Oklahoma Department of Mines

Bond Release Guidelines

These guidelines, written in accordance with Parts 460:20-43, and 460:20-45 of the Oklahoma Permanent Regulatory Program Regulations and required by Section 460:20-43-43 (a)(1), apply to all permitted lands which have been disturbed during mining operations.

October 8, 2014

I. All Land Uses - General Requirements

A. Liability Period

1. The extended period of responsibility for vegetation on the reclaimed area shall last for not less than five full years. The period shall begin with the successful completion of initial planting of all required permanent vegetation species on a site.

2.If a permitted area is planted in separate portions, the liability period shall begin with the successful completion of the initial planting of all required permanent vegetation species on the last portion of the disturbed permit area or, if applicable, an increment of the permit area.

3. An augmentation practice shall restart the liability period on the permit or, if applicable, the increment of the permit.

B. Timely Submission of Vegetation Data

1. Vegetation data (ground cover and production) must be submitted during a time or season (generally within 30 days) that allows the Department to verify its accuracy before conditions excessively alter the vegetation status in the field. Vegetation data should be collected before the dominant species on the reclaimed area or reference area have entered their periods of dormancy. Vegetation data which is not submitted to the Department in a timely fashion, either separately or as part of a bond release application, cannot be used to document revegetation success.

2. The data, if not submitted as part of a formal Phase II or Phase III bond release application, must be accompanied by a cover letter which includes the permit number, company, name of data collector, date of the survey and a specific legal description (which can include a map) of the survey area. The submission must include at least one copy of the raw data and two copies of the data summary. Data not included as part of a formal bond release application should be marked "Attention: Technical Services."

C. Reference Areas

1. Reference areas are unmined land units on the permit area which are maintained for the purpose of measuring successful attainment of vegetative ground cover, productivity or plant species diversity on mined lands. Reference areas must be representative of geology, soil, slope and vegetation on the mined area of the permit. Management of reference areas must be comparable to that required for the post-mining land use of the mined permit area.

2. Species composition of the vegetation of the reference area and of the reclaimed area must be similar in order to achieve a valid comparison.

3. Reference areas approved in the permit application package which have not been appropriately maintained during the bond liability period may lose eligibility as a comparison method.

D. Phase I

1. Schedule

a. Applications for Phase I bond release may be submitted after the requirements below have been met on an increment or an identifiable unit (see definition in Appendix A) of the permit area.

b. The Phase I application form is provided in Appendix S.

2. Backfilling and Grading

a. All backfilling and grading shall be completed in accordance with the approved reclamation plans. Approximate original contour (AOC) shall be achieved. Exceptions to AOC may include impoundments or other structures which have been approved by the Department.

b. Slopes shall not exceed those approved in the permit application package or allowed by applicable performance standards.

3. Topsoil Replacement

a. The permittee has the option of demonstrating successful topsoil replacement in either the Phase I or the Phase II bond release application. If significant amounts of topsoil are still stockpiled by the time of application for a Phase I bond release, beyond that allowed in paragraph (b) below, the Department may recalculate the bond necessary for the permit area.

b. Topsoil shall be replaced to the depth specified in the approved reclamation plan of the permit application package. The operator can retain stockpiled topsoil sufficient to provide for reasonable site maintenance or to cover temporary ponds, diversions or other areas to be reclaimed after achievement of drainage control.

c. If no average replaced topsoil depth was specified in the reclamation plan, one must be calculated and included, along with the method of calculation, in the bond release application. This calculated depth can be based on on-site, pre-mine topsoil data included in the permit application package. Or, if no such data is available, a depth estimate can be calculated from information published in the appropriate Soil Conservation Service county soil survey. This method of calculation is demonstrated in Appendix B.

d. Successful topsoil replacement shall be demonstrated in the bond release application with topsoil depth data collected from the reclaimed area.

4. Subsoil Replacement

a. Any required subsoil replacement must be accomplished prior to Phase I bond release. Subsoil salvage and replacement is routinely required only on prime farmland cropland. However, on certain non-prime farmland sites the Department may have required, as part of the approved reclamation plan, the replacement of subsoil to a specified depth. In these cases, and on prime farmland, the application must include data which demonstrates that subsoil has been replaced to the depth specified.

b. The operator can retain stockpiled subsoil sufficient to fill in temporary ponds, diversions or other areas still necessary for drainage control after Phase I bond release.

5. Drainage Control

a. All drainage control structures shall be completed, certified and maintained in accordance with the approved reclamation plan and the performance standards.

b. Permanent stream diversions or restored stream channels shall be constructed in accordance with the reclamation plan and applicable performance standards.

c. Temporary ponds must be maintained for at least two years after the last augmented seeding of the permit or increment area. Also, they cannot be removed until after attainment of Phase II vegetation standards on the drainage area has been verified by the Department.

6. Structures and Facilities

a. All coal pads, office and maintenance areas and those haul roads, final pits, structures and facilities not approved as permanent (except for temporary drainage control structures) shall be removed from those areas for which Phase I bond release is being applied.

b. Approved permanent impoundments must be holding water by the time of Phase I bond release.

E. Phase II

1. Schedule

a. Applications for Phase II bond release may be submitted after the first full year

of the bond liability period (except for certain cases discussed below) and when the requirements below have been met on an increment or an identifiable unit (see Appendix A) of the permit area.

b. The Phase II application form is provided in Appendix T.

2. Topsoil Replacement

a. If successful topsoil replacement was not demonstrated at the time of Phase I bond release on any part of the permit site, it must be demonstrated in the Phase II application.

b. Refer to the requirements for topsoil replacement (Phase I general requirements) for details regarding the topsoil information which must be supplied in the Phase II bond release application.

3. Revegetation

a. All permanent vegetation species, including grasses, trees and shrubs shall have been planted on the site in accordance with the approved reclamation plan and the land uses approved for the site. The applicant must demonstrate achievement of specific revegetation success standards which are stated either in the approved reclamation plan or elsewhere in this document under the heading for specific land uses. Refer to appendices C through R for approved methods of data collection and analysis.

b. Bare areas (any area with less than 30% desirable ground cover) shall not exceed one-sixteenth acre in size and total not more than one percent of the area planted. Exceptions may be made only in cases of approved industrial or commercial post-mine land uses which require such areas. Ground cover must be sufficient to control erosion.

c. For areas previously disturbed by mining that were not reclaimed to the requirements of the permanent regulatory program regulations (i.e., regraded and topsoil replaced) and that are remined or otherwise disturbed by mining, ground cover must be at least 70% approved vegetation species and must be sufficient to control erosion. (See Appendices for approved species.)

4. Vegetation Sampling Procedures

a. Successful attainment of specific revegetation standards must be demonstrated to the Department using approved sampling procedures as shown in Appendices D, F, and P of this document.

b. Methods which use sub-sampling of the revegetated area (as opposed to harvesting of the entire area) must be based on randomized selection of sampling

sites. See Appendix C for an example of an approved method of randomization.

c. Surveys must include an adequate number of samples. Minimum adequate sample size can be calculated using the method in Appendix J and Q. All surveys must include at least ten samples, except for row crops on prime or non-prime farmland (See Appendix Q).

d. If the sample mean from the mined area does not equal or exceed the success standard, the sample data must be subjected to a statistical analysis which uses a 90-percent confidence interval (i.e., a one-sided t-test with a 0.10 alpha error). See Appendices H, I, J, K, L, and M.

5. Drainage Control and Impoundments

a. No lands can be released from Phase II liability so long as they are contributing suspended solids or acid drainage to streamflow or runoff outside the permit area in excess of the standards set forth in the regulations.

b. Temporary ponds must be maintained for at least two years after the last augmented seeding of the permit or increment area. Also, they cannot be removed until after attainment of Phase II vegetation standards on the drainage area has been verified by the Department.

F. Phase III

1. Schedule

a. Applications for Phase III bond release may be submitted after the fifth full year of the bond liability period upon the completion of all coal mining and reclamation activities and when the requirements of the permit and those listed below have been met on the entire permit area or on an increment of the permit area. Only permits with incremental bonding are allowed the opportunity of being granted a partial Phase III bond release.

b. The Phase III application form is provided in Appendix U.

2. Post-Mining Land Uses

a. All post-mining land uses of the permit area shall have matched those specified in the approved reclamation plan and have met the requirements of 816.133 or 817.133 and be capable of sustaining the approved post-mining land use.

3. Revegetation

a. All revegetation requirements shall have been met in accordance with the regulations, the approved reclamation plan and the revegetation success standards

required for each land use on the site.

b. The applicant must demonstrate achievement of specific revegetation success standards required for each land use (refer to specific land use requirements below). Refer to the general revegetation requirements of Parts I.E.3. and I.E.4. and appendices C through Q.

c. Revegetation standards used to document Phase III success must be the same as those used for Phase II. That is, usage of either reference areas or technical standards must be consistent. Refer to appendices C through Q.

d. For areas previously disturbed by mining that were not reclaimed to the requirements of the permanent regulatory program regulations (i.e., regraded and topsoil replaced) and that are remined or otherwise disturbed by mining,the ground cover on the reclaimed area cannot be less than the ground cover existing prior to redisturbance. If the ground cover prior to redisturbance was less than 70%, the ground cover on the reclaimed area must be at least 70% vegetation and must be sufficient to control erosion.

4. Vegetation Sampling Procedures

a. Successful attainment of specific revegetation standards must be demonstrated to the Department using approved sampling procedures as shown in Appendices D, F, and Q of this document.

b. Methods which use sub-sampling of the revegetated area (as opposed to harvesting of the entire area) must be based on randomized selection of sampling sites. See Appendix C for an example of an approved method of randomization.

c. Surveys must include an adequate number of samples. Minimum adequate sample size can be calculated using the method in Appendix J and Q. All surveys must include at least ten samples, except for row crops on prime and non-prime farmland (See Appendix Q).

d. If the sample mean from the mined area does not equal or exceed the success standard, the sample data must be subjected to a statistical analysis which uses a 90-percent confidence interval (i.e., a one-sided t-test with a 0.10 alpha error). See Appendices H, I, K, L, and M.

5. Drainage Control and Impoundments

a. All temporary ponds and diversions shall have been backfilled, regraded, retopsoiled and revegetated in accordance with the approved reclamation and revegetation plans.

b. All impoundments, ponds, diversions or treatment facilities to be left on the site

after Phase III bond release shall have been specifically approved by the Department as permanent structures. The quality of water in all permanent impoundments shall be suitable on a permanent basis for its approved use. The facilities shall meet applicable water quality effluent limitations. Also, discharge of water from the structures shall not degrade the quality of receiving waters to less than the water quality standards pursuant to applicable State and Federal laws.

c. All permanent ponds, diversions, impoundments and treatment facilities shall have been renovated if necessary to achieve the approved land use and to meet the criteria specified (such as storage capacity) in the detailed design plan. Adequate storage capacity or permanent pool elevations shall have been achieved in all permanent impoundments.

