Rules of
Department of Natural Resources
Division 40—Land Reclamation Commission
Chapter 2—Land Reclamation Performance Requirements for Coal Strip Mining

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Title 10—DEPARTMENT OF NATURAL RESOURCES
Division 40—Land Reclamation Commission
Chapter 2—Land Reclamation Performance Requirements for Coal Strip Mining

10 CSR 40-2.010 Definitions

PURPOSE: This rule defines terms used throughout the land reclamation performance requirements for coal strip mining of this chapter and in keeping with sections 444.510 and 444.535, RSMo.

PUBLISHER'S NOTE: The secretary of state has determined that the publication of the entire text of the material which is incorporated by reference as a portion of this rule would be unduly cumbersome or expensive. Therefore, the material which is so incorporated is on file with the agency who filed this rule, and with the Office of the Secretary of State. Any interested person may view this material at either agency's headquarters or the same will be made available at the Office of the Secretary of State at a cost not to exceed actual cost of copy reproduction. The entire text of the rule is printed here. This note refers only to the incorporated by reference material.

(1) Acid drainage means water with a pH of less than 6.0 discharged from active or abandoned mines and from areas affected by coal mining operations.

(2) Acid-forming materials means earth materials that contain sulfide mineral or other materials which, if exposed to air, water or weathering processes, will cause acids that may create acid drainage.

(3) Affected land means the pit area or area from which overburden has been removed, or upon which overburden has been deposited.

(4) Approximate original contour means that surface configuration achieved by backfilling and grading of the mined area so that the reclaimed area, including any terracing or access roads, closely resembles the general surface configuration of the land prior to mining and blends into and complements the drainage pattern of the surrounding terrain, with all highwalls and spoil piles eliminated.

(5) Aquifer means a zone, stratum or group of strata that can store and transmit water in sufficient quantities for a specific use.

(6) Coal means combustible carbonaceous rock, classified as anthracite, bituminous, subbituminous or lignite by American Society for Testing and Materials (ASTM) designation 0-388-66.

(7) Combustible material means organic material that is capable of burning either by fire or through a chemical process (oxidation) accompanied by the evolution of heat and a significant temperature rise.

(8) Commission means the Land Reclamation Commission.

(9) Compaction means the reduction of pore spaces among the particles of soil or rock, generally done by running heavy equipment over the earth materials.

(10) Director means the director of the Land Reclamation Commission.

(11) Diversion means a channel, embankment or other man-made structure constructed for the purpose of diverting water from one (1) area to another.

(12) Downslope means the land surface between a valley floor and the projected outcrop of the lowest coalbed being mined along each highwall.

(13) 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.

(14) Federal lands means any land, including mineral interests, owned by the United States without regard to how the United States acquired ownership of the lands and without regard to the agency having responsibility for management of those lands.

(15) Flood irrigation means irrigation through natural overflow or the temporary diversion of high flows in which the entire surface of the soil is covered by a sheet of water.

(16) Gob means that portion of refuse consisting of waste coal or bony coal of relatively large size which is separated from the marketable coal in the cleaning process of solid refuse material, not readily waterborne or pumpable, without crushing.

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

(18) Highwall means that side of the pit adjacent to unmined land.

(19) 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.

(20) 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, then moves along or into the ground surface, and returns to the atmosphere as vapor by means of evaporation and transpiration.

(21) Impoundment means a closed basin formed naturally or artificially built, which is dammed or excavated for the retention of water, sediment or waste.

(22) Imminent danger to the health and safety to the public means the existence of any condition, or practice or any violation of a permit or other requirement of this chapter in a coal strip mining and reclamation operation, which condition, practice or violation could reasonably be expected to cause substantial physical harm to persons outside the permit area before that 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 not expose him/herself to the danger during the time necessary for abatement.

(23) Intermittent or perennial stream means a stream or part of a stream that flows continuously during all (perennial) or for at least one (1) month (intermittent) of the calendar year as a result of groundwater discharge or surface runoff. The term does not include an ephemeral stream which is one that flows for less than one (1) month of a calendar year and only in direct response to precipitation in the immediate watershed and whose channel bottom is always above the local water table.

(24) Leachate means a liquid that has percolated through soil, rock or waste and has extracted, dissolved or suspended materials.

(25) Noxious plants means species that have been included on official Missouri lists of noxious plants.

(26) Operator means any person, firm or corporation engaged in or controlling a strip mining operation.

(27) Outslope means the exposed area sloping away from a bench or terrace being constructed as a part of a coal strip mining and reclamation operation.

(28) Overburden, as applied to the strip mining of coal, means all of the earth and other materials which lie above natural deposits of coal and includes earth and other materials disturbed from their natural state in the process of strip mining, excluding topsoil.

(29) Person means any individual, partnership, copartnership, firm, company, public or private corporation, association, joint stock company, trust, estate, political subdivision, or any agency, board, department or bureau of the state or federal government, or any other legal entity whatever, which is recognized by law as the subject of rights and duties.

(30) Pit means the place where coal is being or has been mined by strip mining.

(31) Productivity means the vegetative yield produced by a unit area for a unit of time.

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

(33) Roads means access and haul roads constructed, used, reconstructed, improved or maintained for use in coal strip mining and reclamation operations, including use by coal-hauling vehicles leading to transfer, processing or storage areas. The term includes any such road used and not graded to approximate original contour within forty-five (45) days of construction other than roads used for topsoil removal and coal haulage roads within the pit area. Roads maintained with public funds such as all federal, state, county or local roads are excluded.

(34) Recurrence interval means the precipitation event expected to occur, on the average, once in a specified interval. For example, the ten (10)-year, twenty-four (24)-hour precipitation event would be that twenty-four (24)-hour precipitation event expected to be exceeded on the average once in ten (10) years. Magnitude of these events are as defined by the National Weather Service Technical Paper No. 40, *Rainfall Frequency Atlas of the U.S.*, May 1961, or equivalent regional or rainfall probability information developed from the National Weather Service.

(35) Runoff means precipitation that flows overland before entering a defined stream channel and becoming stream flow.

(36) 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.

(37) Sediment means undissolved organic and inorganic material transported or deposited by water.

(38) Sedimentation pond means any natural or artificial structure or depression used to remove sediment from water and store sediment or other debris.

(39) Significant, imminent environmental harm to land, air or water resources is determined as follows:

(A) An environmental harm is any adverse impact on land, air or water resources, including, but not limited to, plant and animal life;

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

1. Is causing environmental harm; or

2. May reasonably be expected to cause environmental harm at any time before the end of a reasonable abatement time; and

(C) An environmental harm is significant if that harm is appreciable and not immediately reparable.

(40) Slope means average inclination of a surface, measured from the horizontal. Normally expressed as a unit of vertical distance to a given number of units of horizontal distance (for example, 1v:5h = 20% = 11.3°).

(41) Soil horizons means contrasting layers of soil lying one (1) below the other, parallel or nearly parallel to the land surface. Soil horizons are differentiated on the basis of field characteristics and laboratory data. The three (3) major soil horizons are—

(A) A Horizon. The uppermost layer in the soil profile often called the surface soil. It is the part of the soil in which organic matter is most abundant and where leaching of soluble or suspended particles is the greatest;

(B) B Horizon. The layer immediately beneath the A horizon and often called the subsoil. This middle layer commonly contains more clay, iron or aluminum than the A or C horizon; and

(C) C Horizon. The deepest layer of the soil profile. It consists of loose material or weathered rock that is relatively unaffected by biologic activity.

(42) Spoil means overburden that has been removed during surface mining.

(43) Stabilize means any method used to control movement of soil, spoil piles or areas of disturbed earth and includes increasing bearing capacity, increasing shear strength, draining, compacting or revegetating.

(44) Strip mining means mining by removing the overburden lying above natural deposits of coal and mining directly from the natural deposits exposed by strip mining, and includes mining of exposed natural deposits of coal over which no overburden lies.

(45) Subirrigation means irrigation of plants with water delivered to the roots from underneath.

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

(47) Suspended solids means organic or inorganic materials carried or held in suspension in water that will remain on a 0.45 micron filter.

(48) Toxic-forming materials means earth materials or wastes which, if acted upon by air, water, weathering or microbiological processes, are likely to produce chemical or physical conditions in soils or water that are detrimental to biota or uses of water.

(49) 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 or is detrimental to use of water.

(50) Valley fill and head-of-hollow fill means a structure consisting of any materials other than waste placed so as to encroach upon or obstruct to any degree any natural stream channel other than those minor channels

located on highland areas where overland flow in natural rills and gullies is the predominant form of runoff. These fills are normally constructed in the uppermost portion of a V-shaped valley in order to reduce the upstream drainage area (head-of-hollow fills). Fills located farther downstream (valley fills) must have larger diversion structures to minimize infiltration. Both fills are characterized by rock underdrains and are constructed in compacted lifts from the toe to the upper surface in a manner to promote stability.

(51) Waste means earth materials which are combustible, physically unstable, acid- or toxic-forming, wasted or otherwise separated from product coal and are slurried or otherwise transported from coal processing facilities or preparation plants after physical or chemical processing, cleaning or concentrating of coal.

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

AUTHORITY: sections 444.510 and 444.535, RSMo 1986. Original rule filed July 13, 1978, effective Jan. 13, 1979.*

**Original authority: 444.510, RSMo 1971, amended 1976, 1979, 1990; 444.535, RSMo 1978, amended 1988.*

10 CSR 40-2.020 General Obligations for Permits, Maps, Signs and Markers

PURPOSE: This rule sets forth general obligations as to permits, maps, signs and markers applicable to the land reclamation performance requirements for coal strip mining and in keeping with sections 444.535 and 444.550, RSMo.

(1) Authorizations to Operate. A copy of all current permits, licenses, approved plans or other authorizations to operate the mine shall be available for inspection at or near the mine site.

(2) Mine Maps. Any person conducting coal strip mining and reclamation operations shall submit to the commission accurate maps, prepared and certified by a registered professional engineer, of the mine and permit area at a scale of one inch to five hundred feet (1" = 500') or a larger scale as follows:

(A) Two (2) copies of a map showing—

1. The lands from which coal has not yet been removed and the lands and structures which have been used or disturbed to facilitate mining;

2. An identification of the area to correspond with the application;

3. The boundaries of surface properties and names of owners of the area of land to be affected and, if known to the operator, adjacent deep mines and the name of the owner(s) of the surface area within six hundred sixty feet (660') of any part of the area of land to be affected;

4. The names and locations of all streams, creeks or other bodies of public water, roads, buildings, cemeteries, oil and gas wells, and utility lines on or within six hundred sixty feet (660') of the area to be mined;

5. The boundaries of the area of land affected shown by appropriate markings, the cropline of the seam or deposit to be mined and the total number of acres involved in the area of land affected;

6. The date on which the map was prepared, the north point and the section, township and range;

7. An identification of pit areas by name or number and the code for those identifications in a legend on the map; and

8. An identification of the permitted area, areas previously affected but not graded, areas previously affected and graded but not reseeded, and areas previously affected and graded and reseeded by a color code or some equally distinguishable code and that the code be shown in a legend on the maps; and

(B) Two (2) copies of a map showing—

1. A comprehensive water management plan for the area of land affected, including the sources of water inflow, the drainage plan on and away from the area of land affected, indicating the directional flow of water, constructed drainways, constructed washing, cleaning or retaining ponds or reservoirs and the construction plans of them, natural waterways used for drainage, and the nearest streams or tributaries receiving the discharge or overflow, the plan for control or prevention of soil erosion as required by section 444.610.1(2), RSMo, and the plan for control of the inflow of water and leaching or discharge of water, acid, oil and other substances required by section 444.610.1(7), RSMo;

2. The location or information on all structures, instruments and water flows required or regulated by 10 CSR 40-2.060; and

3. The date on which the map was prepared, the north point and the section, township and range.

(3) Specifications for Signs and Markers. All signs required to be posted shall be of a standard design that can be seen and read easily and shall be made of durable material. The signs and other markers shall be maintained during all operations to which they pertain and shall conform to local ordinances and codes.

