

Normal Husbandry Practices for Surface-Mined Lands in Texas

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I. Introduction

This document presents the normal husbandry practices to be used on surface-mined lands in Texas during the extended responsibility period (ERP), in accordance with Tex. Nat. Res. Code §§134.041, .092(a)(19) & (20), and .104 (Vernon's Supp. 1997), and as required by §12.395 of the Texas Coal Mining Regulations (Tex. R.R. Comm'n, 16 Tex. Admin. Code §12.395). Specific approved husbandry practices, such as disease and pest control, application of fertilizers, application and incorporation of other soil amendments, and any other necessary soil and vegetation management activities are listed in this document. Husbandry practices not included in this document may be considered augmentative in nature and, if performed on land that is currently in ERP, may require the land to be removed from the ERP and the ERP to be reinitiated.

The decision whether a particular activity can be classified as a normal husbandry practice will depend both on the regulatory requirements of the Texas Coal Mining Regulations and the post-mine land use.

II. Regulatory Requirements

Under the Texas Surface Coal Mining and Reclamation Act, the permittee is responsible for revegetation success in accordance with the performance standards defined at §§134.092(a)(19) & (20) and 134.104. Texas Coal Mining Regulation §§12.390, .395 and .399, were adopted to implement the performance standards for revegetation success as authorized in the Act. §134.013(a). Section 12.395(c)(4) of the Texas Coal Mining Regulations was adopted to recognize certain management practices that the Commission, in the exercise of its statutory discretion, deems will not further extend the Extended Responsibility Period for revegetation success and bond liability. Under §12.395(c)(4), these practices are termed "normal husbandry practices."

Section 12.395(c)(4) provides as follows:

The Commission may approve selective husbandry practices, excluding augmented seeding, fertilization, or irrigation, provided it obtains prior approval from the Director, Office of Surface Mining Reclamation and Enforcement in accordance with 30 CFR 732.17 (regarding state program amendments; applies to any alteration of an approved state program) that the practices are normal husbandry practices, without extending the period of responsibility for revegetation success and bond liability if such practices can be expected to continue as part of the postmining land use or if the discontinuance of the practices will not reduce the probability of permanent revegetation success. Approved practices shall be normal husbandry practices within the region for unmined land uses similar to the approved postmining land use of the disturbed area, including such practices as disease, pest, and vermin control; and any pruning, reseeding, and transplanting, specifically necessary by such actions.

The Commission intends that "husbandry" and "augment" both have their ordinary meanings as follows:

Husbandry - the control or judicious use of resources: conservation; the cultivation or production of plants and animals: agriculture; the scientific control and management of a branch of farming and especially of domestic animals.

Augment - to make (something well or adequately developed) greater, more numerous, larger, or intense.

III. Conventions for Normal Husbandry Practices

There are several conventions regarding normal husbandry practices for surface-mined lands in Texas:

1. Normal husbandry practices are region-specific and include activities performed by landowners managing lands not disturbed by mining activities. For example, limestone application and incorporation is not practiced anywhere in the South Texas Plains vegetational area; therefore, liming would not be a normal husbandry practice for mines situated in this region. Practices required to address problems that arise from mining-related activities are not considered normal husbandry practices.
2. Normal husbandry practices are those activities that can be expected to continue as part of the postmining land use.
3. Discontinuance of the husbandry practices will not reduce the probability of revegetation success. For example, the discontinuance of maintenance fertilization on grazingland would not result in loss of vegetative cover (it might lead to an alteration of the species composition, however).

Normal husbandry practices are divided into several categories, based on the underlying purpose of the various activities. The general categories consist of the following:

1. General management of soil and vegetation
2. Addition of plant nutrients and other soil amendments
3. Pest management

IV. Normal Husbandry Practices, as Influenced by Land Uses

There are six vegetative community postmining land uses defined in the Texas Coal Mining Regulations: grazingland; pastureland; cropland; forestry; fish and wildlife habitat; and undeveloped land. Each of these land uses has corresponding normal husbandry practices. Grazingland and pastureland are discussed separately in this document, since grazingland is comprised of indigenous vegetation species and pastureland may be planted with adapted, domesticated forage plants or indigenous vegetation species.

A. Grazingland

Grazingland is ...“both grasslands and forest lands where the indigenous vegetation is actively managed for grazing, browsing, or occasional hay production. Land used for facilities in support of ranching operations which are adjacent to or an integral part of these operations is also included” (TAC, Title 16 § 12.3). The grazingland land use is also intended to encompass rangeland uses. Normal husbandry practices for established grazingland areas encompass a wide range of activities

General Management of Soil and Vegetation in Grazingland. The following references define the normal husbandry practices related to management of grazingland:

- Reference Guide for Texas Ranchers. A. McGinty. 1996. Publ. L-5097. Texas Agricultural Extension Service.
- Stocking Rate Decisions. L.D. White and A. McGinty. 1996. Publ. B-5036. Texas Agricultural Extension Service.
- Balancing Forage Demand with Forage Supply. T.R. Troxel and L.D. White. 1996. Publ. B-1606. Texas Agricultural Extension Service.
- Soil and Vegetation Management: Keys to Water Conservation on Rangeland. J.L. Schuster. 1996. Publ. B-6040. Texas Agricultural Extension Service.
- Do You Have Enough Forage? L.D. White. 1995. Publ. L-5141. Texas Agricultural Extension Service.
- Grazing Land Mechanical Treatment, Code 548. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1995.
- Paratill Renovations of Pastures and Hayfields. S.D. Livingston and D.H. Bade. 1996. Texas Agricultural Extension Service.
- Forage Harvest Management, Code 511. National Handbook of Conservation Practices, Natural Resources Conservation Service.
- Prescribed Grazing, Code 528A. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1994.
- Fence, Code 382. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1995.