II. Pastureland - Specific Requirements

A. Phase II

1. Ground Cover

a. On areas with a post-mining land use of pastureland, the applicant must demonstrate that the reclaimed area has had acceptable ground cover during the growing season for at least one year during the liability period, except the first year.

b. Ground cover shall be considered acceptable when it is not less than ninety percent of the success standard.

c. When using a reference area, the success standard is the percentage of ground cover of desirable living plants on the reference area.

d. For permits using reference areas, at no time shall an area reclaimed to a land use of pastureland be released from Phase II or III liability if the ground cover is composed of less than 70 percent of desirable living plants, regardless of the condition of the reference area.

e. When a reference area is not used, the technical success standard is ninety percent ground cover of desirable living plants. Desirable plants are defined in Appendix A. A non-inclusive list of undesirable plant species is provided in Appendix E.

f. No more than ten percent litter and ten percent desirable annual or biennial forbs can be counted as acceptable ground cover in any single sampling unit (e.g., transect or quadrant).

g. Perennial species that are not listed in the approved reclamation plan but which

the Department approves as being desirable and compatible with the post-mining land use can make up to 20% of total ground cover not to exceed 5% ground cover by any one of these species.

h. The approved reclamation plan contained in the permit application package may include other specific restrictions or allowances not stated above.

2. Productivity

a. Productivity data is not required as part of the demonstration of revegetation success for Phase II release on pastureland. However, the application can include productivity data in anticipation of a future Phase III bond release application.

B. Phase III

1. Ground Cover

a. The applicant must demonstrate that the reclaimed area has had acceptable ground cover (see success standards listed under Phase II) for at least two years of the liability period, except the first year.

2. Productivity

a. The applicant must demonstrate that the reclaimed area has had acceptable production of desirable living plants for at least two years of the liability period, except the first year.

b. Production shall be considered to be acceptable when it is not less than ninety percent of the success standard.

c. When using a reference area, the minimum production success standard is one hundred percent of the production of desirable living plants on the approved reference area.

d. When a reference area is not used, the success standard shall be that technical standard approved in the reclamation plan of the permit application. The method for calculating productivity using a technical standard is described in Appendix O.

III. Grazingland - Specific Requirements

A. Phase II

1. Ground Cover

a. On areas with a post-mining land use of grazingland, the applicant must demonstrate that the reclaimed area has had acceptable ground cover during the

growing season for at least one year during the liability period, except the first year.

b. Ground cover shall be considered acceptable when it is not less than ninety percent of the success standard.

c. When using a reference area, the success standard is the percentage of ground cover of desirable living native grasses on the reference area.

d. For permits using reference areas, at no time shall an area reclaimed to a land use of grazingland be released from Phase II or III liability if the ground cover is composed of less than 50 percent of desirable native grasses, regardless of the condition of the reference area.

e. When a reference area is not used, the technical success standard is ninety percent ground cover of desirable living plants. Desirable plants are defined in Appendix A. A non-inclusive list of undesirable plant species is provided in Appendix E.

f. No more than ten percent litter and ten percent desirable annual or biennial forbs can be counted as acceptable ground cover in any single sampling unit (e.g., transect or quadrant).

g. Perennial species that are not listed in the approved reclamation plan but which the Department approves as being desirable and compatible with the post-mining land use can make up to 20% of total ground cover not to exceed 5% ground cover by any one of these species.

h. The approved reclamation plan contained in the permit application package may include other specific restrictions or allowances not stated above.

2. Productivity

a. Productivity data is not required as part of the demonstration of revegetation success for Phase II release on grazingland. However, the application can include productivity data in anticipation of a future Phase III bond release application.

B. Phase III

1. Ground Cover

a. The applicant must demonstrate that the reclaimed area has had acceptable ground cover (see success standards listed under Phase II) for at least two years of the liability period, except the first year.

2. Productivity

a. The applicant must demonstrate that the reclaimed area has achieved acceptable production of desirable living plants for at least two years of the liability period, except the first year.

b. Production shall be considered to be acceptable when it is not less than ninety percent of the success standard.

c. When using a reference area, the minimum production success standard is one hundred percent of the production of desirable living plants on the approved reference area.

d. When a reference area is not used, the success standard shall be that technical standard approved in the reclamation plan of the permit application. The method for calculating productivity using a technical standard is described in Appendix O.

IV. Forestry, Wildlife Habitat, Recreation - Specific Requirements

A. Phase II

1. Ground Cover

a. On areas with a post-mining land use of forestry, recreation or wildlife habitat, the technical success standard for ground cover is 80%. Ground cover shall be considered acceptable when it is not less than ninety percent of the success standard. The reclaimed area must meet the standards for diversity, seasonality, permanence, and regeneration defined in the permit application.

b. In all cases ground cover must be sufficient to control erosion. Up to ten percent of the ground cover of each sampling unit (e.g., transect or quadrant) can be composed of litter produced on-site.

2. Tree Density

a. The minimum tree density success rate that must be achieved on a site shall be specified in the approved reclamation plan.

b. The applicant must demonstrate that the number of planted trees still alive after one year is at least ninety percent of the success standard specified in the approved reclamation plan. To measure tree density the applicant must use the method described in Appendix G.

c. The tree species used and the planting arrangement must have utility for the approved post-mining land use.

B. Phase III

1. Ground Cover

a. On areas with a post-mining land use of forestry, the technical success standard for ground cover is 80%. Ground cover shall be considered acceptable when it is not less than ninety percent of the success standard. The reclaimed area must meet the standards for diversity, seasonality, permanence, and regeneration defined permit application.

b. In all cases ground cover must be sufficient to control erosion. Up to ten percent of the ground cover of each sampling unit (e.g., transect or quadrant) can be composed of litter produced on-site.

2. Tree Density

a. The applicant must demonstrate a tree density on the reclaimed area equal to at least ninety percent of the approved success rate. Trees counted in determining such success shall be healthy and have been in place for not less than two growing seasons.

b. At least 80 percent of the trees used to determine success shall have been in place for at least three years or 60% of the responsibility period.

c. The success standards must be demonstrated to have been attained during the growing season of the last year of the responsibility period.

V. Prime Farmland Cropland - Specific Requirements

A. Phase I

The minimum combined topsoil and subsoil depth to be reconstructed for prime farmland must be in accordance with (IAW) the approved reclamation plans and the requirements of Section 823.14

B. Phase II

1. Ground Cover

a. Following prime farmland soil replacement, the soil surface shall be stabilized with a vegetative cover or other means which effectively controls soil loss by wind and water erosion.

b. Where the prime farmland determination is based on a history of hay crop production rather than row crop production and the post-mine vegetation will consist of a hay crop, the ground cover standards will be the same as those for pastureland.

2. Productivity

a. The applicant must demonstrate that the reclaimed area has acceptable soil productivity by using an average yield of one or more reference crops of the type grown in the area or historically grown on the site. Average yield on the reclaimed prime farmland shall be estimated using an average of at least three years of crop production.

b. Production shall be considered to be acceptable when the average yield during the measurement period is equal to or greater than a technical success standard or the average yield of row or hay crops (if prime farmland determination is based on a history of hay crop production) on an approved reference area.

c. When a reference area is not used, the success standard shall be that technical standard approved in the reclamation plan of the permit application. The method for calculating productivity using a technical standard is described in Appendix O.

d. Test plots (sub-samples of the restored area on which row crops are grown) may be approved for use in demonstrating production success. Test plots are generally used only when the landowner specifically desires the land to be revegetated with improved pasture grasses rather than the row crops historically grown on the area. Specific test plots must be pre-approved by the Department. To gain this approval, the applicant must demonstrate that the test plots used are representative of the restored prime farmland area. The criteria for selecting test plots is similar to those requierments used to select reference areas, described in subsection I.C. on page 4 of these guidelines. Test plots must be representative of geology, soil, and slope of the total reclaimed prime farmland bond release area.

(1). Management of the test plots must be comparable to that of the same crops grown commercially in the region.

(2). Test plots approved in the permit application package which have not been appropriately maintained during the bond liability period will lose eligibility as a comparison method.

e. The following criteria is used to establishing test plots:

(1). A contiguous prime farmland or cropland area represents a single population, test plots are selected at random throughout the contiguous reclaimed area. Appendix C provides methods of selecting randomized sampling locations.

(2). Each test plot represents one sample. Appendix Q provides the minimum sample size for measuring row crops for production standards on prime farmland.

(3). The size of the test plot should be based on the sampling technique (*i.e.*, hand sampling, machine harvest, etc.) that will be used to evaluate crop production. In addition, the plots should be large enough so that impact of any edge effect would be avoided.

(4). The methods for measuring row crop production on prime farmlands is shown in Appendix P.

f. The method to calculate the technical productivity standard for grain or hay crops on prime farmland cropland in Appendix O.

C. Phase III

1. Ground Cover

a. Following prime farmland soil replacement, the soil surface shall be stabilized with a vegetative cover or other means which effectively controls soil loss by wind and water erosion.

b. Where the prime farmland determination is based on a history of hay crop production rather than row crop production and the post-mine vegetation will consist of a hay crop, the ground cover standards will be the same as those for pastureland.

2. Productivity

Restoration of soil productivity on reclaimed prime farmland must be demonstrated prior to Phase II bond release.

VI. Non-Prime Farmland Cropland - Specific Requirements

A. Phase II

1. Ground Cover

a. Following soil replacement, the soil surface shall be stabilized with a vegetative cover or other means which effectively controls soil loss by wind and water erosion.

b. Where the crop being restored on an area is a hay crop rather than row crop, the ground cover standards will be the same as those for pastureland.

2. Productivity

a. Productivity data is not required as part of the demonstration of revegetation

success for Phase II release on non-prime farmland cropland. However, the application can include productivity data in anticipation of a future Phase III bond release application.

B. Phase III

1. Ground Cover

a. Following soil replacement, the soil surface shall be stabilized with a vegetative cover or other means which effectively controls soil loss by wind and water erosion.

b. Where the crop being restored on an area is a hay crop rather than row crop, the ground cover standards will be the same as those for pastureland.

2. Productivity

a. The applicant must demonstrate that the reclaimed area has acceptable soil productivity by using an average yield of one or more reference crops of the type grown in the area or historically grown on the site. Average yield on the reclaimed cropland shall be estimated using an average of any two years of crop production, except the first year.

b. Production shall be considered to be acceptable when the average yield is not less than ninety percent of the success standard.

c. When using a reference area, the minimum production success standard is one hundred percent of the production of desirable living plants on the approved reference area.

d. When a reference area is not used, the success standard shall be that technical standard approved in the reclamation plan of the permit application package.

e. Methods for measuring row crop production on nonprime farmland cropland are described in Appendix P. The table of minimum adequate sample size is shown in Appendix Q. The method to calculate the technical productivity standard for grain or hay crops on nonprime farmland cropland is in Appendix O.