(4) Mine and Permit Identification Signs. Signs identifying the mine areas shall be displayed at all points of access to the permit area from public roads and highways. Signs shall show the name, business address and telephone number of the operator and identification numbers of current mining and reclamation permits or other authorizations to operate. These signs shall not be removed until after release of all bonds.

(5) Perimeter Markers. The perimeter of the permit area shall be clearly marked by durable and easily recognized markers.

(6) Buffer Zone Markers. Buffer zones as defined in 10 CSR 40-2.060 shall be marked in a manner consistent with the perimeter markers along the interior boundary of the buffer zone.

(7) Blasting Signs. If blasting is necessary to conduct coal strip mining operations, signs reading ***Blasting Area*** shall be displayed conspicuously at the edge of blasting areas along access and haul roads within the mine property. Signs reading ***Blasting Area*** and explaining the blasting warning and all-clear signals shall be posted at all entrances to the permit area.

(8) Topsoil Markers. Where topsoil or other vegetation supporting material is segregated and stockpiled according to 10 CSR 40-2.050(4), the stockpiled material shall be marked. Markers shall remain in place until the material is removed.

AUTHORITY: sections 444.535 and 444.550, RSMo 1986. Original rule filed July 13, 1978, effective Jan. 13, 1979.*

**Original authority: 444.535, RSMo 1978, amended 1988 and 444.550, RSMo 1971, amended 1976, 1990.*

10 CSR 40-2.030 Restoration of Affected Land to Equivalent Prior Use

PURPOSE: This rule complies with section 444.535.1(2), RSMo by setting forth the requirements for operators with respect to strip mining of coal to restore the affected land to a condition capable of supporting as a minimum the use of the land prior to mining.

(1) General. All disturbed areas shall be restored to—

(A) Conditions that are capable of supporting the uses which they were capable of supporting before any mining; or

(B) Higher or better uses achievable under criteria and procedures of section (4) of this rule.

(2) Determining Premining Use of Land. 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 had not been previously mined and had been properly managed.

(A) The postmining land use for land that has been previously 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.

(B) 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.

(C) If the premining use of the land was changed within five (5) years of the beginning of 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.

(3) Land-Use Categories. Land use is categorized in the following groups. Change from one (1) to another land-use category in premining to postmining constitutes an alternate land use and the operator shall meet the requirements of section (4) of this rule and all other applicable environmental protection performance standards of this chapter:

(A) Heavy Industry. Manufacturing facilities, powerplants, airports or similar facilities;

(B) Light Industry and Commercial Services. Office buildings, stores, parking facilities, apartment houses, motels, hotels or similar facilities;

(C) Public Services. Schools, hospitals, churches, libraries, water treatment facilities, solid waste disposal facilities, public parks and recreation facilities, major transmission lines, major pipelines, highways, underground and surface utilities, and other servicing structures and appurtenances;

(D) Residential. Single- and multiple-family housing (other than apartment houses) with necessary support facilities. Support facilities may include commercial services incorporated in and comprising less than five percent (5%) of the total land area of housing capacity, associated open space, and minor vehicle parking and recreation facilities supporting the housing;

(E) Cropland. Land used primarily for the production of cultivated and close-growing crops for harvest alone or in association with sod crops. Land used for facilities in support of farming operations are included;

(F) Rangeland. Includes rangelands and forest lands which support a cover of herbaceous or scrubby vegetation suitable for grazing or browsing use;

(G) Hayland or Pasture. Land used primarily for the long-term production of adapted, domesticated forage plants to be grazed by livestock or cut and cured for livestock feed;

(H) Forest Land. Land with at least twenty-five percent (25%) tree canopy or land at least ten percent (10%) stocked by forest trees of any size, including land formerly having had that tree cover and that will be naturally or artificially reforested;

(I) Impoundments of Water. Land used for storing water for beneficial uses such as stock ponds, irrigation, fire protection, recreation or water supply;

(J) Fish and Wildlife Habitat and Recreation Lands. Wetlands, fish and wildlife habitat and areas managed primarily for fish and wildlife or recreation; and

(K) Combined Uses. Any appropriate combination of land uses where one (1) land use is designated as the primary land use and one (1) or more other land uses are designated as secondary land uses.

(4) Criteria for Approving Alternative Postmining Use of Land. An alternative postmining land use may be approved in the reclamation plan, after consultation by the commission with the landowner or the land management agency having jurisdiction over state or federal lands, if the following criteria are met:

(A) The proposed land use is compatible with adjacent land use and, where applicable, with existing local, state or federal land use policies and plans. A written statement of the views of the authorities with statutory responsibilities for land-use policies and plans shall accompany the reclamation plan. The operator shall obtain any required approval of local, state or federal land management agencies, including any necessary zoning or other changes necessarily required for the final land use;

(B) Specific plans have been prepared which show the feasibility of the proposed land use as related to needs, projected land-use trends and markets, and that include a schedule showing how the proposed use will be developed and achieved within a reasonable time after mining and be sustained. The commission may require appropriate demonstrations to show that the planned procedures are feasible, reasonable and integrated with mining and reclamation and that the plans will result in successful reclamation;

(C) Provision of any necessary public facilities is assured as evidenced by letters of commitment from parties other than the operator, as appropriate to provide them in a manner compatible with the operator's plans;

(D) Specific and feasible plans for financing attainment and maintenance of the postmining land use including letters of commitment from parties other than the operator as appropriate, if the postmining land use is to be developed by those parties;

(E) The plans are designed under the general supervision of a registered professional engineer, or other appropriate professional, who will ensure that the plans conform to applicable accepted standards for adequate land stability, drainage and vegetative cover and aesthetic design appropriate for the postmining use of the site;

(F) The proposed use(s) will neither present actual or probable hazard to public health or safety nor will they pose any actual or probable threat of water flow diminution or pollution;

(G) The use(s) will not involve unreasonable delays in reclamation;

(H) Measures to prevent or mitigate adverse effects on fish and wildlife that have been approved by appropriate state and federal fish and wildlife management agencies;

(I) Proposals to change premining land uses of range, fish and wildlife habitat, forest land, hayland and pasture to a postmining cropland use, where the cropland would require continuous maintenance such as seeding, plowing, cultivation, fertilization or other similar practices to be practicable or to comply with applicable federal, state and local laws, shall assure that—

1. There is a firm written commitment by the operator or by the owner or land manager to provide sufficient crop management after release of applicable performance bonds to assure that the proposed postmining cropland use remains practical and reasonable;

2. There is sufficient water available and committed to maintain crop production; and

3. Topsoil quality and depth are shown to be sufficient to support the proposed use; and

(J) The proposed alternative postmining land use, prior to formal permit filing, shall be submitted to the director at least sixty (60) days prior to formal permit filing and the director shall provide public notice of the proposed alternative postmining land use of

not less than forty-five (45) days nor more than sixty (60) days for interested citizens and local, state and federal agencies to review and comment on the proposed land use.

AUTHORITY: section 444.535.1(2), RSMo 1986. Original rule filed July 13, 1978, effective Jan. 13, 1979.*

**Original authority: 444.535.1(2), RSMo 1978, amended 1988.*

10 CSR 40-2.040 Backfilling and Grading Requirements

PURPOSE: This rule complies with section 444.535.1(3), RSMo by setting forth the requirements for backfilling and grading in order to restore the approximate original contour of the land.

(1) General. In order to achieve the approximate original contour, the operator, except as provided in this rule, shall transport, backfill, compact (where advisable to ensure stability or to prevent leaching of toxic materials) and grade all spoil material to eliminate all highwalls, spoil piles and depressions. Cut-and-fill terraces may be used only in those situations expressly identified in this rule. The postmining graded slopes must approximate the premining natural slopes in the area as defined in section (2) of this rule.

(2) Slope Measurements.

(A) To determine the natural slopes of the area before mining, the approved reclamation plan must show that sufficient slopes to adequately represent the land surface configuration, in accordance with site conditions, have been accurately measured and recorded. Each measurement shall consist of an angle of inclination along the prevailing slope extending one hundred (100) linear feet above and below or beyond the coal outcrop or the area to be disturbed; or, where this is impractical, at locations specified and approved in the reclamation plan. Where the area has been previously mined, the measurements shall extend at least one hundred feet (100') beyond the limits of mining disturbances as determined in the reclamation plan to be representative of the premining configuration of the land. Slope measurements shall take into account natural variations in slope so as to provide accurate representation of the range of natural slopes and shall reflect geomorphic differences of the area to be disturbed. Slope measurements may be made from topographic maps showing contour lines, having sufficient detail and accuracy consistent with the submitted reclamation plan.

(B) After the disturbed area has been graded, the final graded slopes shall be measured at the beginning and end of lines established on the prevailing slope at locations representative of premining slope conditions and approval by the director. These measurements must not be made so as to allow unacceptably steep slopes to be constructed.

(3) Final Graded Slopes.

(A) The final graded slopes shall not exceed either the approximate premining slopes as determined according to subsection (2)(A) of this rule or any lesser slope specified in the reclamation plan based on consideration of soil, climate or other characteristics of the surrounding area. Postmining final graded slopes need not be uniform. The requirements of this subsection may be modified in the reclamation plan where the mining is reaffecting previously mined lands that have not been restored to the standards of this section and sufficient spoil is not available to return to the slope determined according to subsection (2)(A) of this rule. Where these modifications are approved, the operator, as a minimum, shall be required to—

1. Retain all overburden and spoil on the solid portion of existing or new benches; and

2. Backfill and grade to the most moderate slope possible to eliminate the highwall which does not exceed the angle of repose or lesser slopes as is necessary to assure stability.

(B) On approval in the reclamation plan and in order to conserve soil moisture, ensure stability and control erosion on final graded slopes, cut-and-fill terraces may be allowed if the terraces are compatible with the postmining land use approved under 10 CSR 40-2.030 and are appropriate substitutes for construction of lower grades on the reclaimed lands. The terraces shall meet the following requirements:

1. The width of the individual terrace bench shall not exceed twenty feet (20') unless necessary for stability, erosion control or roads;

2. The vertical distance between terraces shall be as necessary to prevent excessive erosion and to provide long-term stability;

3. The slope of the terrace outslope shall not exceed 1v:2h (50%). Outslopes which exceed 1v:2h (50%) may be approved if they have a minimum static safety factor of more than 1.5 and provide adequate control over erosion and closely resemble the surface configuration of the land prior to mining. In no case may highwalls be left as part of terraces; and

4. Culverts and underground rock drain outlets shall be used on the terrace only when necessary to prevent erosion and ponding.

(C) All operations on steep slopes of twenty degrees (20°) or more shall meet the provisions of 10 CSR 40-2.100.

(4) Small Depressions. The requirement of this rule to achieve approximate original contour does not prohibit construction of small depressions if approved in the reclamation plan to minimize erosion, conserve soil moisture or promote revegetation. These depressions shall be compatible with the approved postmining land use and shall not be inappropriate substitutes for construction of lower grades on the reclaimed lands. Depressions approved under this section shall have a holding capacity of less than one (1) cubic yard of water or, if it is necessary that they be larger, shall not restrict normal access throughout the area or constitute a hazard. Large, permanent impoundments shall be governed by section (5) of this rule and by 10 CSR 40-2.060(11).

