrip areas) that are to be shared by two or more separately permitted mining operations may be included in one permit application and referenced in the other application(s). Each permittee shall bond the mine facilities unless the permittees sharing it agree to another arrangement for assuming their respective responsibilities. If such agreement is reached, the application shall include a copy of the agreement between or among the parties setting forth the respective bonding responsibilities of each party for the mine facilities. The agreement shall demonstrate to the satisfaction of the Administrator that all responsibilities under the Act and regulations for the mine facilities will be met.

(xix) ~~Section 2(b)(xxii)~~ A Cultural Resources Management Plan which:

(A) ~~Section 2(b)(xxii)(A)~~ Describes the measures to be used to prevent impacts to public parks or places listed on the National Register of Historic Places or, in cases of valid existing rights or where joint agency approval has been obtained, to minimize impacts to such parks or places;

(B) ~~Section 2(b)(xxii)(B)~~ Provides for the mitigation of adverse effects to historic or archaeological properties eligible for listing on the National Register of Historic Places; and

(C) ~~Section 2(b)(xxii)(C)~~ Ensures that the appropriate treatment measures or mitigation will be undertaken prior to the commencement of any specific mining operation that would affect such parks, places or properties.

(xx) ~~Section 2(b)(xxiii)~~ A plan for the management and disposal within the proposed permit area of industrial solid wastes generated by the operation (such as, but not limited to, grease, lubricants, paints, flammable liquids, garbage, trash, discarded mining machinery, lumber and other combustible material), in accordance with Chapter 4, Section 2(c) and with those provisions of the Solid Waste Management Rules and Regulations deemed appropriate by the Administrator.

(xxi) ~~Section 2(b)(xxiv)~~ Plans for the management and disposal within the

permit area of any solid wastes generated by a mine mouth power plant or mine mouth coal drier, in accordance with Chapter 4, Section 2(c) and with provisions of the Solid Waste Management Rules and Regulations deemed appropriate by the Administrator.

### Section 6 Reclamation Plan.

(a) Section 2(b)(ii) ~~The reclamation plan shall include a~~ A time schedule for each major step in the reclamation which coordinates the operator's reclamation plan with the mining plan in such a manner so as to facilitate reclamation at the earliest possible time consistent with Chapter 4, Section 2(k) and the orderly development of the mining property.

(b) Section 2(b)(iv) ~~The reclamation plan shall also describe how~~ A plan whereby the operator will reclaim the affected lands to the proposed postmining land use in accordance with Chapter 4, Section 2(a) which shall include:

(i) Section 2(b)(iv)(A) A plan for topsoil and subsoil removal, storage, protection, and replacement; and for handling and disposal of all toxic, acid-forming, or otherwise hazardous materials, in accordance with Chapter 4, Section 2(c). This shall include a description with location maps and, where appropriate, typical topographic profiles of the mine facility area, mineral stockpiles, spoil piles, and topsoil and subsoil stockpiles. The location, and where required, the capacity of each stockpile shall be described and shown on a map. The application shall also explain how the topsoil will be replaced on the affected land during reclamation, including a description of the thickness of topsoil to be replaced and procedures that will be followed to protect the topsoil from excessive compaction and wind and water erosion until vegetation has become adequately established.

(ii) Section 2(b)(iv)(B) A plan for backfilling, grading and contouring of all affected lands in accordance with Chapter 4, Section 2(b). The plan shall include:

(A) Section 2(b)(iv)(B)(I) A description of the reclaimed land surface with contour maps or cross-sections that show the final surface configuration of the affected lands.

(B) Section 2(b)(iv)(B)(II) Where terraces or benches are proposed, detailed drawings shall be provided which show dimension and design of the terraces, check dams, any erosion prevention techniques and slopes of the terraces and their interval.

(C) Section 2(b)(iv)(B)(III) Where permanent water impoundments are proposed, contour maps and cross-sections which show slope conditions around the impoundment and the anticipated high and low postmining water level. The plan shall contain a description of erosion control techniques and such other design criteria and water quality and quantity conditions to comply with Chapter 4, Section 2(g)(ii).

~~(D) Section 2(b)(iv)(B)(IV)~~ Maps and descriptions necessary to demonstrate that the slopes of the reclaimed land surface do not exceed the approximate premining slopes.

~~(E) Section 2(b)(iv)(B)(V)~~ Procedures for assuring stability of the reclaimed land surface.

~~Section 2(b)(vii)~~ A revegetation plan, including descriptions of:

~~(iii) Section 2(b)(iv)(C)~~ A plan to assure revegetation of all affected land in accordance with Chapter 4, Section 2(d). The plan shall include:

~~(A) Section 2(b)(iv)(C)~~ The method and schedule of revegetation, including but not limited to species of plants, seeding rates, seeding techniques, mulching requirements ~~or~~ and other erosion control techniques, and seeding times to be used in a given area for reclamation purposes.

~~(B) Section 2(b)(iv)(C)~~ The Wyoming Game and Fish Department shall be consulted and its approval shall be required for minimum stocking and planting arrangements of trees and shrubs, including species composition and vegetative ground cover for crucial habitat, declared as such prior to the submittal of a permit application or any subsequent amendment, and critical habitat. For crucial habitat and critical habitat, consultation with and approval obtained from the Wyoming Game and Fish Department for tree and shrub species composition and ground cover for minimum stocking and planting arrangements of trees and shrubs. Crucial habitat must be declared as such prior to the submittal of a permit application or any subsequent amendment.

~~(C) Section 2(b)(iv)(C)~~ The Wyoming Game and Fish Department shall be consulted for minimum stocking and planting arrangements of trees and shrubs, including species composition and vegetative ground cover for important habitat. For important habitat, consultation with and recommendations obtained from the Wyoming Game and Fish Department for tree and shrub species composition and ground cover for minimum stocking and planting arrangements.

~~Section 2(b)(iv)(C)~~ The Wyoming Department of Agriculture shall be consulted regarding croplands and erosion control techniques.

~~(D)~~ The tree species, the number per species, and the location of tree plantings.

~~(E) Appendix A, Section VII. B.~~ After choosing the postmining land uses and considering the dominant postmining topographic features and landowner desires, the applicant should develop different seed mixes which will accommodate the postmining land uses and differences in soils, moisture conditions,

exposures etc. on the postmining landscape. A separate seed mix(es) shall be developed for each approved postmining land use, considering the dominant postmining topographic features and landowner desires.

~~(I) Ch. 4, Section 2(d)(v) The species of vegetation to be used in vegetation efforts shall be described in the reclamation plan indicating the composition of seed mixtures and the amount of seed to be distributed on the area on a per acre basis.~~

~~(II) Ch. 4, Section 2(d)(v) The species and varieties shall~~ Seed types will depend upon the climatic and soil conditions prevailing in the permit area and the proposed postmining landuses of the land after reclamation.

~~(III) Ch. 4, Section 2(d)(v) The sSpecies to be planted as permanent cover shall be self-renewing;~~

~~(IV) Ch. 4, Section 2(d)(v) Seeding rates shall depend upon seed types, climatic conditions and the techniques to be used in seeding;~~

~~(V) Appendix A, VII., B., 4. The seed mix shall contain naturalized, introduced species only if:~~

~~(1.) Appendix A, VII., B., 4. aAdditional herbaceous species are needed; or if~~

~~(2.) Appendix A, VII., B., 4. sSuitable, native species are unavailable; or if~~

~~(3.) Appendix A, VII., B., 4. For cropland or pastureland naturalized introduced species are superior for a specialized land use (e.g. managed hayland or pastureland); or~~

~~(4.) Ch. 4, Section 2(d)(vi) Introduced species may be used only Needed to achieve a quick, temporary, stabilizing cover to control erosion; or;~~

~~(5.) Ch. 4, Section 2(d)(vi) Conducive to achieve a postmining land use approved by the Administrator.~~

~~(VI) Ch. 4, Section 2(d)(vi) Naturalized or nonindigenous native plant species may be included in the approved seed mixture if they support the approved postmining land uses. The operator shall document, unless otherwise authorized by the Administrator, the suitability of these introduced species using data from published literature, from experimental test plots, from on-site experience, or from other information sources.~~



(VII) Appendix A, VII., B. 5. For grazingland, the seed mix shall contain full shrub and/or subshrub species when these species will support the postmining land uses. To increase postmining species diversity and establish shrub mosaics, shrub mixtures shall be developed and seeded separately from the herbaceous mixtures.

(VIII) For federally owned surface, the federal land managing agency shall be consulted for mulching requirements and seeding requirements for cover crops, temporary and permanent reclamation.

(IX) Appendix A, VII. B. The proposed postmining location of each seed mixture shall be illustrated on a post mining contour map.

(F) Appendix A, VII. C. Locations and/or conditions where the operator specifically requests approval not to use mulch.

(G) A weed control plan for State of Wyoming Designated Noxious and Designated Prohibited Weeds and, on federal surface, any additional weeds listed by the federal land managing agency.

(H) Ch. 4, Section 2(d)(xii) An explanation of aAny plans for irrigation must be explained.

(I) Section 2(b)(vii)(A) Irrigation and An explanation of pest and disease control measures, if appropriate;

(J) Section 2(b)(vii)(C) A plan for monitoring permanent revegetation on reclaimed areas, specifically including quantitative sampling, as required by Chapter 4, Section 2(d)(xi)(i)(J).

(iv) Section 2(b)(vii)(B) Measures proposed to be used to determine the success of revegetation as required by Chapter 4, Section 2(d); and A plan for measurement of revegetation success to include:

(A) How a “Reference area” shall be used for cover and production, unless technical standards for cover and production have been approved for a projected postmine community. A “Reference area” is defined in Chapter 1, Section 2(dl).

(B) The methods to be used for measuring the shrub density standard as approved by the Administrator.

(C) The methods to be used for evaluating the shrub density goal as approved by the Administrator, where applicable.

(D) The procedures to be used for measuring species diversity and composition as approved by the Administrator.

(E) If proposed, a technical success standard for a specified vegetation parameter. The technical success standard:

(I) Is derived from a sufficient number of years of baseline data so the standard value can be considered representative over a range of climatic conditions or a relationship between the parameter and climatic variables can be determined. For technical standards for cover and production, a minimum of five years of baseline data is necessary; and

(II) May be extended to an amendment area if the baseline information indicates the standard is applicable in that area.

(F) The procedures to be used as approved by the Administrator for the evaluation of restored postmining vegetation communities which carry the Cropland or Pastureland land use designation.

~~(G) Ch. 4, Section 2(d)(x)(G) Standards for the success for reforestation for commercial harvest shall be established in consultation with forest management agencies and prior to approval of any mining and reclamation plan that proposes reforestation. If reforestation for commercial harvest is the method of revegetation, reforestation shall be deemed to be complete when a reasonable population density as established in the reclamation plan has been achieved, the trees have shown themselves capable of continued growth for a minimum period of five years following planting, and the understory vegetation is adequate to control erosion and is appropriate for the land use goal. Quality and quantity, vegetation cover, productivity, and species diversity shall be determined in accordance with scientifically acceptable sampling procedures approved by the Administrator.~~

~~(v) Section 2(b)(iv)(D) Descriptions, including maps and cross-sections, of the surface water diversion systems which meet the requirements of Chapter 4, Section 2(e). Monitoring of surface and groundwater conditions may be required during the course of the operation based on the existing water conditions and the nature of the proposed operation. If so required, the application shall include a description of the location, construction, maintenance, and removal, where necessary, of such monitoring stations.~~

~~(vi) Section 2(b)(iv)(E) Where a permanent water impoundment is proposed as final reclamation, the application shall include:~~

~~(A) Section 2(b)(iv)(E)(I) Written consent from the surface landowner if different than the mineral owner.~~

(B) Section 2(b)(iv)(E)(II) A description of the proposed use of the impoundment.

(C) Section 2(b)(iv)(E)(III) A statement of the source, quality and quantity of water available for impoundment and a statement regarding its suitability for recreational, irrigation, livestock or wildlife watering. If, upon review of this information, water quality and quantity are not reasonably demonstrated to be suitable for the postmining use, the applicant shall be so notified in writing and shall be allowed to submit further documentation in support of the proposed impoundment to reasonably satisfy the Administrator. If the applicant is unable to demonstrate to the satisfaction of the Administrator that the water quality and quantity will be suitable for the postmining land use, the applicant shall provide an alternate plan.

(D) Section 2(b)(iv)(E)(IV) The operator may be required to monitor surface and groundwaters in order to determine that upon completion of the operation, the water quality and quantity will be consistent with the approved postmining use.

(E) Section 2(b)(iv)(E)(V) A description of the construction of the impoundment so as to meet the requirements of Chapter 4, Section 2(g)(ii).

(vii) Section 2(b)(iv)(F) A plan to assure proper construction and reclamation of any tailings impoundments in accordance with the Act and these regulations.

(viii) Section 2(b)(iv)(G) A plan for the disposal of mine facilities, erected, used or modified by the applicant in accordance with the requirements of Chapter 4, Section 2(m).

(ix) Section 2(b)(x) A description of the measures to be used to seal or manage mine openings in accordance with Chapter 4, Section 2(p), and to cap, plug and seal all exploration holes, bore holes, wells and other openings, excepting developmental drill holes which will be mined through within one year, within the area to be mined during the term of the permit in accordance with Chapter 14. For developmental drilling the application shall contain general descriptions relating to spacing, data collection, and techniques which will be employed, including those which may be needed to comply with the plugging and sealing requirements of W.S. § 35-11-404.

(x) Section 2(b)(xiv) A postmining land use plan, including:

(A) Section 2(b)(xiv)(A) The necessary support and maintenance activities that may be needed to achieve the proposed land use.

(B) Section 2(b)(xiv)(B) Where a land use is proposed different

from the premining land use:

~~(I) Section 2(b)(xiv)(B)(I)~~ A discussion of the utility and capacity of the reclaimed land to support a variety of uses and the relationship of the proposed use to existing land use policies and plans; and

~~(II) Section 2(b)(xiv)(B)(II)~~ A comparison of the premining and postmining land uses. The premining uses of land to which the postmining land use is compared shall be those uses which the land previously supported, if the land has not been previously mined and has been properly managed.

~~(1.) Section 2(b)(xiv)(B)(II)(1.)~~ The postmining land use for land that has been mined and not reclaimed shall be judged on the basis of the highest and best use that can be achieved and is compatible with surrounding areas without requiring unreasonable disturbance of areas previously unaffected by mining.

~~(2.) Section 2(b)(xiv)(B)(II)(2.)~~ The postmining land use for land that has received improper management shall be judged on the basis of the premining use of surrounding lands that have received proper management.

~~(3.) Section 2(b)(xiv)(B)(II)(3.)~~ If the premining use of the land was changed within five years of the beginning of the mining, the comparison of postmining use to premining use shall include a comparison with the historic use of the land as well as its use immediately preceding mining.

~~(C) Section 2(b)(xiv)(C)~~ Approval of alternative land uses shall require a demonstration that:

~~(I) Section 2(b)(xiv)(C)(I)~~ The alternative land use is equal to or greater than the highest previous use;

~~(II) Section 2(b)(xiv)(C)(II)~~ There is reasonable likelihood for achievement of the use;

~~(III) Section 2(b)(xiv)(C)(III)~~ The use does not present any actual or probable hazard to public health or safety, or threat of water diminution or pollution; and

~~(IV) Section 2(b)(xiv)(C)(IV)~~ The use will not:

~~(1.) Section 2(b)(xiv)(C)(IV)(1.)~~ Be impractical or unreasonable;

~~(2.) Section 2(b)(xiv)(C)(IV)(2.)~~ Be inconsistent with applicable land use policies or plans;

(3.) ~~Section 2(b)(xiv)(C)(IV)(3.)~~ Involve unreasonable delay in implementation; or

(4.) ~~Section 2(b)(xiv)(C)(IV)(4.)~~ Cause or contribute to violation of Federal, State, or local law.

DEPARTMENT OF ENVIRONMENTAL QUALITY

LAND QUALITY DIVISION

CHAPTER 4

ENVIRONMENTAL PROTECTION PERFORMANCE STANDARDS

FOR ~~SURFACE~~ COAL MINING OPERATIONS

Section 1. **General.**

This Chapter sets forth the environmental protection performance standards applicable to all coal mining operations. No mining operation shall be conducted except in compliance with the requirements hereof.

Section 2. **General Environmental Protection Performance Standards**

(a) Land uses.

(i) Reclamation shall restore the land to a condition equal to or greater than the "highest previous use." The land, after reclamation, must be suitable for the previous use which was of the greatest economic or social value to the community area, or must have a use which is of more economic or social value than all of the other previous uses.

(ii) Operators are required to restore wildlife habitat, whenever the Administrator determines that this restoration is possible, on affected land in a manner commensurate with or superior to habitat conditions which existed before the land became affected, unless the land is private and the proposed use is for a residential or agricultural purpose which may preclude its use as wildlife habitat.

(iii) Water impoundments used for recreational purposes shall be constructed in accordance with the statutes and (g) of this Section. Recreational lands, other than water impoundments, represent changes in the land which may or may not be suitable for wildlife habitat.

(b) Backfilling, grading and contouring.

(i) Rough backfilling and grading shall follow coal removal as contemporaneously as possible based upon the mining conditions. The operator shall include within the application for a permit to mine a proposed schedule for backfilling and grading with supporting analysis.

(ii) Backfilled materials shall be replaced in a manner which

minimizes water pollution on and off the site and supports the approved postmining land use. Preparation of final graded surfaces shall be conducted in a manner that minimizes erosion and provides a surface for replacement of topsoil that will minimize slippage.

(iii) All affected lands shall be returned to their approximate original contour, except as authorized by a variance or exemption under Chapter 5, Sections 6 and 7, or Chapter 8, or Chapter 9.

(iv) All spoil shall be transported, backfilled, compacted (where necessary to insure stability or to prevent leaching) and graded to eliminate all highwalls, spoil piles, and depressions, except that:

(A) Soil conservation techniques and or small depressions may be employed to retain moisture, minimize erosion, create and enhance wildlife habitat or assist revegetation.

(B) Incomplete elimination of highwalls may be authorized in accordance with Chapter 5, Section 7.

(C) Retention of selected portions of a highwall or other steep feature created during the mining operation may be approved by the Administrator to remain as replacement for natural features that were mined out or are planned to be mined out under the current Mine Plan if the operator demonstrates that the retained highwall will:

(I) Have a static safety factor of 1.3 or greater and be of similar erosive resistance;

(II) Not pose a hazard to people using the area;

(III) Be backfilled to cover the uppermost mineable coal seam to a minimum depth of 4 feet;

(IV) Not exceed the length and height of the premine feature it is replacing;

(V) Be contoured into the surrounding terrain; and

(VI) Enhance or restore important wildlife habitat or hydrologic conditions.

(D) Spoil may be placed on an area outside the mined-out area to restore the approximate original contour by blending the spoil into the surrounding terrain if the following requirements are met.

(I) All vegetative and organic material shall be

removed from the area.

(II) The topsoil on the area shall be handled in accordance with Section 2(c) of this Chapter.

(III) The spoil shall be backfilled and graded on the area in accordance with the requirements of this subsection 2(b).

(v) Postmining slopes shall not exceed a slope necessary to achieve a minimum long-term static safety factor of 1.3, to prevent slides and restore stable drainages and hillslopes.

(vi) Thin overburden. Where surface coal mining operations are proposed to be carried out continuously in the same limited pit area for more than one year from the day coal removal operations begin and where the volume of all available spoil and suitable waste materials over the life of the mine is demonstrated to be insufficient to achieve the approximate original contour considering bulking factor and coal removal, surface mining activities shall be conducted to use all available spoil and suitable waste materials to attain the lowest practicable stable grade, but not more than the angle of repose, and to meet the requirements of paragraphs (ii) and (iv) above.

(vii) Thick overburden. Where the volume of spoil over the life of the mine is demonstrated to be more than sufficient to achieve the approximate original contours considering bulking factor, coal removal and subsidence of backfilled material, excess spoil may be placed outside the pit area in accordance with the requirements of subsection (c).

(viii) Permanent Impoundments: Where permanent impoundments are authorized in accordance with Chapter 2, Section ~~2 6(b)(xiv)(vi)~~, spoil that may result from the impoundment will be handled in accordance with the requirements of this subsection.

(c) Topsoil, subsoil, overburden, spoil, excess spoil, refuse, coal mine waste, acid-forming materials, toxic materials and other wastes.

(i) Topsoil.

(A) All topsoil or approved surface material shall be removed from all areas to be affected in the permit area prior to these areas being affected unless otherwise authorized by the Administrator. The topsoil may be mixed with the subsoil but shall be segregated so as not to become mixed with spoil or waste material, stockpiled in the most advantageous manner and saved for reclamation purposes. The Administrator may authorize topsoil to remain on areas where minor disturbance will occur such as signs, power poles, light traffic, fence lines, monitoring stations or drilling provided that



the minor disturbance will not destroy the protective vegetative cover and will not increase erosion.

(B) When topsoil is not promptly redistributed, the topsoil or approved surface material shall be stockpiled on stable areas within the permit area in such a manner so as to minimize wind and water erosion and unnecessary compaction. In order to accomplish this, the operator shall establish, through planting or other acceptable means, a quick growing cover of vegetation on the topsoil stockpiles. The topsoil shall also be protected from acid or toxic materials, and shall be preserved in a usable condition for sustaining vegetation when placed over affected land. Provided however, where long-term disturbance will occur, the Administrator may authorize the temporary distribution of topsoil to enhance stabilization of affected lands within the permit area. Where this is authorized, the Administrator shall find that the topsoil or subsoil capacity and productive capabilities are not diminished, that the topsoil is protected from erosion, and will be available for reclamation.

(C) Reclamation shall follow mining as soon as is feasible so as to minimize the amount of time topsoil must be stockpiled. Where topsoil has been stockpiled for more than one year, the operator may be required to conduct nutrient analyses to determine if soil amendments are necessary.

(D) Topsoil stockpiles shall be marked with a legible sign containing letters not less than six inches high on all approach roads to such stockpiles. Said signs shall contain the word "Topsoil" and shall be placed not more than 150 feet from any and all stockpiles of topsoil. Such signs must be in place at the time stockpiling is begun.

(E) If abundant topsoil is present, and it is not all needed to accomplish the reclamation required in the approved reclamation plan, the Administrator may approve of use of this topsoil by this or another operator in another area for reclamation purposes.

(F) Trees, large rocks and other waste material which may hinder redistribution of topsoil shall be separated from the topsoil before stockpiling.

(ii) Subsoil.

(A) Except as provided in (B), all subsoil determined by field methods or chemical analysis to be suitable as a plant-growth medium shall be removed from all areas to be affected and handled in accordance with the topsoil requirements of this Section.

(B) Upon an adequate demonstration by the operator that all or a portion of the subsoil material is not needed to meet the revegetation and land use requirements of these regulations, the Administrator may authorize all or a portion of the

subsoil to not be used for reclamation. The unused subsoil may then be regarded as overburden material and handled in accordance with the requirements of this Section.

(iii) The topsoil (A and E horizons) shall be segregated from the subsoil (B and C horizons) where the Administrator determines that this practice is necessary to achieve the revegetation requirements of these regulations.

(iv) Before redistribution of topsoil or subsoil the regraded land shall be treated, if necessary, to reduce potential for slippage and encourage root penetration.

(v) Topsoil, subsoil, and/or an approved topsoil substitute shall be redistributed in a manner that:

(A) Achieves an approximate uniform, stable thickness consistent with the approved permit and the approved postmining land uses, contours and surface water drainage system;

(B) Prevents compaction which would inhibit water infiltration and plant growth;

(C) Protects the topsoil from wind and water erosion before and after it is seeded until vegetation has become adequately established; and

(D) Conserves soil moisture and promotes revegetation.

(vi) All rills and gullies which either preclude achievement of the approved postmining land use or the reestablishment of the vegetative cover, or cause or contribute to a violation of water quality standards for the receiving stream, shall be regraded or otherwise stabilized. Topsoil shall be replaced and the areas shall be reseeded or replanted.

(vii) Nutrients and soil amendments in the amounts determined necessary by soil test or field trials shall be applied to the replaced topsoil, subsoil or substitute material so that adequate nutrient levels are available to establish the vegetative cover. Fertilizer shall be applied at appropriate seasons and in amounts that will minimize pollution of surface waters or groundwaters.

(viii) The Administrator may not require topsoil or subsoil replacement on structures or within impoundments where replacement of this material is inconsistent with the intended use and the structures are otherwise stable.

(ix) If a sufficient volume of suitable topsoil or subsoil is not available for salvage or redistribution, then selected spoil material may be used as a topsoil or subsoil substitute or supplement. The operator shall demonstrate that the resulting plant growth medium is equal to, or more suitable for sustaining vegetation than the existing

topsoil or subsoil and that it is the best available in the permit area to support revegetation. A demonstration of the suitability of the substitutes or supplements shall be based upon analysis of the texture, percent coarse fragments and pH. The Administrator may require other chemical and physical analyses, field site trials, or greenhouse tests if determined to be necessary or desirable to demonstrate the suitability of the topsoil or subsoil substitutes or supplements.

(x) Topsoil and subsoil substitutes.

(A) Topsoil substitute stockpiles shall be segregated from topsoil and overburden piles and shall be identified as substitute material. Identification signs shall be placed not more than 150 feet from all stockpiles of substitute material. Such signs shall be in place at the time stockpiling is begun.

(B) If overburden is to be used in reclamation as a substitute for topsoil, all large rocks and other waste material which may hinder redistribution shall be separated before stockpiling.

(xi) Overburden, spoil, excess spoil, and refuse.

(A) All overburden, spoil material and refuse shall be segregated from the topsoil and subsoil and stockpiled in such a manner to facilitate the earliest reclamation consistent with the approved reclamation plan.

(B) Except where diversions are authorized by these regulations, all overburden, spoil material, and refuse piles must be located to avoid blocking intermittent or perennial drainages and flood plains in order to minimize loss and spread of material due to water erosion. Ephemeral drainages may be blocked if environmentally sound methods for dealing with runoff control and sedimentation are approved by the Administrator.

(I) For temporary stockpiles, material should be replaced in pits as soon as possible consistent with the approved reclamation plan to minimize the amount of time material is stockpiled.

(C) All topsoil shall be removed from areas to be used for piling spoil material prior to the beginning of piling this material.

(D) The operator may be required to have analyses made of spoil material in order to determine if it will be a source of water pollution through reaction with leaching by surface water. If it is determined that this condition may exist, the operator shall describe proposed procedures for eliminating this condition.

(E) All overburden and spoil material that is determined to be toxic, acid-forming or will prevent adequate reestablishment of vegetation on the

reclaimed land surface, unless such materials occur naturally on the land surface, must be properly disposed of during the mining operation.

(F) All temporary overburden and spoil piles shall be located, designed and constructed using prudent engineering practices. Slopes shall be stable and temporary piles shall not be located or placed on slopes that exceed 20 degrees unless the Administrator authorizes such placement based upon demonstrations that the pile will have a safety factor of 1.5 or better, and/or other precautionary design factors are provided to mitigate the steepness of the slope.

(G) Excess Spoil. In addition to the requirements provided in subsections (xi)(A) through (xi)(D) above (with the exception of (xi)(B)(I)), excess spoil piles shall be located, designed, constructed and inspected as prescribed below.