VII. Industrial/Commercial or Residential - Specific Requirements

A. Phase II

Ground cover on undeveloped areas with an approved industrial/commercial or residential post-mining land use shall have ground cover sufficient to control erosion (70%). There is no production requirement. The reclaimed area must meet the standards for diversity, seasonality, permanence, and regeneration defined in the permit application.

B. Phase III

Ground cover on undeveloped areas with an approved industrial/commercial or residential post-mining land use shall have ground cover sufficient to control erosion (70%). There is no production requirement. The reclaimed area must meet the standards for diversity, seasonality, permanence, and regeneration defined in the permit application.

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APPENDIX A.

DEFINITIONS

Other definitions can be found in OPRPR 701.5.

Augmentation: Additional work that is done after original revegetation efforts to aid in vegetation establishment which entails more than typical annual maintenance practice. The guidelines for repair of rills and gullies is defined in Section 460:43-46(c) and 460:20-45-46(c).

Desirable Plant Species: Those permanent perennial species listed in the approved reclamation plan plus a limited percentage of approved annual species planted in conjunction with the permanent vegetation and invading species that are compatible with the approved post-mining land use. Species listed in Appendix E are among those to be considered undesirable.

Drainage Control: Control of surface water which passes across a permit site by means of channels, diversions, berms, terraces, sedimentation ponds and/or other drainage control structures or facilities.

Erosion Control: The control of soil loss on all exposed surface areas by surface water and wind erosion by means of physical or chemical mulch, rip rap, revegetation or other acceptable means.

Identifiable Unit: A portion of a permit site which can be described in legal terms and defined on the ground by physical features such as roads, permanent fences, readily identifiable section lines or well-defined undisturbed areas.

Increment: An identifiable unit of land within a permit site for which a performance bond or other equivalent guarantee is posted.

Litter: Non-living plant material which is attached to or detached from plants produced naturally on-site.

Productivity: The amount of total standing biomass of desirable species. Standing biomass is the aboveground living portion and the attached litter portion of plants produced within a given growing season. Horizontal runners of stoloniferous plants are also included.

APPENDIX B.

ESTIMATION OF PRE-MINING TOPSOIL (A HORIZON) DEPTH

In cases where pre-mining topsoil depth information was not collected, an estimate of the A horizon (topsoil) depth can be calculated from information published in the appropriate Soil Conservation Service county soil surveys. The calculation is an area-weighted average of the pre-mining soil types on the disturbed portion of the permit area.

The information can be found either in the soil descriptions in the county soil survey or in the introductory paragraphs of the interpretation sheets contained in the supplements to the soil surveys.

Example from Sequoyah County Soil Survey:

Soil Type	Depth(inches)	Portion of Area(%)
Lonoke Loam	18	32
Lonoke silty clay loam	18	10
McKamie Loam, 5-12 % slopes	07	28
Pickwick Loam, 1-3% slopes	10	30

The estimated pre-mining topsoil depth can be calculated:

(18)(.32) + (18)(.10) + (7)(.28) + (10)(.30) =
(5.76) + (1.8) + (1.96) + (3.0) = 12.52"

APPENDIX C.

METHODS OF RANDOMIZED SELECTION OF SAMPLING LOCATIONS

In order to be able to subject sampling data to statistical procedures such as the t-test, the sampling locations must be determined by some approved method of randomization. The Department recommends utilization of one of the methods described here.

Grid Overlay Method (adapted from Kershaw)

In this method a grid is drawn or overlaid on a map, preferably an aerial photo, of the permit area (see Figure l). Lines on the grid should be drawn to a scale of 200 feet apart or closer.

One axis of the grid is designated as X and the other as Y. Each intersection point (X,Y coordinate pair) on the grid is a potential sampling location.

The sample is selected by randomly choosing coordinate pairs using a random number table (see Appendix H). Coordinate pairs on the grid which fall outside the permit boundaries are not included in the final sample.

Baseline Method (adapted from Chambers and Brown, 1983)

In this method, a baseline is located along one edge of the area to be sampled (see Figure 2). On the baseline, mark points which are an equal distance apart on a scale of no more than 200 feet apart.

Select a set of numbers between 1 and 100 (or some other range which based on experience will yield an adequate sample size).

In the field, proceed to the first point on the baseline and select the first random number. The number represents the number of paces to be walked (along a line perpendicular to the baseline) to the first sampling location. When the appropriate distance has been reached, the sample is measured.

Select the next chosen random number and walk that many paces to the next location. Additional sampling sites are located in the same manner until the perimeter of the sampling area is reached.

The investigator then returns to the baseline and proceeds to the second predetermined point. Additional sample sites are located along a perpendicular line as described above. The procedure is repeated until an adequate sample size (minimum of ten) is attained.

The investigator can ensure that the random sampling points are well distributed throughout the area being surveyed by multiplying each random number by some constant factor which will result in a sufficient distance between sampling points.

The investigator then returns to the baseline and proceeds to the second predetermined point. Additional sample sites are located along a perpendicular line as described above. The procedure is repeated until an adequate sample size (minimum of ten) is attained.

The investigator can ensure that the random sampling points are well distributed throughout the area being surveyed by multiplying each random number by some constant factor which will result in a sufficient distance between sampling points.

FIGURE 1.

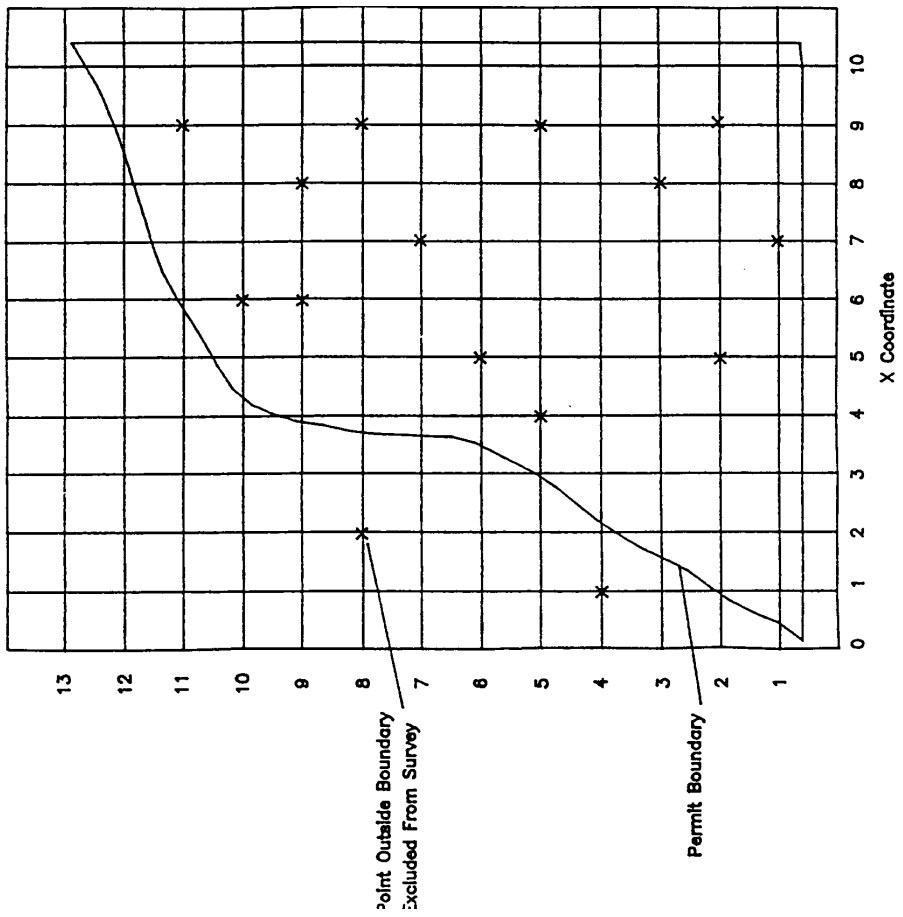


Figure 1.
Appendix C

FIGURE 2.

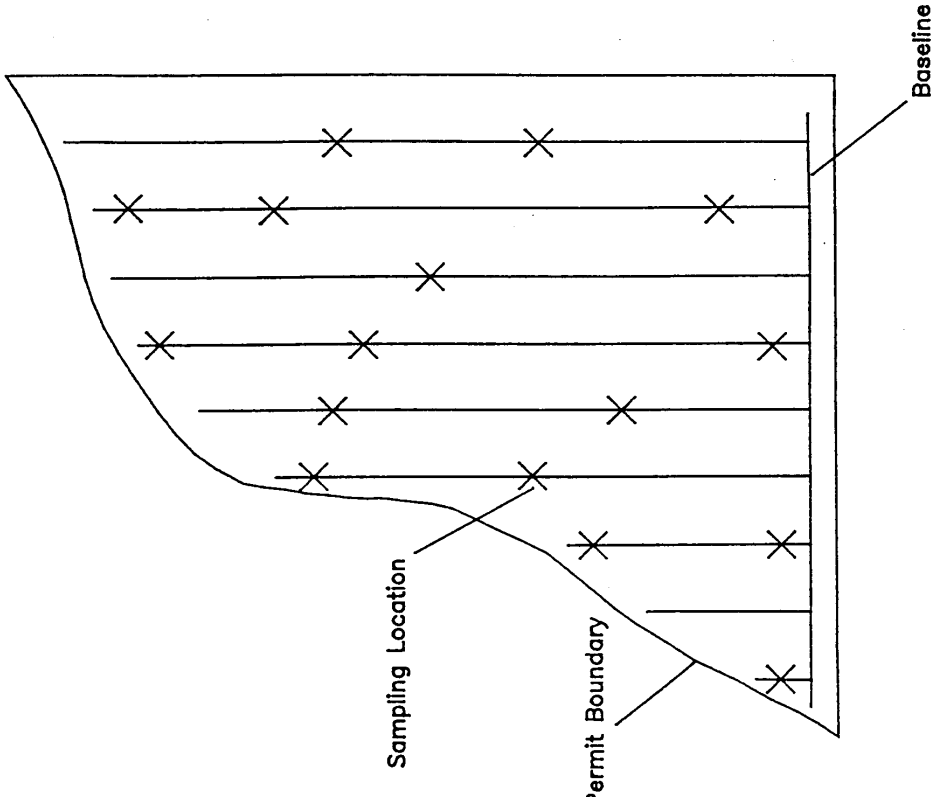


Figure 2.
Appendix C

APPENDIX D.

METHODS OF GROUND COVER SAMPLING

Ground cover on a site can be measured using one of the following methods. Sampling locations must be randomly chosen in accordance with the methods described in Appendix C.