(5) Permanent Impoundments. Permanent impoundments may be retained in mined and reclaimed areas; provided, all highwalls are eliminated by grading to appropriate contour and the provisions for postmining land use (10 CSR 40-2.030) and protection of the hydrologic balance (10 CSR 40-2.060) are met. No impoundments shall be constructed on top of areas in which excess materials are deposited pursuant to sections (12) and (13) of this rule. Impoundments shall not be used to meet the requirements of section (10) of this rule.

(6) Definition of Thin and Thick Restored Overburden. The thin overburden provisions of section (7) of this rule may apply only where the final thickness is less than 0.8 of the initial thickness. The thick overburden provisions of section (8) of this rule may apply only where the final thickness is greater than 1.2 of the initial thickness. Initial thickness is the sum of the overburden thickness and coal thickness. Final thickness is the product of the overburden thickness times the bulking factor to be determined for each mine area. The provisions of sections (7) and (8) of this rule apply only when operations cannot be carried out to comply with the requirements of section (2) of this rule to achieve the approximate original contour.

(7) Thin Overburden. In coal strip mining operations carried out continuously in the same limited pit area for more than one (1) year from the day coal removal operations

begin and where the volume of all available spoil and suitable waste materials is demonstrated to be insufficient to achieve approximate original contour, coal strip mining operations shall be conducted to meet, at a minimum, the following standards:

(A) Transport, backfill and grade, using all available spoil and suitable waste materials from the entire mine area, to attain the lowest practicable stable grade, which may not exceed the angle of repose, and to provide adequate drainage and long-term stability of the regraded areas;

(B) Eliminate highwalls by grading or backfilling to stable slopes not exceeding 1v:2h (50%);

(C) Transport, backfill, grade and revegetate to achieve an ecologically sound land use compatible with the prevailing land use in unmined areas surrounding the permit area; and

(D) Transport, backfill and grade to ensure the impoundments are constructed only where it has been demonstrated that all requirements of 10 CSR 40-2.060 have been met and that the impoundments meet the requirements of this rule and all other applicable federal and state regulations.

(8) Thick Overburden. In surface coal mining operations where the volume of spoil is demonstrated to be more than sufficient to achieve the approximate original contour, coal strip mining operations shall be conducted to meet, at a minimum, the following standards:

(A) Transport, backfill and grade all spoil and wastes not required to achieve approximate original contour in the strip mining area to the lowest practicable grade;

(B) Deposit, backfill and grade excess spoil and wastes only within the permit area and dispose of those materials in conformance with this section;

(C) Transport, backfill and grade excess spoil and wastes to maintain the hydrologic balance in accordance with this section and to provide long-term stability;

(D) Transport, backfill, grade and revegetate wastes and excess spoil to achieve an ecologically sound land use compatible with the prevailing land uses in unmined areas surrounding the permit area; and

(E) Eliminate all highwalls and depressions except as stated in section (5) of this rule by backfilling with spoil and suitable waste materials.

(9) Regrading or Stabilizing Rills and Gullies. When rills or gullies deeper than nine inches (9") form in areas that have been regraded and the topsoil replaced, whether vegetation has been established or not, the operator shall fill, grade or otherwise stabilize the rills and gullies and reseed or replant the areas according to 10 CSR 40-2.090. Rills or gullies of lesser size shall be stabilized if the rills or gullies will be disruptive to the approved postmining land use or may result in additional erosion and sedimentation.

(10) Covering Coal and Acid-Forming, Toxic-Forming, Combustible and Other Waste Materials; Stabilizing Backfilled Materials; and Using Waste Material for Fill.

(A) Cover. All exposed coal seams remaining after mining and any acid-forming, toxic-forming, combustible materials, gob or any other hazardous waste materials identified by the commission that are exposed, used or produced during mining shall be covered with a minimum of four feet (4') of nontoxic and noncombustible material; or, if necessary, treated to neutralize toxicity in order to prevent water pollution and sustained combustion, and to minimize adverse effects on plant growth and land uses. In the reclamation plan where necessary to protect against upward migration of salts, exposure by erosion, to provide an adequate depth for plant growth or to otherwise meet local conditions, the commission may specify thicker amounts of cover using nontoxic material. Acid- or toxic-forming material shall not be buried or stored in proximity to a drainage course so as to cause or pose a threat of water pollution or otherwise violate the provisions of 10 CSR 40-2.060.

(B) Stabilization. Backfilled materials shall be selectively placed and compacted wherever necessary to prevent leaching of toxic-forming materials into surface or subsurface waters in accordance with 10 CSR 40-2.060 and wherever necessary to ensure the stability of the backfilled materials. The method of compacting material and the design specifications shall be approved by the director before the toxic materials are covered.

(C) Use of Waste Materials as Fill. Before waste materials from a coal preparation or conversion facility or from other activities conducted outside the permit area such as municipal wastes are used for fill material, it must be demonstrated by hydrogeological means, and chemical and physical analyses that use of these materials will not adversely affect water quality, water flow and vegetation; will not present hazards to public health and safety; and will not cause instability in the backfilled area.

(11) Grading Along the Contour. All final grading, preparation or overburden before replacement of topsoil, and placement of topsoil, in accordance with 10 CSR 40-2.050, shall be done along the contour to minimize subsequent erosion and instability. If grading, preparation or placement along the contour would be hazardous for equipment operators, then grading, preparation or placement in a direction other than generally parallel to the contour may be used. In all cases, grading, preparation or placement shall be conducted in a manner which minimizes erosion and provides a surface for replacement of topsoil which will minimize slippage.

(12) Disposal of Spoil in Other Than Valley or Head-of-Hollow Fills. Spoil not required to achieve the approximate original contour shall be transported to and placed in a controlled (engineered) manner in disposal areas other than the mine workings or excavations only if approved in the reclamation plan and all the following conditions, in addition to the other requirements of this rules, are met:

(A) The disposal areas shall be within the permit area, if suitable for construction of fills in accordance with the requirements of this section;

(B) The disposal areas shall be located on the most moderate sloping and naturally stable areas available. Where possible, fill materials suitable for disposal shall be placed upon or above a natural terrace, bench or berm if that placement provides additional stability and prevents mass movement;

(C) The fill shall be designed using recognized professional standards certified by a registered professional engineer;

(D) Where the slope in the disposal area exceeds 1v:2.8h (36%), measures such as keyway cuts (excavations to stable bedrock) or rock toe buttresses shall be constructed to stabilize the fill;

(E) The disposal area does not contain springs, natural water courses or wet weather seeps unless lateral drains are constructed from the wet areas to the underdrains in a manner that infiltration of the water into the spoil pile will be prevented;

(F) All organic material shall be removed from the disposal area and the topsoil must be removed and segregated pursuant to 10 CSR 40-2.050 before the material is placed in the disposal area. However, if approved in the reclamation plan, organic material may be used as mulch or may be included in the topsoil;

(G) The spoil shall be transported and placed 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 to ensure long-term stability. The final configuration of the fill must be suitable for postmining land uses approved in accordance with 10 CSR 40-2.030. Terraces shall not be constructed unless approved in the reclamation plan in accordance with subsection (3)(B) of this rule;

(H) If any portion of the fill interrupts, obstructs or encroaches upon any natural drainage channel, the entire fill is classified as a valley or head-of-hollow fill and must be designed and constructed in accordance with the requirements of section (3) of this rule; and

(I) The fill shall be inspected for stability by a registered engineer or other qualified professional specialist during critical construction periods to assure removal of all organic material and topsoil, placement of under-drainage systems and proper construction of terraces according to the approved reclamation plan. The registered engineer or other qualified professional specialist shall provide a certified report after each inspection that the fill has been constructed according to the reclamation plan.

(13) Disposal of Spoil in Valley or Head-of-Hollow Fills. Waste material must not be disposed of in valley or head-of-hollow fills. Spoil to be disposed of in natural valleys must be placed in accordance with the following requirements:

(A) The disposal areas shall be within the permit area and be approved in the reclamation plan as suitable for construction of fills in accordance with the requirements of this section;

(B) The disposal site shall be near the ridge top of a valley selected to increase the stability of the fill and to reduce the drainage area above the fill. Where possible, spoil shall be placed above a natural terrace, bench or berm, if that placement provides additional stability and prevents mass movement;

(C) The fill shall be designed using recognized professional standards certified by a registered professional engineer;

(D) All organic material shall be removed from the disposal area and the topsoil must be removed and segregated pursuant to 10 CSR 40-2.050 before the material is placed in the disposal area. However, if approved in the reclamation plan, organic material may be used as mulch or may be included in the topsoil;

(E) Where the slope in the disposal area exceeds 1v:2.8h (36%), measures such as keyway cuts (excavations to stable bedrock) or rock toe buttresses shall be constructed to stabilize the fill;

(F) A system of underdrains constructed of durable rock shall be installed along the natural drainage system, shall extend the toe to the head of the fill and contain lateral drains to each area of potential drainage or seepage. In constructing the underdrains, no more than ten percent (10%) of the rock may be less than twelve inches (12") in size and no single rock may be larger than twenty-five percent (25%) of the width of the drain. No rock shall be used in the underdrains if it tends to easily disintegrate and then clog the drain or if it is acid- or toxic-forming. The minimum size of the main underdrain shall be—

Total Amount of Fill Material	Predominant Type of Fill Material	Minimum Size of Drain in Feet Width	Height
Less than 1 million yd^3	Sandstone	10	4
Less than 1 million yd^3	Shale	16	8
More than 1 million yd^3	Sandstone	16	8
More than 1 million yd^3	Shale	16	8

(G) Spoil shall be transported and placed in a controlled manner and concurrently compacted in lifts that are less than four feet (4') thick in order to achieve the densities designed to ensure mass stability, to prevent mass movement, to avoid contamination of the rock underdrain and to prevent formation of voids. The final configuration of the fill must be suitable for postmining land uses approved in accordance with 10 CSR 40-2.030;

(H) Terraces shall be constructed to stabilize the face of the fill. The outslope of each terrace shall not exceed fifty feet (50') in height and the width of the terrace shall not be less than twenty feet (20');

(I) The tops of the fill and each terrace shall be graded no steeper than 1v:20h (5%) and shall be constructed to drain surface water to the sides of the fill where stabilized surface channels shall be established off the fill to carry drainage away from the fill. Drainage shall not be directed over the outslope of the fill unless approved in the reclamation plan;

(J) All surface drainage from the undisturbed area above the fill shall be directed away from the fill by approved structures leading into water courses;

(K) The outslope of the fill shall not exceed 1v:2h (50%); and

(L) The fill shall be inspected for stability by a registered engineer or other qualified professional specialist during critical construction periods and at least quarterly throughout construction to assure removal of all organic material and topsoil, placement of underdrainage systems and proper construction of terraces according to the approved reclamation plan. The registered engineer or other qualified professional specialist shall provide a certified report after each inspection that the fill has been constructed as specified in the reclamation plan.

AUTHORITY: section 444.535.1(3), RSMo 1986. Original rule filed July 13, 1978, effective Jan. 13, 1979.*

**Original authority: 444.535, RSMo 1978, amended 1988.*

10 CSR 40-2.050 Topsoil Handling

PURPOSE: This rule complies with section 444.535.1(4), RSMo by setting forth the requirements for handling topsoil in the mining reclamation process.

(1) General. To prevent topsoil from being contaminated by spoil or waste materials, the operator shall remove the topsoil as a separate operation from areas to be disturbed. Topsoil shall be immediately redistributed according to the requirements of section (3) of this rule on areas graded to the approved postmining configuration. The topsoil shall be segregated, stockpiled and protected from wind and water erosion, and from contaminants which lessen its capability to support vegetation if sufficient graded areas are not immediately available for redistribution.