(I) Location Requirements:

(1.) All excess spoil shall be placed in approved excess spoil disposal sites located within the permit area. They shall be:

a. Located on moderately sloping and naturally stable areas where placement provides for stability and prevents mass movement.

b. Located in areas which do not contain springs, seeps, natural or man-made drainages (excluding rills and gullies), croplands, or important wildlife habitat.

(2.) Excess spoil may be returned to underground mine workings in accordance with the plan approved by the Administrator and by MSHA.

(II) Design Standards:

(1.) All excess spoil shall be:

a. Designed, graded and contoured so as to blend in with the topography of the surrounding terrain. Excess spoil pile sites shall not be located on an overall slope that exceeds 20 degrees unless keyway cuts (excavations to stable bedrock), rock toe buttresses or other special structural provisions are constructed to ensure fill stability. The operator must demonstrate to the satisfaction of the Administrator that this material will be stable and can be revegetated as required by this Section.

b. Designed so that all slopes will be stabilized against wind and water erosion. After the grading and contouring of these

stockpiles, topsoil or approved subsoil must be distributed over them in preparation for the revegetation procedure. Revegetation must be completed in accordance with requirements of this Chapter. A permanent drainage system must be established consistent with these regulations.

c. Designed using current, prudent professional standards and certified by a qualified registered professional engineer. All piles shall be designed and constructed in accordance with the standards of this subsection. Special structural provisions shall be designed using prudent current engineering practices, in accordance with Chapter 2, Section ~~25(b)(xviii)(E)~~.

(2.) The foundation and abutments of the fill shall be stable under all conditions of construction. Sufficient foundation investigation and any necessary laboratory testing of foundation materials shall be performed in order to determine the design requirements for foundation stability. Analyses of foundation conditions shall include the effect of underground mine workings, if any, upon the stability of the structure.

(3.) The Administrator may specify additional design criteria on a case-by-case basis as necessary to meet the general requirements of this subsection.

(III) Construction Standards:

(1.) Excess spoil shall be placed in a controlled manner to:

a. Prevent pollution from leachate and surface runoff from the fill on surface water or groundwater of the State.

b. Ensure mass stability and prevent mass movement during and after construction and provide for stable drainages and hillslopes.

c. Ensure that the land mass designated as the disposal site is suitable for reclamation and revegetation compatible with the natural surroundings and approved postmining land use.

(2.) The spoil pile shall be transported and placed in horizontal lifts in a controlled manner, concurrently compacted as necessary to ensure mass stability and prevent mass movement, covered, and graded to allow surface and subsurface drainage to be compatible with the natural surroundings and ensure a minimum long-term static safety factor of 1.5. The Administrator may limit the horizontal lifts to four feet or less as necessary to ensure the stability of the fill or to meet other applicable requirements.

(3.) No water impoundments or large depressions shall be constructed on the fill. Soil conservation techniques may be approved if they are needed to minimize erosion, enhance wildlife habitat or assist revegetation, as long as they are not incompatible with the stability of the fill.

(4.) Slope protection shall be provided to minimize surface erosion at the site. Diversion of surface water runoff shall conform with the requirements of subsection (e) of this Section. All disturbed areas, including diversion ditches that are not riprapped, shall be vegetated upon completion of construction.

(5.) Terraces may be constructed on the outslope of the fill if required for stability, control of erosion, to conserve soil moisture, or to facilitate the approved postmining land use. The grade of the outslope between terrace benches shall not be steeper than 2h:lv (50 percent).

(6.) Excess spoil that is toxic, acid-forming or combustible shall be adequately covered with suitable material or treated to prevent pollution of surface and groundwater, to prevent sustained combustion, and to minimize adverse affects on plant growth and the approved postmining land use.

(IV) Inspection of excess spoil piles.

(1.) The fill shall be inspected for stability by a qualified registered professional engineer or other qualified professional specialist under the direction of a professional engineer experienced in the construction of earth and rockfill embankments at least quarterly throughout construction and during the following critical construction periods:

- a. foundation preparation, including the removal of all organic material and topsoil;
- b. placement of diversion systems;
- c. installation of final surface drainage systems; and
- d. final grading and revegetation.

(2.) Regular inspections by the engineer or specialist shall be conducted during placement and compaction of the fill materials. The registered professional engineer shall promptly provide certified reports to the Administrator which demonstrate that the fill has been maintained and constructed as specified in the design contained in the approved mining and reclamation plan. The report

shall discuss appearances of instability, structural weakness, and other hazardous conditions. A copy of all inspection reports shall be retained at the mine site.

(xii) Coal mine waste.

(A) Coal mine waste shall be disposed only in existing or, if new, in an approved disposal site within a permit area. Coal mine wastes shall not be used in the construction of dams, embankments, or diversion structures. The disposal area shall be designed, constructed and maintained:

(I) In accordance with the excess spoil disposal requirements of (xi)(F)-(I), and (K)-(O) above; and

(II) To prevent combustion and not create a public health hazard.

(B) Disposal of coal mine waste in excess spoil piles may be approved if such waste is:

(I) Placed in accordance with the excess spoil requirements of (xi) above;

(II) Demonstrated to be nontoxic and nonacid-forming (or properly treated); and

(III) Demonstrated to be consistent with the design stability of the fill.

(C) In addition to (A) above, coal mine waste piles shall meet the following requirements:

(I) The disposal facility shall be designed to attain a minimum static safety factor of 1.5. The foundation and abutments must be stable under all conditions of construction.

(II) Following final grading of the waste pile, the site shall be covered with a minimum of four feet of the best available, nontoxic, nonacid-forming and noncombustible material, in a manner that directs runoff away from the waste pile. The site shall be revegetated in accordance with this Chapter. The Administrator may allow less than four feet of cover material based on physical and chemical analyses which show that the revegetation requirements will be met.

(III) Surface drainage from above the pile and from the crest and face of the pile shall be permanently diverted around the waste in accordance with subsection (e) of this Section.

(IV) All coal mine waste piles shall be inspected in accordance with the excess spoil requirements of (xi) above. More frequent inspections shall be conducted if a danger or harm exists to the public health and safety or the environment. Inspections shall continue until the waste pile has been finally graded and revegetated or until later time as required by the Administrator. If any inspection discloses that a potential hazard exists, the Administrator shall be notified immediately, including notification of any emergency protection and remedial procedures which will be implemented. If adequate procedures cannot be formulated or implemented, the Administrator shall inform the appropriate emergency agencies of the hazard to protect the public from the area.

(V) All coal mine waste piles shall meet the requirements of 30 CFR §§ 77.214 and 77.215.

(D) Dams and embankments constructed to impound coal mine waste shall comply with the following:

(I) Each impounding structure shall be designed, constructed and maintained in accordance with the requirements applicable to temporary impoundments. Such structures may not be retained permanently as part of the approved postmining land use. Approval by the State Engineer's Office is not required.

(II) If the impounding structure meets the criteria of 30 CFR § 77.216(a), the combination of principal and emergency spillways shall be able to safely pass or control runoff from the probable maximum precipitation of a 6-hour precipitation event ~~the 100-year, 6-hour design precipitation event~~ or a storm duration having a greater peak flow, as may be required by the Administrator.

(III) Spillways and outlet structures shall be designed to provide adequate protection against erosion and corrosion. Inlets shall be protected against blockage.

(IV) Be designed so that 90 percent or more of the water stored during the design precipitation event can be removed within ten days and at least 90 percent of the water stored during the design precipitation event shall be removed within the ten day period following the design precipitation event.

(V) Runoff from areas above the disposal facility or runoff from the surface of the facility that may cause instability or erosion of the impounding structure shall be diverted into stabilized diversion channels designed to meet the requirements for diversions, and designed to safely pass the runoff from a 100-year, 6-hour design precipitation event or a storm duration having a greater peak flow.

(E) The Administrator may specify additional design criteria



for waste piles or impounding structures on a case-by-case basis as necessary to meet the general performance standards of this subsection.

(F) Coal mine waste fires shall be extinguished by the operator in accordance with a plan approved by the Administrator and the Mine Safety and Health Administration. The plan shall contain, at a minimum, provisions to ensure that only those persons authorized by the operator, and who have an understanding of the procedures to be used, shall be involved in the extinguishing operations. No burning or burned coal mine waste may be removed from a permitted disposal area without a removal plan approved by the Administrator. Consideration shall be given to persons working or living in the vicinity of the structure.

(G) Coal preparation plants shall be included within a permit area. Refer to Chapter 3, Section 6 for requirements applicable to coal preparation plants.

(xiii) Acid-forming and toxic materials, and other waste.

(A) All exposed coal seams remaining after mining and any acid-forming, toxic, and combustible materials, or any waste materials that are exposed, used or produced during mining shall be adequately covered, within 30 days of its exposure with nontoxic, nonacid-forming and noncombustible material, or treated. Compaction followed by burial or treatment shall be provided to prevent pollution of surface and groundwater quality, prevent sustained combustion and to minimize adverse effects on plant growth and postmining land uses. Such materials may be stored in a controlled manner until final burial and/or treatment first becomes feasible as long as storage will not result in any risk of water pollution or other environmental or public health and safety damage. Storage, final burial and treatment shall be done in accordance with all local, State and Federal requirements.

(B) Acid-forming or toxic material, or any other waste material capable of polluting water, shall not be buried or stored in the proximity of a drainage channel or its flood plain so as to cause or pose a threat of water pollution.

(C) Final burial of noncoal mine waste materials (such as grease, lubricants, paints, flammable liquids, garbage, trash, abandoned mining machinery, lumber and other combustible materials) and any wastes classified as hazardous shall be in a designated disposal site authorized by the Solid Waste Management Section of the Department.

(D) Management and final burial on the permit area of solid wastes generated by a mine mouth power plant or mine mouth coal drier shall be in accordance with this Section and with provisions of the Solid Waste Management Rules and Regulations deemed appropriate by the Administrator.

(d) Revegetation.

(i) General Revegetation Performance Standards

(A)(i) The operator shall establish on all affected lands a diverse, permanent vegetative cover of the same seasonal variety native to the area or a mixture of species that will support the approved postmining land use in a manner consistent with the approved reclamation plan. This cover shall be self-renewing, and capable of stabilizing the soil.

(B)(ii) Land which did not support vegetation prior to becoming affected ~~land~~ because of natural soil conditions need not be revegetated unless subsoil from such affected land will support vegetation. The operator shall demonstrate to the Administrator's satisfaction that revegetation or reforestation is not possible if he seeks to proceed under the provisions of the subsection.

(C)(iii) After backfilling, grading, ~~and~~ contouring, and the replacement of topsoil and/or approved substitutes, revegetation shall be commenced in such a manner so as to most efficiently ~~accommodate the retention of~~ retain moisture and control erosion on all affected lands to be revegetated. In addition, any fertilizer requirements ~~as determined on the basis of~~ based on previous analysis must be fulfilled.

(D)(iv) Mulch or other equivalent procedures which will control erosion and enhance soil moisture conditions shall be used on all retopsoiled areas.

(E)(v) Any tillage and/or drill seeding ~~which is accomplished by mechanical drilling~~ shall be on the topographic contour, unless for safety reasons it is not practicable, or perpendicular to the prevailing wind on flat areas. Seeding of affected lands shall be conducted during the first normal period for favorable planting conditions after final preparation unless an alternative plan is approved.

(F)(v) Any rills or gullies that would preclude successful establishment of vegetation or achievement of postmining land use shall be removed or stabilized.

~~(v) The species of vegetation to be used in revegetation efforts shall be described in the reclamation plan indicating the composition of seed mixtures and the amount of seed to be distributed on the area on a per acre basis. Seed types will depend on the climatic and soil conditions prevailing in the permit area and the proposed use of the land after reclamation. Species to be planted as permanent cover shall be self-renewing. Seeding rates will depend on seed types, climatic and soil conditions and the techniques to be used in seeding.~~

~~(vi) Introduced species may be used only to achieve a quick, temporary, stabilizing cover to control erosion, or to achieve a postmining land use as~~

~~approved by the Administrator. Naturalized or nonindigenous native plant species may be included in the approved seed mixture if they support the approved postmining land uses. The operator shall document, unless otherwise authorized by the Administrator, the suitability of these species using data from published literature, from experimental test plots, from on site experience, or from other information sources.~~

~~(vii) When the approved postmining land use is for residential, industrial/commercial, or cropland, the reclaimed area shall be stabilized and revegetated to control erosion unless development or cropping shall immediately occur.~~

~~(viii) For areas previously disturbed by mining and not reclaimed to the requirements of these regulations, the areas shall, at a minimum, be revegetated to a ground cover and productivity level existing before redisturbance and shall be adequate to control erosion.~~

~~(G)(ix) Bond release. The bond for revegetation shall be retained for not less than ten years after the operator has completed seeding, fertilizing, irrigation, or other work to ensure revegetation. The bonding responsibility period shall not be affected where normal and reasonably good husbandry practices are being followed: as described in Chapter 4, Section 2(d)(i)(M). The success of revegetation shall be determined in accordance with Chapter 4, Section 2(d)(x)(ii) of this chapter and paragraphs (E)-(J) below. If the Administrator approves an alternative success standard, as allowed by Section 2(d)(x) of this Chapter, the standard shall be based on technical information obtained from a recognized authority (e.g. Natural Resource Conservation Service, Agricultural Research Service, Universities, Wyoming Game and Fish Department, U.S. Fish and Wildlife Service, etc.), or be supported by scientifically valid research. Use of an alternative technical standard shall be supported by concurrence from State and Federal agencies having an interest in management of the affected lands.~~

~~(H)(x) The Administrator shall not release the entire bond of any operator until such time as revegetation is completed, if revegetation is the method of reclamation as specified in the operator's approved reclamation plan.~~

~~(x) Revegetation shall be deemed to be complete when: (1) the vegetation cover of the affected land is shown to be capable of renewing itself under natural conditions prevailing at the site, and the vegetative cover and total ground cover are at least equal to the cover on the area before mining, (2) the productivity is at least equal to the productivity on the area before mining, (3) the species diversity and composition are suitable for the approved postmining land use and the revegetated area is capable of withstanding grazing pressure at least comparable to that which the land could have sustained prior to mining, unless Federal, State or local regulations prohibit grazing on such lands, and (4) the requirements in (1), (2) and (3) are met for the last two consecutive years of the bonding period. The Administrator shall specify quantitative methods and procedures for determining whether equal cover and productivity has been established including, where applicable, procedures for evaluating postmining species~~

~~diversity and composition. The following options or an alternative success standard approved by the Administrator are available:~~

~~(x)(A) The method utilizing control areas may be selected. If selected, the control areas shall be sampled for cover, productivity, species diversity and composition in the same season that the area to be affected is sampled for baseline data. Quantitative premining and postmining vegetation data from the control areas shall be used to mathematically adjust premining affected area data for climatic change. Premining affected area cover and productivity data will be directly compared by statistical procedures to data from the reclaimed vegetation type when evaluating revegetation success for final bond release. Species diversity and composition data will be qualitatively or quantitatively evaluated as determined by the Administrator.~~

~~(x)(B) The method utilizing reference areas may be selected. If selected, the representativeness of the reference area is verified by a statistical comparison to the plant community that it typifies. Postmining cover and productivity data from the reference area are directly compared by standard statistical procedures to data from the reclaimed area when evaluating revegetation success for final bond release. Species diversity and composition data will be qualitatively or quantitatively evaluated as determined by the Administrator.~~

~~(x)(C) Where the premining cover, productivity, species diversity and composition data cannot be collected, or where the area to be affected is small and incidental to the operation, comparison areas may be selected. For purposes of this method, postmining qualitative and quantitative data from the comparison area are directly compared by procedures acceptable to the Administrator to data from the reclaimed lands when evaluating success of revegetation for final bond release.~~

~~(x)(D) Without regard to the type of method selected, control, reference or comparison areas should be at least two acres in size, located in areas where they will not be affected by future mining, while serving their designated use, managed in a fashion which will not cause significant changes in the vegetation parameters of cover, productivity, species diversity and composition and be representative of the postmining land use.~~

~~(x)(E) The postmining density, composition, and distribution of shrubs shall be based upon site specific evaluation of premining vegetation and wildlife use. Shrub reclamation procedures shall be conducted through the application of best technology currently available.~~

~~(x)(E) (I) For lands affected between May 3, 1978 and August 6, 1996, a goal of a density of a minimum one shrub (full shrubs plus subshrubs) per square meter within a mosaic of shrub patches shall be restored using the best practicable technology. These shrub patches shall: cover a minimum of 10 percent of the postmining (affected area) landscape; be no smaller than 0.05 acres; and be arranged in a~~

~~mosaic that will optimize interspersion and edge effect.~~

~~(x)(E) (II) Except where a lesser density is justified from premining conditions in accordance with Appendix A, at least 20 percent of the eligible lands shall be restored to shrub patches supporting an average density of one shrub per square meter. Patches shall be no less than .05 acres each and shall be arranged in a mosaic that will optimize habitat interspersion and edge effect. Criteria and procedures for establishing the standard are specified in Appendix A. This standard shall apply to all lands affected after August 6, 1996.~~

~~(x)(E) (III) Approved shrub species and seeding techniques shall be applied to all remaining grazingland. Trees shall be returned to a density equal to the premining conditions.~~

~~(x)(E) (IV) For areas containing crucial habitat, designated as such prior to the submittal of a permit application or any subsequent amendment, or critical habitat the Wyoming Game and Fish Department shall be consulted about, and its approval shall be required for, minimum stocking and planting arrangements of shrubs, including species composition. For areas determined to be important habitat, the Wyoming Game and Fish Department shall be consulted for recommended minimum stocking and planting arrangements of shrubs, including species composition, that may exceed the programmatic standard discussed above.~~

(I)(x)(E)(III) and (x)(F) Trees shall be returned to a number equal to the premining number. On affected lands, the total number of postmining trees shall be at least equal to the premining total number on those lands. The Reclamation Plan shall specify the tree species, the number per species and the location of tree plantings. The permittee operator may also receive credit for tree species which invade the reclaimed lands if those tree species support the postmining land use and are approved by the Administrator. Planted trees counted to meet the approved stocking rate shall be healthy, and at least 80 percent shall have been planted for at least eight years. All planted trees must have been in place at least two growing seasons. Invaded trees that are counted to meet the approved stocking rate shall be healthy and may be of any age.

~~(x)(G) Standards for the success of reforestation for commercial harvest shall be established in consultation with forest management agencies and prior to approval of any mining and reclamation plan that proposes reforestation. If reforestation for commercial harvest is the method of revegetation, reforestation shall be deemed to be complete when a reasonable population density as established in the reclamation plan has been achieved, the trees have shown themselves capable of continued growth for a minimum period of five years following planting, and the understory vegetation is adequate to control erosion and is appropriate for the land use goal. Quality and quantity, vegetation cover, productivity, and species diversity shall be determined in accordance with scientifically acceptable sampling procedures approved by the Administrator.~~

~~(x)(H) If the Administrator approves a long-term, intensive agricultural postmining land use, the ten-year period of liability shall commence at the date of initial planting for such long-term agricultural use.~~

~~(x)(I) When the approved reclamation plan is to return to cropland, reclamation shall be deemed to be complete when productive capability is equivalent, for at least two consecutive crop years, to the premining conditions or approved reference areas. The premining production data for the reclaimed site shall be considered in judging completeness of reclamation whenever said data are available.~~

~~(x)(J) The Administrator may set technical success standards for cover and production based on data collected from undisturbed portions of the permit area or adjacent areas during a minimum of five independent sampling programs over a minimum of five years. The technical success standards may be set for a single mine or group of mines in the same geographical area.~~

~~(J)(xi) Monitoring of permanent revegetation on reclaimed areas before and after grazing shall be conducted at intervals throughout the period prior to bond release bond responsibility period in accordance with the plan required by Chapter 2, Section 6(b)(iv). Monitoring results shall be presented in the annual report.~~

~~(xii) Any plans for irrigation must be explained.~~

~~(K)(xiii) The operator must protect young vegetative growth from being destroyed by livestock by fencing or other approved techniques for a period of at least two years, or until the vegetation is capable of renewing itself with properly managed grazing and without supplemental irrigation or fertilization. The Administrator, ~~permittee~~ operator, and the landowner or land managing agency shall determine when the revegetated area is ready for livestock grazing.~~

~~(L)(xiv) The operator must control and minimize the introduction and/or spread of noxious weeds on all affected lands in accordance with Federal and State requirements throughout the entire bond responsibility period.~~

~~(M) The following is a list of normal husbandry practices which, if conducted in a prudent manner, will not restart the minimum ten-year bond responsibility period for re-establishing vegetation.~~

~~(I) The operator may interseed species contained in the approved seed mix over established revegetation, but not within 6 years before the end of the bond responsibility period. The operator may add mulch to an interseeded area to facilitate plant establishment. Augmented seeding (reseeding) is not considered normal husbandry practice.~~

(II) Using approved species, the operator may transplant tree and shrub stock and/or plant containerized or bare root tree or shrub stock into reclamation provided the performance standards of Chapter 4 Section 2(d)(i)(H) for trees, and Chapter 4 Section 2(d)(ii)(A)(II)(2) for shrubs are not compromised.

(III) Grazing of reclamation is a normal husbandry practice.

(IV) For trees and shrubs planted in an approved shelterbelt, the practices of fertilization, irrigation and rototilling may be used as normal husbandry/nursery practices in accordance with standard practices.

(V) Beyond establishment, fertilization is a normal husbandry practice for cropland and pastureland throughout the bond responsibility period. Irrigation is a normal husbandry practice beyond establishment for cropland and pastureland, provided the approved postmine land use is irrigated cropland or irrigated pastureland.

(VI) Mechanical husbandry practices such as selective cutting, mowing, combining, aerating, land imprinting, raking, or harrowing to stimulate permanent vegetation establishment, increase decomposition of organic matter, control weeds, harvest hay, and/or reduce standing dead vegetation and litter are considered normal husbandry practices. Other mechanical practices may be used if approved by the Administrator prior to their application.

(VII) Tillage and replanting are considered normal husbandry practices for croplands.

(VIII) Acceptable weed and pest control techniques representing normal husbandry practices include manual or mechanical removal, controlled burning, biological controls, and herbicide/pesticide applications. The operator may reseed treated areas of less than five acres per year as a component of this husbandry practice without restarting the bond responsibility period.

(IX) Controlled burning may be used to reduce the buildup of litter, weed seeds, and to control undesirable species. The operator may interseed any portion of the treated area, or reseed up to five acres, as a component of this husbandry practice without restarting the bond responsibility period.

(X) Subsidence, settling, and erosional features, such as rills, gullies, or headcuts less than five acres in size may be repaired as a normal husbandry practice. Repairs considered to be normal husbandry practices include hand work, mechanical manipulation, installation of erosion-control matting, silt fences, straw bales, or other similar work. The operator may reseed treated areas of less than five acres as a component of this husbandry practice without restarting the bond responsibility

period.

(XI) Removal of pipelines, small culverts, and small sediment control measures, such as traps, riprap, rock or straw bale check dams, small sediment ponds, and silt fences are considered normal husbandry practices. The operator may reseed treated areas of less than five acres as a component of this husbandry practice without restarting the bond responsibility period, provided the structures are reclaimed at least two years prior to the end of the bond responsibility period.

(N) The following actions have been administratively identified as those which qualify as routine land management activities; implementing these actions will not restart the bonding liability period:

(I) Installation and/or removal of power lines and substations;

(II) Installation and/or removal of fences;

(III) Installation and/or removal of any monitoring equipment or features;

(IV) Establishment and/or reclamation of two-track trails; and

(V) Emplacement and/or removal of above-ground pipelines.

(ii) Revegetation Success Standards

(A) Success standards vary by land use. Where standards for cover, production, and shrub density apply, they are quantitative and must be demonstrated to equal or exceed the success standards using methods and statistical analyses approved and published by the Administrator as required by OSM rules (CFR §816.116 (a)(1), August 30, 2006). Statistical analyses must use a 90-percent statistical confidence interval.

(B) Grazingland and Pastureland

(I) Revegetation shall be deemed to be complete when: (1) the vegetation cover of the affected land is shown to be capable of renewing itself under natural conditions prevailing at the site, and the ~~absolute total~~ vegetative cover ~~and total ground cover~~ is at least equal to the cover on the reference area or technical standard before mining, (2) the annual herbaceous production productivity is at least equal to the annual herbaceous production productivity on the reference area or technical standard, (3) the species diversity and composition are suitable for the approved postmining land use, and (4) the requirements in (1), (2) and (3) are all met during the



~~same for the last two consecutive years of the bonding period for those mines using native area comparisons or the requirements in (1), (2), and (3) are met for two out of four years beginning no sooner than year eight seven of the bonding responsibility period for those mines with technical standards. The Administrator shall specify quantitative methods and procedures for determining whether equal cover and productivity has been established including, where applicable, procedures for evaluating postmining species diversity and composition. Species diversity and composition suitable to the postmine land use must be demonstrated using methods approved by the Administrator. The following reference area type options or an alternative success standard approved by the Administrator are available:~~

~~(1.) The method utilizing control areas may be selected. The operator may choose to use control areas for lands where control areas were originally selected for revegetation success evaluation. Control areas will not be approved for new amendments or permits, after the effective date of these rules as determined under W.S. 16-3-104(b) of the Wyoming Administrative Procedure Act (2007).~~

~~(2.) The operator shall choose one type of "Reference area" as defined in Chapter 1, Section 2(dl). The "Reference area" shall be approved by the Administrator.~~

~~(3.) The Administrator may set or approve quantitative technical success standards for cover and/or production based on data collected from undisturbed portions of the permit area or adjacent areas during a minimum of five independent sampling programs over a minimum of five years. The technical success standards may be set-approved for a single mine or a group of mines in the same geographical area.~~

~~(II) The shrub standard for grazingland shall include the The postmining density, composition, and distribution of shrubs, and shall be based upon site-specific evaluation of premining vegetation and wildlife use. Shrub reclamation procedures shall be conducted through the application of best technology currently available as approved in the permit.~~

~~(1.) Section 2(d)(x)(E)(I) For lands affected between May 3, 1978 and August 6, 1996, a goal of a minimum of one shrub (full shrubs plus subshrubs) per square meter within a mosaic of shrub patches shall be restored using the best practicable technology. These shrub patches shall: cover a minimum of 10 percent of the postmining (affected area) landscape; be no smaller than 0.05 acres; and be arranged in a mosaic that will optimize interspersion and edge effect.~~

~~a. Acreage from permit-wide shrub goal mosaics that is in excess of the required acreage may be banked for credit toward shrub standard lands provided (1) the shrub goal requirement for all shrub goal lands is~~

met, and (2) the methods used to evaluate the shrub goal lands meet the methods and statistical analyses required to achieve the shrub standard.

