DEPARTMENT OF NATURAL RESOURCES

NOTICE OF PROPOSED AMENDMENTS

1) **Heading of the Part**: Permanent Program Performance Standards – Surface Mining Activities

2) **Code Citation**: 62 Ill. Adm. Code 1816

3) **Section Numbers**
   | Proposed Actions |
|-------------------|------------------|
| 1816.22           | Amendment        |
| 1816.116          | Amendment        |
| 1816.117          | Amendment        |
| 1816.APPENDIX A   | Repealed         |
| 1816.EXHIBIT A    | Repealed         |

4) **Statutory Authority**: Implementing and authorized by the Surface Coal Mining Land Conservation and Reclamation Act [225 ILCS 720].

5) **A Complete Description of the Subjects and Issues Involved**: This Part is being amended to bring Illinois’ regulations into consistent wording with federal SCMRA counterparts, to add clarity to regulations, to remove outdated end dates previously removed from federal counterparts, update reference documents, to address removal of 62 IAC 1816.Appendix A, strikes sorghum as a crop for testing, and clarify success standards for specific land uses at surface coal mining operations.

6) **Published studies or reports, and sources of underlying data, used to compose this rulemaking**: None

7) **Will this proposed rulemaking replace an emergency rule currently in effect?** No

8) **Does this rulemaking contain an automatic repeal date?** No

9) **Does this proposed rulemaking contain incorporations by reference?** No

10) **Are there any other proposed rulemakings pending on this Part?** No

11) **Statement of Statewide Policy Objectives**: This rulemaking does not affect units of local government.

12) **Time, Place, and Manner in which interested persons may comment on this proposed rulemaking**: 


13) **Initial Regulatory Flexibility Analysis:**

   A) **Types of small businesses, small municipalities and not for profit corporations affected:** None

   B) **Reporting, bookkeeping or other procedures required for compliance:** None

   C) **Types of professional skills necessary for compliance:** None

14) **Small Business Impact Analysis:** No adverse impacts are anticipated.

15) **Regulatory Agenda on which this rulemaking was summarized:** January 2022

The full text of the Proposed Amendments begins on the next page:
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TITLE 62: MINING
CHAPTER I: DEPARTMENT OF NATURAL RESOURCES

PART 1816
PERMANENT PROGRAM PERFORMANCE STANDARDS - SURFACE MINING ACTIVITIES

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1816.13 Casing and Sealing of Drilled Holes: General Requirements
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1816.21 Topsoil: General Requirements (Repealed)
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1816.45 Hydrologic Balance: Sediment Control Measures
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1816.EXHIBIT A County Crop Yields by Soil Mapping Unit (Repealed)

AUTHORITY: Implementing and authorized by the Surface Coal Mining Land Conservation and Reclamation Act [225 ILCS 720].

Section 1816.22 Topsoil and Subsoil

a) Removal.

1) All topsoil shall be removed as a separate layer from the area to be disturbed, and segregated. Where topsoil is of insufficient quantity or poor quality for sustaining vegetation, the materials approved by the Department in accordance with subsection (b) shall be removed as a separate layer from the area to be disturbed, and segregated.

2) If topsoil is less than six (6) inches thick and no substitutes or supplements are approved in accordance with subsection (b), the operator shall remove a six (6) inch layer that includes the A horizon and the unconsolidated materials immediately below or the A horizon and all unconsolidated materials if the total available is less than six (6) inches and treat the mixture as topsoil.

3) The Department shall not require the removal of topsoil for minor disturbances which:

A) Occur at the site of small structures, such as power poles, signs, fence lines or markers; or

B) Will not destroy the existing vegetation, will not cause erosion and will not degrade the quality or limit the future use of the soil.

4) All material to be removed under this Section shall be removed after the vegetative cover that would interfere with its salvage is cleared from the area to be disturbed, but before any drilling, blasting, mining or other surface disturbance takes place.

b) Substitutes and supplements.
Selected overburden materials may be substituted for, or used as a supplement to topsoil if the operator demonstrates to the Department that the resulting soil
medium is equal to, or more suitable for sustaining vegetation than, the existing topsoil, and the resulting soil medium is the best available in the permit area to support revegetation. The demonstration shall be based upon the information requirements of 62 Ill. Adm. Code 1780.18(b)(4).

c) Storage.

1) Materials removed under subsection (a) if not redistributed immediately shall be segregated and stockpiled.

2) Stockpiled materials shall:
   A) Be selectively placed on a stable site within the permit area;
   B) Be protected from contaminants and unnecessary compaction that would interfere with revegetation;
   C) Be protected from wind and water erosion through prompt establishment and maintenance of an effective, quick growing vegetative cover or through other measures equally effective in controlling erosion approved by the Department; and
   D) Not be moved until required for redistribution unless approved by the Department.

3) Where long-term surface disturbances will result from facilities such as support facilities and preparation plants and where stockpiling of materials removed under subsection (a)(1) would be detrimental to the quality or quantity of those materials, the Department may approve the temporary distribution of the soil materials so removed to an approved site within the permit area to enhance the current use of that site until needed for later reclamation provided that:
   A) Such action will not permanently diminish the capability of the topsoil of the host site; and
   B) The material will be retained in a condition more suitable for redistribution than if stockpiled.
Redistribution.

1) Topsoil materials and topsoil substitutes and supplements removed under subsections subsection (a) and (b) of this section shall be redistributed in a manner that:

A) Achieves an approximate uniform, stable thickness when consistent with the approved post-mining land use, contours and surface-water drainage systems. Soil thickness may also be varied to the extent such variations help meet the specific revegetation goals identified in the permit;

B) Prevents excess compaction of the materials; and

C) Protects the materials from wind and water erosion and contamination before and after seeding and planting.

2) Before redistribution of the material removed under subsection (a) the regraded land shall be treated if necessary to reduce potential slippage of the redistributed material and to promote root penetration. If no harm will be caused to the redistributed material and reestablished vegetation, such treatment may be conducted after such material is replaced.

3) The Department shall not require the redistribution of topsoil or topsoil substitutes on the approved post-mining embankments of permanent impoundments or of roads if it determines that:

A) Placement of topsoil or topsoil substitutes on such embankments is inconsistent with the requirement to use the best technology currently available to prevent sedimentation; and

B) Such embankments will be otherwise stabilized.