(2) Topsoil Removal. All topsoil to be salvaged shall be removed before any drilling for blasting, mining or other surface disturbance.

(A) All topsoil shall be removed unless use of alternative materials is approved in the reclamation plan in accordance with subsection (2)(D) of this rule. Where the removal of topsoil will result in erosion that may cause air or water pollution, the director shall limit the size of the area from which topsoil may be removed at any one time and specify methods of treatment to control erosion of exposed overburden.

(B) All of the A horizon of the topsoil as identified by soil surveys shall be removed according to this section and then replaced on disturbed areas as the surface soil layer. Where the A horizon is less than six inches (6"), a six (6)-inch layer that includes the A horizon and the unconsolidated material immediately below the A horizon (or all unconsolidated material if the total available

is less than six inches (6")) shall be removed and the mixture segregated and replaced as the surface soil layer.

(C) Where necessary to obtain soil productivity consistent with postmining land use, the reclamation plan shall provide that the B horizon or portions of the C horizon or other underlying layers demonstrated to have comparable quality for root development be segregated and replaced as subsoil.

(D) Selected overburden materials may be used instead of, or as a supplement to, topsoil where the resulting soil medium is equal to or more suitable for vegetation and if all the following requirements are met:

1. The operator demonstrates in the reclamation plan that the selected overburden materials or an overburden-topsoil mixture is more suitable for restoring land capability and productivity by the results of chemical and physical analyses. These analyses shall include determinations of pH, percent organic material, nitrogen, phosphorus, potassium, texture class and water holding capacity. The reclamation plan may also require that results of field-site trials or greenhouse tests be used to demonstrate the feasibility of using overburden materials;

2. The chemical and physical analyses and the results of field-site trials or greenhouse tests are accompanied by a certification from a qualified soil scientist or agronomist; and

3. The alternative material is removed, segregated and replaced in conformance with this section.

(3) Topsoil Redistribution.

(A) After final grading and before the topsoil is replaced, regraded land shall be scarified or otherwise treated to eliminate slippage surfaces and to promote root penetration.

(B) Topsoil shall be redistributed in a manner that—

1. Achieves an approximate uniform thickness consistent with the postmining land uses;

2. Prevents excess compaction of the spoil and topsoil; and

3. Protects the topsoil from wind and water erosion before it is seeded and planted.

(4) Topsoil Storage. If the reclamation plan allows storage of topsoil, the stockpiled topsoil shall be placed on a stable area within the permit area where it will not be disturbed or be exposed to excessive water, wind erosion or contaminants which lessen its capability to support vegetation before it can be redistributed on terrain graded to final contour. Stockpiles shall be selectively placed and protected from wind and water erosion, unnecessary compaction and contamination by undesirable material either by a vegetative cover as defined in 10 CSR 40-2.090(7) or by other methods demonstrated to provide equal protection such as snow fences, chemical binders and mulching. Unless approved in the reclamation plan, stockpiled topsoil shall not be moved until required for redistribution on a disturbed area.

(5) Nutrients and Soil Amendments. Nutrients and soil amendments in the amounts and analyses as determined by soil tests shall be applied to the surface soil layer so that it will support the postmining requirements of 10 CSR 40-2.030 and the revegetation requirements of 10 CSR 40-2.090.

AUTHORITY: section 444.535.1(4), RSMo 1986. Original rule filed July 13, 1978, effective Jan. 13, 1979.*

**Original authority: 444.535, RSMo 1978, amended 1988.*

10 CSR 40-2.060 Protection of the Hydrologic System by Water Quality Standards and Effluent Limitations

PURPOSE: This rule complies with section 444.535.1(5), RSMo by setting forth water quality standards and effluent limitations for protection of the hydrologic system.

PUBLISHER'S NOTE: The secretary of state has determined that the publication of the entire text of the material which is incorporated by reference as a portion of this rule would be unduly cumbersome or expensive. Therefore, the material which is so incorporated is on file with the agency who filed this rule, and with the Office of the Secretary of State. Any interested person may view this material at either agency's headquarters or the same will be made available at the Office of the Secretary of State at a cost not to exceed actual cost of copy reproduction. The entire text of the rule is printed here. This note refers only to the incorporated by reference material.

(1) General. The operator shall plan and conduct coal mining and reclamation operations to minimize disturbance to the prevailing hydrologic balance in order to prevent long-term adverse changes in the hydrologic balance that could result from coal strip mining and reclamation operations, both on- and off-site. Changes in water quality and quantity, in the depth to groundwater and in the location of surface water drainage channels shall be minimized so that the post-mining land use of the disturbed land is not adversely affected and applicable federal and state statutes and regulations are not violated. The operator shall conduct operations so as to minimize water pollution and, where necessary, shall use treatment methods to control water pollution. The operator shall employ coal strip mining and reclamation practices that will prevent or minimize water pollution and changes in flows in preference to the use of water treatment facilities. Practices to control and minimize pollution include, but are not limited to, stabilizing disturbed areas through grading, diverting runoff, achieving quick growing stands of temporary vegetation, lining drainage channels with rock or vegetation, mulching, sealing acid- and toxic-forming materials and selectively placing waste materials in backfill areas. If pollution can be controlled only by treatment, the operator shall operate and maintain the necessary water treatment facilities for as long as treatment is required.

(2) Sedimentation Ponds. All surface drainage from the disturbed area, including disturbed areas that have been graded, seeded or planted, shall be passed through a sedimentation pond or a series of sedimentation ponds before leaving the permit area. Sedimentation ponds shall be retained until drainage from the disturbed area has met the water quality requirements of this section and the revegetation requirements of 10 CSR 40-2.090 have been met. Exemptions from this requirement may be granted only when the disturbed drainage area within the total disturbed area is small and if the operator shows that sedimentation ponds are not necessary to meet the effluent limitations of this rule and to maintain water quality in downstream receiving waters. For purposes of this section only, disturbed areas shall not include those areas in which only diversion ditches, sedimentation ponds or roads are installed in accordance with this section and the upstream area is not otherwise disturbed by the operator. Sedimentation ponds required by this rule shall be constructed in accordance with section (6) of this rule in appropriate locations prior to any mining in the affected drainage area in order to control sedimentation or otherwise treat water in accordance with this rule. Discharges from areas disturbed by surface coal mining and reclamation operations must meet all applicable federal and state laws and at a minimum, the following numerical effluent limitations:

Effluent Limitations, in Milligrams Per Liter, mg/l, Except for pH

Effluent Characteristics	Maximum Allowable*	Average of Daily Values for 30 Consecutive Discharge Days*
Iron, total	7.0	3.5
Manganese,** total	4.0	2.0
Total suspended solids	70.0	35.0
pH***	Within the range 6.0—9.0	____

*Based on representative sampling

**Only applies to discharges into receiving waters with a pH of 6.0 or lower

***Where the application of neutralization and sedimentation treatment technology results in inability to comply with the manganese limitations set forth, the commission may allow the pH level in the discharge to exceed to a small extent the upper limit of 9.0 in order, that the manganese limitations will be achieved

(A) Any overflow or other discharge of surface water from the disturbed area within the permit area demonstrated by the operator to result from a precipitation event larger than a ten (10)-year, twenty-four (24) hour frequency event will not be subject to the effluent limitations of this rule.

(B) The operator shall install, operate and maintain adequate facilities to treat any water discharged from the disturbed area that violates applicable federal or state laws or regulations, or the limitations of this section. If the pH of waters to be discharged from the disturbed area is normally less than 6.0, an automatic lime feeder or other neutralization process as approved in the reclamation plan shall be installed, operated and maintained. If it is found that small and infrequent treatment requirements to meet applicable standards do not necessitate use of an automatic neutralization process and that the mine normally produces less than five hundred (500) tons of coal per day, then the use of a manual system may be approved in the reclamation plan if the operator ensures consistent and timely treatment.

(3) Surface Water Monitoring.

(A) The operator shall submit in the reclamation plan a surface water monitoring program which meets the following requirements:

1. Provides adequate monitoring of all discharge from the disturbed area;

2. Provides adequate data to describe the likely daily and seasonal variation in discharges from the disturbed area in terms of water flow, pH, total iron, total manganese and total suspended solids;

3. Provides monitoring at appropriate frequencies to measure normal and abnormal variations in concentrations;

4. Provides an analytical quality control system including standard methods of analysis such as those specified in 40 CFR 136; and

5. Provides a regular report of all measurements to the commission within sixty (60) days of sample collection unless violations of permit conditions occur in which case the commission shall be notified immediately after receipt of analytical results by the operator. If the discharge is subject to regulation by a federal or state permit issued in compliance with the Federal Water Pollution Control Act Amendment of 1972 (33 USC sections 1251–1378), a copy of the completed reporting form supplied to meet the National Pollutant Discharge Elimination System (NPDES) permit requirements may be submitted to the commission to satisfy the reporting requirements if the data meets the sampling frequency and other requirements of this paragraph.

(B) After disturbed areas have been regraded and stabilized in accordance with this chapter, the operator shall monitor surface water flow and quality. Data from this monitoring shall be used to demonstrate that the quality and quantity of runoff without treatment will be consistent with the requirement of this rule to minimize disturbance to the prevailing hydrologic balance and with the requirements of this chapter to attain the approved postmining land use. These data shall provide a basis for approval by the commission for removal of water quality of flow control systems and for determining when the requirements of this section are met. The approved reclamation plan shall set forth the nature of data, frequency of collection and reporting requirements proposed to comply with this subsection.

(C) Equipment, structures and other measures necessary to accurately measure and sample the quality and quantity of surface water discharges from the disturbed area of the permit area shall be properly installed, maintained and operated and shall be removed when no longer required.

(4) Diversion and Conveyance of Overland Flow Away From Disturbed Areas. In order to minimize erosion and to prevent or remove water from contracting toxic-producing deposits, overland flow from undisturbed areas, if required and approved in the reclamation plan, may be diverted away from disturbed areas by means of temporary or permanent diversion structures. The following requirements shall be met:

(A) Temporary diversion structures are those used during mining and reclamation. When no longer needed, these structures shall be removed and the area reclaimed. Temporary diversion structures shall be constructed to safely pass the peak runoff from a precipitation event with a ten (10)-year recurrence interval;

(B) Permanent diversion structures are those remaining after mining and reclamation, and approved for retention in the reclamation plan and by other appropriate state and federal agencies. To protect fills and property, and to avoid danger to public health and safety, permanent diversion structures shall be constructed to safely pass the peak runoff from a precipitation event with a one hundred (100)-year recurrence interval. Permanent diversion structures shall be constructed with gently sloping banks that are stabilized by vegetation. Asphalt, concrete or other similar linings shall not be used unless specifically required to prevent seepage or to provide stability and are approved in the reclamation plan; and

(C) Diversions shall be designed, constructed and maintained in a manner to prevent additional contributions of suspended solids to streamflow or to runoff outside the permit area to the extent possible, using the best technology currently available. In no event shall these contributions be in excess of requirements set by applicable state or federal law. Appropriate sediment control measures for these diversions shall include, but not be limited to, maintenance of appropriate gradients, channel lining, revegetation, roughness structures and detention basins.

(5) Stream Channel Diversions.