At least ten samples per survey must be collected. Minimum adequate sample size must be calculated using the method shown in Appendix J.

Point-Line-Transect Method

In this method a measuring tape is stretched and anchored at each end above the vegetation to be analyzed. The tape should be from 30 to 50 feet long. At exact one-foot intervals a point (real or imaginary) is dropped and the identity of the ground cover at that point is classified and recorded. The ground cover will be classified as a particular plant species, litter, bare ground or rock.

A problem with this method is that each measurement suffers from parallax. Parallax introduces the probability of observer bias and thus error. The large number of "hits" per transect, somewhat compensates for this bias. In spite of its shortcomings, this method has been widely promoted by the Office of Surface Mining Reclamation and Enforcement and for this reason the Department includes it as an approved method.

Point-Frame Method (Mueller-Dombois and Ellenberg, 1974)

This method, also known as the point-quadrant and point-transect method, overcomes the parallax problems inherent in the point-line-transect method. A wooden, metal or plastic frame is constructed with multiple (usually ten) pins. Each pin is fashioned from some type of long metal rod such as a braising rod obtained from a welding supplier. Pins on the frame are a minimum of ten centimeters apart.

A diagram of the frame is shown in Figure 3. As can be seen in the diagram, the frame consists of at least two guide bars which the rods slide through. This arrangement minimizes parallax and thus bias since the observer has little opportunity to choose where the rod goes.

Follow these steps when using this method:

1. A point or pin frame with multiple pins is randomly located on a point within the sampling area.
2. The individual pins are lowered down through the vegetation canopy and the first item touched is recorded as to species, litter, rock, or bare ground.
3. The sample size required to obtain statistical adequacy is usually 100 to 300 pins.
4. The data are summarized either by frame or by transect for statistical analysis.

Additional considerations for point-quadrant sampling are:

1. The frames should be held vertically for measuring cover.

2. The dimensions of the frame should accommodate the height and spacing of the plants to be sampled. (See Figure 3).
3. The pins or rod should be sharp, as dull or blunt pins may result in an overestimate.
4. This method cannot be used when vegetation is blowing in the wind.

Sample Orientation

Both of the methods described above involve linear transects. Therefore, at each sampling location a randomization decision must be made as to its direction of orientation. This can easily be done with a compass and a random number table (Appendix H) . Before going into the field a set of 30 or more numbers between O and 360 is chosen from the table. Then, at each sampling location in the field, a number is selected from the list (and discarded from further use in that particular survey). This will be the number of degrees that the transect will be displaced from magnetic north. A compass is used to find the proper orientation.

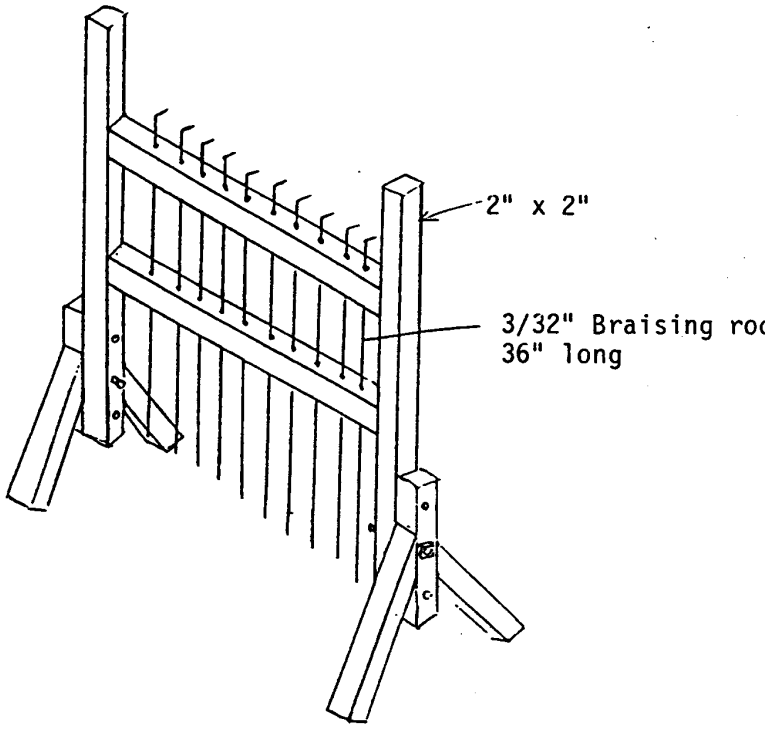
Calculation of Average Desirable Ground Cover

Each transect or frame must be treated statistically as a single sampling unit. The data which is collected for each transect is separated into desirable and undesirable ground cover categories (see the bond release requirements for each land use) and the percentage of ground cover which is desirable is determined for each transect.

For example if 40 out of 50 points on a point-line-transect recorded a desirable plant species, the percentage of desirable ground cover for that transect would be 80%. After this percentage is found for each transect or frame, an estimate of the desirable ground cover for the entire site is calculated by averaging all transects for any given data set. The data set can then be subjected to the appropriate statistical analyses.

RESERVED FOR FIGURE 3.

10 POINT FRAME



APPENDIX D

FIGURE 3

APPENDIX E.

UNDESIRABLE PLANT SPECIES

The following is a list of plant species which cannot be counted in measurements of desirable ground cover or productivity. This list is non-inclusive.

Bitterweed	*Actinea odorata*
Bluesterm, Broomsedge	*Andropogon virginicus*
Bluestem, Splitbeard	*Andropogon ternarius*
Brome, Japanese	*Bromus japonicus*
Broomweed, Annual	*Xanthocephalum dracunculoides*
Buffalobur	*Solanum rostratum*
Cheatgrass	*Bromus tectorum*
Cocklebur	*Xanthium spp.*
Croton	*Croton texensis*
Daisy, Fleabane	*Eriqeron ramosus*
Dock	*Rumex spp.*
Horsenettle, Carolina	*Solanum carolinense*
Ironweed	*Vernonia spp.*
Johnson grass	*Sorqhum halepense*
Milkweed, Broadleaf	*Asclepias latifolia*
Nightshade	*Solanum spp.*
Plantain	*Plantago spp.*
Ragweed	*Ambrosia spp.*
Sandbur, Mat	*Cenchrus pauciflorus*

Sedge	*Carex spp.*
Snakeroot, White	*Eupatorium rugosum*
Sneezeweed, Bitter	*Helenium amarum*
Sorrel	*Rurnex acetosella*
Golden rod	*Solidaqo spp.*
Yarrow	*Achillea millefolium*
Buck Brush	*Symphoricarpos orbiculatus*
Broomweed	*Gutierrezia dracunculoides*
Brome grass	*Bromus spp.*
Prickly sida	*Sida spinosa*
Windmillgrass	*Chloris verticillata*
Thistles	*Cirsium spp., Carduus nutans*
Blackberry	*Rubus spp.*
Common sunflower	*Helianthus annuus*
Threeawn grasses	*Aristida spp.*
Sumac	*Cenchrus pauciflorus*
Spurges	*Euphorbia spp.*
Curlycup gumweed	*Grindelia squarrosa*
Coreopses	*Coreopsis spp.*
Daisy Fleabanes	*Erigeron spp.*
Pigweeds	*Amaranthus spp.*
Blackeyedsusan	*Rudbeckia hirta*

Woolly verbena	*Verbena stricta*
Heath aster	*Aster ericoides*
Peppergrass	*Lepidium spp.*
Sedges	*Carex spp.*
Wild Lettuce	*Lactuca canadensis*

Temporary cover species:

Wheat	*Triticum aestivum*
Oats	*Avena sativa*
Annual rye	*Secale cereale*
Barley	*Hordeum vulgare*
Millets	*Setaria spp.*

APPENDIX F.

METHODS OF PRODUCTION SAMPLING

Grass and herbage production on a site can be measured either by whole area harvesting or by collecting separate samples on the site. If the latter is chosen, the locations of production sampling sites must be determined by one of the random methods described in Appendix C. It is highly recommended that pastureland or grazingland with a predominance of warm season species be clipped during September-October and that pastureland or grazingland with a predominance of cool season grasses be clipped during May- June. If you chose to sample an area twice during the calendar year, the inspector must document and send a copy to Technical Services, a verification that the area sampled was baled, mowed, or otherwise removed of growth (other than what is required to control erosion and maintain vegetative health). If you sample an area twice during a calendar year, the amounts can be added together to show total annual production.

Production of grasses and other approved pasture species is estimated by sampling with quadrant frames. Quadrants can be square, rectangular or circular but should cover at least two square feet.

Minimum sample size is ten. An initial minimum adequate sample size (above the absolute minimum of ten) can be estimated from sample fresh weights in the field using the formula described in Appendix J. Any minimum adequate sample size calculated using fresh weight must be verified later using dry weights.

Pastureland

After the sampling quadrant is placed on the ground, the desirable vegetation within the quadrants clipped to the height specified in the table in this appendix. The clipping height is species specific. In taller vegetation, vegetation near the edge of the quadrant frame may need to be slightly "combed" to ensure that vegetation within and outside of the frame is properly differentiated. Only vegetation which was produced during the growing season can be counted. Old litter from prior growing seasons should be removed from the sample.

Sample vegetation is put into paper bags on which is recorded the date and location number. All production samples must be either air- or oven-dried. If air-dried, samples must be left inside a well-ventilated, air-conditioned building (to minimize fluctuations in humidity) for at least 72 hours, or until a constant weight is obtained, before dry weights are recorded.

The SCS soil productivities from which technical production standards are figured are based on air-dried weights. When production samples from reclaimed areas are oven-dried rather than air-dried, each sample dry weight can be increased by 10% to account for the extra moisture removed during the process of oven-drying.

Total production and statistical analyses of the production data must be based on dry, not fresh, weight. Mean production can be calculated as follows:

$$\text{Mean Production} = \frac{\text{Sum of Sample Dry Weights}}{\text{Number of Samples}} \times \text{Quadrants per Area Conversion Factor}$$

Grazingland

Sampling and calculation of the mean production is exactly the same. However, after the sampling quadrant is placed on the ground, the desirable vegetation in it can be clipped to the ground.

Table

Species	Minimum height that must remain after clipping (in inches)
Bahiagrass *(Paspalum notatum)*	2
Bermudagrass *(Cynodon dactylon)*	2
Dallisgrass *(Paspalum dilatatum)*	2
Fescue *(Festuca arundinacea)*	3
Orchardgrass *(Dactylis glomerata)*	3
Ryegrass *(Lolium perenne)*	2
Lespedeza spp.	3
Alfalfa *(Medicago sativa)*	3
Trifolium spp.	3

APPENDIX G.