Addition of Plant Nutrients and Other Soil Amendments. Fertilization of grazingland with established vegetation and any adjustment of minesoil pH should be done according to the following references:

- Nutrient Management, Code 590. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1990.

- Soil Testing Procedures. 1980. Texas Agricultural Extension Service.
- Crop Nutrient Needs in South and Southwest Texas. C. Stichler and M. McFarland. 1997. Publ. B-6053. Texas Agricultural Extension Service.
- Fertilization and Liming to Establish and Maintain Vegetative Cover for Soil Conservation. Charles D. Welch. 1976. Publ. L-1364. Texas Agricultural Extension Service.
- Soil Acidity and Liming. C.D. Welch and C. Gray. 1981. Publ. L-1822. Texas Agricultural Extension Service.
- Managing Crop Nutrients Through Soil, Manure and Effluent Testing. M.L. McFarland, T.L. Provin, and S.E. Feagley. 1997. Publ. L-5175. Texas Agricultural Extension Service.

Pest Management. Pest management includes control of infestations of weeds, diseases, insects, and vermin. The following references define the normal husbandry practices related to pest management of grazingland for established vegetation:

- Pest Management, Code 595A. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1997.
- Brush Management, Code 314. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1995.
- Chemical Weed and Brush Control, Suggestions for Rangeland. T.G. Welch. 1991. Publ. B-1466. Texas Agricultural Extension Service.
- Control of Weeds and Woody Plants on Rangelands. R.W. Bovey, A.F. Wiese, R.A. Evans, H.L. Morton, and H.P. Alley. 1984. Publ. AD-BU-2344. Texas Agricultural Extension Service.
- Prescribed Burning. Code 338. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1994.
- Integrated Brush Management Systems for Texas. C.W. Hanselka, W.T. Hamilton, and B.S. Rector. 1996. Publ. L-5164. Texas Agricultural Extension Service.
- Integrated Pest Management Guide for Texas Forage Crops. C.T. Allen. 1996. Publ. B-1401. Texas Agricultural Extension Service.
- Fire Ants and Their Management. B.M. Drees and S.B. Vinson. 1993. Publ. B-1536. Texas Agricultural Extension Service.

B. Pastureland

Pastureland (or land occasionally cut for hay) is... “land used primarily for the long-term production of adapted, domesticated forage plants to be grazed by livestock or occasionally cut and cured for livestock feed. Land used for facilities in support of pastureland or land occasionally cut for hay which is adjacent to or an integral part of these operations is also included” (TAC, Title 16 § 12.3).

General Management of Soil and Vegetation in Pastureland. The following references define the normal husbandry practices related to management of pastureland:

- Reference Guide for Texas Ranchers. A. McGinty. 1996. Publ. L-5097. Texas Agricultural Extension Service.
- Stocking Rate Decisions. L.D. White and A. McGinty. 1996. Publ. B-5036. Texas Agricultural Extension Service.
- Balancing Forage Demand with Forage Supply. T.R. Troxel and L.D. White. 1996. Publ. B-1606. Texas Agricultural Extension Service.
- Forage bermudagrass: Selection, establishment, and management. C. Stichler and D.H. Bade. 1996. Publ. B-6035. Texas Agricultural Extension Service.
- Do You Have Enough Forage? L.D. White. 1995. Publ. L-5141. Texas Agricultural Extension Service.
- Grazing Land Mechanical Treatment, Code 548. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1995.
- Paratill Renovations of Pastures and Hayfields. S.D. Livingston and D.H. Bade. 1996. Texas Agricultural Extension Service.
- Forage Harvest Management, Code 511. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1997.
- Prescribed Grazing, Code 528A. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1994.
- Fence, Code 382. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1995.

Addition of Plant Nutrients and Other Soil Amendments. Fertilization of pastureland with established vegetation and any adjustment of minesoil pH should be done according to the following references:

- Nutrient Management, Code 590. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1990.
- Soil Testing Procedures. 1980. Texas Agricultural Extension Service.
- Crop Nutrient Needs in South and Southwest Texas. C. Stichler and M. McFarland. 1997. Publ. B-6053. Texas Agricultural Extension Service.
- Fertilization and Liming to Establish and Maintain Vegetative Cover for Soil Conservation. Charles D. Welch. 1976. Publ. L-1364. Texas Agricultural Extension Service.
- Soil Acidity and Liming. C.D. Welch and C. Gray. 1981. Publ. L-1822. Texas Agricultural Extension Service.
- Managing Crop Nutrients Through Soil, Manure and Effluent Testing. M.L. McFarland, T.L. Provin, and S.E. Feagley. 1997. Publ. L-5175. Texas Agricultural Extension Service.
- Fertilizing Summer Perennial Pastures. J.N. Pratt, W.B. Gass, and H.D. Pennington. 1995. Texas Agricultural Extension Service.