(A) Flow from perennial and intermittent streams within the permit area may be diverted only when the diversions are approved in the reclamation plan and they are in compliance with local, state and federal statutes and regulations. When streamflow is allowed to be diverted, the new stream channel shall be designed and constructed to meet the following requirements:

1. The average stream gradient shall be maintained and the channel designed, constructed and maintained to remain stable and to prevent additional contributions of suspended solids to streamflow or to runoff outside the permit area to the extent possible, using the best technology currently available. In no event shall those contributions be in excess of requirements set by applicable state or federal law. Erosion control structures such as channel lining structures, retension

basins and artificial channel roughness structures shall be used only when approved in the reclamation plan for temporary diversions where necessary or for permanent diversions where they are stable and will require only infrequent maintenance;

2. Channel, bank and flood-plain configurations shall be adequate to safely pass the peak runoff of a precipitation event with a ten (10)-year recurrence interval for temporary diversions and a one hundred (100)-year recurrence interval for permanent diversions; and

3. Fish and wildlife habitat, and water and vegetation of significant value for wildlife shall be protected in consultation with appropriate state and federal fish and wildlife management agencies.

(B) All temporary diversion structures shall be removed and the affected land regraded and revegetated consistent with the requirements of 10 CSR 40-2.040 and 10 CSR 40-2.090. At the time those diversions are removed, the operator shall ensure that downstream water treatment facilities previously protected by the diversion are modified or removed to prevent overtopping or failure of the facilities.

(C) Buffer Zone. No land within one hundred feet (100') of an intermittent or perennial stream shall be disturbed by coal strip mining and reclamation operations unless authorized by the reclamation plan. The area not to be disturbed shall be designated a buffer zone and marked as specified in 10 CSR 40-2.020.

(6) Sediment Control Measures. Appropriate sediment control measures shall be designed, constructed and maintained to prevent additional contributions of sediment to streamflow or to runoff outside the permit area to the extent possible, using the best technology currently available. Sediment control measures may include, but are not limited to: sedimentation ponds, diversion structures, sediment traps, straw dikes, riprap, check dams, vegetative filters, dugout, ponds and chemical treatment. Sedimentation ponds may be used individually or in a series.

(7) Discharge Structures. Discharges from sedimentation ponds and diversions shall be controlled, where necessary, using energy dissipators, surge ponds and other devices to reduce erosion and prevent deepening or enlargement of stream channels and to minimize disturbances to the hydrologic balance.

(8) Acid and Toxic Materials. Drainage from acid- and toxic-forming mine waste materials and spoils into ground and surface water shall be avoided by—

(A) Identifying, burying and treating where necessary, spoil or other materials that will be toxic to vegetation or that will adversely affect water quality if not treated or buried. This material shall be disposed of in accordance with the provisions of 10 CSR 40-2.040(10);

(B) Preventing or removing water from contact with acid- and toxic-forming materials;

(C) Burying or otherwise treating all toxic or harmful materials within thirty (30) days of exposure, if those materials are subject to wind and water erosion. If storage of those materials is approved, the materials shall be placed on impermeable material and protected from erosion and contact with surface water. Coal waste ponds and other coal waste materials shall be maintained according to subsection (8)(D) and 10 CSR 40-2.070 shall apply;

(D) Burying or otherwise treating waste materials from coal preparation plants no later than ninety (90) days after the cessation of the filling of the disposal area. Burial or treatment shall be in accordance with 10 CSR 40-2.040(10); and

(E) Casing, sealing or otherwise managing boreholes, shafts, wells and auger holes or other more or less horizontal holes to prevent pollution of surface or ground water and to prevent mixing of groundwaters of significantly different quality. All boreholes that are within the permit area but are outside the coal strip mining area or which extend beneath the coal to be mined and into water bearing strata shall be plugged permanently in a manner approved in the reclamation plan unless the boreholes have been approved for use in monitoring.

(9) Groundwater.

(A) Recharge Capacity of Reclaimed Lands. The disturbed area shall be reclaimed to restore approximate premining recharge capacity through restoration of the capability of the reclaimed areas as a whole to transmit water to the groundwater system. The recharge capacity should be restored to support the approved postmining land use and to minimize disturbances to the prevailing hydrologic balance at the mined area and in associated off-site areas. The operator shall be responsible for monitoring according to subsection (9)(C) to ensure operations conform to this requirement.

(B) Groundwater Systems. Backfilled materials shall be placed to minimize adverse effects on groundwater flow and quality, to minimize off-site effects and to support the approved postmining land use. The operator shall be responsible for performing monitoring according to subsection (9)(C) to ensure operations conform to this requirement.

(C) Monitoring. Groundwater levels, infiltration rates, subsurface flow and storage characteristics and the quality of groundwater shall be monitored in a manner approved in the reclamation plan to determine the effects of coal strip mining and reclamation operations on the recharge capacity of reclaimed lands and on the quantity and quality of water in groundwater systems at the mine area and in associated off-site areas. When operations are conducted in a manner that may affect the groundwater system, groundwater levels and groundwater quality shall be periodically monitored using wells of a type and number that can adequately reflect changes in groundwater quantity and quality resulting from those operations. Drilling and development of additional wells if needed to adequately monitor the groundwater system may be required in the reclamation plan. As specified and approved in the reclamation plan, additional hydrologic tests, such as infiltration tests and aquifer tests, must be undertaken by the operator to demonstrate compliance with subsections (9)(A) and (B).

(10) Water Rights and Replacement. The operator shall replace the water supply of an owner of interest in real property who obtains all or part of his/her supply of water for domestic, agricultural, industrial or other legitimate use from an underground or surface source where that supply has been affected by contamination, diminution or interruption proximately resulting from surface coal mine operation by the operator.

(11) Permanent Impoundments. The operator may construct, if approved in the reclamation plan pursuant to this section and 10 CSR 40-2.030, permanent water impoundments on mining sites as a part of reclamation activities only when they are adequately demonstrated to be in compliance with 10 CSR 40-2.030 and 10 CSR 40-2.040 in addition to the following requirements:

(A) The size of the impoundment is adequate for its intended purposes;

(B) The impoundment dam construction is designed to achieve necessary stability with an adequate margin of safety compatible with that of structures constructed under P. L. 83-566 (16 USC 1006);

(C) The quality of the impounded water will be suitable on a permanent basis for its intended use and discharges from the impoundment will not degrade the quality of receiving waters below the water quality standards established pursuant to applicable federal and state law;

(D) The level of water will be reasonably stable;

(E) Final grading will comply with the provisions of 10 CSR 40-2.040 and will provide adequate safety and access for proposed water users; and

(F) Water impoundments will not result in the diminution of the quality or quantity of water used by adjacent or surrounding landowners for agricultural, industrial, recreational or domestic uses.

(12) Hydrologic Impact of Roads.

(A) General. Access and haul roads and associated bridges, culverts, ditches and road rights-of-way shall be constructed, maintained and reclaimed to prevent additional contribution of suspended solids to streamflow or to runoff outside the permit area to the extent possible, using the best technology currently available. In no event shall the contributions be in excess of requirements set by applicable state or federal law. All access and haul roads shall be removed and the land affected regraded and revegetated consistent with the requirements of 10 CSR 40-2.040 and 10 CSR 40-2.090, unless retention of a road is approved as part of a postmining land use under 10 CSR 40-2.030 as being necessary to support the post-mining land use or necessary to adequately control erosion and the necessary maintenance is assured.

(B) Construction.

1. All roads constructed after January 13, 1979, as far as possible, shall be located on ridges or on the available flatter and more stable slopes to minimize erosion. Stream fords are prohibited unless they are specifically approved in the reclamation plan as temporary routes across dry streams that will not adversely affect sedimentation and that will not be used for coal haulage. Other stream crossings shall be made using bridges, culverts or other structures designed and constructed to meet the requirements of this paragraph. Roads shall not be located in active stream channels nor shall they be constructed or maintained in a manner that increases erosion or causes significant sedimentation of flooding. However, nothing in this section will be construed to prohibit relocation of stream channels in accordance with section (5) of this rule.

2. In order to minimize erosion and subsequent disturbances of the hydrologic balance, roads shall be constructed in compliance with the following grade restrictions or other grades determined in the reclamation plan to be necessary to control erosion:

A. The overall sustained grade shall not exceed 1v:10h (10%);

B. The maximum grade greater than ten percent (10%) shall not exceed 1v:6.5h (15%) for more than three hundred feet (300'); and

C. There shall not be more than three hundred feet (300') of grade exceeding ten percent (10%) within each one thousand feet (1000').

3. All access and haul roads shall be adequately drained using structures such as, but not limited to, ditches, water barriers, cross drains and ditch relief drains. For access and haul roads that are to be maintained for more than one (1) year, water control structures shall be designed with a discharge capacity capable of passing the peak runoff from a ten (10)-year, twenty-four (24)-hour precipitation event. Drainage pipes and culverts shall be constructed to avoid plugging or collapse and erosion at inlets and outlets. Drainage ditches shall be provided at the toe of all cut slopes formed by construction of roads. Trash racks and debris basins shall be installed in the drainage ditches wherever debris from the drainage area could impair the functions of drainage and sediment control structures. Ditch relief and cross drains shall be spaced according to grade. Effluent limitations of section (2) of this rule shall not apply to drainage from access and haul roads located outside the disturbed area as defined in this rule unless otherwise specified in the reclamation plan.

4. Access and haul roads shall be surfaced with durable material. Toxic- or acid-forming substances shall not be used. Vegetation shall be cleared only for the essential width necessary for road and associated ditch construction and to serve traffic needs.

(C) Maintenance.

1. Access and haul roads shall be routinely maintained by means such as, but not limited to, wetting, scraping or surfacing.

2. Ditches, culverts, drains, trash racks, debris basins and other structures serving to drain access and haul roads shall not be restricted or blocked in any manner that impedes drainage or adversely affects the intended purpose of the structure.

(13) Hydrologic Impacts of Other Transport Facilities. Railroad loops, spurs, sidings and other transport facilities shall be constructed, maintained and reclaimed to control diminution or degradation of water quality and quantity and to prevent additional contributions of suspended solids to streamflow or to runoff outside the permit area to the extent possible, using the best technology currently available. In no event shall contributions be in excess of requirements set by applicable state and federal law.

(14) Discharge of Waters Into Underground Mines. Surface and ground waters shall not be discharged or diverted into underground mine workings.

AUTHORITY: section 444.535.1(5), RSMo 1986. Original rule filed July 13, 1978, effective Jan. 13, 1979.*

**Original authority: 444.535, RSMo 1978, amended 1988.*

10 CSR 40-2.070 Dams Constructed of or Impounding Waste Material

PURPOSE: This rule complies with section 444.535.1(6), RSMo by setting forth the requirements for use of waste materials in the construction of dams or embankments.

PUBLISHER'S NOTE: The secretary of state has determined that the publication of the entire text of the material which is incorporated by reference as a portion of this rule would be unduly cumbersome or expensive. Therefore, the material which is so incorporated is on file with the agency who filed this rule, and with the Office of the Secretary of State. Any interested person may view this material at either agency's headquarters or the same will be made available at the Office of the Secretary of State at a cost not to exceed actual cost of copy reproduction. The entire text of the rule is printed here. This note refers only to the incorporated by reference material.

(1) General.

(A) No waste material shall be used in the new dams unless approved in the reclamation plan.

(B) The operator shall design, locate, construct, operate, maintain, modify and abandon or remove all dams (used either temporarily or permanently) constructed of waste materials in accordance with the requirements of this rule.

(2) Construction of Dams.

(A) Waste shall not be used in the construction of dams unless demonstrated through appropriate engineering analysis to have no adverse effect on stability.

(B) Plans for dams subject to this section shall be approved in the reclamation plan before construction and shall contain the minimum plan requirements established pursuant to 30 CFR Section 77.216-2.