METHOD OF TREE AND SHRUB STOCKING RATE (DENSITY) SAMPLING

Stocking rate, or density, means the number of trees or shrubs per unit area. This can be measured by using the circular rotating quadrant method.

First, random sampling locations are determined by a method discussed in Appendix C. A circular quadrant is established surrounding the sampling point by positioning one end of a rope or string of fixed radius over the sampling point and rotating the other end of the rope around the point in a circle.

All trees or shrubs within the quadrant are counted and recorded by species as the rope is rotated. Each quadrant serves as a sampling unit for statistical analysis. Minimum sample size is ten. Minimum adequate sample size, based on the variance in the number of trees per quadrant, is determined using the method described in Appendix J.

Quadrant size should be based on the size and spacing of the individual trees and shrubs. A larger quadrant size is likely to result in a smaller variance and thus a smaller minimum adequate sample size. For trees, circular quadrants with a radius of 16.7 feet (1/58 acre) are often used.

The most efficient and reliable method of evaluating small or irregularly shaped plantings (e.g., wildlife habitat) may be a complete count of all trees or shrubs. A determination of survival rate may be sufficient for determining adequacy of revegetation if a minimum acceptable survival is described in the terms of the approved reclamation plan. This method is well suited to shrubs or trees that are planted in strips or rows as hedgerows or windbreaks.

APPENDIX H. TABLE OF RANDOM NUMBERS.

A Set of Random Numbers

Column 1	Column 2	Column 3	Column
6327	0983	3798	4679
2167	6484	9467	9058
5939	0407	1804	8827
4672	3865	5689	9878
8071	5185	5514	5308
9509	0603	7461	8550
6615	2588	3558	3349
4833	2422	9790	1183
5594	1809	6931	6571
9441	1699	3947	7702
7922	9812	7229	5252
9419	6494	8179	8065
6178	3556	2466	2495
2647	3961	7546	4799
0474	1839	6926	6534
9814	1577	8293	0301
0104	4579	0627	8667
1608	9470	4131	5345
9722	1557	0471	5498
4189	3582	3675	9461
9855	8088	9006	6897
5791	8234	1472	3421
0872	3310	0510	9046
8953	9809	8037	8376
2895	4319	6544	8953
0609	5248	8734	2498
9795	2464	6170	1063
1572	7371	7936	2841
4307	0294	6060	5194
4857	0197	2401	7005
1632	7189	6463	9830
0745	8034	7882	7152
0736	5110	5165	6571
8168	7924	5876	1407
7468	5313	2736	9010
6044	5420	3077	9070
6716	0059	3001	8871
9342	0169	6880	7986
5809	6048	9051	1151
1532	9715	7081	0109
5506	5812	5917	4415
4045	1751	2817	9958
5966	9930	6437	7279
6062	3296	5093	2503
4097	8379	5670	0614
6793	3999	4645	5143
7960	4853	0583	1920
1321	4067	8503	1604

APPENDIX I.

FORMULAS FOR MEAN AND VARIANCE

$$\text{Mean} = \bar{X} = \frac{\{\sum_{i=1}^{n} X_i\}}{n}$$

$$\text{Variance} = S^2 = \frac{\{\sum_{i=1}^{n} X_i^2\} - \frac{\{\sum_{i=1}^{n} X_i\}^2}{n}}{n - 1}$$

e.g. for $n = 4$, $\bar{X} = \frac{X_1 + X_2 + X_3 + X_4}{n}$

Given:
$X_1 = 2,\ X_2 = 4,\ X_3 = 6,\ X_4 = 8$

then: $\bar{X} = \frac{2 + 4 + 6 + 8}{4} = 5.0$

For the set (2, 4, 6, 8):

$$S^2 = \frac{X_1^2 + X_2^2 + X_3^2 + X_4^2 - \frac{(X_1 + X_2 + X_3 + X_4)^2}{4}}{3}$$

$$S^2 = \frac{(2^2 + 4^2 + 6^2 + 8^{2)} - \frac{(2 + 4 + 6 + 8)^2}{4}}{3}$$

$$S^2 = \frac{(120) - \frac{(20)^2}{4}}{3}$$

$$S^2 = \frac{[120 - (400/4)]}{3} = \frac{20}{3} = 6.67$$

Standard deviation $= S = \sqrt{S^2} = \sqrt{6.67} = 2.58$

APPENDIX J.
CALCULATION OF MINIMUM ADEQUATE SAMPLE SIZE

All surveys conducted to measure ground cover or production must include at least ten samples. Once this first group of samples has been taken, the applicant can determine whether further sample collection is necessary by using the following formula for sample adequacy.

$$n = \frac{(t^2)\ (s^2)}{E^2}$$

Where : n = Minimum adequate sample size.

t = t-value from the table in Appendix M. (begin with 1.383 for the minimum sample size of ten)

s^2 = Initial estimate of variance based on a sample of ten. See Appendix I for method of calculating variance.

E = Acceptable level of sample mean error.

Calculate E by multiplying the average sample size (technical or reference area) by 0.1.

Example:

The following ten productivity samples have been collected during the first stage of the survey

55, 85, 77, 122, 64, 79, 131, 88, 91, 67.

$s^2 = 587.43$

E = (102) (0.1) = 10.2 (Where 102 is the production expected from an average quadrant)

$$n = \frac{(1.383)^2\ 587.43}{104.04}$$

n = 10.8, round to 11.

Therefore, one additional randomly selected samples must be taken.

After the additional samples are collected the minimum sample size calculation must be performed on the sample of 11 to ensure adequacy.

original samples, plus 79

$s^2 = 533.1$

$t = 1.372$ (where d.f. = 10).

$$n = \frac{(1.882)\,(533.1)}{104.04}$$

$$n = 9.64$$

Therefore, the sample of 11 is adequate.

APPENDIX K.

CALCULATING THE t-STATISTIC

Student's t-test is used to compare two means. In this case, only mean is derived from data collected from a reference area and another mean is derived from data collected from the reclaimed (disturbed) area. The t-test is used to determined if there is significant difference between the two means.

First, calculate the two means (See Appendix I):

$\bar{X}_r$, where r represents reference area .

$\bar{X}_d$, where d represents disturbed area .

Then, calculate the two variances (see Appendix I):

S_r^2 and S_d^2

Then, calculate Degrees of Freedom (df)

$df = (n_r - 1) + (n_d - 1)$

where n_r = reference area sample size

n_d = disturbed area sample size

Using the variances, determine the Standard Error of the Pooled Means

$$S_x = \sqrt{[(S_r^2/n_r) + (S_d^2/n_d)]}$$

Finally, determine the value of t_{calc} , the t-statistic:

$$t_{calc} = \frac{(F_r)(\bar{X}_R) - (\bar{X}_d)}{S_x}$$

where F_r = the fraction of $\bar{X}_r$ which must be achieved, e.g. 0.9 (i.e., 90%)

Select $t_{.10}$ from Appendix M (t-Table).

If $t_{calc} \leq t_{.10}$, then revegetation success is achieved.

If $t_{calc} > t_{.10}$, then revegetation has failed.

APPENDIX L

EXAMPLE OF THE t-test

Reference Area		Disturbed Area	
X_{ri}	X_{ri}^2	X_{di}	X_{di}^2
62.5	3906	51.7	2673
65.2	4251	54.2	2938
67.6	4570	53.3	2841
69.9	4886	57.0	3249
69.4	4816	56.4	3181
70.1	4914	61.5	3782
67.8	4597	57.2	3272
70.1	4489	56.2	3158
68.5	4692	58.4	3411
62.4	3894	55.8	3114
670.4	45015	561.7	31619

$n = 10$ $F_r = 0.9$ $n_d = 10$

$\bar{X}_r = 67.04$ $\bar{X}_d = 56.17$

$$S_r^2 = \frac{45015 - \frac{(670.7)^2}{10}}{9} = 7.93$$

$$S_d^2 = \frac{31619 - \frac{(561.7)^2}{10}}{9} = 7.59$$

$$S_x = (.93/10 + 7.59/10)^{1/2} = \sqrt{1.552} = 1.25$$

$$t_{calc} = \frac{(67.04)(0.9) - (56.17)}{1.25} = \frac{4.166}{1.25} = 3.33$$

$df = (n_r - 1) + (n_d - 1) = 18$

$t_{.10} = 1.33$

$t_{calc} > t_{.10}$

The mean productivity on the disturbed area is not within 90% of that on the reference area with 90% statistical confidence. The bond release requirement has not been achieved.

APPENDIX M.

TABLE OF t-STATISTICS

0.1 Probability of a larger value of *t*, sign considered.

df	Values of *t*
1	3.078
2	1.886
3	1.638
4	1.533
5	1.476
6	1.440
7	1.415
8	1.397
9	1.383
10	1.372
11	1.363
12	1.356
13	1.350
14	1.345
15	1.341
16	1.337
17	1.333
18	1.330
19	1.328
20	1.325
21	1.323
22	1.321
23	1.319
24	1.318
25	1.316
26	1.315
27	1.314
28	1.313
29	1.311
30	1.310
40	1.303
60	1.296
120	1.289

APPENDIX N.

COMPARISON OF DISTURBED AREA TO TECHNICAL STANDARD

1. Using Samples

Soil Type	%	Plant Biomass (lbs/acre)
A	75	1800
B	20	2600
C	5	1600

(.75) (1800) + (.20) (2600) + (.05) (1600) = 1950 lbs/acre

This is the estimated average productivity on post-mining site.

Disturbed Site

$\bar{X}$ = 1630 lbs/acre

n = 18

df = 17

S^2 = 194,481

$S_x = \sqrt{(194,481 / 18)} = 104$

$t_{calc} = \frac{(0.9)(1950) - 1630}{104}$

t_{calc} = 1.202

$t_{.10}$ = 1.333

$t_{calc} \leq t_{.10}$ therefore, revegetation success achieved.

APPENDIX O.

CALCULATION OF TECHNICAL PRODUCTIVITY STANDARDS

Technical productivity standards for improved pasture grasses (pastureland), native range grasses (grazingland) and grain or hay crops (croplands) are calculated from soil yield figures published in the Supplements to the Soil Conservation Service County Soil Surveys. If these Supplements are not available, use the original County Soil Surveys. The calculation is an average of yields weighted on the basis of area of each soil type. The productivity standard is based on a high level of management.

Example: Bermudagrass Pastureland

Consider a case in which there are three soil types (or complexes) on a permit site covering 100 acres in Sequoyah County. They are Muldrow silty clay loam (abbreviated Mu) which covers 40 acres, Lonoke silty clay loam, undulating (LsB) which covers 20 acres and Collinsville-Eram complex, 5-20 percent slopes (CnE) which covers 40 acres. The pertinent bermudagrass yield information, shown below, can be found on the soil interpretation records included in the supplement to the soil survey.