(2.) Except where a lesser density is justified from premining conditions in accordance with Appendix A 4A of Chapter 4, at least 20 percent of the eligible lands shall be restored to shrub patches supporting an average density of one shrub per square meter. Patches shall be no less than 0.05 acres each and shall be arranged in a mosaic that will optimize habitat interspersion and edge effect. Criteria and procedures for establishing the standard are specified in Appendix A 4A of Chapter 4. This standard shall apply to all lands affected after August 6, 1996. For bond release purposes, the average postmine total density and species specific density(ies) shall be at least 90 percent of the calculated criteria for the applicable standard.

a. The shrub density standard requires a statistical test using a 90% confidence interval to demonstrate achievement of the standard. The standard must be demonstrated for one year, the last year of the bond responsibility period. At least 80% of the shrubs shall have been planted for at least 60% of the ten-year bond responsibility period, and all planted shrubs shall have been in place for at least two years.

b. Approved shrub species and seeding techniques shall be applied to all remaining grazingland. ~~Trees shall be returned to a number equal to the premining number.~~

c. Shrub mosaic patches must pass the standard for shrub density, based on the shrub option chosen from Appendix 4A of Chapter 4. Shrub patches must also be included in the Sample Unit for evaluation of the standards for total absolute vegetative cover and species diversity and composition. Shrub patches are exempt from the production standard. The operator may change the selected shrub option during the bond responsibility period, if baseline data support the new shrub option, and subject to Administrator approval.

d. For areas designated as crucial or critical habitat, consultation and approval by the Wyoming Game and Fish Department shall be required for minimum stocking rates and planting arrangements of shrubs, including species composition. The approved shrub success standards shall be specified in the Reclamation Plan. Habitat shall be designated as crucial ~~For areas containing crucial habitat, designated as such~~ prior to the submittal of a permit application or any subsequent amendment, ~~or critical habitat the Wyoming Game and Fish Department shall be consulted about and its approval shall be required for, minimum stocking and planting arrangements of shrubs, including species composition.~~ For areas determined to be important habitat, the Wyoming Game and Fish Department shall be consulted for recommended minimum stocking and planting arrangements of shrubs, including species composition, that may exceed the programmatic standard discussed above. Approval of shrub stocking plans by the Wyoming Game and Fish Department is not required for

areas designated as important habitat.

(C) Cropland

(I) When the approved postmining land use is for residential, industrial/commercial, or cropland, the reclaimed area shall be stabilized and revegetated to control erosion unless development or cropping shall immediately occur. The bond responsibility period shall begin the first season a crop is planted.

(II) When the approved reclamation plan is to return to cropland, Reclamation shall be deemed to be complete when productive capability is equivalent for at least two consecutive crop years, to an approved reference area (Chapter 1 Section 2(d)) or published county production data collected the same years the crops are harvested. This standard shall be demonstrated for the two out of four years of the bond responsibility period, starting no sooner than year seven. the premining conditions or approved reference areas. The premining production data for the reclaimed site shall be considered in judging completeness of reclamation whenever said data are available.

(1.) When using a reference area comparison, the operator may choose a reference area under operator control or on a nearby property. The comparison may be made using production quadrats or total field harvest. Appropriate statistical tests will be used for quantitative production quadrat comparisons. Total field harvest comparisons do not require a statistical test. The Administrator shall approve the reference area.

(2.) When using county production data, the total field harvest will be used for a comparison. No statistical test will be required for this comparison.

(D) Fish and Wildlife Habitat. The operator shall gain approval from the Administrator and Wyoming Game and Fish for development of permit-specific performance standards for fish and/or wildlife habitat. These standards shall be stated in the reclamation plan. Specific information shall include:

(I) Which vegetation parameters are used in the standard (e.g. cover, shrubstocking, species diversity and composition);

(II) If shrub stocking is required, then the standards Section 2(d)(ii)(A)(II)(2.)(a.) of this chapter apply; and

(III) Indicate if the standards require a statistical test, a numerical comparison with no statistical test, or a qualitative comparison.

(E) Postmining Wetlands

(I) Reclamation plans for postmining mitigation wetlands shall be reviewed and approved by the Army Corps of Engineers and the Administrator and incorporated into the Land Quality Division permit. Wetland mitigation shall be considered successful when the Army Corps of Engineers determines that mitigation was successful.

(1.) The operator may create and receive success credit for up to 25 percent additional acreage over the Army Corps of Engineers' required mitigation acreage for each mitigation wetland type.

(2.) The minimum bond responsibility period for areas containing mitigation wetlands is ten years and no request for Phase 3 Incremental Bond release shall be made earlier than the last year of the bond responsibility period. A statement of successful mitigation from the Army Corps of Engineers shall be submitted by the operator to the Administrator as demonstration of successful mitigation. If successful mitigation is approved by the Army Corps of Engineers prior to the last year of the bond responsibility period, then the wetland will be evaluated as part of the surrounding area using the standards applied to that area.

(II) Reclamation plans and success standards for postmining enhancement wetlands shall be reviewed and approved by the Administrator and the Game and Fish Department as a type of wildlife habitat and incorporated into the Land Quality Division permit. The reclamation plan and success standards shall be determined by the postmining land use, and fish and wildlife habitat standards in Section 2(d)(ii)(C) of this chapter apply. The minimum bond liability period for enhancement wetlands is ten years and no demonstration of successful reclamation shall be made earlier than the last year of the bond responsibility period.

(F) Industrial, Commercial, and Residential. When the approved postmining land use is ~~for residential, or~~ industrial/commercial, ~~or cropland,~~ the reclaimed area shall be stabilized and revegetated to control erosion unless development ~~or cropping~~ shall immediately occur.

(I) Industrial, commercial and residential areas may be released from area and all incremental bond costs as soon as the area is reclaimed to a condition that is ready for the approved land use. The exact criteria will vary with the postmine land use, and shall be specified in the approved Reclamation Plan.

(G) Developed water resource. For lands within the high water line of a developed water resource there are no revegetation reclamation standards.

(H) Recreational. The operator shall gain approval from the Administrator and the appropriate agency for development of permit-specific performance standards. The standards and the reclamation plan shall be included in the permit. If the reclamation plan includes stocking of trees or shrubs approved by

Wyoming Game and Fish, then successful tree/shrub establishment must be demonstrated for one year, the last year of the bond responsibility period. At least 80% of the trees/shrubs shall have been planted for at least 60% of the last ten years of the bond responsibility period, and all planted trees/shrubs shall have been in place for at least two years.

~~(I) Section 2(d)(x)(G) Forestry.~~ Standards for the success of reforestation for commercial harvest shall be established in consultation with and approval from forest management agencies, ~~and~~ prior to approval of any mining and reclamation plan that proposes reforestation. ~~If reforestation for commercial harvest is the method of revegetation, reforestation shall be deemed to be complete when a reasonable population density as established in the reclamation plan has been achieved, the trees have shown themselves capable of continued growth for a minimum period of five years following planting, and the understory vegetation is adequate to control erosion and is appropriate for the land use goal.~~ The quality and quantity of trees, and the vegetation cover of the understory vegetation community shall be not less than that required to achieve the postmining landuse and shall be determined in accordance with scientifically acceptable sampling procedures approved by the Administrator. Successful tree establishment must be demonstrated for one year, the last year of the bond responsibility period. At least 80% of the trees shall have been planted for at least 60% of the last ten years of the bond responsibility period, and all planted trees shall have been in place for at least two years.

(J) Special Success Standards.

(I) For areas previously disturbed by mining and not reclaimed to the requirements of these regulations, the areas shall, at a minimum, be revegetated to a ground cover and productivity level existing before redisturbance and shall be adequate to control erosion.

(II) For lands and facilities that were affected prior to May 3, 1978, and continuously used by the mining operation since that date, the areas shall be reclaimed to the performance standards that were in effect in Rule and Regulation at the time of initial disturbance. At a minimum, the area must be revegetated to a ground cover adequate to control erosion.

(e) Diversion systems and drainage control.

(i) Diversion of streams.

(A) All diversions shall be designed to assure public safety, prevent material damage outside the permit area, and minimize adverse impacts to the hydrologic balance.

(B) All diversions and associated structures shall be designed,

constructed, maintained and used to ensure stability, prevent, to the extent possible using best technology currently available, additional contribution of suspended solids to streamflow outside the permit area, and comply with all applicable local, State and Federal rules.

(C) Permanent diversions of intermittent and perennial streams shall be designed and constructed so as to be erosionally and geomorphically compatible with the natural drainage system.

(D) The design and construction of all diversions for perennial or intermittent streams shall be certified by a qualified registered professional engineer as meeting the diversion standards of these regulations and the approved permit.

(E) When permanent diversions are constructed or stream channels restored after temporary diversions, the operator shall:

(I) Restore, enhance where practicable, or maintain natural riparian vegetation on the banks and flood plain of the stream;

(II) Establish or restore the stream characteristics, including aquatic habitats to approximate premining stream channel characteristics; and

(III) Establish and restore erosionally stable stream channels and flood plains.

(F) The operator shall renovate all permanent diversions in accordance with the approved reclamation plan prior to abandonment of the permit area.

(G) When no longer needed to achieve the purpose for which they were authorized, all temporary diversions shall be removed and the affected land regraded and revegetated, in accordance with this Chapter. Before diversions are removed, downstream water treatment facilities previously protected by the diversion shall be modified or removed, as necessary, to prevent overtopping or failure of the facilities. This requirement shall not relieve the operator from maintaining water treatment facilities as otherwise required.

(ii) Control of discharge or drainage.

(A) Discharge from sedimentation ponds, permanent and temporary impoundments, coal-processing waste dams and embankments, and diversions shall be controlled, by energy dissipators, riprap channels, and other devices, where necessary, to reduce erosion, to prevent deepening or enlargement of stream channels, and to minimize disturbance of the hydrologic balance. Discharge structures shall be designed according to standard engineering design procedures.

(B) Drainage from acid-forming and toxic-forming material into ground and surface water shall be avoided by:

(I) Identifying, burying, and treating where necessary, material which, in the judgment of the Administrator may adversely affect water quality if not treated or buried;

(II) Preventing water from coming into contact with acid-forming and toxic-forming material and other measures as required by the Administrator; and

(III) Complying with the requirements of subsection (c)(xiii) of this Section and such other measures deemed necessary by the Administrator to protect surface water and groundwater.

(C) Surface water shall not be diverted or otherwise discharged into underground mine workings unless specifically authorized by the Administrator per the requirements of Chapter 19, Section 2(a) of these regulations.

(iii) In addition to meeting the standards of this Section, all diversions of groundwater discharge flows shall meet the standards of Section 2(e).

(iv) Diversion systems - Unchannelized surface water and ephemeral streams.

(A) Surface water shall be diverted around the operation for the following purposes:

(I) To control water pollution.

(II) To control unnecessary erosion.

(III) To protect the on-going operation.

(IV) To protect the water rights of downstream users.

(B) Temporary diversion of surface runoff or diversions used for erosion control shall meet the following standards:

(I) In soils or other unconsolidated material, the sides of diversion ditches shall be no steeper than 1½:1.

(II) In rock, the sides of diversion ditches shall not overhang.

(III) In soils or unconsolidated materials, the sides and, in ditches carrying intermittent discharges, the bottom shall be seeded with approved grasses so as to take advantage of the next growing season.

(IV) Rock riprap, concrete, soil cement or other methods shall be used where necessary to prevent unnecessary erosion.

(V) Culverts or bridges shall be installed where necessary to allow access by the surface owner for fire control and other purposes.

(VI) Diversion ditches shall in a nonerosive manner pass the peak runoff from a 2-year, 6-hour precipitation event, or a storm duration that produces the largest peak flow, as specified by the Administrator.

(C) In no case shall diversion ditches discharge upon topsoil storage areas, spoil or other unconsolidated material such as newly reclaimed areas.

(D) Permanent diversion structures shall be designed to be erosionally stable during the passage of the peak runoff from a 100-year, 6-hour precipitation event, or a storm duration that produces the largest peak flow, as specified by the Administrator.

(v) Diversion of intermittent and perennial streams.

(A) In no case shall spoil, topsoil, or other unconsolidated material be pushed into, or placed below the flood level of a perennial or intermittent stream except during the approved construction of the diversion of said stream.

(B) The Wyoming Game and Fish Department shall be consulted prior to the approval of a diversion of a perennial or intermittent stream.

(C) The banks of a diverted perennial or intermittent stream shall be protected by vegetation by planting approved species to take advantage of the next growing season.

(D) The banks and channel of a diverted perennial or intermittent stream shall be protected where necessary by rock, riprap or similar measures to minimize erosion and degradation of water quality. Permanent diversions shall be designed and constructed to be erosionally stable. The design of the permanent diversion shall also be consistent with the role of the fluvial system.

(E) Mining on the flood plain of a perennial or intermittent stream shall not be permitted if it would cause the uncontrolled diversion of the stream during periods of high water.



(F) Waters flowing through or by the mining operation shall meet the standards set by the U.S. Environmental Protection Agency and the Wyoming Water Quality Division in regard to the effect of the operation upon such waters.

(G) If temporary, the channel and flood plain shall be designed to pass, in a nonerosive manner, the 10-year, 6-hour precipitation event, or the capacity of the unmodified stream channel immediately above and below the diversion, whichever capacity is greater, or a duration having a greater peak flow, as specified by the Administrator. Cross-sections of the existing stream above, below and within the disturbed area may be used to determine the flow capacities, channel configuration and shape.

(H) If permanent, the channel and flood plain shall be designed to pass, in a nonerosive manner, the 100-year, 6-hour precipitation event, or a duration having a greater peak flow, as specified by the Administrator. Cross-sections of the existing stream above, below and within the disturbed area may be used to determine the flow capacities, channel configuration and shape.

(f) Sedimentation ponds.

(i) All surface drainage from affected lands excluding sedimentation ponds, diversion ditches, and road disturbances, shall pass through a sedimentation pond(s) before leaving the permit area. Sedimentation control devices shall be constructed prior to disturbance. The Administrator may grant exemptions to the use of sedimentation ponds where, by the use of alternative sediment control measures, the drainage will meet effluent limitation standards or will not degrade receiving waters.

(ii) Where the sedimentation pond(s) results in the mixing of drainage from affected lands with the drainage from undisturbed areas, the permittee shall comply with the applicable effluent limitation standards for all of the mixed drainage where it leaves the permit area.

(iii) Sedimentation ponds shall be designed and constructed to comply with the applicable requirements of subsection (g)(iv-vii) of this Chapter. They shall be located as near as possible to the affected lands and out of intermittent or perennial streams; unless approved by the Administrator.

(iv) Sedimentation ponds shall be operated and maintained to comply with the requirements of the Water Quality Division and the State Engineer's Office and satisfy the following requirements:

(A) Chemicals that will harm fish, wildlife, and related environmental values shall not be used for flocculation or other water treatments or if used these ponds will be protected.

(B) Sedimentation ponds shall be designed and maintained to contain adequate sediment storage as determined by acceptable empirical methods.

(C) Sluicing of collected sediments shall be prevented for the design precipitation event.

(D) All areas disturbed by the construction of the sedimentation pond shall be revegetated as soon as practicable to reduce erosion.

(v) The design, construction, and maintenance of a sedimentation pond or other sediment control measures in accordance with this subsection shall not relieve the operator from compliance with applicable effluent limitation standards of the Water Quality Division.

(vi) Sediment ponds shall be maintained until removal is authorized by the Division and the affected lands have been stabilized and initial vegetation established in accordance with the approved reclamation plan and the requirements of this Chapter. In no case shall sediment ponds treating reclaimed lands be removed sooner than two years after the last augmented seeding.

(vii) Sediment control measures for affected lands. Appropriate sediment control measures shall be designed, constructed, and maintained using the best technology currently available to prevent additional contributions of sediment to streamflow or to runoff outside the affected land. Such measures may consist of limiting the extent of disturbed land and stabilizing, diverting, treating or otherwise controlling runoff.

(g) Permanent and temporary water impoundments.

(i) Permanent water impoundments are prohibited unless authorized by the Administrator on the basis that:

(A) The impoundment and its water quality and quantity will support or constitute a postmining use equal to or greater than the highest previous use of the land.

(B) Discharge of water, if any, from the impoundment shall not degrade the quality of receiving waters.

(C) The surface landowner, if different from the mineral owner, has consented to the impoundment.

(ii) Permanent water impoundments. Permanent water impoundments shall be constructed in accordance with the following requirements:

(A) Dams must contain an overflow notch and spillway so as to prevent failure by overfilling and washing. Overflow notches and spillways must be riprapped with rock or concrete to prevent erosion.

(B) The slopes around all water impoundments must be gentle enough so as not to present a safety hazard to humans or livestock and so as to accommodate revegetation. Variations from this procedure may be approved by the Administrator based on the conditions present at the individual locality.

(C) Mineral seams and other sources of possible water contamination within the impoundment area must be covered with overburden or stabilized in such a manner to prevent contamination of the impounded water.

(D) Bentonite or other mire-producing material within the impoundment basin shall be removed or covered with materials which will prevent hazards to man or beast.

(iii) The phrase "major impoundment" shall mean any structure impounding water, sediment or slurry:

(A) To an elevation of 20 feet or more above the upstream toe to the crest of the emergency spillway; or

(B) To an elevation of five feet above the upstream toe of the structure and has a storage volume of 20 acre-feet or more; or

(C) Which will be retained as part of the postmining land use, and:

(I) Has an embankment height greater than 20 feet as measured from the downstream toe of the embankment to the top of the embankment; or

(II) Has an impounding capacity of 20 acre-feet or greater.

(iv) The design, construction and maintenance of permanent and temporary impoundments shall be approved by the State Engineer's Office. In addition, the following design and construction requirements shall be applicable:

(A) The design of impoundments shall be certified by a qualified registered professional engineer as designed to meet the requirements of this part and the applicable requirements of the State Engineer, using current, prudent engineering practices. For major impoundments, the certification also shall be filed with the State Engineer.

(B) The vertical portion of any remaining highwall shall be located far enough below the low water line along the full extent of highwall to provide adequate safety and access for the proposed water users.

(C) Faces of embankments and surrounding areas shall be vegetated, except that faces where water is impounded may be riprapped or otherwise stabilized in accordance with accepted design practices, or where appropriate, Water Quality Division rules and regulations.

(D) The embankment, foundation, and abutments for all impoundments shall be designed and constructed to be stable. For any major impoundment or any impoundment which may present a danger to life, property or the environment, the Administrator shall require sufficient foundation investigations and laboratory testing to demonstrate foundation stability, and shall require a minimum static safety factor of 1.5 for the normal pool with steady seepage saturation conditions, and a seismic safety factor of at least 1.2.

(E) All vegetative and organic materials shall be removed and foundations excavated and prepared to resist failure. Cutoff trenches shall be installed if necessary to ensure stability.

(F) All impoundments shall be inspected regularly during construction and immediately after construction by a qualified registered professional engineer or qualified professional specialist under the direction of a qualified professional engineer. These individuals shall be experienced in impoundment construction. Immediately following each inspection a report shall be prepared and certified by the engineer describing the construction work observed and its conformance with the approved designs. All inspection reports shall be retained at the mine site and submitted in the annual report to the Administrator.

(G) After completion of construction and until final bond release or removal, all impoundments shall be inspected annually by a qualified registered professional engineer, or by a qualified professional specialist under the direction of the qualified professional engineer. These individuals shall be experienced in impoundment construction. Immediately following each inspection a report shall be prepared and certified by the engineer describing:

- (I) Existing and required monitoring procedures and instrumentation;
- (II) Depth and elevation of any impounded water;
- (III) Existing storage capacity;
- (IV) Aspects of the dam that may affect its stability or

present any other hazardous condition; and

(V) If the impoundment is being maintained in accordance with the approved design and this Chapter. All annual inspection reports shall be retained at the mine site and annually submitted to the Administrator.

(H) In addition to the post-construction annual inspection requirements contained in paragraph (G) immediately above, all impoundments must be inspected during each of the intervening calendar quarters by a qualified individual designated by the operator. These inspections shall look for appearances of structural weakness and other hazardous conditions.

(I) Those impoundments subject to 30 CFR § 77.216 shall also be inspected in accordance with 30 CFR § 77.216-3.

(J) If any examination of inspection discloses that a potential hazard exists, the operator shall promptly inform the Administrator of the finding and of the emergency procedures formulated for public protection and remedial action. If adequate procedures cannot be formulated or implemented the Administrator shall be notified immediately. The Administrator shall then notify the appropriate agencies that other emergency procedures are required to protect the public.

(K) Impoundments meeting the criteria of 30 CFR § 77.216(a) shall comply with the requirements of 30 CFR § 77.216. The plan required to be submitted to the District Manager of MSHA under 30 CFR § 77.216 shall also be submitted to the Administrator as part of the permit application.

(L) Impoundments shall include either a combination of principal and emergency spillways or a single open channel spillway designed to pass the design precipitation events discussed in subsection (v) below at non-erosive velocities.

(M) In lieu of meeting the requirements in section (L) above, the Administrator may approve a temporary impoundment that relies primarily on storage to control the runoff from the design precipitation event when it is demonstrated by the operator and certified by a qualified registered professional engineer or qualified registered professional land surveyor that the impoundment will safely control the design precipitation event, the water from which could be safely removed in accordance with current, prudent, engineering practices. Such an impoundment shall be located where failure would not be expected to cause loss of life or serious property damage.

(v) The design precipitation event for the spillways for temporary water impoundments shall be a 25-year, 6-hour precipitation event, or a storm duration having a greater peak flow, as may be required by the Administrator or as specified below:

(A) The design precipitation event for spillways on temporary impoundments which meet the criteria of 30 CFR § 77.216(a) shall be a 100-year, 6-hour precipitation event, or a storm duration having a greater peak flow, as may be required by the Administrator; and

(B) Temporary impoundments which meet the criteria of 30 CFR § 77.216(a) and that are intended to impound coal mine waste shall have sufficient spillway and/or storage capacity to safely pass or control runoff from the probable maximum precipitation of a 6-hour precipitation event, or a storm duration having a greater flow, as may be required by the Administrator.

(vi) The design precipitation event for the spillways for a permanent impoundment shall be a 100-year, 6-hour precipitation event, or a storm duration having a greater ~~larger~~ peak flow, as may be required by the Administrator.

(vii) Before abandoning an area or seeking bond release, the operator shall ensure that all temporary structures are removed and reclaimed, and that all permanent structures are renovated, if necessary to meet the requirements of this subsection and to conform to the approved reclamation plan.

(viii) Tailings impoundments.

(A) Impoundments to contain mill tailings or slurry tailings shall be constructed in accordance with established engineering principles and shall be approved by the Wyoming State Engineer's Office. A copy of the State Engineer's approval shall be attached to the application.

(B) Reclamation of tailings impoundments shall be accomplished by removal and storage of all topsoil present within the tailings basin. After termination of operations, the topsoil shall be replaced and revegetated in accordance with these rules and regulations. If other methods of reclamation and stabilization against wind and water erosion are found to be necessary because of natural conditions, this must be stated and described subject to the Administrator's approval.

(h) Protection of Groundwater Recharge Capacity - The recharge capacity of the reclaimed lands shall be restored to a condition which:

(i) Supports the approved postmining land use;

(ii) Minimizes disturbances to the prevailing hydrologic balance in the permit area and in adjacent areas; and

(iii) Provides a rate of recharge that approximates the premining recharge rate.

(i) Surface water and groundwater quality and quantity shall be monitored until final bond release to determine the extent of the disturbance to the hydrologic balance. Monitoring shall be adequate to plan for modification of surface mining activities, if necessary, to minimize adverse affects on the water of the State. The operator is responsible for properly installing, operating, maintaining and removing all necessary monitoring equipment. In addition, the operator is responsible for conducting monitoring in accordance with the requirements of Chapter 2, Section 5(a)(xv) ~~2(b)(xi)(D)(I) and (II)~~ and the approved monitoring plan. Noncompliance results for NPDES discharges shall be promptly reported by the operator to the Water Quality Division Administrator. The operator shall promptly report all other noncompliance results to the Land Quality Division Administrator and shall, after consultation with the Administrator, implement appropriate and prompt mitigative measures for those noncompliance situations determined to be mining caused. The monitoring system shall be based on the results of the probable hydrologic consequences assessment and shall include:

(i) A groundwater monitoring program to determine:

(A) Infiltration rates, subsurface flows, and storage characteristics of the reclaimed land and adjacent areas; and

(B) The effects of reclamation on the recharge capacity of the reclaimed lands.

(ii) A surface water monitoring program which includes monitoring of surface water flow and quality from affected lands including those that have been graded and stabilized. Results of the monitoring will be used to demonstrate that the quality and quantity of runoff from affected lands with or without treatment will minimize disturbance to the hydrologic balance. Water quality monitoring results for discharges other than those authorized by Water Quality Division shall be reported whenever results indicate noncompliance with effluent limitation standards or degradation of the quality of receiving water shall be reported immediately. Monitoring results shall be available for inspection at the mine site.

(j) Roads.

(i) Road classification system.

(A) Each road, as defined in Chapter 1, shall be classified as either a primary road or an ancillary road.

(B) A primary road is any road which is:

(I) Used for transporting mineral or spoil;

(II) Frequently used for access or other purposes for a period in excess of six months; or

(III) To be retained for an approved postmining land use.

(C) An ancillary road is any road not classified as a primary road.

(ii) General performance standards. Each road shall be located, designed, constructed, reconstructed, used, maintained and reclaimed so as to:

(A) Control or prevent erosion, siltation, and the air pollution attendant to erosion, including road dust as well as dust occurring on other exposed surfaces, by measures such as vegetating, watering, using chemical or other dust suppressants, or otherwise stabilizing all exposed surfaces in accordance with current, prudent engineering practices;

(B) Control or prevent damage to fish, wildlife, or their habitat and related environmental values;

(C) Control or prevent additional contributions of suspended solids to stream flow or runoff outside the permit area;

(D) Neither cause nor contribute to, directly or indirectly, the violation of State or Federal water quality standards applicable to receiving waters;

(E) The normal flow of water in streambeds and drainage channels shall not be seriously altered;

(F) Prevent or control damage to public or private property, including the prevention or mitigation of adverse effects on lands listed in Chapter 12, Section 1(a)(v)(A); and

(G) Use nonacid- and nontoxic-forming substances in road surfacing.

(iii) Design and construction limits and establishment of design criteria. To ensure environmental protection appropriate for their planned duration and use, including consideration of the type and size of equipment used, the design and construction or reconstruction of roads shall incorporate appropriate limits for grade, width, surface materials, surface drainage control, culvert placement, and culvert size, in accordance with current, prudent engineering practices.

(iv) Location.



(A) No part of any road shall be located in the channel of an ephemeral stream that has the potential for sufficient flow to cause substantial environmental harm unless a downstream sediment control structure exists within the permit boundaries, any intermittent stream channel or any perennial stream channel unless specifically approved by the Administrator in accordance with subsections 2(c), 2(e), 2(f), 2(h), 2(i), 2(r)(ii) and 2(w) of this Chapter and Section 2(a)(i) of Chapter 19.

(B) Roads shall be located to minimize downstream sedimentation and flooding.

(v) Maintenance.

(A) A road shall be maintained to meet the performance standards of this Chapter.

(B) A road damaged by a catastrophic event, such as a flood or earthquake, shall be repaired as soon as is practicable after the damage has occurred.