Pest Management. Pest management includes control of infestations of weeds, diseases, insects, and vermin. The following references define the normal husbandry practices related to pest management of pastureland for established vegetation:

- Pest Management, Code 595A. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1997.
- Brush Management, Code 314. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1995.
- Chemical Weed and Brush Control, Suggestions for Rangeland. T.G. Welch. 1991. Publ. B-1466. Texas Agricultural Extension Service.
- Control of Weeds and Woody Plants on Rangelands. R.W. Bovey, A.F. Wiese, R.A. Evans, H.L. Morton, and H.P. Alley. 1984. Publ. AD-BU-2344. Texas Agricultural Extension Service.
- Suggestions for Weed Control with Chemicals in Pasture and Forage Crops. R.D. Palmer. Supplement to MP-1060. Texas Agricultural Extension Service.
- Prescribed Burning. Code 338. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1994.
- Integrated Brush Management Systems for Texas. C.W. Hanselka, W.T. Hamilton, and B.S. Rector. 1996. Publ. L-5164. Texas Agricultural Extension Service.
- Integrated Pest Management Guide for Texas Forage Crops. C.T. Allen. 1996. Publ. B-1401. Texas Agricultural Extension Service.
- Fire Ants and Their Management. B.M. Drees and S.B. Vinson. 1993. Publ. B-1536. Texas Agricultural Extension Service.

C. Cropland

Cropland is ... “land used for the production of adapted crops for harvest, alone or in a rotation with grasses and legumes, and includes row crops, small grain crops, hay crops, nursery crops, orchard crops, and other similar specialty crops. Land used for facilities in support of cropland farming operations which is adjacent to or an integral part of these operations is also included” (TAC, Title 16 § 12.3).

Normal husbandry practices for cropland encompass a wide range of activities. The accepted normal husbandry practices include nutrient management, pest management, and reduction of soil compaction.

General Management of Soil and Vegetation in Cropland. The following references define the normal husbandry practices related to management of cropland:

- Bedding, Code 310. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1980.
- Chiseling and Subsoiling, Code 324. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1977.
- Conservation Crop Rotation, Code 328. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1996.
- Contour Buffer Strips, Code 332. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1997.
- Contour Farming, Code 330. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1980.
- Contour Orchard and Other Fruit Area, Code 331. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1978.
- Cover and Green Manure Crop, Code 340. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1977.
- Mulch Till Residue Management, Code 329B. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1994.
- Ridge Till Residue Management, Code 329C. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1994.
- Contour Stripcropping, Code 585. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1978.
- Field Stripcropping, Code 586. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1978.
- Furrow-Diking in Texas. A.E. Colburn and U.U. Alexander. Publ. B-1539 Texas Agricultural Extension Service

Addition of Plant Nutrients and Other Soil Amendments. Fertilization of cropland and any adjustment of minesoil pH should be done according to the following references:

- Nutrient Management, Code 590. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1990.
- Soil Testing Procedures. 1980. Texas Agricultural Extension Service.
- Crop Nutrient Needs in South and Southwest Texas. C. Stichler and M. McFarland. 1997. Publ. B-6053. Texas Agricultural Extension Service.
- Fertilization and Liming to Establish and Maintain Vegetative Cover for Soil Conservation. Charles D. Welch. 1976. Publ. L-1364. Texas Agricultural Extension Service.

- Soil Acidity and Liming. C.D. Welch and C. Gray. 1981. Publ. L-1822. Texas Agricultural Extension Service.
- Managing Crop Nutrients Through Soil, Manure and Effluent Testing. M.L. McFarland, T.L. Provin, and S.E. Feagley. 1997. Publ. L-5175. Texas Agricultural Extension Service.

Pest Management. Pest management includes control of infestations of weeds, diseases, insects, and vermin. The following references define the normal husbandry practices related to pest management of cropland:

- Pest Management, Code 595A. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1997.
- Suggestions for Weed Control with Chemicals in Small Grains. R.D. Palmer. Supplement to MP-1059D. Texas Agricultural Extension Service.
- Suggestions for Weed Control with in Grain Sorghum. P.A. Baumann and D.N. Weaver Texas Agricultural Extension Service
- Suggestions for Weed Control with in Corn. J.E. Bremer and D.N. Weaver Texas Agricultural Extension Service
- Integrated Pest Management Guide for Texas Forage Crops. C.T. Allen. 1996. Publ. B-1401. Texas Agricultural Extension Service.
- Texas Guide for Controlling Insects on Commercial Vegetable Crops. A.N. Sparks, Jr. Publ. B-1305. Texas Agricultural Extension Service.
- Weed Control in Vegetable, Fruit and Nut Crops. L. Brandenberger and J. Sauls. Publ. B-5022. Texas Agricultural Extension Service.
- Texas Plant Diseases Handbook – Chemical Control Supplement for Vegetables and Herbs. M.C. Black and A.M. Sanchez. Texas Agricultural Extension Service.