When an AUM figure is listed in an SCS Soil Survey, it represents actual grazing experience, not total pounds of production. In order to convert AUM to pounds of production, use this procedure:

One animal unit consumes an average of 26 lbs. per day of air dry forage, which is 780 lbs. in one month. Under a high level of management, about half of what grows can be consumed by the animal, which relates to a 50% harvest efficiency. This is because some plant material must be left for erosion protection, some for plant health, and some is lost to weathering, insects and other losses. Therefore, for each 780 lbs. that an animal eats, twice that amount, or 1560 lbs. must exist. Therefore you must sample desirable vegetation in accordance with the method described in Appendix F. Depending on the species, a minimum height must be maintained after clipping. The following formula will allow the conversion of AUM's to pounds per acre production:

(AUM) x (780) = pounds per acre production

LsB	9.5 AUM
Mu	8.5 AUM
CnE	No Yield Given

Note that the yield figures for the LSB and Mu soils are given in animal unit months. One AUM is equal to 780 air dried pounds of grass per acre, therefore the yields of the first two soils can be converted to pounds per acre by multiplying the AUM given by 780.

In cases such as the CnE soils when no bermuda yield is given the potential range production for normal years can be used as a substitute production figure. Range potential is an actual annual (total) productivity. The CnE soil is an example of a soil complex composed of two different soils with different range yield potentials. The Collinsville portion has a normal potential range yield of 2300 pounds per acre while the Eram portion has a yield of 4200 pounds. Since these make up roughly equivalent proportions of the soil complex, the two figures can be averaged to make a yield for the soil as a whole.

Using the information provided above, the soil types can be assumed to have the following bermudagrass productivities and weighting factors based on the percentage of area of the site.

LsB	7,410 lbs/acre	0.20 weight
Mu	6,630	0.40
CnE	3250	0.40

The technical productivity standard can now be calculated:

7,410) (.2) + 6,630) (.4) + (3250) (.4) =
1482 + 2652 + 1300 = 5,434 lbs/acre

Weighted-average grazingland standards in pounds per acre and cropland standards in bushels are calculated in a similar manner.

Example: Native grass Grazingland

Consider a case in which there are three soil types (or complexes) on a permit site covering 100 acres in Craig County. They are Collinsville-Vinita Complex, 2-3% slopes (abbreviated CoF) which covers 40 acres, Bates Loam, 3-5% slopes (abbreviated BaC) which covers 20 acres and Dennis Silt Loam, 1-3% slopes (abbreviated DnB) which covers 40 acres. The pertinent bermudagrass yield information, shown below, can be found on the soil interpretation records included in the supplement to the soil survey.

CoF	3700 lbs./ac., dry weight
BaC	5500 lbs./ac., dry weight
DnB	5500 lbs./ac., dry weight

Note that the yield figures are in pound per acre, dry weight. These are the annual potential production figures for the soils during normal years. Therefore, clipping is a direct comparison.

The CoF soil is an example of a soil complex composed of two different soils with different range yield potentials. The Collinsville portion has a normal potential range yield of 3200 pounds per acre while the Eram portion has a yield of 4200 pounds. Since these make up roughly equivalent proportions of the soil complex, the two figures can be averaged to make a yield for the soil as a whole.

Using the information provided above, the soil types can be assumed to have the following bermudagrass productivities and weighting factors based on the percentage of area of the site.

CoF	3700 lbs/acre	0.20 weight
BaC	5500	0.40
DnB	5500	0.40

The technical productivity standard can now be calculated:

(3700) (.2) + (5500) (.4) + (5500) (.4) =
740 + 2200 + 2200 = 5140 lbs/acre

APPENDIX P.
METHODS FOR MEASURING ROW CROPS IN
PRIME FARMLAND (AND NON-PRIME FARMLAND) PRODUCTION

The minimum acceptable number of samples to be taken relative to field is size is shown in Appendix Q. Appendix Q shows the required number of sample points per crop acres. Sample locations will be determined in accordance with Appendix C. Fields of four acres or less to be sampled in their entirety with yields determined by harvest weight. Sample selections will take place using the following guidelines.

The Oklahoma Department of Mines may elect to increase the minimum number of acceptable sample points per field acres. Some factors which will be considered whether to increase the number of sample points are as follows, but not limited to:

1. Operator requests additional sample points for specific fields.

2. The use of different hybrids in one field.

3. Contour changes within one field which would alter a yield.

4. A coefficient of variation greater than 15%.

$$\text{Coefficient of Variation} = \frac{S}{X} = \frac{\text{Std dev.}}{\text{mean}}$$

SOYBEAN SAMPLING TECHNIQUE DRILLED OR PLANTED BEANS
(>8" rows)

Step 1 - Mark the starting corner of the field to be sampled with a large stake and attach a ribbon or flag to it.

Step 2 - Pace off predetermined sample point coordinates in a sequential fashion to determine individual locations.

Step 3 - After taking the last of the required paces to the first sampling point, mark the closest plant to the toe of your foot. Place a flag at the point that you have just marked. From the point of this flag, and in the direction of travel from where the last pace was counted, measure a distance of six feet of plant row and place a flag at the six foot mark. Starting from the row just identified, measure the distance across five rows. This distance, from row one to row five, divided by four row spaces gives the average row width.

Step 4 - Strip all the soybean pods from all the plants in the 6 foot sample row. Pick up any loose pods or beans found on the ground at the base of these plants. Deposit all the pods, beans and blank pods, into a paper sack. Mark the sack with the appropriate permit number and sample identification number. Secure the sample sack to prevent any sample loss.

Step 5 - Repeat steps 3 and 4 for each additional random sampling point coordinate.

The following method will be used for determination of gross yield of soybean samples. Gross yield is determined by deducting the adjustment of moisture content of the soybean sample from the harvest weight. Moisture content determinations will be made by lab analysis.

Gross Yield = Harvest Weight adjusted for moisture content.

Included below for reference is the Gross Yield formula and an explanation of its components.

$$\text{Gross Yield Per Acre (bu/acre)} = \frac{A \times B}{C \times D \times E}$$

Where: A = Weight of shelled grain from 6 feet of row

B = Percent moisture in grain corrected to 12.5%

$$= \frac{(1.0\% - (\%\ \text{moisture in shelled beans}/100\%))}{0.875}$$

C = Number of grams per pound = 453.6

D = Correction factor for row spacing on drilled or planted beans

$$= \frac{\text{Average row width in ft x 6 ft of row}}{\text{43560 sq ft/acre}}$$

E = Standard weight of 1 bushel of soybeans = 60 lbs.

After calculation of the gross yield, conduct a statistical comparison of these results to the projected production results determined in the approved permit application package.

SOYBEAN SAMPLING TECHNIQUE DRILLED OR PLANTED
(8" rows)

Step 1 - Mark the starting corner of the field to be sampled with a large stake and attach a ribbon or flag to it.

Step 2 - Pace off predetermined sample point coordinates in a sequential fashion to determine individual sample locations.

Step 3 - After taking the last of the required paces to the first sampling point, lay down a sampling frame so that it touches the toe of your shoe, crossing the crop rows at a right angle. Mark the two ends of the sampling frame with stakes just inside the 3.0 foot sampling tines. Continue to lay out the sample area in the direction of travel from where the last pace was counted. Rotate the sampling frame so that it is perpendicular to one corner of the stake (previously marked), and at a right angle to the original frame position. (Note: If at any time the point of a tine is restricted by a soybean plant, slide the soybean frame toward the starting point far enough for the point of the tine to clear the plant.) Repeat this procedure to lay out the other two sides of the sampling square, using the opposite corner of the original frame position to find the other two sides.

Step 4 - Strip all the soybean pods from all the plants in the 9 square feet sampling area. Pick up any loose pods or beans found on the ground. Deposit all the pods, beans and blank pods into a paper sack. Mark the sack with the appropriate permit number and sample identification number. Secure the sample sack to prevent any sample loss.

Step 5 - Repeat steps 3 and 4 for each additional random sampling coordinate.

The following method will be used for determination of gross yield of soybean samples. Gross yield is determined by deducting the adjustment for moisture content of the soybean sample from the harvest weight. Moisture content of the grain sample will be determined by lab analysis.

Gross Yield = Harvest Weight adjusted for moisture content

Included below for reference is the gross yield formula and an explanation of its components.

$$\text{Gross Yield Per Acre (bu/acre)} = \frac{A \times B \times C}{D}$$

Where: A = Total weight of all beans in 9 sq. ft. grid (in grams)

$$B = \text{Conversion factor} = \frac{43560 \text{ sq. ft./ac.}}{453.6 \text{ gms/lb} \times 60 \text{ Lbs/bu} \times 9 \text{ sq. ft.}}$$

C = 1.0 - (% moisture in shelled beans/100%)

D = .875 = The standard moisture content conversion factor of soybeans per bushel (l.0 - (12.5%/100%)).

After calculation of the gross yield, conduct a statistical comparison of these results to the projected production results determined in the approved permit application package.

WHEAT SAMPLING TECHNIQUE
(ROWS <8 INCHES)

Step 1 - Mark the starting corner of the field to be sampled with a large stake and attach a ribbon or flag to it.

Step 2 - Pace off predetermined sample point coordinates in a sequential fashion to determine individual sample location.

Step 3 - After taking the last of the required paces to the first sampling point, lay down a sampling frame so that it touches the toe of your shoe, crossing the crop rows at a right angle. Mark the two ends of the sampling frame with stakes just inside the 1.8 feet sample tines. Continue to lay out the sample area in direction of travel from where the last pace was counted. Rotate the sampling frame so that it is perpendicular to one corner of the stake (previously marked) and at a right angle to the original frame position. Repeat this procedure to lay out the other two sides of the sampling square using the opposite corner of the original frame position to find the other two sides.

Step 4 - Clip all wheat heads from within the square outlined by the sampling frame. The wheat heads should be clipped approximately 1/2 inch below the bottom of the head. Deposit all the collected wheat heads into a paper sample sack. Mark the sack with the appropriate permit number and sample identification number. Secure the sample sack to prevent any sample loss.

Step 5 - Repeat steps 3 and 4 for each additional random sampling point coordinate.

The following method will be used for determination of gross yield of wheat samples. Gross yield is determined by deducting the adjustment for moisture content of the wheat sample from the harvest weight. Moisture content of the grain sample will be determined by lab analysis.

Gross Yield = Harvest Weight adjusted for moisture content.

Included below for reference is the Gross Yield Formula and an explanation of its components.

$$\text{Gross Yield Per Acre (bu/acre)} = \frac{A \times B \times C}{D}$$

Where: A = Sample wt. of wheat in grams

B = 1.0 - (% moisture in grain/100%)

C = Conversion factor

$$= \frac{43560 \text{ sq. ft/ac}}{(60 \text{ lbs/bu} \times 453.6 \text{ gms/Lb} \times 3.24 \text{ sq. ft.})}$$

= .4940 bu/gm acre

D = .880 = The standard moisture content conversion factor of wheat per bushel (l.0 - (12%/100%))

After calculation of the gross yield, conduct a statistical comparison of these results to the projected production results determined in the approved permit application package.