(vi) Reclamation. A road not to be retained under an approved postmining land use shall be reclaimed in accordance with the approved reclamation plan as soon as practicable after it is no longer needed for mining and reclamation operations. This reclamation shall include:

(A) Closing the road to traffic;

(B) Removing all bridges unless approved as part of the postmining land use and removing all culverts unless approved as part of the postmining land use or approved for burial in place;

(C) Removing or otherwise disposing of road-surfacing materials that are incompatible with the postmining land use and revegetation requirements;

(D) Reshaping cut-and-fill slopes as necessary to be compatible with the postmining land use and to complement the natural drainage pattern of the surrounding terrain;

(E) Protecting the natural drainage patterns by installing dikes or cross drains as necessary to control surface runoff and erosion; and

(F) Scarifying or ripping the roadbed, replacing topsoil, subsoil or substitute material and revegetating disturbed surfaces in accordance with subsections 2(c)(i) through 2(c)(x) and 2(d) of this Chapter.

(vii) Primary roads.

(A) Certification. The construction or reconstruction of primary roads shall be certified in a report to the Administrator by a registered professional engineer. The report shall indicate that the primary road has been constructed or reconstructed as designed and in accordance with the approved plan. The report shall be available for review at the mine site within 30 days following the completion of construction of each primary road.

(B) Each primary road embankment shall have a minimum static safety factor of 1.3 or meet the requirements established under Chapter 2, Section 5(a)(xvi)(B) ~~2(b)(xix)(B)~~.

(C) Location.

(I) To minimize erosion, a primary road shall be located, insofar as is practicable, on the most stable available surface.

(II) Fords of intermittent or perennial streams by primary roads are prohibited unless they are specifically approved by the Administrator as temporary routes during periods of road construction.

(D) Drainage control. In accordance with the approved plan:

(I) Each primary road shall be constructed or reconstructed and maintained to have adequate drainage control, using structures such as, but not limited to, bridges, ditches, cross drains, and ditch relief drains. The drainage control system shall be designed to safely pass the peak runoff from a 10-year, 6-hour precipitation event, or greater event as specified by the Administrator;

(II) Drainage pipes and culverts shall be installed as designed, and maintained in a free and operating condition and to prevent or control erosion at inlets and outlets;

(III) Drainage ditches shall be constructed and maintained to prevent uncontrolled drainage over the road surface and embankment;

(IV) Culverts shall be installed, and maintained to sustain the vertical soil pressure, passive resistance of the foundation, and the weight of vehicles using the road;

(V) Natural stream channels shall not be altered or relocated without the prior approval of the Administrator in accordance with applicable Sections 2(c), 2(e), 2(f), 2(h), 2(i), 2(r)(ii) and 2(w) of this Chapter and Section 2(a)(i) of Chapter 19; and

(VI) Except as provided in (vii)(C)(II) of this section, structures for channel crossings of ephemeral streams that have the potential for

sufficient flow to cause substantial environmental harm unless a downstream sediment control structure exists within the permit boundaries, any intermittent stream or any perennial stream shall be made using bridges, culverts, low-water crossings or other structures designed, constructed, and maintained using current, prudent engineering practices. The Administrator shall ensure that low-water crossings are designed, constructed and maintained to prevent erosion of the structure or streambed and additional contributions of suspended solids to streamflow.

(E) Surfacing: Primary roads shall be surfaced with material approved by the Administrator as being sufficiently durable for the anticipated volume of traffic and weight and speed of vehicles using the road.

(viii) Exemptions concerning roads.

(A) If approval is obtained from the surface landowner to leave a road unreclaimed, an operator may request in writing to the Land Quality Division that a road be permitted to remain unreclaimed. The operator must furnish proof of the surface landowner's approval. Final decision of road reclamation will be made by the Land Quality Division Administrator.

(B) In the event that the surface landowner, a city or town, another agency of the State of Wyoming or an agency of the United States government has requested that a road not be reclaimed, no bond shall be required of the applicant for the reclamation of the road and reclamation of the road shall not be required; provided, however, that the Administrator receives a copy of the written request from the surface owner, city or town, or agency of the State or Federal Government, for retention of the road.

(k) Time schedule.

(i) Reclamation must begin as soon as possible after mining commences and must continue concurrently until such time that the mining operation is terminated and all of the affected land is reclaimed. If conditions are such that final reclamation procedures cannot begin until the mining operation is completed, this must be explained in the reclamation plan. A detailed time schedule for the mining and reclamation progression must be included in the reclamation plan. This time schedule shall:

(A) Apply to reclamation of all lands to be affected in the permit area;

(B) Designate times for backfilling, grading, contouring and reseeding;

(C) Be coordinated with a map indicating the areas of

progressive mining and reclamation;

(D) Establish reclamation concurrently with mining operations, whenever possible. If not possible, the schedule shall provide for the earliest possible reclamation consistent with the orderly and economic development of the property; and

(E) If the Administrator approves a schedule where reclamation follows the completion of mining, describe the conditions which will constitute completion or termination of mineral production.

(l) Unanticipated conditions.

(i) An operator encountering unanticipated conditions shall notify the Administrator as soon as possible and in no event more than five days after making the discovery.

(ii) An unanticipated condition is any condition encountered in a mining operation and not mentioned by the operator in his mining or reclamation plan which may seriously affect the procedures, timing, or outcome of mining or reclamation. Such unanticipated conditions include but are not limited to the following:

(A) The uncovering during mining operations of any acid-forming, radioactive, inflammable, or toxic materials which must be burned, impounded, or otherwise disposed of in order to eliminate pollution or safety hazards.

(B) The discovery during mining operations of a significant flow of groundwater in any stratigraphic horizon.

(C) The occurrence of slides, faults, or unstable soil and overburden materials which may cause sliding or caving in a pit which could cause problems or delays with mining or reclamation.

(D) The occurrence of uncontrolled underground caving or subsidence which reaches the surface, causing problems with reclamation and safety hazards.

(E) A discovery of significant archaeological or paleontological importance.

(iii) In the case of the uncovering of hazardous materials, the operator shall take immediate steps to notify the Administrator and comply with any required measures to eliminate the pollution or safety hazard. Under all conditions the operator must take appropriate measures to correct, eliminate, or adapt to an unanticipated condition before mining resumes in the immediate vicinity of that condition.

(m) Disposal of mine facilities.

(i) All mine facilities constructed, used or improved by the operator must be removed or dismantled and shall be reclaimed in accordance with the requirements of this Chapter when no longer needed for the operation unless it can be demonstrated to the Administrator's satisfaction that the buildings or structures will be of beneficial use in accomplishing the proposed use of the land after reclamation or for environmental monitoring.

(ii) If the operator does not wish to remove certain mine facilities, the operator must obtain the written consent of the surface landowner to leave the mine facilities intact. The operator must make a request in writing, providing written proof of the above to the Land Quality Division, that the mine facilities be permitted to remain intact.

(n) Mine Facilities.

(i) Mine facilities shall be operated in accordance with the permit issued for the mine or coal preparation operation to which it is incident or from which its operation results.

(ii) In addition to the other provisions of this Chapter, mine facilities shall be located, maintained, and used in a manner that:

(A) Prevents or controls erosion and siltation, water pollution, and damage to public or private property;

(B) To the extent possible using the best technology currently available;

(I) Minimizes damage to fish, wildlife, and related environmental values; and

(II) Minimizes additional contributions of suspended solids to streamflow or runoff outside the permit area. Any such contributions shall not be in excess of limitations of State or Federal law.

(o) Signs and markers. Uniform and durable signs and markers of an adequate size shall be posted by the operator at those points applicable to the areas or activities to which they pertain. Such signs and markers shall include mine and permit identification signs, perimeter markers, buffer zone markers, blasting signs and soil markers. The operator shall place and maintain all signs and markers prior to commencement and until the completion of the activities to which they pertain, which, for mine and permit identification signs, shall be at the time the bond is released.

(p) Drilled holes and other exposed underground openings: Plugging, sealing

and capping of all drilled holes except those used solely for blasting or developmental drill holes which will be mined through within one year shall meet the requirements of Chapter 14. Developmental drilling shall meet the plugging and sealing requirements of W.S. § 35-11-404, where necessary. Temporary sealing and use of protective devices may be approved by the Administrator if the hole will be used for returning coal-processing waste or water to underground workings or monitoring groundwater conditions, and shall be used, at a minimum, for developmental drilling. Other exposed underground openings shall be properly managed as required by the Administrator to prevent access to mine workings and to keep acid or other toxic drainage from entering ground or surface water.

(i) With the prior approval of the Administrator and the State Engineer, wells may be transferred to another party for further use. The permittee shall remain responsible for the proper management of the well until final bond release.

(q) Air resources protection. All exposed surface areas shall be protected and stabilized to effectively control erosion and air pollution attendant to erosion.

(r) Fish and wildlife performance standards.

(i) An operator shall, to the extent possible using the best technology currently available and consistent with the approved postmining land use, minimize disturbance and adverse impacts on fish, wildlife, and related environmental values, and achieve enhancement of such resources where practicable, which activities shall include:

(A) Properly construct, locate and operate roads and powerlines, including proper design of powerlines to avoid electrocution of raptors.

(B) Prevent access to areas such as roadways or ponds with hazardous materials, to avoid damage to wildlife without limiting access to known important routes.

(C) Afford protection, restore and enhance where practicable important habitats to fish and wildlife. This shall include, but is not limited to, wetlands and riparian vegetation along rivers and streams and bordering ponds and lakes.

(D) Select plant species with shrubs well represented, which will enhance the nutritional and cover aspects of fish and wildlife habitat, where such habitat is identified as part of the postmining use, and distribute the reestablished habitat in a manner which includes a diversity and interspersion of habitats, optimizes edge effect, cover and other benefits for fish and wildlife, and is consistent with Section 2(d)(x)(E).

(E) Promptly report to the regulatory authority any species or critical habitat of such species listed as threatened or endangered, or any golden or bald

eagle nest in or adjacent to the permit area, which was not reported or investigated in the permit application. Upon notification the Administrator shall consult with the Wyoming Game and Fish Department and the U.S. Fish and Wildlife Service and, after consultation, shall identify whether and under what conditions the operator may proceed.

(F) Where the postmining land use is for cropland, to the extent not inconsistent with this intended use, operators shall restore habitat types to break up large blocks of monocultures.

(ii) Stream buffer zone.

(A) No land within 100 feet of a perennial or intermittent stream shall be affected unless the Administrator specifically authorizes such activities closer to or through such a stream upon a finding that:

(I) Surface mining activities will not cause or contribute to the violation of applicable state or federal water quality standards, and will not adversely affect the water quantity and quality or other environmental resources of the stream; and

(II) If there will be a temporary or permanent stream-channel diversion, it will comply with all stream diversion requirements.

(B) The area not to be affected shall be designated a buffer zone, marked in the field and on the mine plan map.

(iii) No surface mining activity shall be conducted which is likely to jeopardize the continued existence of endangered or threatened species listed by the State or the Secretary of the Interior or which will result in the destruction or adverse modification of designated critical habitats of such species in violation of the Endangered Species Act (16 U.S.C. 1531 et seq.). No surface mining activity shall be conducted in a manner which would result in the unlawful taking of a bald or golden eagle, its nest, or any of its eggs. The Administrator shall consult with the State and Federal Fish and Wildlife Agencies to identify whether and under what conditions the operation may continue under this provision.

(iv) The operator shall perform periodic surveys, in the level of detail and for those areas as determined by the Administrator, in accordance with Appendix B of these rules and regulations.

(s) Slides and other damage. Where instability may exist in backfill materials, an undisturbed natural barrier shall be provided to prevent slides and erosion, beginning at the elevation of the lowest coal seam to be mined and extending from the outslope for such distance as may be determined by the Administrator.

(t) Only those operations designed to protect disturbed surface areas and which result in improved resource recovery, abatement of water pollution, or elimination of hazards to the public shall be conducted within 500 feet of an active or abandoned underground mine. Approval for such operation shall be obtained from MSHA for operations proposed to be conducted within 500 feet of an active underground mine. The Administrator shall specifically approve operations proposed to be conducted within 500 feet of an abandoned underground mine.

(u) Cessation of operations. When it is known that a temporary cessation of operations will extend beyond 30 days, the operator shall submit to the Administrator that information required in an annual report.

(v) The operator shall conduct operations so as to maximize the utilization and conservation of the solid fuel resource being recovered so that re-affecting the land in the future can be minimized.

(w) The operator shall conduct all operations in such a manner as to minimize disturbance of the hydrologic balance within the permit and adjacent areas, to prevent material damage to the hydrologic balance outside the permit area, to assure the protection or replacement of water rights, and to support approved postmining land uses in accordance with the terms and conditions of the approved permit and the performance standards of this Chapter. The Administrator may require additional preventative, remedial, or monitoring measures to assure that material damage to the hydrologic balance outside the permit area is prevented. Mining and reclamation practices that minimize water pollution and changes in flow shall be used in preference to water treatment.

(x) Utility installations which are not part of the surface coal mining operation. All operations shall be conducted in a manner which minimizes damage, destruction, or disruption of services provided by oil, gas, and water wells; oil, gas, and coal-slurry pipelines; railroads; electric and telephone lines; and water and sewage lines which pass over, under or through the permit area, unless otherwise approved by the Administrator or owner of the utility installation.



DEPARTMENT OF ENVIRONMENTAL QUALITY

LAND QUALITY DIVISION

CHAPTER 4, APPENDIX 4A

**A. Evaluation of Shrub Density**

Introduction

All “eligible lands”, as defined in Chapter 1, Section 2(am), shall be ~~All land affected after August 6, 1996, excluding cropland, pastureland or treated grazingland as defined in Chapter 1 shall be considered eligible land~~ subject to the standard. Except where a lesser density is justified by premining conditions, at least 20 percent of the eligible land shall be restored to shrub patches supporting an average density of one shrub per square meter ~~(Chapter 4, Section 2(d)(x)(E))~~.

The postmining areal extent of shrub patches and specific shrub density(ies) shall be based on the original premining shrub densities in each vegetation community and the percentage each community contributes to the total eligible land existing in the original permit area and any lands added to the permit area through the amendment process.

Premine community(ies) identified and sampled during the baseline studies shall serve as the target for bond release unless otherwise approved by the Administrator.

For bond release purposes, the average postmine total density and species specific density(ies) shall be at least 90 percent of the calculated criteria for the applicable standard.

**CALCULATING THE REQUIRED POSTMINE DENSITY AND SPECIES COMPOSTION**

In order to calculate density and composition, the following must be identified:

1. Areal extent and premining total density of eligible land by vegetation community;
2. Relative density for each species;
3. Dominant premine species which then becomes the target postmine species;
4. Density of target postmine species using the formula  $D[1/(N + 1)]$ ;
5. Allowable density of postmining residual species; and
6. Acceptable residual species.

\* D is the postmining total shrub density. When D is less than 1.00, the density of the target postmining species is reduced proportionately. N is the number of primary premining shrub and subshrub species.

Table 3: Identification of available options

Option	Identification	Premine
I	Reduced permit-wide full shrub standard	$< 20\% @ \geq 1/M^2$
II	Permit-wide full shrub standard	$\geq 20\% @ \geq 1/M^2$
III	Community-specific full shrub standard	No restrictions
IV	Community-specific full and subshrub standard	No restriction – add subshrubs

The operator shall select one option only for bond release purposes within each permit or amendment area.

Option I: Permit-wide full shrub density standard; reduction in areal extent; composition based on premining full shrub density only (see Figure 1 for an illustration of this Option). For bond release purposes, no more than two separate acreage/density standards shall be used.

1. Reductions in areal extent and shrub density shall be appropriate when the premining vegetation community(ies) supporting at least one shrub per square meter comprised less than 20 percent of the eligible land. The percentage this community contributed to the total eligible land would then become the percentage of the postmining landscape that is required to support one shrub per square meter. The remainder of the postmining 20 percent areal extent of shrub patches shall be required to support shrubs at a density equaling the next highest density existing in a premining community.

2. Compute the relative premining dominance of full shrub species based on a weighted average of the percent areal extent of all vegetation communities and their associated full shrub species present within the eligible land. In this instance, one shrub patch seed mixture will be developed for the entire 20 percent areal extent.

3. From the information calculated in step 2. above, identify the dominant premine full shrub species. This species then becomes the target postmine species within the postmine shrub patches.

4. Compute the minimum density that the postmining target shrub (identified in step 3. above) must meet in order to achieve bond release under the standard. This is accomplished by applying the following equation:

$$D[1/(N + 1)]$$

D is the postmining total shrub density (D is always  $\leq 1.00$ ). N is the number of primary shrub species existing in the premining communities as identified in step 2. above. Primary shrub species shall be defined as full shrub species which comprise at least 10 percent of the relative density of full shrubs.

All primary shrub species shall be included in the shrub patch seed mixture.

5. The postmining residual density is calculated by subtracting the minimum required density of the target species from the total required density.

6. Residual density may be comprised of any premining primary species and any other approved full shrub species. In addition, the following subshrub species may be counted towards up to one half of the residual density.

<i>Artemisia frigida</i>	fringed sagewort
<i>Atriplex gardneri/gordonii</i>	Gardners saltbush
<i>Ceratoides lanata</i>	winterfat
<i>Artemisia pedatifida</i>	birdfoot sagewort
<i>Artemisia spinescens</i>	bud sagewort

**FIGURE 1**

**OPTION I: PERMIT-WIDE SHRUB DENSITY, REDUCTION OF DENSITY  
POSSIBLE COMPOSITION BASED ON FULL SHRUBS**

Note: No reduction of density is possible when 20 percent or more of the eligible acreage supports a premining total shrub density of over 1 shrub per square meter.

**TABLE 1**

Vegetation Community	Number of Acres Affected Following Rule Approval	Percent Eligible Acreage	Premining Total Shrub Density per m <sup>2</sup> (1)	Premining Total Shrub Number
Mixed Shrubland	364.00	18.2	1.20	1,767,730
Upland Grassland	1506.00	75.3	0.80	4,875,826
Scoria Grassland	80.00	4.0	0.30	97,128
Drainage Bottomland	50.00	2.5	0.20	40,470
Pastureland (2)	300.00	n/a	n/a	n/a
<b>Total Eligible Acreage</b>	<b>2000.00</b>			
<b>Total Acreage</b>	<b>2300.00</b>		<b>Premining No. of Shrubs</b>	<b>6,781,153</b>
<b>% Eligible/Total</b>	<b>86.96</b>			

(1) When the permit-wide standard is applied, premining density may be calculated from full shrubs only.  
 (2) Pastureland excluded by regulation

**TABLE 2**

Relative Premining Density for Primary Shrubs (≥ 10% Relative Density)			Postmining Total Shrub Density m <sup>2</sup> D*	N	D* (1/N+1) Density of Dominant per m <sup>2</sup>	Density of Residual Shrubs per m <sup>2</sup>	Density of Approved Subshrubs per m <sup>2</sup>	20% Acreage Reclaimed with Shrubs	Number of Shrubs Established
<b>Big Sagebrush</b>	<b>Rubber Rabbitbrush</b>	<b>Douglas Rabbitbrush</b>							
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>0.43</b>	<b>0.13</b>	<b>0.21</b>	← Numbers are weighted average relative density from Table 3						
<b>Dominant Species for this Option:</b>			<b>BIG SAGEBRUSH</b>						
<b>Reduced Permit-wide Standard</b>									
18.2% at 1/m <sup>2</sup>			1.00	3	0.25	0.375	0.375	364.00	1,473,108
1.8% at 0.8/m <sup>2</sup>			0.80	3	0.20	0.300	0.300	36.00	116,554
20 percent of eligible lands								400.00	
Postmining No. of Shrubs								1,589,662	
* D = Postmining Total Shrub Density (e.g. 0.8 * [1/(3+1)] = 0.20)									

**TABLE 3 – Option I, Figure 1 continued**

<b>Relative Density Information for Species</b>					
Note: Relative density is calculated by number of individuals of each species divided by total number of individuals.					
The value of the dominant species for each type is shaded <span style="display: inline-block; width: 10px; height: 10px; background-color: #cccccc; border: 1px solid black;"></span>					
	Mixed Shrubland	Upland Grassland	Scoria Grassland	Drainage Bottomland	Weighted Average Relative Density**
Silver sagebrush	0.06			0.28	0.02
Big sagebrush	0.63	0.39	0.35	0.11	0.43
Fourwing saltbush		0.03			0.02
Black sagebrush		0.06	0.18		0.05
Rubber rabbitbrush	0.19	0.13			0.13
Douglas rabbitbrush		0.27	0.18		0.21
Wax currant			0.05		0.00
Skunkbrush sumac	0.12		0.20		0.03
Greasewood				0.61	0.02
Common snowberry		0.12	0.04		0.09
Full Shrub Total	1.00	1.00	1.00	1.00	1.00
Fringed sagewort*	0.21	0.03			0.06
Gardner's saltbush*		0.28			0.21
Winterfat*				0.08	0.00
<b>All Full Shrubs/m<sup>2</sup>*</b>	1.20	0.80	0.30	0.20	

\* excludes these subshrubs, which are not allowed to be included in Option I, II or III.

\*\* Calculated by summing across communities the individual species density times the percent eligible acreage of each community divided by 100

Option II: Permit-wide full shrub density standard, no reduction in areal extent or density, composition based on premining full shrub density only (see Figure 2 for an illustration of this Option II).

1. If 20 percent or more of the premine eligible land supports at least 1 shrub per square meter, no reduction in shrub density or areal extent shall be permitted.
2. Compute the relative premining density of full shrub species based on a weighted average of the percent areal extent of all vegetation communities and their associated full shrub species present on eligible land. In this instance, one shrub patch seed mixture will be developed for the entire 20 percent areal extent.
3. From the information calculated in step 2. above, identify the dominant premine full shrub species. This species then becomes the target postmine species within the postmine shrub patches.
4. Compute the minimum density that the postmining target shrub (identified in step 3. above) must meet in order to achieve bond release under the standard. This is accomplished by applying the following equation:

$$D[1/(N + 1)]$$

D is the postmining total shrub density (D is always  $\leq 1.00$ ). N is the number of primary shrub species existing in the premining communities as identified in step 2. above. Primary shrub species shall be defined as full shrub species which comprise at least 10 percent of the relative density of full shrubs.

All primary shrub species shall be included in the shrub patch seed mixture.

5. The postmining residual density is calculated by subtracting the minimum required density of the target species from 1.00.
6. Residual density may be comprised of any premining primary species and other approved full shrub species. In addition, the following subshrub species may be counted towards up to one half of the residual density.

<i>Artemisia frigida</i>	fringed sagewort
<i>Atriplex gardneri/gordonii</i>	Gardners saltbush
<i>Ceratoides lanata</i>	winterfat
<i>Artemisia pedatifida</i>	birdfoot sagewort
<i>Artemisia spinescens</i>	bud sagewort

**FIGURE 2**

**OPTION II: PERMIT-WIDE SHRUB DENSITY, NO DENSITY REDUCTION POSSIBLE  
COMPOSITION BASED ON FULL SHRUBS**

Note: No reduction of density is possible when 20 percent or more of the eligible acreage supports a premining total shrub density of over 1 shrub per square meter

**TABLE 1**

Vegetation Community	Number of Acres Affected Following Rule Approval	Percent Eligible Acreage	Premining Total Shrub Density per m <sup>2</sup> (1)	Premining Total Shrub Number
Mixed Shrubland	444.00	22.2	1.20	2,156,242
Upland Grassland	1426.00	71.3	0.80	4,616,818
Scoria Grassland	80.00	4.0	0.30	97,128
Drainage Bottomland	50.00	2.5	0.20	40,470
Pastureland (2)	300.00	n/a	n/a	n/a
<b>Total Eligible Acreage</b>	<b>2000.00</b>		<b>Premining No. of Shrubs</b>	<b>6,910,657</b>
<b>Total Acreage</b>	<b>2300.00</b>			
<b>% Eligible/Total</b>	<b>86.96</b>			

(1) When the permit-wide standard is applied, premining density may be calculated from full shrubs only.  
 (2) Pastureland excluded by regulation

**TABLE 2**

Relative Premining Density for Primary Shrubs (≥ 10% Relative Density)			Postmining Total Shrub Density m <sup>2</sup> D*	N	D* (1/N+1) Density of Dominant per m <sup>2</sup>	Density of Residual Shrubs per m <sup>2</sup>	Density of Approved Subshrubs per m <sup>2</sup>	20% Acreage Reclaimed with Shrubs	Number of Shrubs Established
<b>Big Sagebrush</b>	<b>Rubber Rabbitbrush</b>	<b>Douglas Rabbitbrush</b>							
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>0.43</b>	<b>0.13</b>	<b>0.21</b>	← Numbers are weighted average relative density from Table 3						
<b>Dominant Species for this Option:</b>					<b>BIG SAGEBRUSH</b>				
<b>Reduced Permit-wide Standard</b>									
<b>100% at 1/m<sup>2</sup></b>			<b>1.00</b>	<b>3</b>	<b>0.25</b>	<b>0.375</b>	<b>0.375</b>	<b>400.00</b>	<b>1,618,800</b>
<b>20 percent of eligible lands</b>								<b>400.00</b>	
								<b>Postmining No. of Shrubs</b>	<b>1,618,800</b>

\* D = Postmining Total Shrub Density (e.g. 1.0 \* [1/(3+1)] = 0.25)

**TABLE 3 – Option II, Figure 2 continued**

Relative Density Information for Species					
Note: Relative density is calculated by number of individuals of each species divided by total number of individuals.					
The value of the dominant species for each type is shaded ■					
	Mixed Shrubland	Upland Grassland	Scoria Grassland	Drainage Bottomland	Weighted Average Relative Density**
Silver sagebrush	0.06			0.28	0.02
Big sagebrush	0.63	0.39	0.35	0.11	0.43
Fourwing saltbush		0.03			0.02
Black sagebrush		0.06	0.18		0.05
Rubber rabbitbrush	0.19	0.13			0.13
Douglas rabbitbrush		0.27	0.18		0.21
Wax currant			0.05		0.00
Skunkbrush sumac	0.12		0.20		0.03
Greasewood				0.61	0.02
Common snowberry		0.12	0.04		0.09
Full Shrub Total	1.00	1.00	1.00	1.00	1.00
Fringed sagewort*	0.21	0.03			0.07
Gardner's saltbush*		0.28			0.20
Winterfat*				0.08	0.00
All Full Shrubs/m <sup>2</sup> *	1.20	0.80	0.30	0.20	

\* excludes these subshrubs, which are not allowed to be included in Option I, II or III.  
 \*\* Calculated by summing across communities the individual species density times the percent eligible acreage of each community divided by 100



Option III: Community-specific full shrub density standard (see Figure 3 for an illustration of this Option).

1. Each eligible premining vegetation community serves as the basis for developing the required postmine density and areal extent. The percentage each community contributes to the total eligible land is multiplied by 20 percent to establish the number of acres required on the postmining landscape. The average number of full shrubs each community supported premine serves as the postmine average density for that particular community.

2. Compute the relative premining dominance of all full shrub species within each eligible vegetation community. In this instance, one shrub patch seed mixture will be developed for each eligible vegetation community.

3. From the information calculated in step 2. above, identify the dominant premine full shrub species within each eligible vegetation community. This species then becomes the target postmine species within a particular shrub patch corresponding to a specific vegetation community.