D. Forestry

Forestry is... “land used or managed for the long-term production of wood, wood fiber, or wood-derived products. Land used for facilities in support of forest harvest and management operations which is adjacent to or an integral part of these operations is also included” (TAC, Title 16 § 12.3).

General Management of Forestry. The following references define the normal husbandry practices related to management of forestry:

- Tree/Shrub Pruning, Code 660A. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1997.
- Stocking levels for commercial forestland, Correspondence from E.H. Barron to Surface Mining and Reclamation Division, March 10, 1995.
- Texas Forestry Best Management Practices. Texas Forestry Association. 1997.

Addition of Plant Nutrients and Other Soil Amendments. Fertilization and any adjustment of minesoil pH should be done according to the following references:

- Nutrient Management, Code 590. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1990.
- Soil Testing Procedures. 1980. Texas Agricultural Extension Service.
- Fertilization and Liming to Establish and Maintain Vegetative Cover for Soil Conservation. Charles D. Welch. 1976. Publ. L-1364. Texas Agricultural Extension Service.
- Soil Acidity and Liming. C.D. Welch and C. Gray. 1981. Publ. L-1822. Texas Agricultural Extension Service.
- Managing Crop Nutrients Through Soil, Manure and Effluent Testing. M.L. McFarland, T.L. Provin, and S.E. Feagley. 1997. Publ. L-5175. Texas Agricultural Extension Service.

Pest Management. Pest management includes control of infestations of weeds, diseases, insects, and vermin. The following references define the normal husbandry practices related to pest management in forestry:

- Pest Management, Code 595A. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1997.
- Weed Control in Windbreaks. M.J. Walterscheidt and D.N. Weaver. Publ. L-2234. Texas Agricultural Extension Service.
- Wood-boring Insects of Trees and Shrubs. B.M. Drees, J.A. Jackman, and M.E. Merchant. Publ. B-5086. Texas Agricultural Extension Service.
- Pine Webworm. Texas Forest Service. 1979. Circular 239.
- Fall Webworm. Texas Forest Service. 1979. Circular 240.
- Sawflies. Texas Forest Service. 1979. Circular 241.
- Cut and Leave: A recommended method to reduce losses from the southern pine beetle. Texas Forest Service. 1985. Circular 223 (revised).
- Salvage: A method to reduce losses from the southern pine beetle. Texas Forest Service. 1985. Circular 225 (revised).

E. Fish and Wildlife Habitat

Fish and wildlife habitat is... “land dedicated wholly or partially to the production, protection, or management of species of fish or wildlife” (TAC, Title 16 § 12.3).

General Management of Fish and Wildlife Habitat. The following references define the normal husbandry practices related to management of fish and wildlife habitat:

- Tree/Shrub Pruning, Code 660A. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1997.
- Recommendations for fish and wildlife habitat (includes stocking rates), Correspondence from R.C. Telfair, III. to the Surface Mining and Reclamation Division. February 3, 1995.
- Prescribed Burning. Code 338. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1994.

Bobwhite Quail and Other Grassland Bird Species Habitat Management Practices.

Native Grass and Forb Restoration

- Restoring Native Grasslands. Hays, K. B, M. Wagner, F. Smeins, and R. N. Wilkins. Texas Cooperative Extension, Texas A&M University, College Station, USA. Extension Publication L-5456.
- Native Warm season Grasses for Virginia and North Carolina: Benefits for Livestock and Wildlife. Capel, S. W. 1995. Virginia Department of Game and Inland Fisheries, Richmond, USA.

Grazing

- “Bobwhites and Black Baldies: Grazing as a Tool for Quail Management.” Rollins, D., and L. A. Brennan. 2004. The Cattleman, pages 60-70.
- Cattle Management to Enhance Wildlife Habitat in South Texas. J. A. Ortega-S., and F. C. Bryant. 2005. Caesar Kleberg Wildlife Management Institute, Texas A&M University-Kingsville, USA. Wildlife Management Bulletin No. 6.

Patch Burning

- Application of the Fire–Grazing Interaction to Restore a Shifting Mosaic on Tallgrass Prairie. Fuhlendorf, S. D., and D. M. Engle. 2004. Journal of Applied Ecology 41:604-614.
- Patch Burning Effects on Grazing Distribution. Vermeire, L. T., R. B. Mitchell, S. D. Fuhlendorf, and R. L. Gillen. 2004. Journal of Range Management 57:248-252.
- Restoring Heterogeneity on Rangelands: Ecosystem Management Based on Evolutionary Grazing Patterns. Fuhlendorf, S. D., and D. M. Engle. Bioscience 51:625-632.

Strip Discing

- Beef, Brush, and Bobwhites: Quail Management in Cattle Country. Guthery, F. S. 1986. Caesar Kleberg Wildlife Research Institute Press, Kingsville, Texas, USA.