WHEAT SAMPLING TECHNIQUES
(Discernable Rows)

Step 1 - Mark the starting corner of the field to be sampled with a large stake and attach a ribbon or flag to it.

Step 2 - Pace off predetermined sample point coordinates in a sequential fashion to determine individual sample locations.

Step 3 - After taking the last of the required paces to the first sampling point, lay down a sampling frame so that it touches the toe of your shoe, crossing the crop rows at a right angle. Mark the two ends of the sampling frame with stakes just inside the 1.8 feet sample tines. Continue to lay out the sample area in the direction of travel from where the last pace was counted. Rotate the sampling frame so that it is perpendicular to one corner of the stake (previously marked), and at a right angle to the original frame position. Repeat this procedure to lay out the other two rows to be sampled. (Total 3 rows) Note: The row spacing will be determined by measuring across 5 rows to obtain an average. (i.e. the distance in row 1 to 5 / 4).

Step 4 - Clip all wheat heads from within the square outlined by the sampling frame. The wheat heads should be clipped approximately 1/2 inch below the bottom of the head. Deposit all the collected wheat heads into a paper sample sack. Mark the sack with the appropriate permit number and sample identification number. Secure the sample sack to prevent any sample loss.

The following method will be used for determination of gross yield of wheat samples. Gross yield is determined by deducting the adjustment for moisture content of the wheat sample from the harvest weight. Moisture content of the grain sample will be determined by lab analysis.

Gross Yield = Harvest Weight adjusted for moisture content

Included below for reference is the Gross Yield formula and an explanation of its components.

$$\text{Gross Yield Per Acre (bu/acre)} = \frac{A \times B \times C}{D}$$

Where: A = Sample wt. of wheat in grams
B = 1.0 - (% moisture in grain/100%)

C = Conversion factor

$$= \frac{43560 \text{ sq. ft/ac}}{(60 \text{ lbs/bu} \times 453.6 \text{ gms/lb} \times \text{no. of rows harvested} \times 1.8 \text{ ft} \times \text{average row spacing (in ft)}}$$

D = .880 = The standard moisture content conversion factor of wheat per bushel (l.0 - (12%/100%)).

After calculation of the gross yield, conduct a statistical comparison of these results to the projected production results determined in the approved permit application package.

OATS SAMPLING TECHNIQUE
(ROWS <8")

Step 1 - Mark the starting corner of the field to be sampled with a large stake and attach a ribbon or flag to it.

Step 2 - Pace off predetermined sample point coordinates in a sequential fashion to determine individual sample locations.

Step 3 - After taking the last of the required paces to the first sampling point, lay down a sampling frame so that it touches the toe of your shoe, crossing the crop rows at a right angle. Mark the ends of the sampling frame with stakes just inside the 1.8 feet sampling tines. Continue to lay out the sample area in the direction of travel from where the last pace was counted. Rotate the sampling frame so that it is perpendicular to one corner of the stake (previously marked) and at a right angle to the original frame position. Repeat this procedure to lay out the other two sides of the sampling square using the opposite corner of the original frame position to find the other two sides.

Step 4 - Clip all oat heads from within the square outlined by the sampling frame. The oat heads should be clipped approximately 1/2 inch below the bottom of the head.

Deposit all the collected oat heads into a paper sample sack. Mark the sack with the appropriate permit number and sample identification number. Secure the sample sack to prevent any sample loss.

Step 5 - Repeat steps 3 and 4 for each additional random sampling point coordinate.

The following method will be used for determination of gross yield of oat samples. Gross yields determined by deducting the adjustment for moisture content of the oat sample from the harvest weight. Moisture content of the grain samples will be determined by lab analysis.

$$\text{Gross Yield Per Acre (bu/acre)} = \frac{A \times B \times C}{D}$$

Where: A = Sample weight of oats in grams

B = 1.0 - (% moisture in grain/100%)

C = Conversion factor

$$= \frac{43560 \text{ sq. ft/ac}}{(32 \text{ lbs/bu} \times 453.6 \text{ gms/lb} \times 3.24 \text{ sq. ft.})}$$

= .9262 bu/gm acre

D = .850 = The standard moisture content conversion factor of oats per bushel
(1.0-(15%/100%))

After calculation of the gross yield, conduct a statistical comparison of these results to the projected production results determined in the approved permit application package.

OATS SAMPLING TECHNIQUE
(Discernible Rows)

Step 1 – Mark the starting corner of the field to be sampled with a large stake and attach a ribbon or flag to it.

Step 2 – Pace off predetermined sample point coordinates in a sequential fashion to determine individual sample location.

Step 3 – After taking the last of the required paces to the first sampling point, lay down a sampling frame so that it touches the toe of your shoe, crossing the crop row at a right angle. Mark the two ends of the sampling frame with stakes just inside the 1.8 feet sampling tines. Continue to lay out the sample area in the direction of travel from where the last pace was counted. Rotate the sampling frame so that it is perpendicular to one corner of the stake (previously marked) and at a right angle to the original frame position. Repeat this procedure to lay out the other two rows to be sampled. Note: The row spacing will be determined by measuring across 5 rows to obtain an average (i.e. the distance in row 1 to 5 / 4).

Step 4 – Clip all oat heads from within the square outlined by the sampling frame. The oat heads should be clipped approximately 1/2 inch below the bottom of the head. Deposit all the collected oat heads into a paper sample sack. Mark the sack with the appropriate permit number and sample identification number. Secure the sample sack to prevent any sample loss.
Step 5 – Repeat steps 3 and 4 for each additional random sampling point coordinate.

The following method will be used for determination of gross yield of oat samples. Gross yield is determined by deducting the adjustment for moisture content of the oat sample from the harvest weight. Moisture content of the grain sample will be determined by lab analysis.

Gross Yield = Harvest Weight adjusted for moisture content

Included below for reference is the Gross Yield formula and an explanation of its components.

$$\text{Gross Yield Per Acre (bu/acre)} = \frac{A \times B \times C}{D}$$

Where: A = Sample wt. of oats in grams
B = 1.0 – (% moisture in grain/100%)

C = Conversion factor

$$= \frac{43560 \text{ sq. ft/ac}}{(32 \text{ lbs/bu} \times 453.6 \text{ gms/lb} \times \text{no. of rows harvested} \times 1.8 \text{ ft} \times \text{average row spacing (in ft)})}$$

D = .850 = The standard moisture content conversion factor of oats per bushel (l.0 – (15%/100%)).

After calculation of the gross yield, conduct a statistical comparison of these results to the projected production results determined in the approved permit application package.

SORGHUM SAMPLING TECHNIQUE

Step 1 - Mark the starting corner of the field to be sampled with a large stake and attach a ribbon or flag to it.

Step 2 - Pace off predetermined sample point coordinates in a sequential fashion to determine individual sample locations.

Step 3 - After taking the 1st of the required paces to the first sampling point, place a stake immediately adjacent to the closest sorghum plant to the toe of your shoe. Measure ten feet of the plant row starting at the first stake and placing a second stake at the ten foot mark. Mark the first five head and the last five heads with rubber bands. These heads will be used for moisture determination. One sample unit will equal one ten foot sorghum row section.

Step 4 - Clip all grain heads in Row 1 within the ten foot segment of the sample unit.

Step 5 - Weigh the clipped grain heads using a balance scale and obtain field weight to the nearest tenth (0.1) of a pound. Place any grain heads collected for moisture determination into sealed polyethylene bags. Mark the bags with the appropriate permit number and sample identification number.

Step 6 - Measure on a perpendicular line from the plants in row one (1) to the plants in row five (5). Divide this measured distance by four (4) to determine the average row width.

Step 7 - Repeat steps 3 through 6 for each additional random sampling point coordinate .

The following method will be used for determination of gross yield of sorghum samples. Gross yield is determined by deducting the adjustment for moisture content of threshed grain from the harvest weight. Moisture content of the grain samples will be made by lab analysis.

Gross Yield = Harvest Weight adjusted for moisture content

Included below for reference is the Gross Yield formula and an explanation of its components.

$$\text{Gross Yield (bu/ac)} = \frac{A \times B}{C \times D}$$

Where:
A = Weight of threshold grain at time of moisture test

B = Percent moisture in grain corrected to 14.0%

$$= \frac{1.0 - (\%\ \text{moisture in grain}/100\%)}{.860}$$

C = Row Factor	28" = .001071
Area or percent of Acre	30" = .001148
Sampled with 20 feet	36" = .001377
of Row (2 rows x 10 feet)	38" = .001454
	40" = .001530

D = 56 lbs (weight of standard bushel of sorghum)

and .860 = The standard moisture content conversion factor of sorghum per bushel (l.0 - .140)

After calculation of the gross yield, conduct a statistical comparison of these results to the projected production results determined in the approved permit application package.

SPECIAL PROBLEMS IN SAMPLE LAYOUT

1. It is possible for a sample grid coordinate to fall on areas within the field boundary which were not planted to crops (i.e., grass waterway, roadway, etc.) When this situation occurs, stop the pace count at the start of such an area and resume the count on the other side of the area.

2. If a blank area is crossed which was planted to crops, the pace count should be continued through this area. Usually such areas are due to poor germination, insects, standing water, etc. (if the sample area falls in this planted area which is blank, then a zero yield is established).

3. If a sample coordinate falls partly in a blank area which was not planted for harvest, move the sample area ahead until it is wholly on acreage planted to the crop being sampled. The sample point should begin one pace from the edge of the blank area.

APPENDIX Q.

MINIMUM SAMPLE SIZE FOR ROW CROPS IN
PRIME FARMLAND (OR NON- PRIME FARMLAND)
PRODUCTION DETERMINATION

SOYBEANS

Number of acres in the field	Minimum Sample Size
4 - 39 acres	10
40 - 279 acres	12
280 - 639 acres	16
640 acres or more	26

WHEAT – OATS

Number of acres in the field	Minimum Sample Size
4 - 39 acres	6
40 - 279 acres	8
280 - 639 acres	10
640 acres or more	14

SORGHUM

Number of acres in the field	Minimum Sample Size
4 - 39 acres	10
40 - 279 acres	16
280 - 639 acres	28

APPENDIX R.
PHASE I BOND RELEASE APPLICATION

PHASE I BOND RELEASE APPLICATION

DATE _____

This request applies to _____ Initial _____ Permanent Program Permit.