4. Compute the minimum density that the postmining target shrub (identified in step 3. above) must meet in order to achieve bond release under the standard. This is accomplished by applying the following equation:

$$D[1/(N + 1)]$$

D is the postmining total shrub density (D is always  $\leq 1.00$ ). N is the number of primary shrub species existing in the premining communities as identified in step 2. above. Primary shrub species shall be defined as full shrub species which comprise at least 10 percent of the relative density of full shrubs.

All primary shrub species shall be included in the respective shrub patch seed mixtures.

5. The postmining residual density is calculated by subtracting the minimum required density of the target species with each vegetation community from the total required density for that community.

6. Residual density may be comprised of any premining primary species and any other approved full shrub species. In addition, the following subshrub species may be counted towards up to one half of the residual density with each community.

<i>Artemisia frigida</i>	fringed sagewort
<i>Atriplex gardneri/gordonii</i>	Gardners saltbush
<i>Ceratoides lanata</i>	winterfat
<i>Artemisia pedatifida</i>	birdfoot sagewort
<i>Artemisia spinescens</i>	bud sagewort

**OPTION III: COMMUNITY SPECIFIC SHRUB DENSITY – COMPOSITION BASED ON FULL SHRUBS ONLY**

**TABLE 1**

Vegetation Community	Number of Acres Affected Following Rule Approval	Percent Eligible Acreage	Premining Total Shrub Density per m <sup>2</sup>	Premining Total Shrub Number	Postmining Total Shrub Density m <sup>2</sup> "D"	N	Dominant Species	D x (1/N+1) Density of Dominant per m <sup>2</sup>	Density of Residual Shrubs per m <sup>2</sup>	Approved Subshrubs per m <sup>2</sup>	20% Acreage Reclaimed with Shrubs	Number of Shrubs Established		
Mixed Shrubland	364	18.2	1.20	1,767,730	1.00	3	Big Sagebrush	0.25	0.38	0.38	72.80	294,622		
Upland Grassland	1506	75.3	0.80	4,875,826	0.80	4	Big Sagebrush	0.16	0.32	0.32	301.20	975,165		
Scoria Grassland	80	4.0	0.30	97,128	0.30	4	Big Sagebrush	0.06	0.12	0.12	16.00	19,426		
Drainage Bottomland	50	2.5	0.20	40,470	0.20	3	Greasewood	0.05	0.08	0.08	10.00	8,094		
Pastureland (1)	300	n/a	n/a											
<b>Total Postmining Shrub Acres</b>											<b>400.00</b>			
<b>Total Eligible Acreage</b>				<b>2000</b>	<b>Premining No. of Shrubs</b>		<b>6,781,153</b>					<b>Postmining No. of Shrubs</b>		<b>1,297,306</b>
<b>Total Acreage</b>		<u><b>2300</b></u>												
<b>% Eligible/Total</b>		<b>87.0</b>												
<b>(1) pastureland excluded by regulation</b>														
<b>* D = Postmining Total Shrub Density (e.g. 0.8 x [1/(4+1)] = 0.16)</b>														

**TABLE 2 – Option 3, Figure 3 continued**

<b>Relative Density Information for Species – Full Shrub Only</b>				
<b>The value of the dominant species for each type is shaded. ■</b>				
	<b>Mixed Shrubland</b>	<b>Upland Grassland</b>	<b>Scoria Grassland</b>	<b>Drainage Bottomland</b>
<b>Silver sagebrush</b>	<b>0.06</b>			<b>0.38</b>
<b>Big sagebrush</b>	<b>0.63</b>	<b>0.39</b>	<b>0.35</b>	<b>0.11</b>
Fourwing saltbrush		0.03		
Black sagebrush		0.06	0.18	
Rubber rabbitbrush	0.19	0.13		
Douglas rabbitbrush		0.27	0.18	
Wax currant			0.05	
Skunkbrush sumac	0.12		0.20	
Greasewood				0.51
Common snowberry		0.12	0.04	
<b>Full Shrub Total</b>	1.00	1.00	1.00	1.00
Fringed sagewort*	0.21	0.03		
Gardner's saltbush*		0.28		
Winterfat*				0.08
Number shrubs $\geq$ .1	3	4	4	3
All Full Shrubs/m <sup>2</sup>	1.20	0.80	0.30	0.20

\*excludes these subshrubs, which are not allowed to be included in Option I, II or III.

Option IV: Community-specific full shrub and approved subshrub density standard (see Figure 4 for an illustration of this Option)

1. Each eligible premining vegetation community serves as the basis for developing the required postmine density and areal extent. The percentage each community contributes to the total eligible land is multiplied by 20 percent to establish the number of acres required on the postmining landscape. The average number of full shrubs and approved subshrubs each community supported premine serves as the postmine average density for that particular community.

The following are the approved subshrubs which shall be included in calculating the premining density within each community:

<i>Artemisia frigida</i>	fringed sagewort
<i>Atriplex gardneri/gordonii</i>	Gardners saltbush
<i>Ceratoides lanata</i>	winterfat

2. Compare the relative premining dominance of full shrub and approved subshrub species within each eligible vegetation community. In this instance, one shrub patch seed mixture will be developed for each eligible vegetation community.

3. From the information calculated in step 2. above, identify the dominant premine full shrub or approved subshrub species with each eligible vegetation community. This species then becomes the target postmine species within a particular shrub patch corresponding to a specific vegetation community.

4. Compute the minimum density that the postmining target shrub/approved subshrub (identified in step 3. above) must meet in order to achieve bond release under the standard. This is accomplished by applying the following equation:

$$D[1/(N + 1)]$$

D is the postmining total shrub density (D is always  $\leq 1.00$ ). N is the number of primary shrub/approved subshrub species existing in the premining communities as identified in step 2. above. Primary shrub/approved subshrub species shall be defined as full shrub/approved subshrub species which comprise at least 10 percent of the relative density of full shrubs. However, in order to be considered primary species, fringed sagewort must comprise at least 20 percent of the relative shrub/approved subshrub composition.

All primary shrub/approved subshrub species shall be included in the respective shrub patch seed mixtures.

5. The postmining residual density is calculated by subtracting the minimum required density of the target species within each vegetation community from the total required density for that community.

6. Residual density may be comprised of any premining primary full shrub/approved subshrub species and any other approved full shrub species. In addition, the following subshrub species may be counted towards up to one half of the residual density within each community.

<i>Artemisia frigida</i>	fringed sagewort
<i>Atriplex gardneri/gordonii</i>	Gardners saltbush
<i>Ceratoides lanata</i>	winterfat
<i>Artemisia pedatifida</i>	birdfoot sagewort
<i>Artemisia spinescens</i>	bud sagewort

**OPTION IV: COMMUNITY SPECIFIC SHRUB DENSITY – COMPOSITION BASED ON FULL SHRUBS AND APPROVED SUBSHRUBS**

**TABLE 1**

Vegetation Community	Number of Acres Affected Following Rule Approval	Percent Eligible Acreage	Premining Total Shrub Density per m <sup>2</sup>	Premining Total Shrub Number	Postmining Total Shrub Density m <sup>2</sup> "D"	N	Dominant Species	D x (1/N+1) Density of Dominant per m <sup>2</sup>	Density of Residual Shrubs per m <sup>2</sup>	Approved Subshrubs per m <sup>2</sup>	20% Acreage Reclaimed with Shrubs	Number of Shrubs Established		
Mixed Shrubland	364	18.2	1.40	2,062,351	1.00	3	Big Sagebrush	0.25	0.38	0.38	72.80	294,622		
Upland Grassland	1506	75.3	1.10	6,704,260	1.00	3	Big Sagebrush	0.16	0.32	0.32	301.20	975,165		
Scoria Grassland	80	4.0	0.30	97,128	0.30	4	Big Sagebrush	0.06	0.12	0.12	16.00	19,426		
Drainage Bottomland	50	2.5	0.20	40,470	0.20	3	Greasewood	0.05	0.08	0.08	10.00	8,094		
Pastureland (1)	300	n/a	n/a											
										<b>Total Postmining Shrub Acres</b>		<b>400.00</b>		
Total Eligible Acreage	2000	Premining Number of Shrubs		8,904,209								Postmining No. of Shrubs		1,297,306
Total Acreage	2300													
% Eligible/Total	87.0													
(1) pastureland excluded by regulation * D = Postmining Total Shrub Density (e.g. 0.3 x [1(4+1)] = 0.06)														

A complete proposal for evaluation of postmining shrub density should include:

1. A commitment to provide a brief history of the methods employed to implant shrubs and the husbandry practices specifically related to shrub establishment and maintenance.
2. Methods to identify shrub patches and to determine their areal distribution and extent.
3. Proposed sampling methods for the determination of shrub density within the patches. This discussion should include number of samples.
4. Proposed methods for documenting the presence and distribution of shrub species on all other lands jointly used by livestock and wildlife.

DEPARTMENT OF ENVIRONMENTAL QUALITY

LAND QUALITY DIVISION

CHAPTER 5

PERFORMANCE STANDARDS FOR SPECIAL CATEGORIES

OF SURFACE COAL MINING

Section 1. **Applicability.** The requirements of this Chapter, together with the general performance standards in Chapter 4, apply to all operations described herein. If a conflict occurs between any particular requirements of this Chapter and any other Chapter of Land Quality Division Rules and Regulations, this Chapter shall be controlling.

Section 2. **Prime Farmlands.**

(a) Prime farmland soil removal, stockpiling and replacement.

(i) Soil materials to be used in the reconstruction of the prime farmland shall be removed before drilling, blasting, or mine related disturbances in a manner that prevents mixing or contaminating these materials with undesirable material.

(ii) The A soil horizon, then the B and C soil horizons, either separately or in combination, or other suitable material that will allow for reconstruction of a root zone of greater productive capability to that existing prior to mining must be separately removed and segregated. Where it is impractical to immediately replace the soil horizon material or other suitable materials, each horizon separately removed must be separately stockpiled and properly identified. The Administrator may approve a plan which does not provide for the separation of soil horizons if the application can document by acceptable scientific procedures that removal of all topsoil in one step would not diminish prime farmland restoration objectives.

(iii) During reconstruction of prime farmland soil, the C horizon material and then the B horizon material or a combination thereof shall be replaced first. The A horizon material shall be replaced as the surface layer unless the Administrator has approved an alternative segregation plan. Reconstruction of prime farmland soil shall include:

(A) Replacement of a minimum depth of 48 inches of soil and other approved plant growth materials or a depth equal to the depth of a subsurface horizon in the natural soil that inhibits root penetration, whichever is shallower. The Administrator may require a depth greater than 48 inches whenever necessary to restore productive capacity due to uniquely favorable soil horizons at greater depths. Soil horizons shall be considered to inhibit root penetration if their densities, chemical properties, or water holding capacities



restrict or prevent penetration by roots of plants commonly grown in the vicinity of the permit area and have little or no beneficial effect on soil productive capacity.

(B) Replacement only on land which has been returned to a slope not to exceed premining conditions and scarified to reduce compaction of the graded spoil surface.

(C) Replacement in a manner that avoids excessive compaction, so that the pore space of the soil, after reconstruction, is of a size, distribution, and amount which allows a favorable rooting zone; minimizes soil erosion; and restores an available water holding capacity consistent with the premining soil condition.

(b) Prime farmland soil stabilization, productivity, and revegetation.

(i) Following soil replacement, a vegetative cover capable of stabilizing the soil surface shall be established as soon as practicable. The revegetation soil amendments and mulching requirements of Chapter 4, Section 2(d) of the regulations shall be met.

(ii) Prime farmland soil productivity shall be measured within ten years after soil replacement.

(A) Soil productivity shall be measured on a representative sample, or on all the mined and reclaimed prime farmland area, using the reference crop determined under paragraph (C) immediately below. A statistically valid sampling technique at a 90 percent or greater statistical confidence level shall be used as approved by the Administrator in consultation with the U.S. Soil Conservation Service.

(B) Restoration of soil productivity shall be considered achieved when the average yield during the measurement period equals or exceeds the average yield of the reference crop established for the same period for nonmined soils of the same or similar texture or slope phase of the soil series in the surrounding area under equivalent management practices.

(C) The reference crop on which restoration of soil productivity is proven shall be selected from the crops most commonly produced on the surrounding prime farmland. Where row crops are the dominant crops grown on prime farmland in the area, the row crop requiring the greatest rooting depth shall be chosen as one of the reference crops.

(D) Reference crop yields for a given crop season are to be determined from:

(I) The current yield records of representative local farms in the surrounding area, with concurrence by the U.S. Soil Conservation Service; or

(II) The average county yields recognized by the U.S. Department of Agriculture, which has been adjusted by the U.S. Soil Conservation Service for local yield variation within the county that is associated with differences between nonmined prime farmland soil and all other soils that produce the reference crop.

(E) Under either procedure in paragraph (D) immediately above, the average reference crop yield may be adjusted, with the concurrence of the U.S. Soil Conservation Service, for:

(I) Disease, pest, and weather-induced seasonal variations;  
or

(II) Differences in specific management practices where the overall management practices of the crops being compared are equivalent.

~~(iii) Small acreages of prime farmland which the Administrator, in consultation with the local conservation district and soil conservation service personnel, determines to be uneconomical to maintain as cropland after restoration may be exempt from the reconstruction standards of this subsection.~~ Areas where permits were issued prior to August 3, 1977 are exempt from the reconstruction standards of this Section.

### Section 3. **Alluvial Valley Floors.**

(a) Surface coal mining operations shall be conducted to preserve and reestablish throughout the mining and reclamation process those geologic, hydrologic and biologic characteristics that support the essential hydrologic functions, as identified during premining investigations or monitoring conducted during the surface coal mining and reclamation operation.

(b) Environmental monitoring:

(i) If environmental monitoring shows that a surface coal mining operation is interrupting, discontinuing, or precluding farming on alluvial valley floors or is causing material damage to water supplying alluvial valley floors not subject to the statutory exclusions of W.S. § 35-11-406(n)(v), the operation shall immediately take remedial measures and report this condition to the Administrator within 24 hours.

(ii) An environmental monitoring system shall be installed, maintained and operated by the operator on all alluvial valley floors during surface coal mining and reclamation operations and continued until all bonds are released. The monitoring system shall provide sufficient information to show that the essential hydrologic functions of the alluvial valley floor are being preserved or reestablished.

(iii) All monitoring data collected and analyses thereof shall be provided in the annual report.

(c) For all operations, the operator shall:

(i) Restore the essential hydrologic functions of alluvial valley floors located on affected lands; and

(ii) Preserve the essential hydrologic functions of alluvial valley floors located outside the affected lands.

#### Section 4. **Coal In Situ Processing Activities.**

(a) Coal in situ processing activities shall:

(i) Be planned and conducted to minimize disturbance to the prevailing hydrologic balance;

(ii) Avoid discharge of fluids into holes or wells, other than as approved by the Administrator;

(iii) Prevent discharge of process fluid into surface waters;

(iv) Conduct air and water quality monitoring programs as necessary to comply with appropriate Federal and State air and water quality standards; and

(v) Conduct all activities in accordance with the performance standards contained in Chapter 18, 4 and 7.

Section 5. **Combined Surface and Underground Mining Operations.** In addition to the requirements of Chapters 4 and 7, each operator shall ensure that the vertical distance between combined surface and underground mining activities working separate seams shall be sufficient to provide for the health and safety of the workers and to prevent surface water from entering the underground workings.

#### Section 6. **Auger Mining.**

(a) Unless otherwise determined by the Administrator that the coal reserves make it impracticable to recover the remaining resource, the operator shall leave areas of undisturbed coal as approved by the Administrator to provide access for removal of those reserves by future underground mining.

(b) Auger mining may be limited or prohibited to minimize disturbance of the prevailing hydrologic balance, unwarranted subsidence, or if the prohibition is necessary to

maximize the utilization, recoverability or conservation of the solid fuel resources.

(c) Each auger hole shall be capped, sealed, or plugged in accordance with Chapter 14, unless other management techniques are approved by the Administrator. Each auger hole shall be plugged within 72 hours after completion if it is discharging water containing toxic-forming or acid-forming material by backfilling and compacting noncombustible and impervious material into the hole to a depth sufficient to form a water-tight seal. Auger holes shall not be sealed with an impervious material if the Administrator determines that the resulting impounded water may create a hazard to the environment or public health or safety. Auger holes that are not discharging water, or if the discharging water does not contain toxic-forming or acid-forming material and will not pose a threat of pollution to groundwater as required by Chapter 4, Section 2(c)(xiii), shall be backfilled as contemporaneously as practicable and will not require sealing with an impervious material.

(d) Subsidence control shall be provided as required by Chapter 7, Section 2.

(e) Where auger mining operations are conducted in previously mined areas that were not reclaimed to the standards of Chapter 4, Section 2(b), the reaffected lands shall be reclaimed in accordance with the requirements of Section 7 of this Chapter. Any coal seam mined shall be covered with a minimum of four feet of nonacid and nontoxic-forming material and graded to a slope which is stable, compatible with the approved postmining land use, and provides drainage. The operator shall provide the Administrator a written demonstration, prepared by a qualified registered professional engineer, showing the fill has a minimum static safety factor of 1.3.

#### Section 7. **Remining.**

(a) Under the following conditions, the requirements in Chapter 4, Section 2(b)(iv), requiring the elimination of highwalls shall not apply to operations which affect land disturbed by previous coal mining operations which were not reclaimed in accordance with the requirements of Chapter 4, Section 2(b) (i.e., State Program requirements):

(i) Where the volume of all reasonably available spoil is demonstrated in writing to the Administrator to be insufficient to completely backfill the reaffected or enlarged highwall, and this condition is documented in writing by the Administrator, the highwall shall be eliminated to the maximum extent technically practical in accordance with the following criteria:

(A) All spoil generated by the remining operation and any other reasonably available spoil shall be used to backfill the area. Under this Section, "reasonably available spoil" means spoil located in the immediate vicinity of the remining operation, which shall be included in the permit area, that is accessible and available for use and that when rehandled will not cause a hazard to public safety or significant damage to the environment.

(B) The backfill shall be graded to a slope which is compatible with the approved postmining land use and which provides adequate drainage and long-term stability.

(C) Any portion of highwall that remains after backfilling and grading of the remaining permit area shall be stable and not pose a hazard to the public health and safety or to the environment. The operator shall demonstrate to the Administrator that the remaining highwall is stable.

(b) For revegetation success standards, as a minimum, the vegetative ground cover shall not be less than the ground cover existing before redisturbance and shall be adequate to control erosion.

## **APPENDIX A**

### **VEGETATION SAMPLING METHODS AND RECLAMATION SUCCESS STANDARDS FOR SURFACE COAL MINING OPERATIONS**

#### **Introduction**

~~Procedures specified in this document are required for surface coal mining operators per its reference in Chapter 2, Section 2(a)(vi)(C) of the WDEQ/LQD Rules and Regulations. Permission for significant departures from this Appendix should be requested by formal proposal to the Division. Proposed alternatives will be evaluated by the state and federal authorities prior to approval and implementation. Alternative methods which are equally acceptable to those recommended in this Appendix will be given due consideration.~~

~~This document outlines acceptable procedures for generation, analysis and presentation of vegetation data and revegetation practices to assist a permit applicant with respect to the permit application requirements of W.S. § 35-11-406(a)(vii), (b)(i) and (b)(iii), Sections 2(a)(vi)(A) & (B), 2(a)(vi)(C), and 2(b)(iv)(C) of Chapter 2 of LQD Rules and Regulations and Sections 2(a)(i), 2(a)(ii), 2(d)(i) through (xiv) of Chapter 4 of LQD Rules and Regulations. The description of lands not previously permitted should be in accordance with methods specified in this document or in accordance with an approved alternative. Renewal applications may utilize vegetation baseline data collected using earlier approved methods if the results are part of the currently approved mine permit.~~

~~The type and amount of vegetation information required for mining permit applications may be modified depending upon:~~

- ~~a. The type of land disturbed and/or the type and acreage of disturbance.~~
- ~~b. The size of the permit area.~~

~~This document outlines acceptable procedures for:~~

- ~~A. Designing and executing premining baseline vegetation inventories.~~
- ~~B. Documenting the premining land uses and the capability of the existing plant communities to support those uses.~~
- ~~C. Establishing and evaluating appropriate postmining land uses.~~
- ~~D. Formulating a sound revegetation plan by choosing appropriate plant species and plant community types which will support the postmining land uses.~~
- ~~E. Establishing quantitative and qualitative vegetation parameters which serve as reclamation success standards for purposes of final bond release.~~
- ~~F. Preparing sections of Appendices D-1, D-8, and D-11 and the Reclamation Plan.~~
- ~~G. Evaluating the success of revegetation efforts and for eventual request of full bond release.~~

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D. Figure 4: Option IV	A 41



## I. General Inventory Procedures

~~These procedures constitute an acceptable premining vegetation inventory. Other methods and types of inventories may be acceptable if they meet or exceed the objectives of this appendix. Failure to receive prior approval for alternative procedures may cause significant delays during permit review, and rejection of the sampling methods and procedures if these do not result in an equivalent data base. WDEQ/LQD strongly encourages cooperative interactions among the regulatory authority, prospective applicants and consultants to prospective applicants during the design and execution of baseline inventories and preparation of permit applications.~~

### A. Mapping of Plant Communities

~~The plant communities or vegetation types of the entire permit area shall be delineated on an aerial mosaic photograph or topographic base map. The mapping should be extended to adjacent areas (0.8 km) on all sides of the permit area boundary or study area boundary. This suggested extension beyond the permit area applies only to mapping of community types. This suggestion does not refer to sampling of areas outside the permit area.~~

~~The LQD does not recommend the use of SCS range sites for the mapping of premining plant communities. The range site concept does not facilitate practical units for reclamation purposes.~~

~~The map scale should be between 1:4,800 and 1:10,000 (approximately 1 inch equal to 400-700 feet).~~

~~The vegetation map should clearly and accurately show all appropriate legend information outlined under the heading "Maps" in WDEQ/LQD Guidelines No. 6 or 6A. In addition, the vegetation map should identify all sample locations, accurately locate all Control Areas (CONA) (See Glossary), identify and describe the type and extent of all existing disturbances and identify all areas to be affected by mining and associated activities, including access roads, railroad spurs, etc.~~

### B. Sampling of Plant Communities

~~Each defined plant community of the permit area and all CONAs should be sampled for the following parameters:~~

- ~~1. % vegetation cover by species~~
- ~~2. % total cover (= sum of all species)~~
- ~~3. % total ground cover (= vegetation + litter + rock)~~
- ~~4. % bare ground~~

5. ~~herbaceous production by species~~
6. ~~total herbaceous production~~
7. ~~density and distribution of full shrubs (and subshrubs when appropriate)~~
8. ~~density of trees~~
9. ~~species diversity and species composition~~

~~The LQD prefers that these vegetation parameters be estimated by vegetation type, considering the entire permit area as a single unit, i.e. without a distinction between affected and non affected areas. The LQD feels that sampling the entire permit area will:~~

1. ~~facilitate the derivation of more accurate quantitative and qualitative revegetation success standards;~~
2. ~~provide the operator greater flexibility in planning the location and progression of pits and the location of mining facilities.~~

~~However, the applicant should also consider their chosen method of evaluating revegetation success (Sections III.B. and VIII.B.) when deciding whether to distinguish between affected and non affected areas for sampling purposes.~~

~~Both absolute and relative values for % species cover, % vegetation cover, % total ground cover, herbaceous production by species and total herbaceous production should be provided. The absolute values of % vegetation cover, % total cover and total herbaceous production constitute the quantitative revegetation success goals, as per Chapter 4, Section 2(d)(x), for evaluation of full bond release. The relative values of cover and production are used to evaluate the representative nature of the CONAs and may be used in evaluating postmining species diversity and species composition as per Chapter 4, Section 2(d)(x).~~

~~Please see the Glossary for definitional distinctions between absolute and relative values.~~

### C. ~~Establishing and Sampling Control Areas or Reference Areas~~

~~The applicant should establish a Control Area (CONA) or Reference Area (REFA) for each vegetation type, in excess of 10 acres, which will be disturbed (or a greater area approved by the Division) unless the Division has agreed that reestablishment of the vegetation type will not be required. For the sake of brevity, this guideline will generally use only the term CONA. However, all applicants should clearly understand that either the CONA or REFA concept is an acceptable procedure for the evaluation of revegetation success under provisions of Chapter 4, Section 2(d)(x).~~

~~Sections III.B. and VIII.B. describe the conceptual distinctions between the use of CONAs or REFAs. Applicants may develop, propose and request approval for alternatives to CONAs or REFAs for the evaluation of revegetation success.~~

~~Each CONA should be marked on the vegetation map, should be permanently marked in the field, and should be managed in a fashion equivalent to all other non-affected lands within the permit area. By definition the land units chosen as CONAs should remain unaffected by mining and associated activities over the life of the mine, and they cannot be moved without resampling the entire type they represent.~~

~~The applicant should present vegetation data on each community type and each CONA in a fashion which facilitates evaluation of the representative nature of each CONA. A tabular summary might best achieve this comparison (see Appendix V, Table 3).~~

#### ~~D. Describing the Plant Communities~~

~~Each plant community and the representative CONA should be verbally described. The description should include the general vegetation composition, the dominant plant species, characteristic topography, soil types, average slope, aspect and interspersion with or relationship to other community types. The quantitative and qualitative vegetation information may be best presented in a tabular format (Appendix V, Table 2).~~

~~If noxious (designated) or declared weeds (see Appendix I) comprise more than 25% of the vegetation cover on three (3) or more contiguous acres, these areas should be mapped as distinct vegetation types and identified on the vegetation map. These weedy species should be noted in the species list; their presence in any of the mapped community types should also be noted. Quantitative sampling should not be performed on noxious weed mapping units.~~

~~The presence of selenium indicators (Appendix III) should also be noted and their distribution discussed.~~

~~The applicant should present the following information in a tabular format (see Appendix V, Table 1):~~

- ~~1. Total acreage of each vegetation type on the permit area.~~
- ~~2. Total acreage of each vegetation type sampled on the study area, if the study area is larger than the permit area.~~
- ~~3. Total acreage of each vegetation type affected by mining and associated activities.~~
- ~~4. % of each vegetation type affected by mining and associated activities.~~
- ~~5. Total acreage of each CONA.~~
- ~~6. Total acreage of all other mapping units, e.g. reservoirs, cropland, pastureland, hayland, existing disturbed areas.~~

~~A 3 1/2" x 5" (or larger) photograph or a 2-3 frame panoramic sequence showing the general features of each community type and its representative CONA should be provided in the vegetation report. Photocopies of photographs are not acceptable. The location of all photographs should be noted on the vegetation map.~~

### E. Compiling a Plant Species List

~~The applicant should compile a list of the vascular plants of the permit area, including plant species observed but not actually recorded during sampling. The species list should be field checked and updated at least once a month from April through September during the field season when baseline sampling is performed. Regional and seasonal phenological processes should determine the actual compilation time period.~~

~~The plant species should be listed by scientific binomial and common name under life-form categories. Suggested categories include annual grasses, perennial grasses, grass-like species, forbs, succulents, full shrubs, subshrubs and trees.~~

~~The applicant should list the literature and/or personnel contacted for identification of plant species and note the location of any herbarium samples collected during the baseline inventory. A specimen of the following may be requested to confirm its occurrence:~~