4) Nutrients and soil amendments shall be applied to the initially redistributed material when necessary to establish the required vegetative cover.
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e) Subsoil segregation. The Department may require that the B horizon, C horizon, or other underlying strata, or portions thereof, be removed and segregated, stockpiled, and redistributed as subsoil in accordance with the requirements of subsections (c) and (d) if it finds that such subsoil layers are necessary to comply with the revegetation requirements of Sections 1816.111, 1816.113, 1816.114, 1816.116 and 1816.117.

(Source: Amended at 46 Ill. Reg. _______, effective _______________)

Section 1816.116 Revegetation: Standards for Success

a) Success of Revegetation

1) Success of revegetation shall be judged in accordance with this Section, and Section 1816.117, and as described in the Agricultural Lands Productivity Formula (Illinois Department of Natural Resources, Office of Mines and Minerals, Land Reclamation Division and Illinois Department of Agriculture, Bureau of Land and Water Resources, October 19, 2021, this incorporation includes no later amendments or additions). The Agricultural Lands Productivity Formula is a program that compares reclaimed field crop yields against projected county yields adjusted annually for weather variations. The Agricultural Lands Productivity Formula is described in writing and made available to the public.

2) Requirements

A) The period of extended responsibility for successful revegetation shall begin after the last year of augmented seeding, fertilizing, irrigation, or other work, excluding husbandry practices that are approved by the Department in accordance with subsection (a)(2)(C).

B) The period of extended responsibility shall continue for a period of not less than 5 full years, except that on lands eligible for remining, the period of responsibility (until September 30, 2004) shall be 2 full years. Vegetation parameters identified in subsection (a)(1) shall equal or exceed the approved success standard set forth in subsection (a)(3).
C) The Department shall approve selective husbandry practices, excluding irrigation or augmented seeding or augmented fertilization, without extending the period of responsibility for revegetation success and bond liability, if such practices can be expected to continue as part of the post-mining land use or if discontinuance of the practices after the liability period expires will not reduce the probability of permanent revegetation success. Approved practices shall be normal conservation and land use management practices within the region for unmined lands having land uses similar to the approved post-mining land use of the disturbed area, including such practices as disease, pest, and vermin control; any pruning, reseeding and/or transplanting specifically necessitated by such actions; approved agricultural practices described in the Illinois Agronomy Handbook, 24th Edition (University of Illinois at Champaign-Urbana, University of Illinois Extension, College of Agriculture, Consumer and Environmental Science, 1917 Wright St., Champaign IL 61820 (2009-2002; this incorporation includes no later amendments or editions)); and those practices that are a part of an approved conservation plan subject to the Farm Security and Rural Investment Act of 2002 (P.L. 107-171; 116 Stat. 134). On all lands with a postmining land use other than cropland, any areas reseeded or replanted as a part or result of a normal husbandry practice must be sufficiently small in size and limited in extent of occurrence, or part of a hay management plan which is an agricultural practice described by the Illinois Agronomy Handbook or as part of an approved conservation plan subject to the Farm Security and Rural Investment Act of 2002, and the reestablished vegetation must be in place for a sufficient length of time so as not to adversely affect the Department's ability to make a valid determination at the time of bond release as to whether the site has been properly reclaimed to a condition in which it will support a diverse, effective, permanent vegetative cover of the required nature and productivity. Copies of the Illinois Agronomy Handbook and the Farm Security and Rural Investment Act of 2002 are available at the Department's Springfield office.
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D) Rill and gully repair on cropland-capable reclaimed land will not be considered augmentation if a permittee has an approved erosion control plan in place in the field pursuant to 62 Ill. Adm. Code 1823.14(g) or 1825.14(f), and shortly after the first rainfall event after the repair, the Department makes the following determinations:

i) the area is a minor erosional feature;

ii) the area is small;

iii) the erosion is not expected to recur; and

iv) the area is stable.

The Department shall notify the permittee in writing whether or not a repair is augmentative. Such written notice shall be in the form of an inspection report or other document issued by the Department.

E) Rill and gully repair on noncropland-capable land will not be considered augmentation if, shortly after the first rainfall event after the repair, the Department makes the following determinations:

i) the area is a minor erosional feature;

ii) the area is small;

iii) the erosion is not expected to recur; and

iv) the area is stable.

The Department shall notify the permittee in writing whether or not a repair is augmentative. Such written notice shall be in the form of an inspection report or other document issued by the Department.
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F) Augmentation

Wetlands shall be considered augmented when significant alterations are made to the size or character of the watershed, pumping is used to maintain water levels, or neutralizing agents, chemical treatments or fertilizers are applied to the wetland area, except that wetlands managed as wildlife food plot areas using agricultural techniques shall not be considered augmented when normal agricultural husbandry practices, such as routine liming and fertilization, are used. The application of neutralization agents and fertilizers used for minor remediation work or repairs is considered a normal husbandry practice and not augmentative. Water level management using permanent water control structures is considered a normal husbandry practice.

G) Other Management Practices

The Department shall approve the use of deep tillage for prime farmland and high capability land as a beneficial practice that will not restart the 5 year period of responsibility, if the following conditions are met:

i) The permittee has submitted a request to use the practice and has identified the field that will be deep tilled;

ii) One or more hay crops, or other acceptable row crops, have been grown or will be grown to dry out the subsoil prior to deep tilling the field; and

iii) The Department has determined that the use of deep tillage will be beneficial to the soil structure and long term crop production of the field and the benefits will continue well beyond the responsibility period.