(C) Construction requirements are as follows:

1. Design shall be based on the flood from the probable maximum precipitation

event unless the operator shows that the failure of the impounding structure would not cause loss of life or severely damage property or the environment, in which case, depending on site conditions a design based on a precipitation event of no less than one hundred (100)-year frequency may be approved in the reclamation plan;

2. The design freeboard distance between the lowest point on the embankment crest and the maximum water elevation shall be at least three feet (3') to avoid overtopping by wind and wave action;

3. Dams shall have minimum safety factors as follows:

Case	Loading Conditions	Minimum Safety Factor
I	End of construction	1.3
II	Partial pool with steady seepage saturation	1.5
III	Steady seepage from spillway or decant crest	1.5
IV	Earthquake (cases II and III with seismic loading)	1.0

4. The dam, foundation and abutments shall be stable under all conditions of construction and operation of the impoundment. Sufficient foundation investigations and laboratory testing shall be performed to determine the factors of safety of the dam for all loading conditions in paragraph (2)(C)3. of this rule and for all increments of construction;

5. Seepage through the dam, foundation and abutments shall be controlled to prevent excessive uplift pressures, internal erosion, sloughing, removal of material by solution or erosion of material by loss into cracks, joints and cavities. This may require the use of impervious blankets, pervious drainage zones or blankets, toe drains, relief wells or dental concreting of jointed rock surface in contact with embankment materials;

6. Allowances shall be made for settlement of the dams and the foundation so that the freeboard will be maintained;

7. Impoundments created by dams of waste materials shall be subject to a minimum drawdown criteria that allows the facility to be evacuated by spillways or decants of ninety percent (90%) of the volume of water stored during the design precipitation event within ten (10) days;

8. During construction of dams subject to this section, the structures shall be periodically inspected by a registered professional engineer to ensure construction according to the approved design. On completion of construction, the structure shall be certified by a registered professional engineer experienced in the field of dam construction as having been constructed in accordance with accepted professional practice and the approved design; and

9. A permanent identification marker, at least six feet (6') high and that shows the dam number assigned pursuant to 30 CFR Section 77.216-1 and the name of the person operating or controlling the dam, shall be located on or immediately adjacent to each dam within thirty (30) days of certification of design pursuant to this rule.

(D) All dams, including those not meeting the size or other criteria of 30 CFR Section 77.216(a) shall be routinely inspected by a registered professional engineer or someone under supervision of a registered professional engineer, in accordance with 30 CFR Section 77.216-3.

(E) All Dams Shall be Routinely Maintained. Vegetative growth shall be cut where necessary to facilitate inspection and repairs. Ditches and spillways shall be cleaned. Any combustible materials present on the surface, other than that used for surface stability, such as mulch or dry vegetation, shall be removed and any other appropriate maintenance procedures followed.

(F) All dams subject to this section shall be certified annually as having been constructed and modified in accordance with current prudent engineering practices to minimize the possibility of failures. Any changes in the geometry of the impounding structure shall be highlighted and included in the annual certification report. These certifications shall include a report on existing and required monitoring procedures and instrumentation, the average and maximum depths and elevations of any impounded waters over the past year, existing storage capacity of impounding structures, any fires occurring in the material over the past year and any other aspects of the structures affecting their stability.

(G) Any enlargements, reductions in size, reconstruction or other modification of the dams shall be approved by the commission before construction begins.

(H) All dams shall be removed and the disturbed areas regraded, revegetated and stabilized before the release of bond unless retention of those dams are approved as being compatible with an approved postmining land use under 10 CSR 40-2.030.

AUTHORITY: section 444.535.1(6), RSMo 1986. Original rule filed July 13, 1978, effective Jan. 13, 1979.*

**Original authority: 444.535, RSMo 1978, amended 1988.*

10 CSR 40-2.080 Use of Explosives

PURPOSE: This rule complies with section 444.535.1(7), RSMo by setting forth the requirements for the use of explosives in strip mining for coal.

(1) General.

(A) The operator shall comply with all applicable local, state and federal laws and regulations, and the requirements of this rule on the storage, handling, preparation and use of explosives.

(B) Blasting operations that use more than the equivalent of five pounds (5 lbs.) of trinitrotoluene (TNT) shall be conducted according to a reasonable time schedule approved by the director.

(C) All blasting operations shall be conducted by experienced, trained and competent persons who understand the hazards involved. Persons working with explosive materials shall—

1. Have demonstrated a knowledge of, and a willingness to comply with, safety and security requirements;

2. Be capable of using mature judgement in all situations;

3. Be in good physical condition and not addicted to intoxicants, narcotics or other similar types of drugs;

4. Possess current knowledge of the local, state and federal laws applicable to their work; and

5. Have obtained a certificate of completion of training and qualification as required by state law.

(2) Preblasting Survey.

(A) On the request to the commission of a resident or owner of a man-made dwelling or structure that is located within one-half(1/2) mile of any part of the permit area, the operator shall conduct a preblasting survey of the dwelling or structure and submit a report of the survey to the commission.

(B) Personnel approved by the commission shall conduct the survey to determine the condition of the dwelling or structure and to document any preblasting damage and other physical factors that could reasonably be affected by the blasting. Assessments of structures, such as pipes, cables, transmission lines and wells and other water systems, shall be limited to surface condition and other readily available data. Special attention shall be given to the preblasting conditions of wells and other water systems used for human, animal or agricultural purposes and to the quantity and quality of the water.

(C) A written report of the survey shall be prepared and signed by the persons who

conducted the survey and prepared the written report. The report shall include recommendations of any special conditions or proposed adjustments to the blasting procedures outlined in section (5) of this rule which should be incorporated into the blasting plan to prevent damage. Copies of the report shall be provided to the person requesting the survey and to the commission.

(3) Public Notice of Blasting Schedule. At least ten (10) days, but not more than twenty (20) days, before beginning a blasting program in which explosives that use more than the equivalent of five pounds (5 lbs.) of TNT are detonated, the operator shall publish a blasting schedule in a newspaper of general circulation in the locality of the proposed site. Copies of the schedule shall be distributed by mail to local governments and public utilities and to each residence within one-half (1/2) mile of the blasting sites described in the schedule. The operator shall republish and redistribute the schedule by mail at least every three (3) months. Blasting schedules shall not be so general as to cover all working hours but shall identify as accurately as possible the location of the blasting sites and the time periods when blasting will occur. The blasting schedule, at a minimum, shall contain—

(A) Identification of the specific areas in which blasting will take place. The specific blasting areas described shall not be larger than three hundred (300) acres with a generally contiguous border;

(B) Dates and times when explosives are to be detonated expressed in not more than four (4)-hour increments;

(C) Methods to be used to control access to the blasting area;

(D) Types of audible warnings and all-clear signals to be used before and after blasting; and

(E) A description of possible emergency situations (defined in paragraph (5)(A)2. of this rule), which have been approved in the reclamation plan, when it may be necessary to blast at times other than those described in the schedule.

(4) Public Notice of Changes to Blasting Schedules. Before blasting in areas not covered by a previous schedule or whenever the proposed frequency of individual detonations are materially changed, the operator shall prepare a revised blasting schedule in accordance with the procedures in section (3) of this rule. If the change involves only a temporary adjustment of the frequency of blasts, the operator may use alternate methods to notify the governmental bodies and individuals to whom the original schedule was sent.

(5) Blasting Procedures.

(A) General.

1. All blasting shall be conducted only during the daytime hours, defined as sunrise until sunset. Based on public requests or other considerations, including the proximity to residential areas, the reclamation plan may specify more restrictive time periods.

2. Blasting may not be conducted at times different from those announced in the blasting schedule except in emergency situations where rain, lightning, other atmospheric conditions or operator or public safety requires unscheduled detonation.

3. Warning and all-clear signals of different character that are audible within a range of one-half (1/2) mile from the point of the blast shall be given. All persons within the permit area shall be notified of the meaning of the signals through appropriate instructions and signs posted as required by 10 CSR 40-2.020.

4. Access to the blasting area shall be regulated to protect the public and livestock from the effects of blasting. Access to the blasting area shall be controlled to prevent unauthorized entry at least ten (10) minutes before each blast and until the operator's authorized representative has determined that no unusual circumstances such as imminent slides or undetonated charges exist and access to and travel in or through the area can safely resume.

5. Areas in which charged holes are awaiting firing shall be guarded, barricaded and posted or flagged against unauthorized entry.

6. Airblast shall be controlled so that it does not exceed one hundred twenty-eight (128) decibel linear-peak at any man-made dwelling or structure located within one-half (1/2) mile of the permit area.

7. Except where lesser distances are approved in the reclamation plan (based upon a preblasting survey or other appropriate investigations) blasting shall not be conducted within—

A. Three hundred feet (300') of any building used as a dwelling, school, church, hospital or nursing facility;

B. Three hundred feet (300') of facilities including, but not limited to, disposal wells, petroleum or gas-storage facilities, municipal water-storage facilities, fluid-transmission pipelines, gas or oil-collection lines, or water and sewage lines; and

C. Five hundred feet (500') of an underground mine not totally abandoned except with the concurrence of the Federal Mining Enforcement and Safety Administration.

(B) Blasting Standards.

1. Blasting shall be conducted to prevent injury to persons, damage to public or private property outside the permit area, adverse impacts on any underground mine and change in the course, channel or availability of ground or surface waters outside the permit area.

2. In all blasting operations, except as otherwise stated, the maximum peak particle velocity of the ground motion in any direction shall not exceed two (2) inches per second at the immediate location of any dwelling, public building, school, church or commercial or institutional building. The commission, in the reclamation plan, may reduce the maximum peak particle velocity allowed if it determines that a lower standard is required because of density of population or land use, age or type of structure, geology or hydrology of the area, frequency of blasts or other factors.

3. The maximum peak particle velocity of ground motion does not apply to property inside the permit area that is owned or leased by the operator.

4. An equation for determining the maximum weight of explosives that can be detonated within any eight (8)-millisecond period is given in paragraph (5)(B)5. of this rule. If the blasting is conducted in accordance with this equation, the commission will consider the vibrations to be within the one inch (1") per second limit.

5. The maximum weight of explosives to be detonated within any eight (8)-millisecond period shall be determined by the formula

$$W = \left(\frac{D}{60} \right)^2$$

where

W = the maximum weight of explosives, in pounds, that can be detonated in any eight (8)-millisecond period; and

D = the distance, in feet, to the nearest dwelling, public building, school, church, or commercial or institutional building.

6. For distances between three hundred fifty feet to five thousand feet (350'–5000'), solution of the equation results in the following maximum weight.

Distance (D) in feet	Maximum Weight W) in pounds
350	34
400	44
500	69

600	100
700	136
800	178
900	225
1000	278
1100	336
1200	400
1300	460
1400	544
1500	625
1600	711
1700	803
1800	900
1900	1002
2000	1111
2500	1736
3000	2500
3500	3402
4000	4444
4500	5625
5000	6944

7. If on a particular site the peak particle velocity continuously exceeds one-half (1/2) inch per second after a period of one (1) second following the maximum ground particle velocity, the reclamation plan will be revised to limit the ground motion.

(C) Seismograph Measurements.

1. Where a seismograph is used to monitor the velocity of ground motion and the peak particle velocity limit of one inch (1") per second is not exceeded, the equation in paragraph (5)(B)5. of this rule need not be used. However, if the equation is not being used, a seismograph record shall be obtained for every shot.

2. The use of a modified equation to determine maximum weight of explosives for blasting operations at a particular site may be approved on receipt of a petition accompanied by reports including seismograph records of test blasting on the site. However, in no case shall the commission approve the use of a modified equation where the peak particle velocity limit of one inch (1") per second required in paragraph (5)(B)2. of this rule would be exceeded.