Brush Management

- Invasion of Oklahoma Rangelands and Forests by Eastern Redcedar and Ashe Juniper. Engle, D. M., T. G. Bidwell, and M. E. Mosely. Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, USA. Extension Publication E-947.
- Managing Pines for Profit and Wildlife. Puckett, K. M., P. D. Keyser, H. L. Haney, Jr., C. L. Godfrey, S. F. Warner, and S. W. Capel. 1998. Virginia Department of Game and Inland Fisheries, Richmond, USA. Wildlife Information Publication No. 98-1.

Prescribed Burning

- Fire as a Tool for Managing Wildlife Habitat in Texas. Brown, C. G., and D. Rollins, editors. 2005. September 14-16, 2005, Kerrville, Texas. Texas Cooperative Extension, San Angelo, USA.
- Fire and Quail in Texas. Perez, R. M, and S. J. DeMaso. 2005. Pages 107-119 in C. G. Brown and D. Rollins, editors. Fire as a tool for managing wildlife habitat in Texas. Texas Cooperative Extension, San Angelo, USA.
- Using Prescribed Fire in Oklahoma. Bidwell, T. G., and R. E. Masters. Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, USA. Extension Publication E-927.

Bobwhite Ecology and Management

- Ecology and Management of Texas Quails. Brennan, L. A. Editor. 2006. Texas A&M University Press. College Station, USA.
- Ecology and Management of the Bobwhite Quail in Alabama. Stewart, S. 2005. Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries, Montgomery, USA.
- Bobwhites on Oklahoma Farms and Ranches: Management Options for Landowners. Guthery, F. S., R. E. Masters, and M. D. Porter. 2002. Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, USA. Extension Publication E-968.
- Bobwhite Quail Habitat Evaluation and Management Guide. Bidwell, T. G., R. E. Masters, M. Sams, and S. Tulley. Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, USA. Extension Publication E-904.
- The Technology of Bobwhite Management: The Theory Behind the Practice. Guthery, F. S. 2000. Iowa State Press, Ames, Iowa USA.
- Beef, Brush, and Bobwhites: Quail Management in Cattle Country. Guthery, F. S. 1986. Caesar Kleberg Wildlife Research Institute Press, Kingsville, Texas, USA.

Addition of Plant Nutrients and Other Soil Amendments. Fertilization and any adjustment of minesoil pH should be done according to the following references:

- Nutrient Management, Code 590. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1990.
- Soil Testing Procedures. 1980. Texas Agricultural Extension Service.

- Fertilization and Liming to Establish and Maintain Vegetative Cover for Soil Conservation. Charles D. Welch. 1976. Publ. L-1364. Texas Agricultural Extension Service.
- Soil Acidity and Liming. C.D. Welch and C. Gray. 1981. Publ. L-1822. Texas Agricultural Extension Service.
- Managing Crop Nutrients Through Soil, Manure and Effluent Testing. M.L. McFarland, T.L. Provin, and S.E. Feagley. 1997. Publ. L-5175. Texas Agricultural Extension Service.

Pest Management. Pest management includes control of infestations of weeds, diseases, insects, and vermin. The following references define the normal husbandry practices related to pest management in fish and wildlife habitat:

- Pest Management, Code 595A. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1997.
- Brush Management, Code 314. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1995.
- Chemical Weed and Brush Control, Suggestions for Rangeland. T.G. Welch. 1991. Publ. B-1466. Texas Agricultural Extension Service.
- Control of Weeds and Woody Plants on Rangelands. R.W. Bovey, A.F. Wiese, R.A. Evans, H.L. Morton, and H.P. Alley. 1984. Publ. AD-BU-2344. Texas Agricultural Extension Service.
- Prescribed Burning. Code 338. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1994.
- Integrated Brush Management Systems for Texas. C.W. Hanselka, W.T. Hamilton, and B.S. Rector. 1996. Publ. L-5164. Texas Agricultural Extension Service.
- Fire Ants and Their Management. B.M. Drees and S.B. Vinson. 1993. Publ. B-1536. Texas Agricultural Extension Service.
- Weed Control in Windbreaks. M.J. Walterscheidt and D.N. Weaver. Publ. L-2234. Texas Agricultural Extension Service.
- Wood-boring Insects of Trees and Shrubs. B.M. Drees, J.A. Jackman, and M.E. Merchant. Publ. B-5086. Texas Agricultural Extension Service.
- Cut and Leave: A recommended method to reduce losses from the southern pine beetle. Texas Forest Service. 1985. Circular 223 (revised).
- Salvage: A method to reduce losses from the southern pine beetle. Texas Forest Service. 1985. Circular 225 (revised).

F. Undeveloped Land

Undeveloped land (or no current use or land management) is... “land that is undeveloped or, if previously developed, land that has been allowed to return naturally to an undeveloped state or has been allowed to return to forest through natural succession” (TAC, Title 16 § 12.3).

The definition of undeveloped land precludes any type of management inputs during the ERP. The desired selection and density of reclamation species must have been planted before undeveloped land is placed into the ERP, since that land use does not allow any type of management activities. However, limited erosion repair is allowed (see Section V, Repair of Erosion and Reseeding Activities).