The Department shall notify the permittee in writing of its decision. Such written notice shall be in the form of an inspection report or other document issued by the Department.
3) Ground cover and production shall be considered equal to the approved success standard when they are not less than 90% of the success standard. The sampling techniques for measuring success shall use a 90% statistical confidence interval (i.e., one-sided t test with a 0.10 alpha error). Vegetative ground cover shall be measured using the technique set forth in 62 Ill. Adm. Code 1816.117(d). Standards for success shall be applied in accordance with the approved post-mining land use and, at a minimum, the following conditions:

A) The vegetative ground cover for areas previously disturbed by mining operations that were not reclaimed to the requirements 62 Ill. Adm. Code 1810 through 1828 and that are remined or otherwise redisturbed by surface coal mining operations, shall not be less than the greater of 70% or the percentage of ground cover existing before redisturbance, and shall be adequate to control erosion during the last year of the responsibility period;

B) For areas to be developed for industrial, commercial or residential use less than 2 years after regrading is completed, the vegetative ground cover shall not be less than that required to control erosion and shall not be less than 70%;

C) For areas designated in the approved reclamation plan as cropland, except those cropland areas subject to 62 Ill. Adm. Code 1823.15, success of revegetation of cropland areas shall be determined in accordance with subsection (a)(4) or (a)(6). Crop production shall be considered successful if it is 90% of that crop production required in subsection (a)(4) or (a)(6) with 90% statistical confidence (i.e., one-sided t test with a 0.10 alpha error) for a minimum of any 2 crop years of a 10 year period prior to release of the performance bond, except the first year of the 5 year responsibility period. During the extended 5 year responsibility period, erosion from cropland must be minimized using equivalent or better management practices than surrounding unmined cropland. The 5 year responsibility period shall begin after the last year of augmented seeding, fertilizing, or soil treatment and at the time of the planting of the crops to be grown for the productivity
showing or crops grown in rotation. Crop production for proof of productivity purposes shall be initiated within 10 years after completion of backfilling and final grading. All cropland shall be maintained using proper management practices as set forth in subsection (a)(2)(C) until the end of the responsibility period. Once chosen by the permittee, the productivity alternative in subsection (a)(6) may not be modified without approval from the Department;

D) For areas to be developed for fish and wildlife habitat (including shelter belts), recreation, or forest products land uses, success of revegetation shall be determined on the basis of tree and shrub populations and ground cover. The tree and shrub population and ground cover shall meet the standards described in Section 1816.117;

E) For areas designated as pasture and/or hayland or grazing land in the approved reclamation plan, except for erosion control devices and other structures (i.e., levees, ditches, waterways, impounding structures, etc.) productivity success (tons of grasses and/or legumes per acre) shall be determined in accordance with subsection (a)(4) or (a)(6). Productivity shall be considered successful if it is 90% of the productivity required in subsection (a)(4) or (a)(6) with 90% statistical confidence (i.e., one-sided t test with a 0.10 alpha error) for a minimum of any 2 crop years of a 10 year period prior to release of the performance bond, except the first year of the 5 year extended responsibility period. All pasture, hayland and grazing land shall be maintained using proper management practices as set forth in subsection (a)(2)(C) until the end of the responsibility period. Production for proof of productivity purposes shall be initiated within 10 years after completion of backfilling and final grading. Ground cover shall be considered successful if it is 90% with 90% statistical confidence (i.e., one sided t test with a 0.10 alpha error) for a minimum of any 2 years of a 10 year period prior to the release of the performance bond, except the first year of the 5 year extended responsibility period. On high capability land, the Department shall allow the permittee to substitute corn production for hay production. If
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determined to be a proper management practice in accordance with subsection (a)(2)(C), the Department shall allow the permittee to substitute one year of crop production of an allowable crop specified in subsection (a)(4)(D) for one year of hay production on limited capability land. Once chosen by the permittee, the productivity alternative in subsection (a)(6) may not be modified without approval from the Department;

F) Non-contiguous areas less than or equal to 4 acres which were disturbed from activities such as, but not limited to, signs, boreholes, power poles, stockpiles and substations shall be considered successfully revegetated if the permittee can demonstrate that the soil disturbance was minor, i.e., the majority of the subsoil remains in place, the soil has been returned to its original capability and the area is supporting its approved post-mining land use at the end of the responsibility period.

4) In order to use the Agricultural Lands Productivity Formula, Appendix A of this Part, or the alternative in subsection (a)(6), to determine success of revegetation, the following shall apply:

A) The permittee shall submit annually, by February 15, a one inch equals 500 (1:500) feet or larger scale drawing or aerial photograph delineating:

i) Field boundaries, a field numbering scheme and the total acreage for each field which will be cropped to demonstrate proof of productivity for the coming crop year. The Department shall approve such submittal if the information is correct and accurate. Once field boundaries are established in a submittal, the boundaries shall not be changed without recommencing the responsibility period, unless the submittal is amended in accordance with subsection (a)(4)(A)(ii); and

ii) The crop (e.g., hay, wheat, corn, soybeans, sorghum, etc.) which will be grown on each field to demonstrate proof of productivity for the coming crop year. The permittee may
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amend its scale drawing in accordance with 62 Ill. Adm. Code 1774.13(b)(2) until July 15 of the submittal year. Each such amendment shall contain a written explanation of changes from the original submittal and include a map reflecting the changes. A field is an area of land reclaimed by a single reclamation technique that comprises either high capability land or prime farmland or limited capability pasture land. The size of the field and its boundaries are determined by such factors which include, but are not limited to, contour, non-cropped boundaries and size of farming equipment.

B) Fields identified in subsection (a)(4)(A) to be measured for success of revegetation for cropland shall be planted annually to a single approved crop. The current sampling method of the Agricultural Lands Productivity Formula Appendix A shall apply. Soil and water conservation practices approved in the permit application including but not limited to grass waterways, diversion ditches, contour grass strips, and sedimentation ponds within the boundaries of a field shall be excluded from the sampling requirements of the Agricultural Lands Productivity Formula Section 1816 Appendix A and shall remain vegetated with permanent ground cover species, where appropriate, to conserve soil and water resources. Subject to rulemaking, the Department in cooperation with the Illinois Department of Agriculture may determine if a portion of a field is a representative sample of the entire field when technology has developed to make it possible through physical and chemical agronomic testing to demonstrate success of vegetation through soil surveys or when statistically valid sampling procedures are developed for determining success of revegetation based upon cropping and sampling a representative portion of the field.

C) Adjustments for abnormal growing conditions shall be accepted by the Department if the adjustments are certified by a qualified professional (American Society of Agronomy certified) or National Association of State Departments of Agriculture crop
enumerators used under this Section, whose ability to perform such adjustments has been previously approved by the Department.