3. The commission may require a seismograph recording of any or all blasts.

(D) Records of Blasting Operations. A record of each blast, including seismograph reports, shall be retained for at least three (3) years and shall be available for inspection by the commission and the public on request. The record shall contain the following data:

1. Name of operator or other person conducting the blast;

2. Location, date and time of blast;

3. Name, signature and license number of blaster-in-charge;

4. Direction and distance, in feet, to nearest dwelling, school, church or commercial or institutional building neither owned or leased by the operator;

5. Weather conditions;

6. Type of material blasted;

7. Number of holes, burden and spacing;

8. Diameter and depth of holes;

9. Types of explosives used;

10. Total weight of explosives used;

11. Maximum weight of explosives detonated within any eight (8)-millisecond period;

12. Maximum number of holes detonated within any eight (8)-millisecond period;

13. Methods of firing and type of circuit;

14. Type and length of stemming;

15. If mats or other protections were used;

16. Type of delay detonator used and delay periods used; and

17. Seismograph records, where required, including:

A. Seismograph reading, including exact location of seismograph and its distance from the blast;

B. Name of person taking the seismograph reading; and

C. Name of person and firm analyzing the seismograph record.

AUTHORITY: section 444.535, RSMo 1986. Original rule filed July 13, 1978, effective Jan. 13, 1979. Amended: Filed July 15, 1980, effective Nov. 13, 1980.*

**Original authority: 444.535, RSMo 1978, amended 1988.*

10 CSR 40-2.090 Revegetation Requirements

PURPOSE: This rule complies with section 444.535.1(8), RSMo by setting forth the requirements for revegetation of lands affected by coal strip mining.

(1) General.

(A) The operator shall establish on all land that has been disturbed, a diverse, effective and permanent vegetative cover of species native to the area of disturbed land or species that will support the planned postmining uses of the land approved according to 10 CSR 40-2.030. For areas designated as prime farmland, the reclamation procedures of 10 CSR 40-2.110 shall also apply.

(B) Revegetation shall be carried out in a manner that encourages a prompt vegetative cover and recovery of productivity levels compatible with approved land uses. The vegetative cover shall be capable of stabilizing the soil surface with respect to erosion. All disturbed lands, except water areas and surface areas of roads that are approved as a part of the postmining land use, shall be seeded or planted to achieve a vegetative cover, of the same seasonal variety native to the area of disturbed land. If both the premining and postmining land use is intensive agriculture, planting of the crops normally grown will meet the requirement. Vegetative cover will be considered of the same seasonal variety when it consists of a mixture of species of equal or superior utility for the intended land use when compared with the utility of naturally occurring vegetation during each season of the year.

(C) On federal lands, the surface management agency shall be consulted for approval prior to revegetation regarding what species are selected and following revegetation, to determine when the area is ready to be used.

(2) Use of Introduced Species. Introduced species may be substituted for native species only if appropriate field trials have demonstrated that the introduced species are of equal or superior utility for the approved postmining land use, or are necessary to achieve a quick, temporary and stabilizing cover. These species substitution shall be approved in the reclamation plan. Introduced species shall meet applicable state and federal seed or introduced species statutes, and shall not include poisonous or potentially toxic species.

(3) Timing of Revegetation. Seeding and planting of disturbed areas shall be conducted during the first normal period for favorable planting conditions after final preparation. The normal period for favorable planting shall be that planting time generally accepted locally for the type of plant materials selected to meet specific site conditions and climate. Any disturbed areas, except water areas and surface areas of roads that are approved under 10 CSR 40-2.030 as part of the postmining land use, which have been graded shall be seeded with a temporary cover of small grains, grasses or legumes to control erosion until an adequate permanent cover is established. When rills or gullies, that would preclude the successful establishment of vegetation or the achievement of the postmining land use, form in regraded topsoil and overburden materials as specified in 10 CSR 40-2.040, additional regrading or other stabilization practices will be required before seeding and planting.

(4) Mulching. Mulch shall be used on all regraded and topsoiled areas to control erosion, to promote germination of seeds and to increase the moisture retention of the soil. Mulch shall be anchored to the soil surface where appropriate, to ensure effective protection of the soil and vegetation. Mulch means vegetation residues or other suitable materials that aid in soil stabilization and soil moisture conservation, thus providing microclimatic conditions suitable for germination and growth and do not interfere with the postmining use of the land. Annual grains such as oats, rye and wheat may be used instead of mulch when it is shown that the substituted grains will provide adequate stability and that they will later be replaced by species approved for the postmining use.

(5) Methods of Revegetation.

(A) The operator shall use technical publications or the results of laboratory and field tests approved in the reclamation plan to determine the varieties, species, seeding rates and soil amendment practices essential for establishment and self-regeneration of vegetation.

(B) Where hayland, pasture or range is to be the postmining land use, the species of grasses, legumes, browse, trees or forbs for seeding or planting and their pattern of distribution shall be selected by the operator to provide a diverse, effective and permanent vegetative cover with the seasonal variety, succession, distribution and regenerative capabilities native to the area. Livestock grazing will not be allowed on reclaimed land until the seedlings are established and can sustain managed grazing. The director, in consultation with the operator and the landowner or in concurrence with the governmental land managing agency having jurisdiction over the surface, shall determine when the revegetated area is ready for livestock grazing.

(C) Where forest is to be the postmining land use, the operator shall plant trees adapted for local site conditions and climate. Trees shall be planted in combination with an herbaceous cover of grains, grasses, legumes, forbs or woody plants to provide a diverse, effective and permanent vegetation cover with the seasonal variety, succession and regeneration capabilities native to the area.

(D) Where wildlife habitat is to be included in the postmining land use, the operator shall consult with appropriate state and federal wildlife and land management agencies and shall select those species that will fulfill the needs of wildlife, including food, water, cover and space. Plant groupings and water resources shall be spaced and distributed to fulfill the requirements of wildlife.

(6) Standards for Measuring Success of Revegetation.

(A) Success of revegetation shall be determined either by comparison to standards set forth in this rule or by comparison to reference areas approved in the reclamation plan. Reference areas mean land units of varying size and shape identified and maintained under appropriate management for the purpose of measuring ground cover, productivity and species diversity that are produced naturally. The reference areas must be representative of geology, soils, slope, aspect and vegetation in the permit area. Management of the reference area shall be comparable to that which will be required for the approved postmining land use of the area to be mined. Estimating techniques either established by the commission or approved in the reclamation plan will be used to determine the degree of success in the revegetated area.

(B) Standards for success shall be applied in accordance with the approved postmining land use and shall be met for two (2) growing seasons. However, ground cover of living plants on the revegetated area shall in no case be less than that required to control erosion. In terms of specific land uses, the following minimum standards for success apply:

1. For areas reclaimed to pasture, the ground cover of living plants on the revegetated area shall be equal to ninety percent (90%);

2. For areas reclaimed to cropland, success in revegetation shall be determined on the basis of crop production from the disturbed area compared to crop production from a reference area. The average of a minimum of two (2) years' crop production from the disturbed area shall equal the corresponding average production of the approved reference area. Production on nonprime cropland shall be considered equal if it is at least ninety percent (90%) of the production of the reference area; whereas, production on prime farmland shall be considered equal if it is at least one hundred percent (100%) of the production of the reference area;

3. For areas reclaimed to woodland, the success of revegetation shall be determined on the basis of tree stocking. Specifically, a reclaimed area with a postmining land use of woodland must have a minimum stocking of four hundred fifty (450) countable stems per acre. A countable stem shall—

A. Have been in place for at least sixteen (16) months;

B. Be alive and healthy;

C. Have at least one-third (1/3) of its length in live crown; and

D. Not be in danger of being eliminated by herbaceous vegetation;

4. For areas reclaimed to wildlife habitat, the success of revegetation shall be determined on the basis of tree and shrub stocking and herbaceous ground cover. Specifically, a reclaimed area with a postmining land use of wildlife habitat must have a minimum stocking of two hundred twenty-five (225) countable stems where trees, shrubs, or both, are established and at least ninety percent (90%) ground cover where herbaceous vegetation is established. A countable stem shall meet the requirements described in paragraph (6)(B)3. of this rule;

5. Previously mined areas that were not reclaimed to the standards required by this chapter prior to November 15, 1976. The ground cover of living plants for those areas shall not be less than required to control erosion, and in no case less than that existing before redisturbance; and

6. Areas to be developed immediately for industrial or residential use. The ground cover of living plants shall not be less than required to control erosion. As used in this paragraph, immediately means less than two (2) years after regrading has been completed for the area to be used.

(C) Species diversity, distribution, seasonal variety and vigor shall be evaluated on the basis of the results which could reasonably be expected using the methods of revegetation approved under section (5) of this rule.

(7) Seeding of Stockpiled Topsoil. Topsoil stockpiled in compliance with 10 CSR 40-2.050 must be seeded or planted with an effective cover of nonnoxious quick growing annual and perennial plants during the first normal period for favorable planting conditions or protected by other approved measures as specified in 10 CSR 40-2.050.

AUTHORITY: section 444.535.1(8), RSMo 1986. Original rule filed July 13, 1978, effective Jan. 13, 1979. Amended: Filed June 3, 1985, effective Oct. 28, 1985. Amended: Filed April 2, 1986, effective July 26, 1986. Amended: Filed Aug. 4, 1987, effective Nov. 23, 1987.*

**Original authority:444.535, RSMo 1978, amended 1988.*

10 CSR 40-2.100 Steep-Slope Mining Requirements

PURPOSE: This rule complies with section 444.535.2., RSMo by setting forth the requirements for strip mining on steep slopes.

(1) All the requirements of this chapter shall apply.

(2) In addition, the operator conducting coal strip mining and reclamation operations on natural slopes that exceed twenty degrees (20°), or on lesser slopes that require measures to protect the area from disturbance after grading is completed as determined in the reclamation plan after consideration of soils, climate, the method of operation, geology and other regional characteristics, shall meet the following performance standards. The standards of this section do not apply where mining is done on a flat or gently rolling terrain with an occasional steep slope through which the mining proceeds and leaves a plain or predominantly flat area:

(A) Spoil, waste materials or debris, including that from clearing and grubbing and abandoned or disabled equipment, shall not be placed or allowed to remain on the downslope;

(B) The highwall shall be completely covered with spoil and the disturbed area graded to comply with the provisions of 10 CSR 40-2.040. Land above the highwall shall not be disturbed unless the disturbance will facilitate compliance with the requirements of this section and is approved in the reclamation plan;

(C) Material in excess of that required to meet the provisions of 10 CSR 40-2.040(1)–(11) shall be disposed of in accordance with the requirements of 10 CSR 40-2.040(12) and (13); and

(D) Woody materials may be buried in the backfilled area only when burial does not cause or add to instability of the backfill. Woody materials may be chipped and distributed through the backfill when approved by the commission.

AUTHORITY: section 444.535.2., RSMo 1986. Original rule filed July 13, 1978, effective Jan. 13, 1979.*

**Original authority: 444.535, RSMo 1978, amended 1988.*

10 CSR 40-2.110 Prime Farmlands Performance Requirements

PURPOSE: This rule complies with section 444.535.1(1), RSMo by setting forth the requirements for reclamation by coal strip mine operators for prime farmland.

PUBLISHER'S NOTE: The secretary of state has determined that the publication of the entire text of the material which is incorporated by reference as a portion of this rule would be unduly cumbersome or expensive. Therefore, the material which is so incorporated is on file with the agency who filed this rule, and with the Office of the Secretary of State. Any interested person may view this material at either agency's headquarters or the same will be made available at the Office of the Secretary of State at a cost not to exceed actual cost of copy reproduction. The entire text of the rule is printed here. This note refers only to the incorporated by reference material.