V. Repair of Damaged Reclaimed Areas and Removal of Structures

Erosion of landscapes is a natural process; however, the rate and extent of its occurrence are dependent on relief, type of geologic material, precipitation, and vegetative cover. Appropriate, effective reclamation planning takes these factors into account and should produce a regrading plan that will minimize potential erosion problems.

Additionally, reclaimed sites may experience some type of damage to established vegetation at some point during the period of extended responsibility period. Examples of such damage would include small slips, channel erosion, and unauthorized access. This damage is not normally a result of failure of vegetation or inadequate vegetation practices, and the degree of damage varies from site to site.

The Commission may consider damage repair (from erosion or otherwise) as a normal husbandry practice, provided that the damage is not caused by a lack of planning, design, or implementation of the mining and reclamation plan. The total acreage of repaired areas cannot exceed three contiguous acres or ten percent of the total land of that ERA (extended responsibility area). In cases of erosion, repairs may be considered non-augmentative if rill and gully damage was caused by precipitation exceeding a 10 year/24-hour event or damage occurred before the first two years (5-year ERP; areas with annual precipitation > 26 inches) or four years (10-year ERP; areas with annual precipitation ≤ 26 inches). After the first two years (5-year ERP) or four years (10-year ERP), total acreage for erosion repair cannot exceed one contiguous acre or two percent of the total land of that ERA.

Regrading and revegetation of areas where approved, temporary structures such as sediment ponds, roads, and small diversions have been removed will be considered as non-augmentative, even though the removal and reseeding of the structures is not a normal husbandry practice. Any structure that may pose significant potential for reclamation problems upon removal is excluded and will require a separate ERP. This determination will be made by the Director of the Surface Mining and Reclamation Division on a case-by-case basis.

Overseeding of winter cover crops and/or summer annuals, into existing vegetation, is considered a normal husbandry practice (these should be included in the mining company's reclamation plan).

Restocking of woody species is allowed, as long as the time and quantity of restocking is in compliance with the regulations in TAC, Title 16 §12.395(b)(3)(B).

The Commission will require that areas undergoing damage repair or removal of structures to be fully revegetated with permanent, permit-approved species for at least one year before final bond release and meet all vegetation cover and productivity success standards.

General Management of Erosion Repair and Reseeded Areas. The following references define the normal husbandry practices related to management of erosion repair and reseeded areas:

- Critical Area Planting, Code 342. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1977.
- Mulching, Code 484. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1977.

- Conservation Cover, Code 327. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1987
- Pasture and Hay Planting, Code 512. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1995
- Range Planting, Code 550. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1995.

Addition of Plant Nutrients and Other Soil Amendments. Fertilization and any adjustment of minesoil pH should be done according to the following references:

- Nutrient Management, Code 590. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1990.
- Soil Testing Procedures. 1980. Texas Agricultural Extension Service.
- Fertilization and Liming to Establish and Maintain Vegetative Cover for Soil Conservation. Charles D. Welch. 1976. Publ. L-1364. Texas Agricultural Extension Service.
- Managing Crop Nutrients Through Soil, Manure and Effluent Testing. M.L. McFarland, T.L. Provin, and S.E. Feagley. 1997. Publ. L-5175. Texas Agricultural Extension Service.

Pest Management. Pest management includes control of infestations of weeds, diseases, insects, and vermin. The following references define the normal husbandry practices related to pest management for erosion repair and reseeded areas:

- Pest Management, Code 595A. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1997.
- Brush Management, Code 314. National Handbook of Conservation Practices, Natural Resources Conservation Service. 1995.
- Chemical Weed and Brush Control, Suggestions for Rangeland. T.G. Welch. 1991. Publ. B-1466. Texas Agricultural Extension Service.
- Control of Weeds and Woody Plants on Rangelands. R.W. Bovey, A.F. Wiese, R.A. Evans, H.L. Morton, and H.P. Alley. 1984. Publ. AD-BU-2344. Texas Agricultural Extension Service.
- Integrated Brush Management Systems for Texas. C.W. Hanselka, W.T. Hamilton, and B.S. Rector. 1996. Publ. L-5164. Texas Agricultural Extension Service.
- Integrated Pest Management Guide for Texas Forage Crops. C.T. Allen. 1996. Publ. B-1401. Texas Agricultural Extension Service.
- Fire Ants and Their Management. B.M. Drees and S.B. Vinson. 1993. Publ. B-1536. Texas Agricultural Extension Service.
- Suggestions for Weed Control with Chemicals in Pasture and Forage Crops. R.D. Palmer. Supplement to MP-1060. Texas Agricultural Extension Service.

VI. Non-Normal and Unacceptable Husbandry Practices or Augmentation

There are several activities that are non-normal husbandry practices and will be considered unacceptable husbandry practices that, if performed on areas within the ERP, will cause the ERP for the affected area to be reinitiated. Acceptable husbandry practices are activities that are normally performed by landowners managing unmined land. Practices required to address problems that arise from mining-related activities are not considered normal husbandry practices.