D) The crops to be grown shall include those commonly grown on surrounding unmined cropland such as corn, soybeans, hay, sorghum or wheat. The Department may approve a hay crop use where this is a common use of unmined cropland in the surrounding area. Prime farmland and other cropland areas must include a minimum of one successful year of corn and if the Department has approved its use, a maximum of one successful year each of hay and wheat crops may be used for the productivity demonstration. If deep tillage has been completed to a minimum depth of 36 inches prior to bond release, the applicant may use more than one successful year of hay or wheat as a crop to be used for the productivity demonstration. The requirement for one successful year of corn remains unchanged under this subsection (a)(4)(D).

5) Wetland revegetation shall be deemed successful when:

A) The applicable wetland vegetation criteria included in the following reference materials have been met: in the Corps of Engineers Wetlands Delineation Manual (Department of the Army Technical Report Y-87-1, January 1987, published by the Department of the Army, Waterways Experiment Station, Corps of Engineers, P.O. Box 631, Vicksburg, Mississippi 39180-0631); Regional Supplement to the Corp of Engineers Wetlands Delineation Manual: Midwest Region (Department of the Army ERDC/EL TR-10-16, August 2010, published by the Department of the Army, U.S. Army Engineer Research and Development Center, 3909 Ferry Halls Road, Vicksburg, MS 39180-6199), and the National Wetland Plant List for the State of Illinois (U.S. Army Corps of Engineers 2018, National Wetland Plant List, version 3.4 http://wetland-plants.usace.army.mil). The reference materials have been achieved following sampling procedures specified in that manual, which does not include any later amendments or editions and is available for inspection and copying at the Department's Springfield office; and
Areas designed to support vegetation in the approved plan shall have a minimum areal coverage of 30%. The testing procedure in Section 1816.117(d)(1) through (3) shall be used to evaluate the extent of cover. Areal cover shall be determined to be present if any approved wetland species is measured at the increment. The percentage of areal cover shall be established for the area tested by taking the total number of measurements where areal cover was determined to be present.

In order to use the alternative to the Agricultural Lands Productivity Formula, Appendix A, to determine success of revegetation, the following shall apply: use of this alternative is contingent upon the permittee demonstrating for the entire field that the soil strength of the entire soil profile will average ≤ 200 psi or has been deep tilled to a minimum depth of 36 inches prior to bond release, and soil fertility will average Optimum Management for pH, P and K values as defined under the current Illinois Agronomy Handbook, and intensive land leveling is implemented, as needed, for the entire field. Areas to be tested are allowed under the provisions of subsections (a)(3)(C) or (E).

The following substitution of the annual pit base yield adjustment Column F of Appendix A (County Average Yield File) shall read:

Column F is a derived optimum management production (see the equation below) obtained by multiplying the figures in Column D times the figures in Column E. This production figure will normally exceed actual production because the optimum level management yield is used. The purpose of using the optimum management production is to derive a weighted average optimum management yield that is the total optimum management production (Column F) divided by the total grain acres in the county (Column D).
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The weighted optimum management yield figure will be used to derive a "factor" as described below:

\[
\text{County Success Factor} = \frac{\text{Average of the Five Previous Official County Crop Yield for the Five Previous Years}}{\text{Average of Weighted Optimum Management Yield for the Five Years}}
\]

When the factor derived in subsection (a)(6)(A) and hand sampling are used, the harvest loss will be calculated by averaging the harvest loss of the 5 previous years for the crop being tested.

b) The person who conducts surface mining activities shall:

1) Conduct periodic measurements of vegetation, soils, and water prescribed or approved by the Department, to identify if remedial actions are necessary during the applicable period of liability specified in subsection (a); and

2) Initiate a soil compaction and fertility testing plan, subject to the approval of the Department, for areas that have incurred 5 unsuccessful attempts to meet the production required by subsection (a)(3)(C) or (E) or 62 Ill. Adm. Code 1823.15, or shall initiate deep tillage under appropriate soil moisture conditions on the areas, subject to the approval of the Department.

3) Permittees shall submit by February 15 of each year a report of reclamation activities conducted during the previous calendar year, which initiate or may alter the responsibility period or are specifically required by the Department to evaluate a normal husbandry practice, using forms provided by the Department. Examples of reclamation activities to be reported and/or evaluated include but are not limited to crops used in temporary and permanent seedings, grasses and legumes planted, trees and shrubs planted, soil amendments added, and location and type of augmentation activities. The forms shall be submitted with a copy of the approved post-mining land use and capability map depicting the location of such activities. The map shall be planned as a continuous map so the reclamation activities conducted each year may be added and indicated on the map by the dates the activities were conducted.
Section 1816.117 Revegetation: Tree, Shrub, and Herbaceous Wildlife Vegetation

a) For areas to be developed for fish and wildlife habitat (including shelter belts), recreation, or forest products land uses, success of vegetation shall be determined on the basis of tree and shrub population and vegetative ground cover. Such parameters are described as follows:

1) Trees and shrubs that will be used in determining the success of vegetation and the adequacy of plant arrangement shall have utility for the approved post-mining land use. Tree and/or shrub population shall be considered successful if it meets the population required in subsection (b) below with 90% statistical confidence (i.e., one-sided t test with a 0.10 alpha error) during the fifth year of the responsibility period or later in the responsibility period. On lands eligible for remining, the period of responsibility (until September 30, 2004) shall be 2 full years. Trees and shrubs counted in determining such success shall be healthy, e.g. not demonstrating abnormal growth, coloring, leaf drop or disease. At the time of bond release such trees and shrubs shall be alive, and shall have been in place for at least 3 growing seasons, i.e. 3 years. On lands eligible for remining, trees and shrubs need not have been in place for 3 years; however, such trees and shrubs shall not be counted in determining success during the same calendar year in which they were planted.

2) Vegetative ground cover shall not be less than required to achieve the approved post-mining land use and shall be adequate to control erosion and shall not be less than 70% during the last year of the responsibility period.

3) Permanent roads, parking lots and similar impervious structures on the revegetated area shall not require the planting of trees and shrubs or herbaceous ground cover. Erosion control structures, including pond embankments, shall not require the planting of trees and shrubs.