Permittee _____ Permit No. _____

Legal Description _____

_____

_____

_____ County _____

Section	Township	Range	Acres Permitted	Acres Disturbed	Acres For Release
TOTAL					

Explain any difference in permitted acres and acreages to be released _____

_____

_____

_____

Bond Information:

ID#	_____	for $	_____	date	_____	By	_____
#	_____	for $	_____	date	_____	By	_____
CD#	_____	for $	_____	date	_____	By	_____
Other#	_____	for $	_____	date	_____	By	_____

TOTAL AMOUNT REQUESTED FOR RELEASE _____

Explain “Other” by Attachment.

Notification:

List affected landowners, adjacent landowners, public agencies, companies and other entities about this bond release. Provide copies of all letters of notification and date mailed.

Newspaper Publication:

Submit a copy of an advertisement placed at least once a week for four consecutive weeks in a newspaper of general circulation published in the county of the area being applied for bond release.

Name of Newspaper _____

Dates of Publication _____ | _____ | _____ | _____

Nearest town, city or municipality _____

Reclamation Information:

Is backfilling and grading complete on the site requested for release? _____ If no, explain.

Have all drainage control structures been completed and all ponds certified? _____ If no, explain.

Has all topsoil been redistributed on the reclaimed site (except for that required to reclaim temporary ponds or structures)? _____ If no, explain.

Does the permit area include prime farmland? _____

Does the reclamation plan require any subsoil replacement on non-prime farmland areas? _____

Provide three copies of data which demonstrates successful topsoil replacement. If the permit area includes prime farmland, or if the reclamation plan requires replacement of subsoil on non-prime farmland areas, provide three copies of data which demonstrates successful subsoil replacement.

Provide three copies of current maps/aerial photographs (the same scale as the permit maps) for each section within the increment/permit area. Each map must have the signature, seal and number of a registered professional engineer or other competent person and identify all post-mining landuses and any temporary or permanent structures.

Provide three location maps (8 ½" x 11").

Provide topographic profiles (cross sections or contours, whichever was in original permit application package) of major slopes to adequately represent the post-mining permit area. (Permanent Program only).

Submit three copies of the completed Phase I application form and three copies of supplemental material (unless otherwise required) to the Department.

List of Attachments:

I hereby certify that all the above information and attached supplemental material is true and correct, that the acres being requested for Phase I bond release meet requirements of the reclamation plan filed with the approved permit and revisions, and that the acreage meets applicable performance standards in the appropriate Rules and Regulations.

Permittee/Company Official _____ Date _____

Title/Position _____

Address _____ City _____ State ____ Zip _____

Subscribed and sworn to before me this _____ day of _____ 2006.

Notary Public _____

My commission expires _____ 2006.

APPENDIX S. PHASE II BOND RELEASE APPLICATION

PHASE II BOND RELEASE APPLICATION

DATE _____

This request applies to _____ Initial _____ Permanent Program Permit.

Permittee _____ Permit No. _____

Legal Description _____

_____

_____

_____ County _____

Section	Township	Range	Acres Permitted	Acres Disturbed	Acres For Release
TOTAL					

Explain any difference in permitted acres and acreages to be released _____

_____

_____

_____

Bond Information:

ID#	_____	for $	_____	date	_____	By	_____
#	_____	for $	_____	date	_____	By	_____
CD#	_____	for $	_____	date	_____	By	_____
Other#	_____	for $	_____	date	_____	By	_____

TOTAL AMOUNT REQUESTED FOR RELEASE _____

Explain “Other” by Attachment.

Notification:

Attach a list of affected landowners, adjacent landowners, public agencies, companies, and other entities notified about this bond release. Provide copies of all letters of notification.

Newspaper Publication:

Submit a copy of an advertisement placed at least once a week for four successive weeks in a newspaper of general circulation published in the county of the area being applied for bond release.

Name of Newspaper _____

Dates of Publication _____ | _____ | _____ | _____

Nearest town, city or municipality _____

Reclamation and Revegetation Information:

Was documentation of successful topsoil replacement on the entire permit area provided in the Phase I bond release application package (excluding topsoil held back for pond or gully reclamation)? _____

If no, explain and provide three copies of documentation of successful topsoil replacement.

Does the permit area include any prime farmland which was disturbed during mining operations? _____

If yes, the vegetation report must include prime farmland productivity data.

What is the date of the start of the liability period (after completion of initial planting of all permanent vegetation species or after any augmentation procedures?

_____

Has the permanent vegetation been established in accordance with the approved reclamation plan? _____ If no, explain

Provide three copies of a vegetation report which demonstrates the successful establishment of permanent vegetation on the site.

In the vegetation report, describe the methods used to sample ground cover (and productivity, if the permit area includes prim farmland). Describe randomization procedures used in the selection of sampling plots or points. Show how minimum adequate sample size was determined (sample size shall be no less than ten per each area sampled). Show details (eg. Variances, means, t-statistics) of the statistical analysis used to answer the ground cover and productivity questions on the preceding page. Provide sufficient data that ODM can calculate means and variances for each sample (a complete set of raw data is not necessary but ODM reserves the right to request raw data if it desires). State who conducted the survey and when it was done. Describe the standard used in the statistical comparisons (published technical standard or reference area). If a technical standard was used, state its source of publication and any ways in which it may have been modified for use in this document. If a reference area(s) was used show that is was managed in a way appropriate to its function as a reference area.

Did the reclamation plan include any special wildlife habitat planting plans? _____

If yes, demonstrate in the vegetation report that these plans have been successfully conducted.

Approved Post-Mining Landuse (acres):

a. Cropland	_____	b. Pastureland	_____	c. Grazingland	_____
d. Forestry	_____	e. Water Resources	_____	f. Wildlife Habitat	_____
g. Industrial	_____	h. Residential	_____	i. Other (list)	_____

Have all of the acreages listed above which constitute land use changes been approved either in the original permit or by revision? _____ If no, explain

All off-site drainage is within the water quality requirements of the regulations. _____

Has impounded/discharged water been chemically treated? _____

If “yes”, state last date and type of treatment. _____

Provide three location maps (8 ½" x 11") for each section within the permit.

Provide three copies of current map/aerial photographs (same scale as permit maps) for each section within the increment/permit area showing post-minin gland uses, wildlife habitat plantings, permanent impoundments and facilities.

Submit three copies of the completed Phase II application forms and three copies of all supplemental material to the Department.

List of Attachments:

I hereby certify that all the above information and attached supplemental material is true and correct, that the acres being requested for Phase II bond release meet requirements of the reclamation plan filed with the permit and/or revisions and that the acreage meets all applicable performance standards in the appropriate Rules and Regulations.

Permittee/Company Official _____ Date _____

Title/Position _____

Address _____ City _____ State ____ Zip _____

Subscribed and sworn to before me this _____ day of _____ 2006.

Notary Public _____

My commission expires _____ 2006.

APPENDIX T. PHASE III BOND RELEASE APPLICATION

PHASE III BOND RELEASE APPLICATION

DATE _____

This request applies to _____ Initial _____ Permanent Program Permit.

Permittee _____ Permit No. _____

Legal Description _____

_____

_____

_____ County _____

Section	Township	Range	Acres Permitted	Acres Disturbed	Acres For Release
TOTAL					

Explain any difference in permitted acres and acreages to be released _____

_____

_____

_____

Bond Information:

ID#	_____	for $	_____	date	_____	By	_____
#	_____	for $	_____	date	_____	By	_____
CD#	_____	for $	_____	date	_____	By	_____
Other#	_____	for $	_____	date		By	_____
TOTAL				AMOUNT REQUESTED FOR RELEASE			_____

Explain “Other” by Attachment.

Notification:

Attach a list of affected landowners, adjacent landowners, public agencies, companies, and other entities notified about this bond release. Provide copies of all letters of notification.

Newspaper Publication:

Submit a copy of an advertisement placed at least once a week for four successive weeks in a newspaper of general circulation published in the county of the area being applied for bond release.

Name of Newspaper _____

Dates of Publication _____ | _____ | _____ | _____

Nearest town, city or municipality _____

Reclamation and Revegetation Information:

Does the permit area include any prime farmland which was disturbed during mining operations? _____ If no, explain

What is the date of the start of liability period (after completion of initial planting of all permanent vegetation species or after any augmentation procedures)?

_____

Has permanent vegetation been established in accordance with the approved reclamation plan? _____ If no, explain

Provide three copies of a vegetation report which demonstrates the successful establishment of permanent vegetation on the site.

In the vegetation report, describe the methods used to sample ground cover and productivity. Describe randomization procedures used in the selection of sampling plots or points. Show how minimum adequate sample size was determined (sample size shall be no less than ten per each area sampled). Show details (eg. Variances, means, t-statistics) of the statistical analysis used to answer the ground cover and productivity questions on the preceding page. Provide sufficient data that ODM can calculate means and variances for each sample (a complete set of raw data is not necessary but ODM reserves the right to request raw data if it desires). State who conducted the survey and when it was done. Describe the standard used in the statistical comparisons (published technical standard or reference area). If a technical standard was used, state its source of publication and any ways in which it may have been modified for use in this document. If

a reference area(s) was used show that it was managed in a way appropriate to its function as a reference area. The standard used (technical or reference area) must be the same used in the Phase II application.

Did the reclamation plan include any special wildlife habitat planting plans? _____

If yes, demonstrate in the vegetation report that these plans have been successfully conducted.

Approved Post-Mining Landuses (acres):

a. Cropland	_____	b. Pastureland	_____	c. Grazingland	_____
d. Forestry	_____	e. Water Resources	_____	f. Wildlife Habitat	_____
g. Industrial	_____	h. Residential	_____	i. Other (list)	_____

Have all of the acreages listed above which constitute land use changes been approved either in the original permit or by revision? _____ If no, explain

Have all approved land uses been achieved on the site? _____ If no, explain

Have all permanent impoundments or ponds achieved an adequate and stable water level? _____ If no, explain

All off-site drainage is within the water quality requirements of the regulations. _____

Has impounded/discharged water been chemically treated?

If "yes" state last date and type of treatment. _____

_____

Provide three location maps (8 ½" x 11") for each section within the permit.

Provide three copies of current map/aerial photographs (same scale as permit maps) for each section within the increment/permit area showing post-minin gland uses, wildlife habitat plantings, permanent impoundments and facilities.

Submit three copies of the completed Phase II application forms and three copies of all supplemental material to the Department.

List of Attachments:

I hereby certify that all the above information and attached supplemental material is true and correct, that the acres being requested for Phase II bond release meet requirements of the reclamation plan filed with the permit and/or revisions and that the acreage meets all applicable performance standards in the appropriate Rules and Regulations.

Permittee/Company Official _____ Date _____

Title/Position _____

Address _____ City _____ State ____ Zip _____

Subscribed and sworn to before me this _____ day of _____ 2006.

Notary Public _____

My commission expires _____ 2006.

APPENDIX U.

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