- ~~1. any plant of special concern (Appendix IV).~~
- ~~2. any species which is similar to a plant of special concern;~~
- ~~3. any species not previously recorded in Wyoming.~~
- ~~4. any species out of its known range.~~

~~The applicant should specifically note any plants of special concern (Appendix IV) which occur on or adjacent to the permit area.~~

### F. Sample Adequacy

~~The applicant should attain formula-based sample adequacy or achieve the maximum sample size for each of the following vegetation parameters in each vegetation type and each CONA:~~

- ~~1. % vegetation cover (absolute value only).~~
- ~~2. % total ground cover (absolute value only).~~
- ~~3. Total herbaceous production (absolute value only).~~

~~Section IV of this appendix outlines procedures for calculating sample adequacy and lists maximum and minimum sample sizes.~~

## H. Detailed Qualitative and Quantitative Sampling Procedures

### A. Choice of Sample Locations

~~All sample locations must be chosen by random or systematic procedures. Random procedures are discussed in most standard statistical texts. The selection of sample locations must be done objectively in the lab or office, not in the field. Grid line~~

~~intervals (when used) should be no more than 65 meters on the ground. After the sample locations are selected, pacing from easily identifiable land marks is sufficiently accurate to locate them in the field.~~

~~Systematic sampling is described in Cochran (1977), Chapter 8. Systematic samples are acceptable only if each vegetation type is entirely covered. Calculations for systematic samples may be done by assuming the sample is random.~~

~~Sample locations must not be discarded because they are located on areas which are barren or otherwise seem atypical. However, sample locations which fall within recognizable and distinct inclusions within a given vegetation type, on obvious ecotones between types or on areas obviously disturbed by human activities or for land management practices, may be excluded during actual sampling. The applicant should carefully note and report in the permit application, Appendix D-8, all such occurrences.~~

~~The same procedures should be used for choosing sample locations in CONAs as in the permit area as a whole. These procedures should be clearly described in the permit application, Appendix D-8.~~

#### ~~B. Choosing Sampling Methods~~

~~The quantitative vegetation data requested in this appendix can be gathered using the basic methods of quadrants and/or transects. The choice of methods lies with the applicant. The choice should be based upon:~~

- ~~1. The specific parameter being measured.~~
- ~~2. The degree of statistical accuracy desired.~~
- ~~3. Operator knowledge of the permit area and its plant communities.~~
- ~~4. Operator experience in using a given technique.~~

~~The methods discussed in this guideline have been widely used in plant communities of Wyoming. In general, they have provided sufficiently detailed and accurate information to meet the permit application requirements of W.S. § 35-11-406 and Chapters 2 and 4 of LQD Rules and Regulations. In particular, the methods discussed in this appendix have consistently provided the type, quantity and quality of data necessary to:~~

- ~~1. document the highest previous use of the land within a permit area.~~
- ~~2. document that the regional plant communities can or cannot support the prevailing land uses.~~
- ~~3. develop sound reclamation and revegetation methods.~~
- ~~4. establish sound quantitative and qualitative revegetation success goals.~~

~~Investigators have devised numerous study designs, sampling regimes and sampling methods for, vegetation analysis. Some of these procedures variously known as two-stage sampling, double sampling, cluster sampling, stratified sampling, etc., have been~~

~~used for baseline vegetation inventories in Wyoming. However, in general these methods have not proven satisfactory for attaining adequate baseline information. Operationally, the large variance terms associated with these sampling methods have caused serious difficulties in attaining the sample adequacy tests of this appendix. The LQD does not recommend use of these procedures.~~

~~The references listed in Appendix VI may provide useful information regarding sampling methods.~~

#### ~~1. Use of Quadrats~~

~~All of the required vegetation parameters can be estimated using quadrats. However, a single quadrant size and shape may not be appropriate for all parameters. Furthermore, there is no absolute, universal method for determining quadrant size or shape. Quadrant size and shape should be selected to reduce variance and thereby reduce the number of samples needed. The quadrant should be sufficiently large so that:~~

- ~~a. Separation, counting and measurement of the individual plants can be performed with relative ease.~~
- ~~b. Sampling efficiency is as high as possible.~~
- ~~c. The largest plant within the quadrant does not fill the quadrant.~~
- ~~d. All quadrants enclose some vegetation.~~

#### ~~2. Use of Line Transects~~

~~All transects should be at least 50 meters in length. If a transect runs out of a given vegetation community, select a new random orientation, at the point where the transect leaves the vegetation type, which will return the transect to the same vegetation type.~~

~~If quadrats are spaced along a transect, no fewer than five (5) quadrats should be placed along each transect. If point intercept methods are employed along a 50-meter transect, no fewer than fifty (50) sample points should be evenly spaced along each transect.~~

~~Independent of the method, each transect comprises a sample size (N) of one (1).~~

### ~~C. Suggested Sampling Procedures for Specific Vegetation Parameters~~

#### ~~1. Cover Parameters~~

~~Chapter 1 of LQD Rules and Regulations defines "cover," as vegetation, litter and rock over the soil which intercept rainfall. This definition describes % total ground cover. Operationally, vegetation cover is the vertical projection of the general~~

~~outline of plants (ignoring minor gaps between branches and holes in the canopy) to the ground surface expressed as a percent of a surface reference unit.~~

~~The applicant should collect data for the following categories:~~

- ~~1. % vegetation cover by species~~
- ~~2. % total vegetation cover (=sum of all species)~~
- ~~3. % total ground cover (=vegetation + litter + rock)~~
- ~~4. % bare ground~~

~~The original absolute cover values for individual species should be manipulated to provide relative cover values.~~

~~For sampling purposes rock may be considered any stone or mineral matter at least one (1) square centimeter in size. Litter is any plant part, lying on the ground surface, whose structural integrity remains recognizable.~~

~~a. Quadrat Methods~~

~~Species cover, vegetation cover and total ground cover can be determined from appropriately sized quadrants by ocular estimation. The considerations for determining quadrat size and shape discussed earlier clearly apply to cover sampling.~~

~~b. Line Transect Methods~~

~~Species cover, vegetation cover and total cover can be determined from procedures based on line transects. The point intercept method has been frequently and successfully applied in Wyoming plant communities. Point samples may be determined using the following tools: sharpened rod or pin or an ocular siting device projected vertically downward to the sample location on the transect.~~

~~When estimating % cover by species, only the first hit on each species should be recorded and used in the calculations. If one projection intercepts the same species more than once, record only the "first hit" on that species. If one projection intercepts more than one species, separate hits should be recorded for each on each species.~~

~~When estimating % total vegetation cover, the first "hit" per projection should be used.~~

~~In general, the line transect should be at least fifty (50) meters long; Point samples should be collected at one (1) meter intervals. Each transect constitutes a sample size (N) of one (1).~~

## 2. Total Herbaceous Production

~~In this appendix, the term production will describe an estimate of the total herbaceous standing crop biomass which is measured at or near the expected peak of the standing crop. Herbaceous production by species and total herbaceous production should be estimated for each community type and its representative CONA.~~

### a. Grazing Exclosures

~~All production estimates should be taken from within grazing exclosures. Random sample points (exclosure locations) should be established before the growing season. The exclosures should be placed in the field on or before April 15th or as soon after snowmelt as field conditions permit. Cages should be placed at this time to avoid possible data complications from snow accumulation through the winter.~~

~~The number of cages needed can be estimated from preliminary sampling, from results of previous vegetation sampling on site or from other vegetation surveys in similar vegetation types in the area. All permit applications and approved permits for mining in Wyoming are public documents and open to review. Analysis of existing data from applicable documents should be an integral part of all study designs for a baseline vegetation inventory. Applicants should establish several extra exclosures in each vegetation type and CONA to accommodate possible loss of some exclosures due to destruction by cattle, inaccessible locations, placement in an inclusion, etc.~~

~~The cage size and quadrant size must be chosen with each other in mind. The exclosure must be sufficiently large to accommodate the sample quadrant and to provide a buffer area which reduces the potential for serious edge effects.~~

~~All exclosures should be removed when the inventory is complete.~~

### b. Field Methods

~~The standing crop biomass of all herbaceous species should be harvested in each quadrant. Full shrubs, succulents, annual grasses, annual forbs, *Yucca* spp., noxious weeds, cushion plants and trees should not be harvested. The seasonal growth of subshrubs should be harvested (see Appendix II) when accurate density data are unattainable. If annual grasses and/or annual forbs are major community components, these life forms should be clipped.~~

~~The vegetation should be clipped by species in each vegetation type and each CONA. The minor or remaining species can be harvested by life form category (Section I.E.).~~



All biomass should be carefully dried in an oven to a constant weight and recorded to the nearest 0.1 gram. Data should be reported in grams per square meter.

e. Data on Cropland, Hayland or Pastureland

~~Land units which have experienced special management such as cropland or pastureland (see definitions under "cropland and pastureland", respectively) should be delineated and identified on the vegetation map. Best available information on the current and historical management of these lands and their production must be provided. The applicant should consult appropriate land owners or managers for these data. All sources for this information should be identified in the text. Harvest data should be presented in units of grams per square meter, if possible. Cropland need not be sampled for any of the vegetation parameters outlined in Section I.B. However, some vegetation sampling of pasturelands and haylands may be appropriate. It is strongly recommended that the applicant contact LQD during the initial planning stages of the proposed vegetation inventories to discuss appropriate sampling procedures relative to these land units.~~

~~In general, CONAs or REFAs need not be established for these land units. The premining production data, similar undisturbed management units or average area agricultural statistics information may serve as reclamation success standards per Chapter 4, Section 2(d)(x)(I). However, given site specific conditions it may be appropriate to establish CONAs or REFAs for haylands and pasturelands. The need to establish CONAs or REFAs should be discussed with the LQD during the initial planning stages of the vegetation inventory.~~

3. Shrub Habitat Characteristics

~~The postmining density, composition and distribution of shrubs shall be based upon site-specific evaluation of the premining vegetation and wildlife use. Except where a lesser density is justified from premining conditions, at least 20 percent of the eligible land shall be restored to shrub patches supporting an average density of one shrub per square meter (Chapter 4, Section 2(d)(x)(E)). Thus, the baseline vegetation inventory shall include premining shrub distribution data, to include an estimation of the distribution and areal extent of shrub clumps or patches. Shrub density and cover data shall be components of the shrub distribution information.~~

~~When shrub density data are estimated, they shall be gathered from each community, but not from CONAs, REFAS OR MINIMUM EXREFAS. Shrubs shall be divided into woody species (full shrubs) and suffrutescent species (subshrubs) for sampling purposes (see Appendix II).~~

~~Shrub density counts shall be performed within a 50 square meter area using a plot shape appropriate to the community.~~

~~Data shall be recorded by species and then manipulated to formulate full shrub and subshrub density values for each community type. The data shall be reported as number per square meter and number per acre. The growth characteristics of certain subshrub species under various environmental conditions may prohibit accurate density counts. Under these circumstances, consultation with LQD may provide for the collection of seasonal growth biomass as a substitute method of characterizing these plant species.~~

~~All shrub density data collected after August 6, 1996 shall be subject to sample adequacy tests specified in Section IV. of this Appendix. However, all shrub density data collected prior to August 6, 1996 shall not be subject to sample adequacy tests unless that shrub density data is being used to fulfill the 20% standard. In general, when sampling is conducted which is not subject to sample adequacy, the number of shrub density sample points should correspond to the number of cover samples in each community type.~~

#### 4. Tree Distribution

~~Chapter 4, Section 2(d)(x)(E) requires that trees be returned to a density equal to the pre-mining conditions on all surface mining operations.~~

~~Plotless distance, methods and direct counts have been used to estimate tree densities in Wyoming plant communities. Because of the patterns of distribution and general paucity of tree species on lands affected by mining in Wyoming, direct count methods may be the most accurate and efficient. Depending upon community characteristics, plant distribution, plant size and availability of source materials, direct counts may be made by field reconnaissance or from aerial photographs. If plotless methods are used, 15-20 randomly chosen sample points should be sampled. Some estimate of height and/or age distribution should also be provided.~~

~~Tree density data are not required for CONAs. Tree density data are not subject to sample adequacy tests.~~

~~The general locations or concentrations of trees should be illustrated on the vegetation map.~~

#### 5. Species Composition and Species Diversity

~~Chapter 1 of LQD Rules and Regulations defines species composition as the "...number, kinds, amount and quality of species" and species diversity as the "...number of species per unit area". Chapter 4, Section 2(d)(x) establishes suitable~~

~~postmining species diversity and composition as revegetation success goals for all operators.~~

~~The concept of species diversity is complex. Some researchers suggest that species diversity can be measured by indices of diversity. Though numerous indices of diversity have been developed, no standard index exists and no single index is necessarily better than another.~~

~~The applicant should collect premining data which can be manipulated to document the species composition and species diversity of premining plant communities.~~

#### ~~D. Recording of Sample Methodology~~

~~All sampling procedures must be presented clearly in the text of Appendix D-8. The applicant should use the same procedures for sampling vegetation types and CONAS.~~

### ~~III. Establishing Revegetation Success Goals~~

#### ~~A. Quantitative and Qualitative Vegetation Standards~~

~~Chapter 4, Section 2(a)(i) requires that reclamation restore the land to a condition equal to or greater than the "highest previous use". Chapter 4, Section 2(d)(x) outlines specific vegetation parameters which constitute revegetation success goals when reclaimed lands are considered for full bond release.~~

~~These qualitative and quantitative vegetation parameters which constitute revegetation success goals include:~~

- ~~1. % vegetation cover (absolute value).~~
- ~~2. % total ground cover (absolute value).~~
- ~~3. Total production for herbaceous species (absolute value).~~
- ~~4. Density of full shrub and subshrub species (in mosaics according to the applicable goal or standard).~~
- ~~5. Areal extent of shrub mosaics according to the applicable goal or standard.~~
- ~~6. Total number of trees.~~
- ~~7. Species diversity and species composition.~~
- ~~8. Attainment of these parameters for the last two consecutive years for those mines using reference areas, or for those mines using an approved technical standard., two out of four years beginning no sooner than year eight of the bonding period~~

~~The premining values of these parameters, estimated from the vegetation types actually affected by mining and/or from other undisturbed portions of the same type which are representative of the affected vegetation types, are used to generate the postmining revegetation success goals.~~

~~The baseline vegetation inventory should generate a single quantitative or qualitative value for parameters 1, 2, 3, 5 and 6 from each vegetation type and its representative CONA. Each quantitative and qualitative goal should be clearly presented in the permit application, Appendix D 8, and at least referenced in the Reclamation Plan.~~

#### ~~B. Establishing Land Units for Use in Evaluating Revegetation Success for Full Bond Release~~

~~As noted above, Chapter 4 specifies the vegetation parameters which constitute revegetation success goals for full bond release and requires the LQD Administrator to specify methods for evaluating attainment of these goals. At this time, all approved success evaluation methods must be based upon analysis of an undisturbed land unit, i.e. a control area or reference area. As discussed more fully in Section VIII, several methods of evaluating revegetation success exist. Each of the methods conceptually share several common features:~~

- ~~1. During the baseline inventory, the applicant delineates portions of vegetation types which will remain undisturbed and which are biotically and abiotically representative of vegetation types affected by mining activities.~~
- ~~2. During the baseline inventory, standard sampling methods are used to estimate the premining values of the vegetation parameters (outlined above in Section III.A.) on each affected vegetation type and an undisturbed portion of the same vegetation type. These premining data are used to document the representative nature of the undisturbed unit.~~
- ~~3. At least two (2) years prior to the desire for full bond release, the revegetation success parameters are again estimated on the revegetated areas and the undisturbed units.~~

~~The applicant should choose which conceptual framework is appropriate for the evaluation of revegetation success under the conditions expected to exist on the mine site. Alternate success standards for evaluating reclamation success may be submitted for approval by the Administrator. The applicant must establish at least one land unit, within an undisturbed portion of a vegetation type, which is representative of each vegetation type that will experience ten (10) acres or more of disturbance (or a greater area if approved by the Division).~~

~~The following types of undisturbed land units may be established for use in evaluating revegetation success. The land units themselves and the conceptual framework within which they are used are not interchangeable. The applicant should consistently establish one type of land unit from the following:~~

~~Control Area means a land unit which is representative, in terms of physiography, soils, vegetation and land use history, of a plant community affected by mining activities. The~~

~~representative nature of the Control Area is verified by subjective (nonstatistical) comparison of its qualitative and quantitative characteristics to similar information from the plant community it typifies.~~

~~Quantitative premining and postmining vegetation data from the Control Area are used to mathematically adjust premining affected area data for climatic change. These adjusted data are directly compared by statistical procedures (confidence level of 80%,  $\alpha = 0.2$ ) to data from a reclaimed vegetation type when evaluating revegetation success for full bond release. Qualitative data are compared by standard procedures agreed to by the applicant or permittee and LQD.~~

~~Reference Area means a land unit which is representative, in terms of physiography, soils, vegetation and land use history, of a plant community affected by mining activities. The representative nature of the Reference Area is verified by statistical comparison (confidence level of 90%,  $\alpha = 0.1$ ) of its absolute values of % vegetation cover, % total ground cover and total herbaceous production to similar data from the plant community it typifies. Species composition and species diversity are subjectively (nonstatistically) evaluated.~~

~~Quantitative postmining vegetation data from the Reference Area are directly compared, by standard statistical procedures (confidence level of 80%,  $\alpha = 0.2$ ), to data from a reclaimed vegetation type when evaluating revegetation success for full bond release. Qualitative data are compared by standard procedures agreed to by the applicant or permittee and LQD.~~

~~Note: The following is a special kind of reference area that can be utilized by the operator.~~

~~Extended Reference Area means all the undisturbed portions of a vegetation type which has experienced disturbance by mining activities. The representative nature of the Extended Reference Area is verified by evaluation of vegetation mapping procedures, the adequacy of premining vegetation data, soils data, physiography and land use history information.~~

~~Postmining quantitative vegetation data from the Extended Reference Area are directly compared by standard statistical procedures (confidence level of 80%,  $\alpha = 0.2$ ), to data from a reclaimed vegetation type when evaluating revegetation success for full bond release. No mathematical adjustment for climatic change is made. Qualitative data are compared by standard procedures agreed to by the applicant or permittee and LQD.~~

~~A Control Area (CONA) or Reference Area (REFA) should be at least two (2) acres in size. Larger land units are preferred, whenever possible, for the following reasons: 1) to reduce the variability (in terms of the abiotic and biotic characteristics) between the CONAs or REFAs and the communities they typify; and 2) to reduce the potential adverse impacts to the CONAs or REFAs due to intensive sampling at the time of bond~~

~~release, which becomes more critical when successive units of reclaimed lands are being evaluated for revegetation success.~~

~~All CONAs or REFAs should remain undisturbed by mining activities and should be managed in a fashion which will not cause significant, management related changes in the vegetation parameters used to evaluate revegetation success. Permittees should contact LQD if they perceive the need to relocate a previously established CONA or REFA.~~

~~Section VIII.B. further outlines operational differences among the CONA and REFA concepts when evaluating the success of revegetation.~~

~~For existing mining operations where vegetation data were not collected prior to disturbance, another type of land unit may be established for purposes of evaluating revegetation success.~~

~~Comparison Area means a land unit which is representative, in terms of physiography, soils, vegetation and land use history, of a premining plant community from which no vegetation data were collected prior to disturbance. The representative nature of the Comparison Area may be validated by a subjective field reconnaissance of the site or by subjective evaluation of vegetation data generated by a sampling program. The establishment procedures should be agreed to by the permittee or applicant and the LQD prior to establishment.~~

~~Postmining quantitative data from the comparison area are directly compared, by standard statistical procedure (confidence level of 80%,  $\alpha = 0.2$ ), to data from a reclaimed vegetation type when evaluating revegetation success for full bond release. No mathematical adjustment for climatic change is made. Qualitative data are compared by standard procedure agreed to by the permittee or applicant and LQD.~~

~~A Comparison Area should be at least two (2) acres in size and should be managed in a fashion which will not cause significant changes in the vegetation parameters used to evaluate revegetation success. The permittee or applicant should establish and request approval of the Comparison Area at least two (2) years prior to an anticipated request for full bond release.~~

#### IV. Estimating Adequate Sample Size

##### A. General Considerations

~~The applicant must achieve sample adequacy or execute the maximum sample size for each CONA and for each vegetation type.~~

~~The applicant must achieve sample adequacy for each of the following parameters independently in each CONA and each vegetation type.~~

1. ~~% vegetation cover (absolute cover).~~
2. ~~% total ground cover (absolute cover).~~
3. ~~Total herbaceous production.~~

## B. Procedures

The applicant should sample at least the minimum number of sample locations as outlined by Table 2. below. The following formula should then be used in an incremental and iterative fashion to estimate sample adequacy:

$$n_{\min} = \frac{2(sz)^2}{(d\bar{x})^2}$$

where:

$n_{\min}$  = the number of sample points needed in a given vegetation type  
 sample standard deviation = S

$$S = \sqrt{\frac{\sum x_i^2 - \frac{(\sum x_i)^2}{n}}{n-1}}$$

z = the z statistic

d = acceptable amount of inherent variability to be identified between the sample mean and the true population mean; See Table 1 below for d and z values.

$\bar{x}$  = sample mean for cover or production

If sample adequacy is not met in an incremental fashion, the sample adequacy test should be applied until the maximum number of samples, as outlined by Table 2, is reached. Alternatively, the applicant may simply establish and sample the maximum number of samples presented in Table 2.

The applicant should always present analyses of sample adequacy using the  $n_{\min}$  formula. These analyses are best presented in a tabular format (see Appendix V, Table 4). In order that LQD personnel may check these data, all parameters of the formula must be clearly presented.

If the calculated  $n_{\min}$  exceeds the maximum sample size of Table 2, the applicant should indicate the confidence level (d value) achieved by solving for z (assuming n actual =  $n_{\min}$ ). The applicant should also present a brief explanation of why the sample was unusually variable and thus formula adequacy was not achieved.

## C. Determining d and z values

The community composition determines the d and z values for assessment of sample adequacy for total herbaceous production. Two arbitrary community types are defined as follows:

1. A grassland community is a vegetation type where the contribution of the cover of full shrubs and subshrubs comprises less than 20% of the total cover of all species.
2. A shrubland community is a vegetation type where the contribution of the cover of full shrubs and subshrubs comprises more than 20% of the total cover of all species.

These definitions are based upon analyses of existing premining vegetation data. Their derivation is available from LQD upon request.

After making this operational distinction based upon sampling data, choose the appropriate parameters from Table 1 below. The parameters used for evaluation of % vegetation cover and % total ground cover do not vary with community type. Consult Table 1 for appropriate parameters.

Table 1. z and d values for use in the sample adequacy formula

<u>Vegetation parameter</u>	<u>z</u>	<u>d</u>
% vegetation cover, grassland & shrubland	1.28	0.1
% total ground cover, grassland & shrubland	1.28	0.1
total herbaceous production, grassland	1.28	0.1
total herbaceous production, shrubland	0.84	0.2
50 m <sup>2</sup> shrub density plots	0.84	0.2

D. Determining Minimum and Maximum Sample Sizes

Table 2. Minimum and maximum sample sizes for various sampling methods

<u>Sampling Method</u>	<u>sample size</u>	
	<u>minimum</u>	<u>maximum</u>
<u>1. In Control or Reference Areas</u>		
quadrats	10	30
transects with quadrats	5	30
intercept transects	15	30
<u>2. In Vegetation Types</u>		
quadrats	15	50
transects with quadrats	7	30
intercept transects	20	50
50 m <sup>2</sup> shrub density plots	15	*

\* if sample adequacy can not be achieved after sampling 50 shrub density plots, the operator shall contact the LQD for guidance



~~The maximum and minimum sample sizes for CONAs also apply to vegetation types which cover fewer than 30 ha (80 acres) or vegetation types which will experience fewer than 4 ha (10 acres) of disturbance. The applicant should consult LQD for direction in such situations.~~

~~The maximum and minimum sample sizes were constructed with the following qualifications:~~

- ~~1. cover, production and density are being estimated using appropriately sized quadrats.~~
- ~~2. line transects are 50m long with 50 evenly spaced estimation points.~~
- ~~3. all sample points are randomly or systematically chosen.~~
- ~~4. vegetation types are accurately and professionally delineated, mapped and sampled.~~
- ~~5. a permit area no larger than 10,000 acres. If a permit area exceeds 10,000 acres it may require a larger sample size. The applicant should consult LQD for direction in such situations.~~
- ~~6. shrub density is estimated using a 50 square meter plot~~

~~Compromise of any of these criteria may result in serious difficulties with sample adequacy requirements and may compromise acceptability of the baseline vegetation inventory.~~

#### ~~V. Suggested Timetable for Components of the Vegetation Inventory~~

<del>Design vegetation study</del>	<del>Any time — discuss with DEQ/LQD well in advance of field sampling season</del>
<del>Map vegetation types of entire permit area</del>	<del>Any time — field check during growing season, prior to baseline sampling.</del>
<del>Describe each vegetation type</del>	<del>Any time — confirm dominant species during and after field sampling.</del>
<del>Construct species list</del>	<del>Field check at least once a month from April through September (actual period is determined by regional and seasonal phenology).</del>
<del>Place grazing exclosures in field</del>	<del>Before April 15 or following snowmelt.</del>
<del>Sample for vegetation parameters including tree and full shrub density. CONAs or REFAs and vegetation types should be sampled at the same time to permit valid comparisons of data.</del>	<del>July through September — actual sampling period is determined by regional and seasonal phenology.</del>

## VI. General Format for Appendix D-8 of the Permit Application

The following is a suggested outline for organization of Appendix D-8.