4) For purposes of this Section, herbaceous species means: grasses, legumes and nonleguminous forbs; woody plants means woody shrubs, trees and
vines; and ground cover means the area of ground covered by the combined above ground parts of vegetation and the litter that is produced naturally on site.

5) For purposes of this Section, normal husbandry and conservation practices shall include pruning, disease, pest, vermin and herbaceous vegetation control including mowing, replanting and rill and gully repairs. The replanting of trees and shrubs in areas described in Section 1816.116(a)(2)(C) shall be limited to 20% of the original approved planting rate during the first year of the responsibility period and 10% of the original approved planting rate during the second year of the responsibility period. The repair of rills and gullies shall be limited to those approved as a normal conservation practice under Section 1816.116(a)(2)(C), (D) and (E).

b) For areas where woody plants are used for fish and wildlife habitat (including shelter belts), or recreation land uses, the area shall have a minimum population of 250 trees or shrubs per acre. Planting arrangements such as hedgerows, border plantings, clump plantings, shelterbelts, and open herbaceous areas which increase diversity within wildlife areas may be approved by the Department on a case-by-case basis prior to planting such areas. Where woody plants are used for forest products land uses, the area shall have a minimum population of 450 trees or shrubs per acre.

c) For areas planted to trees or shrubs including wildlife habitat (including shelter belts), recreation, and forest products land uses, the sampling procedure for measuring populations is described as follows:

1) The permittee shall submit a scale drawing or aerial photograph delineating the fields to be sampled and the total number of acres in each field. A one inch equals 500 (1:500) feet or larger scale shall be used. Once field boundaries are established in a submittal, the boundaries shall not be changed unless the Department approves a request in accordance with 62 Ill. Adm. Code 1774.13.

2) One of the following circular plot sizes shall be selected by the sample enumerator:
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<table>
<thead>
<tr>
<th>Plot Size/Acres</th>
<th>Radius/Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/160</td>
<td>9.31</td>
</tr>
<tr>
<td>1/120</td>
<td>10.75</td>
</tr>
<tr>
<td>1/100</td>
<td>11.78</td>
</tr>
<tr>
<td>1/90</td>
<td>12.41</td>
</tr>
<tr>
<td>1/80</td>
<td>13.17</td>
</tr>
<tr>
<td>1/70</td>
<td>14.07</td>
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<td>16.65</td>
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<td>18.61</td>
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<td>1/30</td>
<td>21.50</td>
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<tr>
<td>1/20</td>
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</tr>
<tr>
<td>1/10</td>
<td>37.24</td>
</tr>
<tr>
<td>1/5</td>
<td>52.66</td>
</tr>
<tr>
<td>1/4</td>
<td>58.88</td>
</tr>
</tbody>
</table>

3) The number of plots needed to sample 2.5% of the area will be calculated employing the following formula:

   Number of Plots equals 2.5% multiplied by Sample Area in acres divided by plot size.

4) Based on the number of plots needed to be sampled and plot size, locate transect lines an equal distance apart throughout the area to be sampled. Position individual plots an equal distance apart along transect lines. Determine the total length of all transect lines combined and then divide by the total number of plots needed to be sampled. When an individual plot is positioned within 60 feet of the boundary of the area to be sampled, the location of the plot shall be moved perpendicular to the transect line until the plot is 60 feet from the boundary of the area to be sampled or the greatest distance possible where 60 feet cannot be achieved.

5) Sample each plot for compliance with subsections (a)(1) and (b) and record live trees and/or shrubs and species.

6) Calculate population levels as follows:
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A) Average number of live trees and/or shrubs per plot equals total number of live trees and/or shrubs divided by number of plots; and

B) Number of live trees and/or shrubs per acre equals average number of live trees and/or shrubs per plot multiplied by plot size denominator.

7) Representatives of the Department shall administer all sampling.

d) Vegetative ground cover shall be measured by the following technique:

1) Twenty random points shall be identified in the area to be tested.

2) A 20 feet engineer’s tape shall be extended directly south of each point. If the tape extends beyond the boundary of the area to be tested or extends into an area where herbaceous ground cover has been controlled with herbicides to minimize competition with woody plants, the tape shall be rotated in 90 degree increments until the entire 20 feet length is within the boundary of the area to be tested or area not treated with the herbicide.

3) A measurement shall be taken at each .2 foot increment directly above or below the tape.

4) Ground cover shall be determined to be present if any vegetation identified in subsection (a)(4) is measured at the increment.

5) A percentage of ground cover shall be established for the area tested by taking the total number of measurements where ground cover was determined to be present.

e) For areas where herbaceous vegetation plants are used for fish and wildlife habitat (including shelterbelts), or recreation land uses, vegetative ground cover of approved species shall not be less than required to achieve the approved post-mining land use and shall be adequate to control erosion and shall not be less than 70% during the last year of the responsibility period. Planting arrangements such as hedgerows, border plantings, clump plantings, shelterbelts, and open herbaceous area that increase diversity within wildlife areas may be approved by the Department on a case-by-case basis prior to planting those areas.
Section 1816. APPENDIX A Agricultural Lands Productivity Formula (Repealed)

SOIL MASTER FILE

The Soil Master File of the Agricultural Lands Productivity Formula contains a comprehensive list of the soil mapping units currently recorded in Illinois. The Soil Master File provides the soil mapping unit number, common mapping name, and the optimum level of management yields for corn, soybeans, wheat and mixed hay. The Soil Master File is created annually by the Illinois Department of Agriculture, pursuant to 20 ILCS 205/115. The reference document for information contained in the soil master file shall be Bulletin 811, "Optimum Crop Productivity Ratings for Illinois Soil," University of Illinois, College of Agricultural, Consumer and Environmental Sciences, Office of Research, August 2000.

COUNTY CROPPED ACREAGE FILE

The Agricultural Lands Productivity Formula requires that the number of cropped acres by soil mapping unit be calculated for each county. These calculations are generated by computer using the following formula:

\[
\text{Total acres per soil type per county} \times \frac{\text{percent of acres per soil type}}{\text{percent of total acreage cropped}} = \text{total cropped acres per soil type}
\]

The percent of total acreage cropped per soil type will be provided by County Soil and Water Conservation Districts. Any changes to these figures must be approved by the County Soil and Water Conservation District Board with a certified copy of all changes submitted by August 15 of each year to the Illinois Department of Agriculture.