The general requirements of revegetation require that the established vegetative cover be: “diverse, effective, and permanent”; “capable of stabilizing the soil surface from erosion”; and “be capable of self-regeneration and plant succession” [TAC, Title 16 §12.390(a)(1,4) and (b)(3)]. Those requirements are made in an effort to maximize the ecosystem stability of the reclaimed landscape. This stability increases a landscape’s resistance to disturbance; therefore, there is a much lower probability of complete vegetative failure during years of excessive drought or other extreme weather conditions.

The following activities are not allowed (and will be considered unacceptable husbandry practices or augmentation) and therefore cause an affected area to have the ERP reinitiated:

- Reseeding of areas devoid of vegetation due to acid minesoils;
- irrigation; supplemental watering of herbaceous vegetation; and supplemental watering of large woody stock later than two years after planting;
- all application and incorporation of alkaline amendments; except for non-excessive application (compared to levels recommended in TAEX publications) to the “plow layer” of the minesoil (approximately a 6-inch depth); and
- excessive application of plant nutrients (compared to levels recommended in TAEX and NRCS publications), related to plant species, land use, and management level.

Evaluation that unacceptable husbandry practices or augmentation may have taken place will be accomplished using the following information:

- field inspection reports: information related to erosion repair areas, areas requiring reseeding/replanting, land use, type of damage, extent of damage, evidence or visual observation of the application of large amounts of alkaline materials (in excess of 5 tons CaCO₃ equivalent/acre) and presence of acid minesoils and/or pyritic material weathering byproducts.
- minesoil chemical analysis data: excessive levels of several plant macronutrients (N or P), as related to native soils in the immediate area; extremely high levels of plant-available calcium (Ca). Determination that levels of the previously-mentioned analytical parameters are excessive will be done using information from and analytical methodology used by the Texas Agricultural Extension Service.

VII. Literature Cited

- Allen, C.T. 1996. Integrated pest management guide for Texas forage crops. Publ. B-1401. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Barron, E.H. 1995. Correspondence, dated March 10, 1995, from Texas Forest Service to M.B. Hodgkiss, Surface Mining and Reclamation Division, Railroad Commission of Texas.
- Baumann, P.A. and D.N. Weaver. Suggestions for weed control with in sorghum. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Black, M.C. and A.M. Sanchez. 1996. Texas plant diseases handbook – Chemical control supplement for vegetables and herbs. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Bovey, R.W., A.F. Wiese, R.A. Evans, H.L. Morton, and H.P. Alley. 1984. Control of weeds and woody plants on rangelands. Publ. AD-BU-2344. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Brandenberger, L. and J. Sauls. 1995. Weed control in vegetable, fruit and nut crops. Publ. B-5022. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Bremer, J.E. and D.N. Weaver. Suggestions for weed control with in corn. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Colburn, A.E. and U.U. Alexander. 1986. Furrow-diking in Texas. Publ. B-1539 Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Drees, B.M., J.A. Jackman, and M.E. Merchant. 1994. Wood-boring insects of trees and shrubs. Publ. B-5086. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Drees, B.M. and S.B. Vinson. 1993. Fire ants and their management. Publ. B-1536. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Hanselka, C.W., W.T. Hamilton, and B.S. Rector. 1996. Integrated brush management systems for Texas. Publ. L-5164. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Livingston, S.D. and D.H. Bade. 1996. Paratill Renovations of Pastures and Hayfields. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- McFarland, M.L., T.L. Provin, and S.E. Feagley. 1997. Managing crop nutrients through soil, manure and effluent testing. Publ. L-5175. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- McGinty, A. 1996. Reference guide for Texas ranchers. Publ. L-5097. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.

- Palmer, R.D. 1987. Suggestions for weed control with chemicals in small grains. Supplement to MP-1059D. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Palmer, R.D. 1987. Suggestions for weed control with chemicals in pasture and forage crops. Supplement to MP-1060. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Pratt, J.N. W.B. Gass, and H.D. Pennington. 1995. Fertilizing summer perennial pastures.. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Schuster, J.L. 1996. Soil and vegetation management: Keys to water conservation on rangeland. Publ. B-6040. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Soil Survey Division Staff. 1993. Soil survey manual. USDA Handbook No. 18. U.S. Government Printing Office. Washington, D.C.
- Sparks, Jr., A.N. 1997. Texas guide for controlling insects on commercial vegetable crops. Publ. B-1305. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Stichler, C. and D.H. Bade. 1996. Forage bermudagrass: Selection, establishment, and management. Publ. B-6035. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Stichler, C. and M. McFarland. 1997. Crop nutrient needs in south and southwest Texas. Publ. B-6053. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Telfair, Ray C. 1995. Correspondence, dated February 3, 1995, from Texas Parks and Wildlife Department to M.B. Hodgkiss, Surface Mining and Reclamation Division, Railroad Commission of Texas.
- Texas Agricultural Extension Service. 1980. Soil testing procedures. The Texas A&M University System. College Station, TX.
- Texas Forest Service. 1979. Fall webworm. Circular 240. The Texas A&M University System. College Station, TX.
- Texas Forest Service. 1979. Pine webworm. Circular 239. The Texas A&M University System. College Station, TX.
- Texas Forest Service. 1979. Sawflies. Circular 241. The Texas A&M University System. College Station, TX.
- Texas Forest Service. 1985. Cut and leave: A recommended method to reduce losses from the southern pine beetle. Circular 223 (revised). The Texas A&M University System. College Station, TX.