- ~~A. Table of Contents—A summary of the major entries, including lists of figures, tables, and maps.~~
- ~~B. Introduction—A description of the location and general features of the permit area and the personnel (or firm) conducting the baseline inventory.~~
- ~~C. Methods—A description of all procedures used in the baseline inventory, which includes:
  - ~~1. delineation and mapping of vegetation types and other land units.~~
  - ~~2. general sampling design for the permit area.
    - ~~a. selection of sample points~~
    - ~~b. plot size and shape, transect characteristics, etc.~~
    - ~~c. specific calendar dates of all sampling~~~~
  - ~~3. general sampling design for the Control or Reference Areas.~~
  - ~~4. establishment, marking and management of CONAs or REFAs.~~
  - ~~5. evaluation of sample adequacy.~~
  - ~~6. compilation of species list.~~~~
- ~~D. Results and Discussion—A presentation and interpretation of the vegetation data, to include:
  - ~~1. description of the Vegetation Map and each vegetation type or other land unit.~~
  - ~~2. description of each CONA or REFA and discussion of its representative nature.~~
  - ~~3. tabular summary of the areal extent of each mapping unit and acreage affected by mining (see Table 1, Appendix V).~~
  - ~~4. summarized vegetation parameters for the permit area (see Tables 2 and 5, Appendix V).~~
  - ~~5. summarized vegetation parameters for the CONAs (see Tables 3 and 5, Appendix V).~~
  - ~~6. comparison of vegetation data between each vegetation type and its representative CONA (see Table 3, Appendix V).~~
  - ~~7. evaluation of sample adequacy for each vegetation type and its representative CONA (see Table 4, Appendix V).~~
  - ~~8. species list, selenium indicators, species of special concern and noxious (designated) or declared weeds (see Appendices I, III and IV).~~~~
- ~~E. Literature Cited~~
- ~~F. Raw Data~~

## ~~VII. Developing a Revegetation Plan~~

### ~~A. General Considerations~~

~~A postmining revegetation plan should incorporate information from the premining baseline vegetation inventory, to include:~~

- ~~1. Input and concurrence from the "resident or agricultural landowner" regarding the applicant's proposed reclamation plan (as per W.S. § 35-11-406(b)(xi)).~~
- ~~2. The premining land uses and the plant species which supported those land uses.~~
- ~~3. The type, number, size and distribution of premining plant communities, croplands or pasturelands.~~
- ~~4. The major plant species from each premining plant community, cropland or pastureland.~~
- ~~5. The growth form (bunch or sod forming) and seasonal variety (cool or warm season) of the dominant grass species.~~
- ~~6. Type and distribution of full shrubs, subshrubs and trees. General proposed locations of shrub mosaics including the areas which are expected to be most conducive to shrub establishment should be shown on a map of the postmining landscape.~~

~~The applicant should consider returning the major vegetation types, major plant species and growth forms in numbers and configurations which will support the postmining land uses (see definitions).~~

### ~~B. Seed Mixtures~~

~~After choosing the postmining land uses and considering the dominant postmining topographic features and landowner desires, the applicant should develop different seed mixes which will accommodate the postmining land uses and differences in soils, moisture conditions, exposures etc. on the postmining landscape. Also, considering seed availability, growth form, seasonal variety and prevailing dominant species, each proposed seed mixture should:~~

- ~~1. contain no fewer than four (4) herbaceous species, unless a proposed land use (e.g. managed hayland or pastureland) requires fewer species;~~
- ~~2. contain the native dominant herbaceous species which support the postmining land uses;~~
- ~~3. if needed, contain additional species native to the region which support the postmining land uses;~~

- ~~4. contain naturalized, introduced species only if additional herbaceous species are needed, or if suitable, native species are unavailable or if naturalized species are superior for a specialized land use (e.g. managed hayland or pastureland);~~
- ~~5. contain full shrub and/or subshrub species when these species will support the postmining land uses. To increase postmining species diversity and establish shrub mosaics, shrub mixtures should be developed and seeded separately from the herbaceous mixtures (see Coenenberg, 1982);~~
- ~~6. contain native forb species if natural reinvasion of forbs will be limited by site-specific conditions.~~

~~For coal operators, seed mixtures for all postmining communities which will be jointly used by livestock and wildlife should include full shrub and/or subshrub species.~~

~~The proposed postmining location of each seed mixture should be illustrated on a postmining contour map.~~

~~Seed mixtures for temporary stabilization of sites, stockpiles or other special uses should also be developed considering site-specific characteristics. The LQD strongly discourages the use of aggressive introduced plant species, particularly crested wheatgrass, on topsoil stockpiles. The concern lies in the possible carry over of such species to postmine lands during the replacement of stockpiled topsoil, which could ultimately result in problems (on the applicant's part) in meeting species diversity requirements at the time of bond release due to the predominance of the above mentioned introduced species. The LQD feels that other vigorous, rhizomatous species are readily available for such uses.~~

### C. Seeding Practices

~~In general, all seed mixtures should total at least 14 lbs. PLS (Pure Live Seed) per acre when drill seeded. Seeding depth should be 1/4 to 1/2 inch when drilled. However, small seeded species (e.g. big sagebrush, blue grama, etc.) establish best when the seed is broadcast and lightly covered. Drill seeding should occur on the contour or across the prevailing wind direction. If seed mixtures are broadcast, the rate of application should be doubled and the seed should be lightly covered.~~

~~The LQD strongly recommends that the applicant consider staggered seeding methods to facilitate the establishment of warm season grasses and shrubs and/or to revegetate areas with poor quality substrates, (e.g. see Coenenberg, 1982; DePuit, 1982). Similarly, direct backhaul of live topsoil has proven very beneficial to establishment of diverse postmining plant communities (DePuit, 1984).~~

~~In general, the most appropriate seeding times are after October 15th or before April 15th. The soil should not be frozen or snowcovered. An extension to May 15th entails minimal risk of failure in most years. The actual choice of seeding time should be based on regional climatic conditions, site specific environmental conditions, operator preference and operator experience.~~

~~Chapter 2, Section 2(b)(iv)(C) and Chapter 4, Section 2(d)(iv) require the use of mulch on all reclaimed lands, unless specific permission is granted for not using mulch. The LQD considers a seeded cover crop/stubble mulches as an acceptable alternative to crimped (hay or straw) mulch. In fact, research (Schuman, et. al. 1980) has shown that cover crop/stubble mulch have several advantages over the use of crimped hay or straw mulch including:~~

- ~~1. decreased operation and application costs.~~
- ~~2. better wind and water erosion control.~~
- ~~3. increased water infiltration.~~
- ~~4. increased weed control.~~
- ~~5. less temperature fluctuation at shallow soil depths.~~

~~In the event that a crimped mulch is utilized, weed free native hay is preferred over the use of domestic hay or straw mulch. This reduces the chances of introducing noxious weeds onto the reclaimed area and can promote the introduction of desirable native species.~~

~~In general, the LQD does not recommend hydromulching as a permanent revegetation practice. Hydromulching has proven useful only for temporary reclamation activities.~~

#### D. Husbandry Practices

~~The applicant should clearly discuss the postmining husbandry practices it expects to use on revegetated communities. The bonding period usually begins after the permittee has completed fertilizing, seeding, irrigation or other work to ensure revegetation, Chapter 4, Section 2(d)(x); W.S. § 35-11-423(a).~~

~~Chapter 4, Section 2(d)(xiii) requires that newly seeded areas must be protected from livestock grazing for a minimum of two (2) years or until the plant community is capable of renewing itself under proper management practices. The newly seeded areas may be protected by fencing or other management practices which meet the intent of this statutory provision.~~

#### E. Postmining Grazing Practices

~~Chapter 4, Section 2(d)(xiii) states that the LQD, the permittee and the landowner or land managing agency will mutually determine if and when domestic livestock grazing will be introduced on revegetated areas.~~

~~The Reclamation Plan shall include some discussion of the above point.~~

#### F. Restoration of Shrubs, Subshrubs and Trees

~~On coal mined lands, the postmining density, composition, and distribution of shrubs shall be based upon site specific evaluation of the premining vegetation and wildlife use.~~

~~Efforts to achieve the density standard shall be conducted through the application of best technology currently available. Except where a lesser density is justified from premining conditions, at least 20 percent of the eligible land shall be restored to shrub patches supporting an average density of one shrub per square meter (Chapter 4, Section 2(d)(x)(E)).~~

~~For coal operators, tree species shall be returned to a postmining density equal to the premining density. The application should detail the age or size of transplants, the nature of the stock (bareroot, tubelings, etc.), the transplanting procedures and methods of protecting the transplanted stock from large and small herbivores.~~

#### ~~G. Literature~~

~~Literature in Appendix VI may provide additional information for construction of revegetation plans. Specific acceptable revegetation practices may be found in permits approved by DEQ/LQD; additional proposed practices occur in pending permit applications. Both these sources are public documents. Applicants are encouraged to consult these sources and/or DEQ/LQD for further information.~~

### ~~VIII. Testing Adequacy of Reclamation~~

~~The Reclamation Plan should contain a discussion of the applicant's proposed methods for evaluation of revegetation success. The discussion should address all qualitative and quantitative success standards.~~

#### ~~A. Reclamation Success Standards~~

~~Chapter 2, Section 2(b)(xiv) of the LQD Rules and Regulations requires that the applicant clearly define the postmining land uses. Livestock grazing and wildlife habitat are the most commonly proposed postmining land uses. Chapter 4, Section 2(d)(x) defines the following success goals for all operators:~~

- ~~1. Postmining cover equal to premining cover;~~
- ~~2. Postmining production equal to premining production;~~
- ~~3. Species composition and species diversity capable of supporting the postmining land uses;~~
- ~~4. Attainment of all the above for two consecutive years immediately prior to full bond release for those mines using reference areas, or two out of four years beginning no sooner than year eight of the bonding period for those mines using an approved technical standard.~~

#### ~~B. Land Units Used for Evaluating Revegetation Success~~

~~The vegetation parameters which are compared between the Control Area (CONA) or Reference Area (REFA) or Extended Reference Area (EXREFA) and the reclaimed area (RECA) are identical. However, the methods used to compare the vegetation parameters~~

differ intrinsically among the methods. These intrinsic differences are explained in Sections 1, 2 and 3 below.

1. Procedures Using a Control Area

The CONA concept involves the use of a mathematical adjustment for climatic changes which may have occurred between the dates that the premining and postmining data were collected.

The CONA concept is used to test the attainment of the success goals of % vegetation cover, % total ground cover and total herbaceous production. The operator should use the same methods in premining and postmining sampling to generate the following parameters:

Premining

Affected Area ————— Control Area

$\bar{x}_1$  = percent cover or production —————  $\bar{y}_1$  = percent cover or production

$S\bar{x}_1^2$  = variance of mean —————  $S\bar{y}_1^2$  = variance of mean

Postmining

Reclaimed Area ————— Control Area

$\bar{x}_2$  = percent cover or production —————  $\bar{y}_2$  = percent cover or production

$S\bar{x}_2^2$  = variance of mean —————  $S\bar{y}_2^2$  = variance of mean

Where:  $S\bar{x}_2^2$  &  $S\bar{y}_2^2$  = variance of mean =  $\frac{\sum \bar{x}_i^2 - \frac{(\sum \bar{x}_i)^2}{n}}{n(n-1)} = \frac{(S)^2}{n}$

If the value of  $\bar{y}_1$  is statistically equal (confidence level = 90%,  $\alpha = 0.1$ ) to  $\bar{y}_2$ ,

$\bar{x}_1$  should be directly compared (confidence level = 80%,  $\alpha = 0.2$ ) to  $\bar{x}_2$ .

If  $\bar{y}_1$  is not statistically equal to  $\bar{y}_2$ , an additional parameter,  $\hat{x}$ , is generated in the following fashion:

$\hat{x}$  = the cover or production goal adjusted for climatic change

$$\hat{x} = \left( \bar{y}_2 / \bar{y}_1 \right) \cdot \bar{x}_i$$

Reclamation will be considered adequate for % total ground cover, % vegetation cover and total production when the following inequality has been satisfied for two (2) consecutive growing seasons:

$$\bar{x}_2 = \hat{x} + z_{0.8} \sqrt{S\bar{x}_2^2 + S\hat{x}^2} \geq 0$$

where  $S\bar{x}_2^2$  = the estimated variance of  $\{\overline{x}\}$  calculated by

$$\left( \frac{\bar{x}_1^2}{\bar{y}_1^2} \right) \cdot S\bar{y}_2^2 + S\bar{y}_2^2 \cdot Sr^2 + S\bar{y}_1^2 \cdot Sr^2$$

where:

$$Sr^2 \cong \left( \frac{\bar{x}_1^2}{\bar{y}_1^2} \right) \left( \frac{S\bar{x}_1^2}{\bar{x}_1^2} + \frac{S\bar{y}_1^2}{\bar{y}_1^2} \right)$$

If  $\bar{x}_2 > \hat{x}$ , the above inequality is met and the lengthy variance calculations are unnecessary.

An example calculation is available upon request for the entire bond release comparison outlined above.

## 2. Procedures Using a Reference Area

The REFA concept does not incorporate the use of a mathematical adjustment for climatic change. If climatic change has influenced the vegetation, it is assumed that the individual species and species assemblages of the REFA and RECA will have responded similarly.

The REFA concept is used to test the attainment of the success goals of % vegetation cover, % total ground cover and total herbaceous production. The operator should use the same methods to sample the REFA and RECA for the last two (2) consecutive years after the minimum bonding period and after the operator considers revegetation successful.

For each year's data set, the data from the REFA are directly compared, by standard statistical procedure (confidence level = 80%,  $\alpha = 0.2$ ), to the RECA data. The goals of equal cover and production must be achieved for each quantitative parameter for the last two (2) consecutive years of the bonding period.

## 3. Procedures Using an Extended Reference Area

The EXREFA concept is identical to the REFA concept in its statistical comparisons. The intrinsic difference between the EXREFA and REFA concept lies in the postmining sampling of all of the undisturbed area of a given vegetation type, versus the sampling of a small, representative unit, the REFA.



### C. Evaluation of Species Diversity and Species Composition

~~The postmining plant communities must have sufficiently diverse species composition (numbers and types of individual species and life forms) and sufficient species diversity (a measure of the variability of the species composition) to support the postmining land uses.~~

~~Appendix D-8 should contain a discussion of premining species composition and species diversity. The discussion should include the value (e.g. browse, shelter, grazing, soil protection) of the major species and communities as a whole. A major species is defined as having relative cover equaling or exceeding two (2) percent. This discussion should be documented by applicable literature.~~

~~The Reclamation Plan should include a discussion of projected postmining species composition and species diversity, and the ability of the species to support the postmining land uses. The composition of reclamation seed mixes and/or special plantings, known species characteristics and life form distribution should form the basis of this discussion.~~

~~The applicant should also include in the Reclamation Plan a conceptual outline of how it proposes to evaluate species diversity and composition when bond release is requested. This outline may include:~~

- ~~1. a discussion of the species of the reclaimed community and their ability to support and maintain the postmining land uses;~~
- ~~2. the role of these species in secondary succession;~~
- ~~3. a direct qualitative comparison of the species composition of the premining and postmining communities;~~
- ~~4. a direct qualitative comparison of the life forms of the premining and postmining communities using an appropriate index of similarity or other assessment method agreeable to the LQD.~~

~~An index of similarity (Mueller-Dombois and Ellenberg, 1974) may be used to compare the premining and postmining communities. However, such indices should not constitute the sole criterion for evaluation of species diversity.~~

~~DEQ/LQD has developed a suggested format and procedures for evaluation of species composition and species diversity. These documents are available upon request; alternative methods may be appropriate.~~

### D. Evaluation of Restored Cropland or Pastureland

~~Unless specifically approved in a Reclamation Plan, the areal extent of specially managed land units, such as croplands, haylands or pasturelands, should not significantly exceed their~~

areal extent on the premining landscape. If a coal operator desires significant changes in postmining land uses, e.g. a significant increase in croplands, the proposal must be justified and approved as per Chapter 2, Section 2(b)(xiv).

As per Chapter 4, Section 2(d)(x)(I), postmining restoration of cropland is deemed complete when their "productive capability" is equivalent, for at least two (2) consecutive crop years, to premining conditions. Premining cropland production data should be considered in judging restored croplands, whenever said data are available. The equivalency can be assessed by direct comparison of postmining production data to accurate premining production data. Alternatively, the permittee may identify a premining cropland unit whose production capacity will be used as a success standard. Clearly the premining cropland unit must remain unaffected by mining activities, should be managed in an appropriate manner and should accurately represent the disturbed premining croplands. Alternative methods of evaluating cropland may be approved by the Administrator.

The LQD Rules and Regulations do not specifically address procedures for evaluating revegetation success on post-mining pasturelands and haylands. The procedures agreed to by the applicant and LQD should be clearly presented in the Reclamation Plan.

#### E. Evaluation of Shrub Density

##### Introduction

All land affected after August 6, 1996, excluding cropland, pastureland or treated grazingland as defined in Chapter 1 shall be considered eligible land subject to the standard. Except where a lesser density is justified by premining conditions, at least 20 percent of the eligible land shall be restored to shrub patches supporting an average density of one shrub per square meter (Chapter 4, Section 2(d)(x)(E)).

The postmining areal extent of shrub patches and specific shrub density(ies) shall be based on the original premining shrub densities in each vegetation community and the percentage each community contributes to the total eligible land existing in the original permit area and any lands added to the permit area through the amendment process.

Premine community(ies) identified and sampled during the baseline studies shall serve as the target for bond release unless otherwise approved by the Administrator.

For bond release purposes, the average postmine total density and species specific density(ies) shall be at least 90 percent of the calculated criteria for the applicable standard.

#### CALCULATING THE REQUIRED POSTMINE DENSITY AND SPECIES COMPOSITION

In order to calculate density and composition, the following must be identified:

1. Areal extent and premining total density of eligible land by vegetation community;

2. Relative density for each species;
3. Dominant premine species which then becomes the target postmine species;
4. Density of target postmine species using the formula  $D[1/(N + 1)]$ ;<sup>⊘</sup>
5. Allowable density of postmining residual species; and
6. Acceptable residual species.

<sup>⊘</sup>—D is the postmining total shrub density. When D is less than 1.00, the density of the target postmining species is reduced proportionately. N is the number of primary premining shrub or subshrub species.

Table 3: Identification of available options

Option	Identification	<del>PREMINE</del>
I	Reduced permit wide full shrub standard	$< 20\% @ \geq 1/M^2$
II	Permit wide full shrub standard	$\geq 20\% @ \geq 1/M^2$
III	Community specific full shrub standard	No restrictions
IV	Community specific full and subshrub standard	No restrictions—add subshrubs

The operator shall select one option only for bond release purposes within each permit or amendment area.

Option I: Permit wide full shrub density standard; reduction in areal extent; composition based on premining full shrub density only (see Figure 1 for an illustration of this Option). For bond release purposes, no more than two separate acreage/density standards shall be used.

1. Reductions in areal extent and shrub density shall be appropriate when the premining vegetation community(ies) supporting at least one shrub per square meter comprised less than 20 percent of the eligible land. The percentage this community contributed to the total eligible land would then become the percentage of the postmining landscape that is required to support one shrub per square meter. The remainder of the postmining 20 percent areal extent of shrub patches shall be required to support shrubs at a density equalling the next highest density existing in a premining community.
2. Compute the relative premining dominance of full shrub species based on a weighted average of the percent areal extent of all vegetation communities and their

~~associated full shrub species present within the eligible land. In this instance, one shrub patch seed mixture will be developed for the entire 20 percent areal extent.~~

- ~~3. From the information calculated in step 2. above, identify the dominant premine full shrub species. This species then becomes the target postmine species within the postmine shrub patches.~~
- ~~4. Compute the minimum density that the postmining target shrub (identified in step 3. above) must meet in order to achieve bond release under the standard. This is accomplished by applying the following equation:~~

$$D\{1/(N + 1)\}$$

~~D is the postmining total shrub density (D is always  $\leq 1.00$ ). N is the number of primary shrub species existing in the premining communities as identified in step 2. above. Primary shrub species shall be defined as full shrub species which comprise at least 10 percent of the relative density of full shrubs.~~

~~All primary shrub species shall be included in the shrub patch seed mixture.~~

- ~~5. The postmining residual density is calculated by subtracting the minimum required density of the target species from the total required density.~~
- ~~6. Residual density may be comprised of any premining primary species and any other approved full shrub species. In addition, the following subshrub species may be counted towards up to one half of the residual density.~~

<u>Artemisia frigida</u>	fringed sagewort
<u>Atriplex gardneri/gordonii</u>	Gardners saltbush
<u>Ceratoides lanata</u>	winterfat
<u>Artemisia pedatifida</u>	birdfoot sagewort
<u>Artemisia spinescens</u>	bud sagewort

~~For a hard copy of Figure 1: Tables 1 and 2 please refer to the copy on file with the Secretary of State or with the Wyoming Department of Environmental Quality.~~

~~For an electronic copy of these tables please contact the Land Quality Division at 777-7757.~~

~~For a hard copy of Figure 1: Table 3 please refer to the copy on file with the Secretary of State or with the Wyoming Department of Environmental Quality.~~

~~For an electronic copy of this table, please contact the Land Quality Division at 777-7757~~

~~Option II: Permit wide full shrub density standard, no reduction in areal extent or density, composition based on premining full shrub density only (see Figure 2 for an illustration of this Option).~~

- ~~1. If 20 percent or more of the premine eligible land supports at least 1 shrub per square meter, no reduction in shrub density or areal extent shall be permitted.~~
- ~~2. Compute the relative premining density of full shrub species based on a weighted average of the percent areal extent of all vegetation communities and their associated full shrub species present on eligible land. In this instance, one shrub patch seed mixture will be developed for the entire 20 percent areal extent.~~
- ~~3. From the information calculated in step 2. above, identify the dominant premine full shrub species. This species then becomes the target postmine species within the postmine shrub patches.~~
- ~~4. Compute the minimum density that the postmining target shrub (identified in step 3. above) must meet in order to achieve bond release under the standard. This is accomplished by applying the following equation:~~

$$D\{1/(N + 1)\}$$

~~D is the postmining total shrub density (D is always  $\leq$  1.00). N is the number of primary shrub species existing in the premining communities as identified in step 2. above. Primary shrub species shall be defined as full shrub species which comprise at least 10 percent of the relative density of full shrubs.~~

~~All primary shrub species shall be included in the shrub patch seed mixture.~~

- ~~5. The postmining residual density is calculated by subtracting the minimum required density of the target species from 1.00.~~
- ~~6. Residual density may be comprised of any premining primary species and any other approved full shrub species. In addition, the following subshrub species may be counted towards up to one half of the residual density.~~

<del><u>Artemisia frigida</u></del>	<del>fringed sagewort</del>
<del><u>Atriplex gardneri/gordonii</u></del>	<del>Gardners saltbush</del>
<del><u>Ceratoides lanata</u></del>	<del>winterfat</del>
<del><u>Artemisia pedatifida</u></del>	<del>birdfoot sagewort</del>
<del><u>Artemisia spinescens</u></del>	<del>bud sagewort</del>

~~For a hard copy of Figure 2: Tables 1 and 2 please refer to the copy on file with the Secretary of State or with the Wyoming Department of Environmental Quality, Land Quality Division.~~

~~For an electronic copy of Tables 1 and 2, please contact the Land Quality Division at 777-7757.~~



~~For a hard copy of Figure 2: Table 3 please refer to the copy on file with the Secretary of State or with the Wyoming Department of Environmental Quality, Land Quality Division.~~

~~For an electronic copy of Table 3, please contact the Land Quality Division at 777-7757.~~

Option III: Community specific full shrub density standard (see Figure 3 for an illustration of this Option)

1. ~~Each eligible premining vegetation community serves as the basis for developing the required postmine density and areal extent. The percentage each community contributes to the total eligible land is multiplied by 20 percent to establish the number of acres required on the postmining landscape. The average number of full shrubs each community supported premine serves as the postmine average density for that particular community.~~
2. ~~Compute the relative premining dominance of all full shrub species within each eligible vegetation community. In this instance, one shrub patch seed mixture will be developed for each eligible vegetation community.~~
3. ~~From the information calculated in step 2. above, identify the dominant premine full shrub species within each eligible vegetation community. This species then becomes the target postmine species within a particular shrub patch corresponding to a specific vegetation community.~~
4. ~~Compute the minimum density that the postmining target shrub (identified in step 3. above) must meet in order to achieve bond release under the standard. This is accomplished by applying the following equation:~~

$$D[1/(N+1)]$$

~~D is the postmining total shrub density (D is always  $\leq 1.00$ ). N is the number of primary shrub species existing in the premining communities as identified in step 2. above. Primary shrub species shall be defined as full shrub species which comprise at least 10 percent of the relative density of full shrubs.~~

~~All primary shrub species shall be included in the respective shrub patch seed mixtures.~~

5. ~~The postmining residual density is calculated by subtracting the minimum required density of the target species within each vegetation community from the total required density for that community.~~
6. ~~Residual density may be comprised of any premining primary species and any other approved full shrub species. In addition, the following subshrub species may be counted towards up to one half of the residual density within each community.~~

<u>Artemisia frigida</u>	fringed sagewort
<u>Atriplex gardneri/gordonii</u>	Gardners saltbush
<u>Ceratoides lanata</u>	winterfat
<u>Artemisia pedatifida</u>	birdfoot sagewort
<u>Artemisia spinescens</u>	bud sagewort

~~For a hard copy of Figure 3: Tables 1 and 2 please refer to the copy on file with the Secretary of State or with the Wyoming Department of Environmental Quality, Land Quality Division.~~

~~For an electronic copy of Tables 1 and 2, please contact the Land Quality Division at 777-7757.~~

Option IV: Community-specific full shrub and approved subshrub density standard (see Figure 4 for an illustration of this Option)

1. Each eligible premining vegetation community serves as the basis for developing the required postmine density and areal extent. The percentage each community contributes to the total eligible land is multiplied by 20 percent to establish the number of acres required on the postmining landscape. The average number of full shrubs and approved subshrubs each community supported premine serves as the postmine average density for that particular community.

The following are the approved subshrubs which shall be included in calculating the premining density within each community:

<u>Artemisia frigida</u>	fringed sagewort
<u>Atriplex gardneri/gordonii</u>	Gardners saltbush
<u>Ceratoides lanata</u>	winterfat

2. Compute the relative premining dominance of full shrub and approved subshrub species within each eligible vegetation community. In this instance, one shrub patch seed mixture will be developed for each eligible vegetation community.
3. From the information calculated in step 2. above, identify the dominant premine full shrub or approved subshrub species within each eligible vegetation community. This species then becomes the target postmine species within a particular shrub patch corresponding to a specific vegetation community.
4. Compute the minimum density that the postmining target shrub/approved subshrub (identified in step 3. above) must meet in order to achieve bond release under the standard. This is accomplished by applying the following equation:

$$D\{1/(N+1)\}$$

D is the postmining total shrub density (D is always  $\leq 1.00$ ). N is the number of primary shrub/approved subshrub species existing in the premining communities as identified in step 2. above. Primary shrub/approved subshrub species shall be defined as full shrub/approved subshrub species which comprise at least 10 percent of the relative density of full shrubs. However, in order to be considered a primary species, fringed sagewort must comprise at least 20 percent of the relative shrub/approved subshrub composition.

All primary shrub/approved subshrub species shall be included in the respective shrub patch seed mixtures.

5. The postmining residual density is calculated by subtracting the minimum required density of the target species within each vegetation community from the total required density for that community.