The County Cropped Acreage File reflects the total acres of each soil type per county, percent of acreage cropped, and the computed figure of total cropped acres by soil type in each county. The "total cropped acres" figures are carried forward to the County Average Yield File. The County Cropped Acreage File is created annually by the Illinois Department of Agriculture, pursuant to 20 ILCS 205/115.

COUNTY AVERAGE YIELD FILE
The next procedure of the Agricultural Lands Productivity Formula is to equate annual county crop yield data to the soils derived in the “County Cropped Acreage File”. Section 1816.Exhibit A and the following paragraphs summarize the procedure for calculating the crop yield for each soil mapping unit.

Column A reflects the soil mapping units as they appear on a county-by-county basis.

Column B is the number of acres cropped in a county per soil type as recorded in the County Cropped Acreage File. These cropped acreage figures are then added together to give a total number of acres cropped for the county.

Column C is the percent of the acreage represented by each soil type when compared with the total in Column B (Column B = total acres in soil mapping unit times the percent of acres cropped in the county by mapping unit).

The number of acres planted in grain (Column D) is calculated by multiplying the percent of each soil mapping unit in the county (Column C) by the total acres in the county harvested for corn, soybeans, wheat and mixed hay. (See asterisk in Section 1816.Exhibit A.) The purpose of this calculation is to estimate the number of acres harvested from each of the particular soil mapping units. It is assumed that 25% of the total corn, soybean, wheat and mixed hay acreage was planted on that particular soil mapping unit. Therefore, the “grain acres” are distributed on the soil mapping units based upon the percent of acres in each soil mapping unit.

Column E is the adjusted yield information for each crop which comes from the Soil Master File.

Column F is a derived optimum management production (see the equation below) obtained by multiplying the figures in Column D times the figures in Column E. This production figure will normally exceed actual production because the optimum level management yield is used. The purpose of using the optimum management production is to derive a weighted average optimum management yield; which is, the total optimum management production (Column F) divided by the total grain acres in the county (Column D). The weighted optimum management yield figure will be used to derive a "factor" as described below:

\[
\text{Factor} = \frac{\text{Official County Crop Yield}}{\text{Weighted Optimum Management Yield}}
\]
Column G results from the multiplication of the above factor times the optimum level management yield of each soil mapping unit (Column E). The result is a yield which represents the average yield in either bushels per acre or tons per acre in the county for that year and crop. If official county crop yields are unavailable for a specific crop in a given year, the Department, in consultation with the permittee, and with the concurrence of the Illinois Department of Agriculture, will substitute a county crop yield from an adjacent county with similar soils, if it can be determined that similar weather conditions occurred in that year.

PERMIT SPECIFICS—YIELD STANDARD

a) After completing calculations for the projected yield of the test year in question, a yield standard for each capability class in the disturbed area in the pit must be calculated. The yield standard, which is also applicable to high capability and limited capability land will be calculated in a manner similar to prime farmland.

b) The number of prime farmland acres in each soil mapping unit will be divided by the total prime farmland acres in the pit to obtain a weighted proportion for each soil type. The weighted proportion of each prime farmland soil mapping unit in the pit, relative to the total prime farmland acres in the pit, will be multiplied times the projected yield for the pre-mining soil types. The weighted final yield for each prime farmland soil type in a pit will be added together and the total becomes the yield requirement for the pit.

c) After mining operations have ceased, the Department shall recalculate the yield standards for the pit based solely on the soils which were disturbed. Recalculated targets shall be applicable to all areas tested for productivity subsequent to the recalculation. Approved significant revisions after permanent cessation of mining shall cause the targets to be recalculated and applied to productivity fields tested after the recalculation.

AGRICULTURAL LANDS PRODUCTIVITY FORMULA SAMPLING METHOD

The sampling methodology that the Illinois Department of Agriculture or the Illinois Department of Natural Resources will use to gather the data needed to determine if productivity has been returned to reclaimed mine land is summarized below for corn, soybeans, wheat, sorghum, and mixed hay.
This sampling methodology requires an operator to submit by February 15 of each year, a scale drawing or aerial photo delineating specific field boundaries and type of crop which is to be sampled for proof of productivity for the current crop year. Each scale drawing and photo submitted shall include a field numbering scheme and the total acreage for each field on which sampling is being requested. In addition, the scaled drawing shall be no less than 1 inch equals 500 feet or greater than 1 inch equals 100 feet. The February 15 annual submittal may be amended by the operator until July 15. Each such amendment shall contain a written explanation of changes from the original submittal and an aerial photograph or scaled drawing reflecting the corrected sampling submittal.

The determination of sample points within a specific field will be made on the basis of a grid overlay scheme with the location of sample points on the grid randomly generated by computer. An intentional bias of 50 feet will be introduced to all field boundaries to remove the potential that sampling points may fall in turn around areas, or areas where contiguous soil reconstruction may cause field boundaries to not be indicative of whole field productivity.

The minimum acceptable number of samples to be taken relative to field size is shown in Section 1816. Table D sample points per crop acres, with fields of 4 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 Illinois Department of Agriculture may elect to increase the minimum number of acceptable sample points per field acres. Some factors which will be considered in determining 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%.

The Department and the Illinois Department of Agriculture shall jointly request the operator to verify yields by harvest weight (e.g., scale tickets) for reasons, including but not limited to:

1. Verification of random sampling results.
2. Availability of sample enumerators.

In each such case, the certified harvest yield adjusted, to optimum moisture content, will become the comparison yield for the Agricultural Lands Productivity Formula target yield.

CORN 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 last of the required paces to the first sampling point, place a stake immediately adjacent to the closest corn stalk to the toe of your shoe. Measure 15 feet of the corn row starting at the first stake and placing a second stake at the 15 foot mark.