- Texas Forest Service. 1985. Salvage: A method to reduce losses from the southern pine beetle. Circular 225 (revised). The Texas A&M University System. College Station, TX.
- Texas Forestry Association. 1997. Texas forestry best management practices. P.O. Box 1488, Lufkin, TX.
- Troxel, T.R. and L.D. White. 1996. Balancing forage demand with forage supply. B-1606. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- USDA-NRCS. 1977. Chiseling and subsoiling, Code 324. National Handbook of Conservation Practices, Natural Resources Conservation Service.
- USDA-NRCS. 1977. Cover and green manure crop, Code 340. National Handbook of Conservation Practices, Natural Resources Conservation Service.
- USDA-NRCS. 1977. Critical area planting, Code 342. National Handbook of Conservation Practices, Natural Resources Conservation Service.
- USDA-NRCS. 1977. Mulching, Code 484. National Handbook of Conservation Practices, Natural Resources Conservation Service.
- USDA-NRCS. 1978. Contour orchard and other fruit area, Code 331. National Handbook of Conservation Practices, Natural Resources Conservation Service.
- USDA-NRCS. 1978. Contour stripcropping, Code 585. National Handbook of Conservation Practices, Natural Resources Conservation Service.
- USDA-NRCS. 1978. Field stripcropping, Code 586. National Handbook of Conservation Practices, Natural Resources Conservation Service.
- USDA-NRCS. 1980. Bedding, Code 310. National Handbook of Conservation Practices, Natural Resources Conservation Service.
- USDA-NRCS. 1980. Contour farming, Code 330. National Handbook of Conservation Practices, Natural Resources Conservation Service.
- USDA-NRCS. 1987. Conservation cover, Code 327. National Handbook of Conservation Practices, Natural Resources Conservation Service. Washington, D.C.
- USDA-NRCS. 1990. Nutrient management, Code 590. National Handbook of Conservation Practices, Natural Resources Conservation Service. Washington, D.C.
- USDA-NRCS. 1994. Mulch till residue management, Code 329B. National Handbook of Conservation Practices, Natural Resources Conservation Service.
- USDA-NRCS. 1994. Ridge till residue management, Code 329C. National Handbook of Conservation Practices, Natural Resources Conservation Service.
- USDA-NRCS. 1994. Prescribed burning, Code 338. National Handbook of Conservation Practices, Natural Resources Conservation Service. Washington, D.C.

- USDA-NRCS. 1994. Prescribed grazing, Code 528A. National Handbook of Conservation Practices, Natural Resources Conservation Service. Washington, D.C.
- USDA-NRCS. 1995. Brush management, Code 314. National Handbook of Conservation Practices, Natural Resources Conservation Service. Washington, D.C.
- USDA-NRCS. 1995. Fence, Code 382. National Handbook of Conservation Practices, Natural Resources Conservation Service. Washington, D.C.
- USDA-NRCS. 1995. Pasture and hay planting, Code 512. National Handbook of Conservation Practices, Natural Resources Conservation Service. Washington, D.C.
- USDA-NRCS. 1995. Grazing land mechanical treatment, Code 548. National Handbook of Conservation Practices, Natural Resources Conservation Service. Washington, D.C.
- USDA-NRCS. 1995. Range Planting, Code 550. National Handbook of Conservation Practices, Natural Resources Conservation Service. Washington, D.C.
- USDA-NRCS. 1996. Conservation crop rotation, Code 328. National Handbook of Conservation Practices, Natural Resources Conservation Service.
- USDA-NRCS. 1997. Contour buffer strips, Code 332. National Handbook of Conservation Practices, Natural Resources Conservation Service.
- USDA-NRCS. 1997. Forage harvest management, Code 511. National Handbook of Conservation Practices, Natural Resources Conservation Service. Washington, D.C.
- USDA-NRCS. 1997. Pest management, Code 595A. National Handbook of Conservation Practices, Natural Resources Conservation Service. Washington, D.C.
- USDA-NRCS. 1997. Tree/shrub pruning, Code 660A. National Handbook of Conservation Practices, Natural Resources Conservation Service. Washington, D.C.
- Walterscheidt, M.J. and D.N. Weaver. 1987. Weed control in windbreaks. Publ. L-2234. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Welch, C.D. 1976. Fertilization and liming to establish and maintain vegetative cover for soil conservation. Publ. L-1364. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Welch, C.D. and C. Gray. 1981. Soil acidity and liming. Publ. L-1822. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- Welch, T.G. 1991. Chemical weed and brush control, suggestions for rangeland. Publ. B-1466. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- White, L.D. 1995. Do you have enough forage? Publ. L-5141. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.
- White, L.D. and A. McGinty. 1996. Stocking rate decisions. Publ. B-5036. Texas Agricultural Extension Service. The Texas A&M University System. College Station, TX.