~~6. Residual density may be comprised of any premining primary full shrub/approved subshrub species and any other approved full shrub species. In addition, the following subshrub species may be counted towards up to one half of the residual density within each community.~~

~~Artemisia frigida ————— fringed sagewort  
Atriplex gardneri/gordonii ————— Gardners saltbush  
Ceratoides lanata ————— winterfat  
Artemisia pedatifida ————— birdfoot sagewort  
Artemisia spinescens ————— bud sagewort~~

~~For a hard copy of Figure 4: Tables 1 and 2 please refer to the copy on file with the Secretary of State or with the Wyoming Department of Environmental Quality, Land Quality Division.~~

~~For an electronic copy of Tables 1 and 2, please contact the Land Quality Division at 777-7757.~~

~~A complete proposal for evaluation of postmining shrub density should include:~~

- ~~1. A commitment to provide a brief history of the methods employed to implant shrubs and the husbandry practices specifically related to shrub establishment and maintenance.~~
- ~~2. Methods to identify shrub patches and to determine their areal distribution and extent.~~
- ~~3. Proposed sampling methods for the determination of shrub density within the patches. This discussion should include number of samples.~~
- ~~4. Proposed methods for documenting the presence and distribution of shrub species on all other lands jointly used by livestock and wildlife.~~

~~F. Summary~~

~~The major components of a complete proposal for evaluation of revegetation success shall be presented in the Reclamation plan and shall include:~~

- ~~1. A commitment to provide a brief discussion of the reclamation practices used on each reclaimed area, including the seed mix applied, any husbandry practices used (e.g., interseeding, biocide application, grazing practices, etc.) and the land management practices applied.~~
- ~~2. A commitment to describe the procedures used to define the boundaries of each reclaimed area, including any combinations of different age classes of reclaimed areas.~~
- ~~3. Presentation of the methods used to define the vegetational composition of each reclaimed area, such that the proper CONA may be chosen. Two approaches seem apparent:
  - ~~a. The composition may be determined by a thorough, qualitative field reconnaissance. Qualitative means the use of methods which do not involve point sampling procedures as discussed in Section II.A.~~
  - ~~b. The composition may be determined by standard, point sampling techniques. These data would subsequently be used in the direct evaluation of revegetation success.~~~~
- ~~4. Specification of the actual methods employed for each vegetation parameter. The sampling procedures should use standard methods and should be based upon standard procedures for the choice of sample locations. Clearly, the same methods must be used on the reclaimed areas and CONA or REFA.~~

5. ~~Specification of the number of samples to be taken for each parameter from the reclaimed areas and CONA. Several options are available:
  - a. ~~The applicant may employ the sample adequacy procedures of Appendix A, as qualified by maximum and minimum sample numbers.~~
  - b. ~~The applicant may employ other standard, statistical tests for assessing sample adequacy.~~~~
6. ~~Specification of the statistical methods proposed for the comparison of quantitative vegetation parameters.~~
7. ~~Specification of qualitative or quantitative (or a combination thereof) methods to assess the success standard that species diversity and species composition are capable of supporting the postmining land uses.~~
8. ~~Specification of methods to assess the establishment of suitable postmining wildlife habitat, including assessment of the quantitative and qualitative aspects of wildlife habitat.~~



## Appendix I

### List of Prohibited and Restricted Noxious (Designated) Weeds for the State of Wyoming.

This list has been compiled from the appropriate laws governing the control of noxious (designated) weeds in the State of Wyoming (i.e. The Weed and Pest control Act of 1973 and The Wyoming Seed Laws). County Weed Control supervisors should be contacted for additional lists of declared weeds.

#### Prohibited Noxious (Designated) Weeds

##### Compositae – Sunflower Family

- ~~– Arctium minus – common burdock~~
- ~~– Carduus acanthoides – plumeless thistle~~
- ~~– Carduus nutans – musk thistle~~
- ~~– Centaurea masulosa – spotted knapweed~~
- ~~– Centaurea repens – Russian knapweed~~
- ~~– Chrysanthamum leucanthemum – ox eye daisy~~
- ~~– Cirsium arvense – Canada thistle~~
- ~~– Franseria discolor = Ambrosia tomentosa – skeletonleaf bursage~~
- ~~– Onopordum acanthium – Scotch thistle~~
- ~~– Sonchus arvensis – perennial sowthistle~~

##### Convolvulaceae – Morning Glory Family

- ~~– Convolvulus arvensis – field bindweed~~

##### Cruciferae – Mustard Family

- ~~– Cardaria draba – hoarycress~~
- ~~– Cardaria pubescens – hoarycress~~
- ~~– Isatis tinctoria – Dyer's woad~~
- ~~– Lepidium latifolium – perennial pepperweed~~

##### Boraginaceae – Borage Family

- ~~– Cynoglossum officinale – hound's tongue~~

##### Euphorbiaceae – Spurge Family

- ~~– Euphorbia esula – leafy spurge~~

##### Gramineae – Grass Family

- ~~– Agropyron repens – quackgrass~~

~~Serophulariaceae—Figwort Family~~

~~—Linaria dalmatica—Dalmation toadflax~~

~~—Linaria vulgaris—yellow toadflax~~

Restricted Noxious (Designated) Weeds

~~Compositae—Sunflower Family~~

~~—Ambrosia psilostachya—perennial ragweed~~

~~—Centaurea diffusa—diffuse knapweed~~

~~—Centaurea solstitialis—yellow starthistle~~

~~—Iva axillaris—poverty weed~~

~~—Lactuca pulchella—blue flowering lettuce~~

~~—Tanacetum vulgare—tansy~~

~~Convolvulaceae—Morning Glory Family~~

~~—Cuscuta species—dodder~~

~~Cruciferae—Mustard Family~~

~~—Descurainia pinnata—tansymustard~~

~~—Chorispora tenella—blue mustard~~

~~Gramineae—Grass Family~~

~~—Avena fatua—wild oat~~

~~Leguminosae~~

~~—Glycyrrhiza lepidota—wild licorice~~

~~—Sphaerophya salsula—Austrian peaweed~~

~~Plantaginaceae—Plantain Family~~

~~—Plantago lanceolata—buckhorn plantain~~

~~Zygophyllaceae—Caltrop Family~~

~~—Tribulus terrestris—Puncture vine~~

~~See glossary for definition of the following terms:—noxious (designated) weeds, prohibited noxious (designated) weeds, restricted noxious (designated) weeds and declared weeds.~~

## Appendix II – Subshrubs

This list was prepared from literature sources and permit documents on file with DEQ/LQD. Nomenclature follows Dorn (1977).

<u>Amorpha canescens</u>	<u>Gutierrezia sarothrae</u>
<u>Arctostaphylos uva-ursi</u>	(= <u>Xanthocephalum</u>
<u>Artemisia frigida</u>	<u>sarothrae</u> )
<u>Artemisia longifolia</u>	<u>Kochia americana</u>
<u>Artemisia ludoviciana</u>	<u>Leptodactylon caespitosum</u>
<u>Artemisia pedatifida</u>	<u>Leptodactylon pungens</u>
<u>Artemisia spinescens</u>	<u>Mahonia repens</u> (= <u>Berberis</u>
<u>Atriplex falcata</u>	<u>repens</u> )
<u>Atriplex gardneri</u> (= <u>A.</u>	<u>Sphaeromeria argentea</u>
<u>nuttallii</u> = <u>A. gordonii</u> )	<u>Yucca glauca</u>
<u>Brickellia eupatorioides</u>	
<u>Ceratoides lanata</u>	
<u>Eriogonum brevicaulis</u>	
<u>Eriogonum effusum</u>	
<u>Eriogonum jamesii</u>	
<u>Eriogonum microthecum</u>	
<u>Eriogonum pauciflorum</u>	

## Appendix III – Primary Selenium Indicator Plants

This list was developed from Beath (1982). Nomenclature follows Dorn (1977).

<u>Astragalus bisulcatus</u>	<u>Haplopappus multicaulis</u>
<u>Astragalus flavus</u>	<u>Haplopappus wardii</u>
<u>Astragalus grayi</u>	<u>Stanleya pinnata</u>
<u>Astragalus pectinatus</u>	<u>Stanleya tomentosa</u>
<u>Astragalus racemosus</u>	<u>Stanleya viridiflora</u>
	<u>Xylorhiza glabriuscula</u>

#### Appendix IV—Plant Species of Special Concern

One plant species in Wyoming is currently listed as Threatened (T) and another is listed as Endangered (E) under the federal Endangered Species Act. Two other species are candidates (C) for potential listing. These plants are noted by their assigned ranking in parentheses. However, there are many additional species occurring within Wyoming which may be considered for formal listing in the future. State and federal agencies have historically afforded these species special consideration until their status is accurately assessed.

Presented below are those species currently (as of January, 2001) listed as Threatened (T), Endangered (E), or Candidates (C). In addition to this list, the Administrator will compile a list of those species that deserve special consideration. This list will be made available to the public and will be updated as determined by the Administrator.

*Gaura neomexicana ssp. coloradensis* (C)

*Penstemon haydenii* (E)

*Spiranthes diluvialis* (T)

*Yermo xanthocephalus* (C)

Appendix V—Suggested Tabular Format for Data Presentation

Table 1.—Areal extent and percent of total area for each of the vegetation types and other mapping units

Mapping Units	Affected Area		Unaffected Area		Entire Permit Area		Control Areas
	Total Acres	% of Area	Total Acres	% of Area	Total Acres	% of Area	Total Acres
1. Upland —grassland	1697.8	51.9	580.8	44.2	2278.6	49.7	2.5
2. Streamside —meadow	31.4	0.9	58.4	4.4	89.8	1.9	3.0
—							
—							
—							
8. Agricultural areas	424.9	12.9	60.0	4.5	484.9	10.6	--
9. Disturbed areas	102.7	3.1	5.9	0.4	108.6	2.4	--
10. Reservoirs	1.3	0.1	0.1	0.1	1.4	0.1	--
—TOTAL	3271.3		1315.6		4586.9		15.5

**Table 2. Summary of life form vegetation sampling data for the Control Area for the Streamside Meadow Grassland Community. All values are means.**

	Vegetation Cover (%)		Herbaceous Prod.(g/m <sup>2</sup> )	
	Absolute	Relative	Absolute	Relative
<b>Perennial Grasses &amp; Grass-like Species</b>				
<i>Agropyron smithii</i>	44.7	-85.6	180.0	-90.9
<i>Agropyron trachycaulum</i>	-0.4	-0.8	-0.2	-0.1
<i>Bouteloua gracilis</i>	-1.1	-2.1	-3.1	-1.6
<i>Stipa comata</i>	-0.1	-0.2	-0.4	-0.8
<i>Stipa viridula</i>	-3.0	-5.7	-10.5	-5.3
—Sub-Total*	49.3	-94.4	194.2	-98.0
<b>Annual Grasses</b>				
<i>Bromus japonicus</i>	-0.1	-0.2	-0.2	-0.1
<b>Forbs</b>				
<i>Achillea lanulosa</i>	-0.3	-0.6	-0.5	-0.3
<i>Aster adscendens</i>	-0.1	-0.2	-0.2	-0.1
<i>Taraxacum officinale</i>	-0.8	-1.5	-1.1	-0.5
Unknown Rosette	-0.1	-0.2	-0.1	-0.1
—Sub-Total*	-1.3	-2.5	-1.9	-1.0
<b>Subshrubs &amp; Succulents</b>				
<i>Artemisia ludoviciana</i>	-0.7	-1.3	-1.8	-0.9
<i>Ceratoides lanata</i>	-0.1	-0.2	---	---
<i>Gutierrezia sarothrac</i>	-0.4	-0.8	---	---
—Sub-Total*	-1.2	-2.3	-1.8	-0.9
<b>Full Shrubs</b>				
<i>Artemisia tridentata</i>	-0.1	-0.2	---	---
<i>Atriplex canescens</i>	-0.2	-0.4	---	---
—Sub-Total*	-0.3	-0.6	---	---
<b>TOTALS</b>	<b>52.2</b>	<b>100.0</b>	<b>198.1</b>	<b>100.0</b>

—\*sub total across all species within a given life form category

NOTE: A similar table should summarize data for each community type and each control area or reference area.

**Table 3. Quantitative Comparison of major species in the Control Area and Affected Area for the Streamside Meadow Grassland Community. All values are means.**

	Affected Area		Control Area	
	Absolute Cover (%)	Herbaceous Production (g/m <sup>2</sup> )	Absolute Cover %	Herbaceous Production (g/m <sup>2</sup> )
<b>PERENNIAL GRASSES AND GRASS-LIKE SPECIES</b>				
<i>Agropyron smithii</i>	-9.0	-66.6	44.7	180.1
<i>Poa pratensis</i>	-6.7	-16.6	-1.2	-4.9
<i>Bouteloua gracilis</i>	-5.7	-8.5	-1.1	-3.1
<i>Distichlis stricta</i>	-5.1	-13.7	42.3	---
<i>Stipa comata</i>	-3.0	-4.7	-0.1	-0.5
<i>Carex spp.</i>	-4.9	-18.4	-0.1	-1.2
— Sub-Total*	45.5	160.8	51.6	208.1
<b>FORBS</b>				
<i>Taraxacum officinale</i>	-4.5	---	-0.8	---
<i>Aster falcatus</i>	-2.4	---	---	---
<i>Aster adscendens</i>	-1.8	---	-0.1	---
<i>Achillea lanulosa</i>	-0.7	---	-0.3	---
— Sub-Total*	13.6	-41.3	-2.2	-7.4
<b>SUB-SHRUBS</b>				
<i>Artemisia ludoviciana</i>	-5.5	---	-0.7	---
<i>Artemisia frigida</i>	-1.0	-3.5	---	---
— Sub-Total*	-6.7	-3.6	-1.1	-1.1
<b>SHRUBS</b>				
<i>Artemisia tridentata</i>	-0.1	---	-0.1	---
<i>Rosa woodsii</i>	-0.5	---	---	---
<i>Atriplex canescens</i>	---	---	-0.2	---
— Sub-Total*	-0.6	---	-0.3	---
<b>TOTALS</b>	66.4	206.4	55.3	217.4

\* Sub-Total across all species within a life form category

NOTE: a similar table should summarize data for each community type and each control area or reference area

**Table 4. Summary of sample adequacy calculations for % vegetation cover using the formula of Appendix A**

	Vegetation Cover (%) $\bar{x} \pm 1 \text{ S.D.}$	Actual Sample Size	Computed Adequate Sample Size	Computed* z-value	Confidence Level Achieved
<b><u>AFFECTED AREA</u></b>					
<b><u>Grasslands</u></b>					
1. Streamside Meadow	66.4 ± 7.3	26	-4	N/A	N/A
2. Upland Grassland	20.4 ± 8.6	29	-58	0.90	81.6
_____ □					
_____ □					
_____ □					
5. Scoria Grassland	51.0 ± 13.5	33	23	N/A	N/A
<b><u>Shrublands</u></b>					
1. Big Sagebrush	28.1 ± 6.9	25	-20	N/A	N/A
2. Silver Sagebrush	63.4 ± 19.8	21	-32	1.04	85.1
<b><u>CONTROL AREA</u></b>					
<b><u>Grasslands</u></b>					
1. Streamside Meadow	55.3 ± 11.1	15	-14	N/A	N/A
2. Upland Grassland	33.8 ± 19.3	20	107	0.55	70.9
5. Scoria Grassland	52.7 ± 14.9	29	-27	N/A	N/A
<b><u>Shrublands</u></b>					
1. Big Sagebrush	21.6 ± 3.5	15	-9	N/A	N/A
2. Silver Sagebrush	53.3 ± 15.6	15	-29	0.94	82.6

\* These values should be calculated only if the computed sample size exceeds the actual sample size and the actual sample size is less than the maximum required sample size.

NOTE: A similar table should summarize data for % total cover and herbaceous production



**Table 5. Summary cover and production data from Affected Area and Control Area sampling. All values are means  $\pm$  one standard deviation. These data constitute the premining values for use in the Control Area concept for the evaluation of revegetation success**

	Affected Area			Control Area		
	Absolute Vegetation Cover	Absolute Total Cover %	Herbaceous Vegetation Cover (g/sq m)	Absolute Vegetation Cover (%)	Absolute Total Cover (%)	Herbaceous Production (g/sq m)
<b>Grasslands*</b>						
1. Streamside Meadow	66.4 $\pm$ 7.3	95.7 $\pm$ 18.1	206.4 $\pm$ 81.9	55.3 $\pm$ 11.1	74.0 $\pm$ 16.1	217.4 $\pm$ 78.6
2. Upland Grassland	20.4 $\pm$ 8.6	78.4 $\pm$ 13.2	60.4 $\pm$ 6.3	33.8 $\pm$ 19.3	80.3 $\pm$ 11.0	83.3 $\pm$ 23.4
—□						
—□						
—□						
5. Scoria Grassland	51.0 $\pm$ 13.5	95.0 $\pm$ 9.0	70.5 $\pm$ 20.9	52.7 $\pm$ 14.0	91.7 $\pm$ 9.2	66.9 $\pm$ 17.4
<b>Shrublands*</b>						
1. Big Sagebrush	28.1 $\pm$ 6.9	81.1 $\pm$ 20.1	34.7 $\pm$ 14.9	21.6 $\pm$ 3.5	78.9 $\pm$ 15.1	26.9 $\pm$ 12.0
2. Silver Sagebrush	63.4 $\pm$ 19.8	84.1 $\pm$ 19.3	116.0 $\pm$ 50.7	53.3 $\pm$ 15.6	75.8 $\pm$ 11.6	117.5 $\pm$ 52.8

\* As defined by Appendix A

## Appendix VI—References

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## Appendix VII—Glossary

~~"Absolute Cover" is the determination of % cover of a given cover category in a fashion which is operationally independent of the other categories. Thus the sum of absolute cover categories (e.g. vegetation and litter/rock and bare ground) may be less than, equal to or greater than 100% (see Relative Cover).~~

~~"Affected Land" (Affected Area) means the area of land from which overburden is removed, or upon which overburden, development waste rock or refuse is deposited, or both, access roads, haul roads, mineral stockpiles, mill tailings, impoundment basins, and all other lands whose natural state has been or will be disturbed as a result of the operations.~~

~~"Adjacent Areas" means land located outside the permit area upon which air, surface water, groundwater, fish, wildlife, or other resources protected by the Act may reasonably be expected to be adversely impacted by mining or reclamation operations. Unless otherwise specified by the Administrator, this area shall presumptively be limited to lands within one-half mile of the proposed permit area.~~

~~"Baseline Vegetation Inventory" is a vegetation sampling program executed prior to any significant surface disturbance caused by proposed mining activities. The inventory will provide a verbal and mental picture of the prevailing plant communities and will quantitatively and qualitatively classify the different plant communities to the specifications of Wyoming State Law.~~

~~"Comparison Area" means a land unit which is representative, in terms of physiography, soils, vegetation and land use history, of a premining plant community from which no vegetation data were collected prior to disturbance. The representative nature of the Comparison Area may be validated by a subjective field reconnaissance of the site or by subjective evaluation of vegetation data generated by a sampling program. The establishment procedures should be agreed to by the permittee or applicant and LQD prior to establishment.~~

~~Postmining quantitative data from the Comparison Area are directly compared, by standard statistical procedures (confidence level of 80%,  $\alpha = 0.2$ ), to data from a reclaimed vegetation type when evaluating revegetation success for full bond release. No mathematical adjustment for climatic change is made. Qualitative data are compared by standard procedures agreed to by the applicant or permittee and LQD.~~

~~A Comparison Area should be at least two (2) acres in size and should be managed in a fashion which will not cause significant changes in vegetation parameters used to evaluate revegetation success.~~

~~"Control Area" means a land unit which is representative in terms of physiography, soils, vegetation and land use history, of a plant community affected by mining activities. The representative nature of the Control Area is verified by subjective (non-statistical)~~

~~comparison of its quantitative and qualitative characteristics to similar information from the plant community it typifies.~~

~~Quantitative premining and postmining vegetation data from the Control Area are used to mathematically adjust premining affected area data for climatic change. These adjusted data are directly compared by statistical procedures (confidence level = 80%,  $\alpha = 0.2$ ) to data from a reclaimed vegetation type when evaluating revegetation success for full bond release. Qualitative data are compared by standard procedures agreed to by the applicant or permittee and LQD.~~

~~A Control Area should be at least two (2) acres in size and should be managed in a fashion which will not cause significant changes in the vegetation parameters used to evaluate revegetation success.~~

~~"Cool Season Plant" is a species which grows and flowers during the spring. Its growth usually slows or becomes dormant during the hotter, drier portions of the summer, but the species may resume growth in the fall with the advent of cooler temperatures and available soil moisture.~~

~~"Cover" is the proportion of the ground surface cloaked by a vertical projection of objects on or above that ground surface. Cover is expressed as a percentage of a surface reference unit. The following cover categories are of interest to LQD:~~

- ~~1. % litter and rock cover is the proportion of the ground surface overlain by dead plant material and rock (defined as any stone or mineral matter at least one (1) square centimeter in size).~~
- ~~2. % vegetation cover is the vertical projection of the general outline of plants (ignoring minor gaps between branches and holes in the canopy) to the ground surface.~~
- ~~3. % total ground cover is the sum of the cover values for % vegetation, % litter and % rock.~~
- ~~4. % bare ground is the proportion of the ground surface occupied by unvegetated mineral soil.~~

~~"Cropland" means land used for the production of adapted crops for harvest, along or in a rotation with grasses and legumes, and includes row crops, small grain crops, hay crops, nursery crops, orchard crops, and other similar specialty crops.~~

~~"Density" is the number of individuals per unit area.~~

~~"Dominant" refers to the species with the greatest density relative to all other species sampled.~~

"Extended Reference Area" means all the undisturbed portion of a vegetation type which has experienced disturbance by mining activities. The representative nature of the Extended Reference Area is verified by evaluation of vegetation mapping procedures, the adequacy of premining quantitative and qualitative vegetation data, soils data, physiography and land use history information.

Postmining quantitative vegetation data from the Extended Reference Area are directly compared by standard statistical procedures (confidence level of 80%,  $\alpha=0.2$ ) to data from a reclaimed vegetation type when evaluating revegetation success for full bond release. No mathematical adjustment for climatic change is made. Qualitative data are compared by standard procedures agreed to between the permittee and LQD.

An Extended Reference Area should be managed in a fashion which will not cause significant changes in vegetation parameters used to evaluate revegetation success.

"Forestry" means land used or managed for the long term production of wood, wood fiber, or wood derived products.

"Full Shrub" is a perennial woody plant which differs from a tree by normally being shorter in height and by often having several stems arising near the base.

"Grazing Enclosure" is a fence or other device utilized to prevent grazing by large herbivores in order to more accurately estimate production of a land unit.

"Grazingland" includes rangelands and forest lands where the indigenous native vegetation is actively managed for grazing, browsing, or may occasionally be cut for hay production.

"Land Use" refers to the specific uses or management related activities which a given unit of land experiences. Land use is directly supported by, but not directly defined by the existing plant communities. See definitions of cropland, pastureland, grazingland, forestry, or appropriate discussion in LQD Rules and Regulations, Chapter 1, under "land use."

"Life Form" is a category of growth morphology which appears to have some adaptive significance. Examples of life forms include trees, full shrubs, sub shrubs, perennial grasses, annual forbs, succulents, cushion plants, etc.

"Line Intercept" is a cover estimation method based upon the measurement of the proportion of a line transect intercepted by the vertical projection of plant parts. Absolute cover, when using the line intercept method, is defined by the formula

$$\% \text{ cover of } A = \frac{\text{sum of all segments intercepted by } A}{\text{total length of the line transect}} \times 100$$

"Litter" means any recognizable plant parts or structures which are lying on the ground surface. Decomposing organic matter which has lost its structural integrity or which is no longer a recognizable plant part is not litter.

"Noxious Weeds" are agriculturally unuseful or troublesome plants whose seeds are totally prohibited from or severely limited in any amounts in commercial crop seed offered for sale. These designations are made by State law.

"Prohibited noxious" (designated) weeds are those species whose seed is not allowed in the seed of crops under any amounts. Restricted noxious (designated) weeds are those species whose seed is tolerated in the seed of crops only under small amounts. Declared weeds are those species which are of a particular concern to a specific county which may or may not be considered noxious (designated) under State law.

"Pastureland" is land used primarily for the long term production of adapted, domesticated forage plants to be grazed by livestock or occasionally cut and cured for livestock feed.

"Permit Area" means the area of land and water within the boundaries of the approved permit or permits during the entire life of the operation and includes all affected lands and water.

"Plant Community" (Vegetation Type) is a relatively homogeneous combination of individual plants existing under common environmental conditions.

"Plotless Sampling" means estimation of vegetation parameters without the use of two-dimensional areal reference units.

"Point Intercept" is a cover estimation method based upon the lowering of a "pin" through the vegetation at objectively established sampling points. The "pin" may be an ocular siting device (e.g. crosshairs), a sharpened rod or a series of sharpened rods. Absolute cover, when using the point intercept method, is defined by the formula:

$$\% \text{ cover of } A = \frac{\text{number of hits on } A}{\text{total number of hits}} \times 100$$

"Primary shrub species" means all full shrub species which comprise at least 10 percent of the relative density of full shrubs. However, if an operator selects Option IV, the community specific full shrub and approved subshrub density standard, then "primary shrub species" means all full shrub and approved subshrub species which comprise at least 10 percent of the relative density of full shrubs. It is further provided under Option IV that in order to be considered as a "primary shrub species", fringed sagewort must comprise at least 20 percent of the relative shrub and approved subshrub species composition.

"Production" is an estimate of the total standing crop biomass of herbaceous species (grass, grass like, forb and some subshrub species). The estimate is made at a time near the expected peak of the current year's growth and is reported on a per unit area basis.

"Quadrat" is a two dimensional areal unit which is superimposed on the ground surface for the purposes of estimating one or more vegetation parameters.



"Reference Area" means a land unit which is representative, in terms of physiography, soils, vegetation and land use history, of a plant community affected by mining activities. The representative nature of the Reference Area is verified by statistical comparison (confidence level of 90%,  $\alpha = 0.1$ ) of its absolute values of % vegetation cover, % total ground cover and total herbaceous production to similar data from the plant community it typifies. Species composition and species diversity are also subjectively (non-statistically) evaluated.

Postmining quantitative vegetation data from the Reference Area are directly compared by standard statistical procedures (confidence level of 80%,  $\alpha = 0.2$ ), to data from a reclaimed vegetation type when evaluating revegetation success for full bond release. No mathematical adjustment for climatic change is made. Qualitative data are compared by standard procedures agreed to between the permittee and LQD.

A Reference Area should be at least two (2) acres in size and should be managed in a fashion which will not cause significant changes in the vegetation parameters used to evaluate revegetation success.

"Relative Cover" is the expression of any number of cover categories e.g. vegetation + litter/rock + bare ground) in relation to each other, such that the sum of the relative cover values for those categories totals 100%. Relative Cover is calculated by the formula:

$$\% \text{ Relative Cover of A} = \frac{\text{Absolute Cover of A}}{\text{Sum of the Absolute Cover of categories}} \times 100$$
$$A + B + \dots n$$

"Selenium Indicator Plants" are plant species which may selectively concentrate selenium in their tissue and/or be tolerant of high selenium concentrations in the soil. These species, when grazed by cattle or sheep, may produce toxic reactions known as selenium poisoning.

"Shrub Mosaic" is a pattern of shrub patches designed to achieve maximum habitat interspersion and edge effect. The boundary of a mosaic encompasses the areal extent of shrub patches and other vegetation types occupying the area between the patches.

"Shrub Patch" refers to a continuous surface of varying shape and size (no less than 0.05 acres) that is intensively managed to support a high density of shrubs.

"Species Composition" means number, kinds, amount, and quality of species.

"Species Diversity" means number of species per unit area.

"Study Area" means the full extent of the surface area which was sampled during the baseline vegetation inventory. The study area may coincide with or exceed the permit area.

"Subshrub" is a perennial plant which is partly woody, usually at the base, but also partly herbaceous. The individual plant generally dies back to the woody tissue after each year's growth.

"Transect" is a sampling method which involves the establishment of a long, continuous line or strip. The starting point and orientation of the line should be randomly established.

"Warm Season Plant" is a species which produces most or all of its growth during the late spring and summer, subsequently flowering in the late summer or autumn.