Step 4–Determine the 3rd and 4th ears of the first row starting with the first stalk of corn. Tag these ears with a rubber band. If there are fewer than 4 ears in the first row, the last ear and the next to last ear should be tagged. In the case where a stalk has more than one ear, count the top ear first. (Note: An ear of corn is defined as a cob having at least one kernel. The tagged ears will be used to determine the moisture content, and at least 250 grams of grain are needed. If it does not appear that the 3rd and 4th ears will supply 250 grams of grain for a moisture test, then the 5th, 6th and/or 7th ear should be included until at least 250 grams of corn is collected.)

Step 5–Husk all ears in Row 1 within the 15 foot segment of the sample. Husk the ears and snap the shank off as cleanly as possible. Be sure to include any ears tagged for moisture testing.

Step 6–Weigh the husked ears using a balance scale – obtain field weight in pounds.

Step 7–After weighing, put ears tagged for moisture testing into polyethylene bags and seal. Mark the bag with the appropriate field number (as supplied by the mine operator), and sample identification number.

Step 8–Measure on a perpendicular line from the stalks in row one to the stalks in row 5. Divide this measured distance by 4 to determine the average row width.
Step 9 - Repeat Steps 3 through 8 for each additional random sampling point coordinate.

Step 10 - Send or deliver to the Illinois Department of Agriculture any grain sample collected for moisture content analysis. (Note: If any single sample requires more than one bag, additional bags should be identified sequentially such as 1A, 1B, 1C.)

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

\[
\text{Gross Yield} = \text{Harvest Weight adjusted for moisture content.}
\]

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

\[
\text{Gross Yield} = \frac{A \times B \times C}{D} \quad \text{Per Acre} \quad \frac{E \times F}{\text{bu/ac}}
\]

Where:

\[
A = \text{Field weight of husked ears of corn from 15 feet of row} \times 2 \quad (2 \text{ Rows x 15 feet})
\]

\[
B = \text{Weight of shelled grain at time of moisture test}
\]

\[
C = \text{Percent moisture in grain corrected to 15.5%}
\]

\[
C = 1.0 - \left( \frac{\% \text{ moisture in grain}}{100} \right) \times 0.845
\]

\[
D = \text{Weight of ears of Corn used for moisture determination}
\]

\[
E = \text{Row Factor}
\]

Average row width in feet \times 15 feet of row \times 43560 \text{ square feet/acre}

and \(0.845\) = The standard moisture content conversion factor of corn per bushel \((1.0 - (15.5\% /100))\)
F = Weight of standard bushel of corn = 56 lbs.

After calculation of the gross yield, the statewide Harvest Loss will be subtracted from the gross yield to obtain a net yield per sample. Harvest Loss is the difference between actual grain yield and what is hauled from a field. The net yield determinations for each sample will be averaged together to obtain a yield figure for the entire field being evaluated for proof of productivity.

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 6 feet of plant row and place a flag at the 6 foot mark. Starting from the row just identified, measure the distance across 5 rows. This distance, from row one to row 5, divided by 4 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 field number (as provided by the mine operator), and sample identification number. Secure the sample sack to prevent any sample loss. (Note: If sample weight is less than the 250 grams needed for the moisture test, sufficient grain of known moisture content will be added to the sample so that moisture tests can be made.)

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

Step 6—Send or deliver to the Illinois Department of Agriculture any grain sample collected for moisture content analysis. (Note: If any single sample requires more than one bag, additional bags should be identified sequentially such as 1A, 1B, 1C.)
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.

\[
\text{Gross Yield} = \text{Harvest Weight adjusted for moisture content.}
\]

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

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

Where:
- \(A\) = Weight of shelled grain from 6 feet of row
- \(B\) = Percent moisture in grain corrected to 12.5%
  \[B = (1.0 - (\% \text{ moisture in shelled beans}/100\%)) \times 0.875\]
- \(C\) = Number of grams per pound = 453.6
- \(D\) = Correction factor for row spacing on drilled or planted beans
  \[D = \frac{\text{Average row width in ft} \times \text{6 ft of row}}{43560 \text{ sq ft/acre}}\]
- \(E\) = Standard weight of 1 bushel of soybeans = 60 lbs

After calculation of the gross yield, the statewide Harvest Loss as calculated by the Illinois Agricultural Statistics Service will be subtracted from the gross yield to obtain a net yield per sample. Harvest loss is the difference between actual grain yield and what is hauled from a field. The net yield determination for each sample will be averaged together to obtain a yield figure for the entire field being evaluated for proof of productivity.

**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 2 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 2 sides of the sampling square, using the opposite corner of the original frame position to find the other 2 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 field number (as provided by the mine operator), and sample identification number. Secure the sample sack to prevent any sample loss. (Note: If sample weight is below 250 grams for the moisture test, grain of known moisture content will be added to the sample so that moisture tests can be made.)

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

Step 6 - Send or deliver to the Illinois Department of Agriculture any grain sample collected for moisture content analysis. (Note: If any single sample requires more than one bag, additional bags should be identified sequentially such as 1A, 1B, 1C.)

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.
**Gross Yield Per Acre** = \( A \times B \times C \times D \) (bu/acre)

Where:
- \( A \) = Total weight of all beans in 9 sq. ft. grid (in grams)
- \( B \) = Conversion factor = \( \frac{43560 \text{ sq. ft./ac.}}{453.6 \text{ gms/lb} \times 60 \text{ lbs/bu} \times 9 \text{ sq. ft.}} \)
- \( C = 1.0 - \left( \frac{\% \text{ moisture in shelled beans}}{100\%} \right) \)
- \( D = 0.875 \) = The standard moisture content conversion factor of soybeans per bushel (1.0 - (12.5%/100%)).

After calculation of the gross yield, the Harvest Loss will be subtracted from the gross yield to obtain a net yield per sample. Harvest Loss is the difference between actual grain yield and what is hauled from the field. The net yield determinations for each sample will be averaged together to obtain a yield figure for the entire field being evaluated for proof of productivity.

**WHEAT SAMPLING TECHNIQUES**
(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 2 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 2 sides of the sampling square using the opposite corner of the original frame position to find the other 2 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 field number (as supplied by the mine operator), and sample identification number. Secure the sample sack to prevent any sample loss. (Note: If sample weight is below 250 grams for the moisture test, grain of known moisture content will be added to the sample so that moisture tests can be made.)