(1) Applicability.

(A) Operators of coal strip mining and reclamation operations conducted on prime farmland shall comply with all the requirements of this chapter in addition to the special requirements of this rule. Prime farmlands are those lands defined in section (2) of this rule that have been used for the production of cultivated crops including nurseries, orchards and other specialty crops and small grains for at least five (5) years out of the twenty (20) years preceding the date of the permit application.

(B) Nothing in this section shall apply to any permit issued prior to August 3, 1977, any revisions or renewals of that permit or any continuous and existing strip mining operation for which a permit was issued prior to August 3, 1977. To meet the criteria of a continuous and existing operation, the applicant must submit to the director for review the following:

1. Proof that a definite contract for the coal field, which they intend to mine, existed on August 3, 1977;

2. Proof that the permittee had a legal right to mine the lands prior to August 3, 1977, through ownership, contract or lease, but not including an option to buy, lease or contract;

3. Proof that the lands contain part of a continuous recoverable coal seam that was being mined in a single continuous mining pit (or multiple pits if the lands are proven to be part of a single continuous surface coal mining operation) begun under a permit issued prior to August 3, 1977;

4. A plan including any supportive data required by the director, outlining the proposed procedures to meet the productive capacity of the intended land use as declared in the permit, as per 10 CSR 40-2.090; and

5. A detailed map delineating the exempted acreage.

(2) For purposes of this rule—

(A) Prime farmland means those lands that meet the applicability requirements in section (1) of this rule and the specific technical criteria prescribed by the secretary of agriculture as published at 42 FedReg 42359 (August 23, 1977). These criteria are included here for convenience. Terms used in this section are defined in United States Department of Agriculture publications *Soil Taxonomy*, Agriculture Handbook 436; *Soil Survey Manual*, Agriculture Handbook 18; *Rainfall-Erosion Losses From Cropland*, Agriculture Handbook 282; and *Saline and Alkali Soils*, Agriculture Handbook 60. To be considered prime farmland, soils must meet all of the following criteria:

1. The soils have—

A. Aquic, udic, ustic or xeric moisture regimes and sufficient available water capacity within a depth of forty inches (40") or, if the root zone is less than forty inches (40") deep, in the root zone in order to produce the commonly grown crops in seven (7) or more years out of ten (10);

B. Xeric or ustic moisture regimes in which the available water capacity is limited but the area has a developed irrigation water supply that is dependable and of adequate quality (a dependable water supply is one in which enough water is available for irrigation in eight (8) out of ten (10) years for the crops commonly grown); or

C. Aridic or torric moisture regimes and the area has a developed irrigation water supply that is dependable and of adequate quality;

2. The soils have a temperature regime that is frigid, nexic, thermic or hyperthermic (pergelic and cryic regimes are excluded). These are soils that at a depth of ten inches (10") have a mean annual temperature higher than thirty-two degrees Fahrenheit (32° F). In addition, the mean summer temperature at this depth in soils with a zero (0) horizon is higher than forty-seven degrees Fahrenheit (47° F); in soils that have no zero (0) horizon, the mean summer temperature is higher than fifty-nine degrees Fahrenheit (59° F);

3. The soils have a pH between 4.5 and 8.4 in all horizons within a depth of forty inches (40") or, if the root zone is less than forty inches (40") deep, in the root zone;

4. The soils either have no water table or have a water table that is maintained at a sufficient depth during the cropping season to allow food, feed, fiber, forage and oilseed crops common to the area to be grown;

5. The soils can be managed so that, in all horizons within a depth of forty inches (40"), or if the root zone is less than forty inches (40") deep, in the root zone; during part of each year the conductivity of saturation extract is less than four (4) mmhos/cm and the exchangeable sodium percentage (ESP) is less than fifteen (15);

6. The soils are not flooded frequently during the growing season (less often than once in two (2) years);

7. The soils have a product of K (erodibility factor) × percent slope of less than 2.0 and a product of I (soil erodibility) × C (climatic factor) not exceeding sixty (60);

8. The soils have a permeability rate of at least 0.06 inch per hour in the upper twenty inches (20") and the mean annual soil temperature at a depth of twenty inches (20") is less than fifty-nine degrees Fahrenheit (59° F); the permeability rate is not a limiting factor if the mean annual soil temperature is fifty-nine degrees Fahrenheit (59° F) or higher; and

9. Less than ten percent (10%) of the surface layer (upper six inches (6")) in these soils consists of rock fragments more coarse than three inches (3").

(B) Renewal of permit shall mean a decision by the regulatory authority to extend the time by which the permittee may complete mining within the boundaries of the original permit, and revision of the permit shall mean a decision by the regulatory authority to allow changes in the method of mining operations within the original permit area or the decision of the regulatory authority to allow incidental boundary changes to the original permit;

(C) A pit shall be deemed to be a single continuous mining pit even if portions of the pit are crossed by a road, pipeline, railroad, powerline or similar crossing; and

(D) A single continuous surface coal mining operation is presumed to consist only of a single continuous mining pit under a permit issued prior to August 3, 1977, but may include noncontiguous parcels if the operator can prove by clear and convincing evidence that, prior to August 3, 1977, the noncontiguous parcels were part of a single permitted operation. For the purposes of this subsection, clear and convincing evidence includes, but is not limited to, contracts, leases, deeds or other properly executed legal documents (not including options) that specifically treat physically separate parcels as one (1) surface coal mining operation.

(3) Identification of Prime Farmland. Prime farmland shall be identified on the basis of soil surveys submitted by the applicant. The requirement for submission of soil surveys may be waived if the operator can demonstrate according to the procedures in section (4) of this rule that no prime farmlands are involved. Soil surveys shall be conducted according to standards of the National Cooperative Soil Survey, which include the procedures set forth in United States Department of Agriculture Handbooks 436, *Soil Taxonomy* and 18, *Soil Survey Manual* and shall include:

(A) Data on moisture availability, temperature regime, flooding, water table, erosion characteristics, permeability or other information that is needed to determine prime farmland in accordance with section (2) of this rule;

(B) A map designating the exact location and extent of the prime farmland; and

(C) A description of each soil mapping unit.

(4) Negative Determination of Prime Farmland. The land shall not be considered as prime farmland where the operator can demonstrate one (1) or more of the following situations:

(A) Lands within the proposed permit boundaries have been used for the production of cultivated crops for less than five (5) years out of twenty (20) years preceding the date of the permit application;

(B) The slope of all land within the permit area is ten percent (10%) or greater;

(C) Land within the permit area is not irrigated or naturally subirrigated, has no developed water supply that is dependable and of adequate quality and the average annual precipitation is fourteen inches (14") or less;

(D) Other factors exist, such as a very rocky surface, or the land is frequently flooded, which clearly place all land within the area outside the purview of prime farmland; and

(E) A written notification, based on scientific findings and soil surveys that land within the proposed mining area does not meet the applicability requirements in section (1) of this rule, is submitted by a qualified person other than the operator and is approved in the reclamation plan.

(5) Plan for Restoration of Prime Farmland. The operator shall submit a reclamation plan for the mining and restoration of any prime farmland within the proposed permit boundaries. This plan shall be used in judging the technological capability of the operator to restore prime farmlands. The plan shall include:

(A) A description of the original undisturbed soil profile, as determined from a soil survey, showing the depth and thickness of each of the soil horizons that collectively constitute the root zone of the locally adapted crops and are to be removed, stored and replaced;

(B) The proposed method and type of equipment to be used for removal, storage and replacement of the soil in accordance with section (7) of this rule;

(C) The location of areas to be used for the separate stockpiling of the soil and plans for soil stabilization before redistribution;

(D) If applicable, documentation, such as agricultural school studies or other scientific data from comparable areas that supports the use of other suitable material instead of the A, B or C soil horizon, to obtain on the restored area equivalent or higher levels of yield as nonmined prime farmlands in the surrounding area under equivalent levels of management;

(E) Plans for seeding or cropping the final graded mine land and the conservation practices to control erosion and sedimentation during the first twelve (12) months after regrading is completed. Proper adjustments for seasons must be made so that final graded land is not exposed to erosion during seasons when vegetation or conservation practices cannot be established due to weather conditions; and

(F) Available agricultural school studies, company data or other scientific data for comparable areas that demonstrate that the operator using his/her proposed method of reclamation will achieve within a reasonable time, equivalent or higher levels of yield after mining as existed before mining.

(6) Consultation with Secretary of Agriculture and Issuance of Permit.

(A) The commission may grant a permit which shall incorporate the plan submitted under section (5) of this rule if it finds in writing that the applicant—

1. Has the technological capability to restore the prime farmland within the proposed permit area, within a reasonable time, to equivalent or higher levels of yield as nonmined prime farmland in the surrounding area under equivalent levels of management; and

2. Will achieve compliance with the standards of section (7) of this rule.

(B) Before any permit is issued for areas that include prime farmlands, the commission will consult with the secretary of agriculture or his/her designee. The secretary of agriculture will provide a review of the proposed method of soil reconstruction and comment on possible revisions that will result in a more complete and adequate restoration.

(7) Special Requirements. For all prime farmlands to be mined and reclaimed, the operator shall meet the following special requirements:

(A) All soil horizons to be used in the reconstruction of the soil shall be removed before drilling, blasting or mining to prevent contaminating the soil horizons with undesirable materials. Where removal of soil horizons results in erosion that may cause air and water pollution, the reclamation plan shall specify methods of treatment to control erosion of exposed overburden. The operator shall remove separately the—

1. Entire A horizon or other suitable soil materials which will create a final soil having an equal or greater productive capacity than that which existed prior to mining in a manner that prevents mixing or contamination with other material before replacement;

2. B horizon of the natural soil or a combination of B horizon and underlying C horizon or other suitable soil material that will create a reconstructed root zone of equal or greater productive capacity than that which existed prior to mining in a manner that prevents mixing or contamination with other material; and

3. Underlying C horizons or other strata, or a combination of these horizons or other strata, to be used instead of the B horizon that are of equal or greater thickness and that can be shown to be equal or more favorable for plant growth than the B horizon and that when replaced will create in the reconstructed soil a final root zone of comparable depth and quality to that which existed in the natural soil;

(B) The A horizon and B horizon must be stored separately from each other, if stockpiling of soil horizons is allowed in the reclamation plan in lieu of immediate replacement. The stockpiles must be placed within the permit area and where they will not be disturbed or exposed to excessive erosion by water or wind before the stockpiled horizons can be redistributed on terrain graded to final contour. Stockpiles in place for more than thirty (30) days must meet the requirements of 10 CSR 40-2.050(4);

(C) The final graded land must be scarified before the soil horizons are replaced;

(D) The material from the B horizon, or other suitable material specified in paragraph (7)(A)2. or 3. of this rule must be replaced in such a manner as to avoid excessive compaction of overburden and to a thickness comparable to the root zone that existed in the soil before mining;

(E) The A horizon or other suitable soil materials, which will create a final soil having an equal or greater productive capacity than existed prior to mining, as the final surface soil layer to the thickness of the original soil as determined in paragraph (7)(A)1. of this rule must be replaced in a manner that—

1. Prevents excess compaction of both the surface layer and underlying material and reduction of permeability to less than 0.06 inch per hour in the upper twenty inches (20") of the reconstructed soil profile; and

2. Protects the surface layer from wind and water erosion before it is seeded or planted; and

(F) Nutrients and soil amendments must be applied as needed to establish quick vegetative growth.

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**Original authority 444.535.1(1), RSMo 1978, amended 1988; and 444.810, RSMo 1979, amended 1983.*