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

Step 6 - Send or deliver to the Illinois Department of Agriculture grain sample collected for moisture content analysis. (Note: If any single sample requires more than one bag, additional bags should be identified sequentially such as 1A, 1B, 1C).

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.

\[
\text{Gross Yield Per Acre} = \frac{A \times B \times C}{D}
\]

Where:

- \(A\) = Sample wt. of wheat in grams
- \(B = 1.0 - (\% \text{ moisture in grain}/100\%\)
- \(C\) = Conversion factor

\[
= \frac{43560 \text{ sq. ft/acre}}{(60 \text{ lbs/bu} \times 453.6 \text{ gms/lb} \times 3.24 \text{ sq. ft.})}
\]

\[
= \frac{4940 \text{ bu/gm acre}}{0.880} = \begin{align*}
\text{The standard moisture content conversion factor of wheat per bushel (1.0 – (12%/100%))}
\end{align*}
\]
After calculation of the gross yield, the Harvest Loss will be subtracted from the gross yield to obtain a net yield per sample. Harvest Loss is the difference between actual grain yield and what is hauled from a field. The net yield determinations for each sample will be averaged together to obtain a yield figure for the entire field being evaluated for proof of productivity.

WHEAT SAMPLING TECHNIQUES

(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 rows at a right angle. Mark the 2 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 2 rows to be sampled. (Total 3 rows) Note: The row spacing will be determined by measuring across 5 row spaces 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 field number (as supplied by the mine operator), and sample identification number. Secure the sample sack to prevent any sample loss. (Note: If sample weight is below 250 grams for the moisture test, grain of known moisture content will be added to the sample so that moisture tests can be made.)

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

Step 6 – Send or deliver to the Illinois Department of Agriculture any grain sample collected for moisture content analysis. (Note: If any single sample requires more than one bag, additional bags should be identified sequentially such as 1A, 1B, 1C.)
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.

\[
\text{Gross Yield} = \text{Harvest Weight adjusted for moisture content}
\]

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

\[
\text{Gross Yield Per Acre} = \left( \frac{A \times B \times C}{D} \right) \quad (\text{bu/acre})
\]

Where:

- \( A \) = Sample wt. of wheat in grams
- \( B = 1.0 - \left( \frac{\% \text{ moisture in grain}}{100\%} \right) \)
- \( C \) = Conversion factor

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

\[
D = 0.880 = \text{The standard moisture content conversion factor of wheat per bushel (1.0 - (12%/100%))}.
\]

After calculation of the gross yield, the statewide Harvest Loss will be subtracted from the gross yield to obtain a net yield per sample. Harvest Loss is the difference between actual grain yield and what is hauled from the field. The net yield determinations for each sample will be averaged together to obtain a yield figure for the entire field being evaluated for proof of productivity.

**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 last 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 10 feet of the plant row starting at the first stake and placing a second stake at the 10 foot mark. Mark the first 5 heads and the last 5 heads with rubber bands. These heads will be used for moisture determination. One sample unit will equal one 10 foot sorghum row section.

Step 4 - Clip all grain heads in Row 1 within the 10 foot segment of the sample unit.

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

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

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

Step 8 - Send or deliver to the Illinois Department of Agriculture any grain sample collected for moisture content analysis. (Note: If any single sample requires more than one bag, additional bags should be identified sequentially such as 1A, 1B, 1C.)

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 the threshed grain from the harvest weight. Moisture content of the grain samples will be made by lab analysis.

\[
\text{Gross Yield} = \frac{\text{Harvest Weight adjusted for moisture content}}{\text{E x F}}
\]

Where: \( A = \) Field weight of grain heads of sorghum from 10 feet of row x 2 (2 rows x 10 feet)
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\[ B = \text{Weight of threshold grain at time of moisture test} \]

\[ C = \frac{\text{Percent moisture in grain corrected to 13.0\%}}{1.0} = 1.0 - \frac{\text{Percent moisture in grain}}{100\%} \times .870 \]

\[ D = \text{Weight of grain head and seeds used for moisture determination} \]

\[ E = \text{Row Factor} \]

<table>
<thead>
<tr>
<th>Area or percent of acre sampled</th>
<th>28&quot;</th>
<th>30&quot;</th>
<th>36&quot;</th>
<th>38&quot;</th>
<th>40&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>with 20 feet</td>
<td>.001070</td>
<td>.001148</td>
<td>.001377</td>
<td>.001455</td>
<td>.001529</td>
</tr>
<tr>
<td>row (2 rows x 10 feet)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ F = 56\text{ lbs (weight of standard bushel of sorghum)} \times .870 = \text{The standard moisture content conversion factor of sorghum per bushel (1.0 \times 1.30)} \]

After calculation of the gross yield, the statewide Harvest Loss will be subtracted from the gross yield to obtain a net yield per sample. Harvest Loss is the difference between actual grain yield and what is hauled from a field. The net yield determinations for each sample will be averaged together to obtain a yield figure for the entire field being evaluated for proof of productivity.

MIXED HAY 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 last of the required paces to the first sampling point, lay down a sampling frame perpendicular to the toe of your shoe, where applicable, crossing crop rows at a right angle. Mark the 2 ends of the sampling frame with the stakes just inside the 3 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 2 sides of the sampling square using the opposite corner of the original frame position to locate the other 2 sides. In all cases, the layout of the sample area shall be consistent for each randomly identified sample point.

Step 4 - Clip all hay stalks from within the square outlined by the sampling frame. The hay stalks should be uniformly clipped to an approximate height of 2 inches above ground level.

Step 5 - Quarter the collected sample and seal in a suitable poly bag sample container. Mark the sample container with the appropriate field number (as supplied by the mine operator), and sample identification number. Secure the sample container to prevent any sample loss. (Note: It is important when sampling hay that collected samples be chilled and transported in a container capable of sustaining the chilled condition. Hay deteriorates when allowed to heat up.)

Step 6 - Repeat steps 3 and 4 for each additional random sampling point coordinate.

Step 7 - Send or deliver to the Illinois Department of Agriculture any hay sample collected for moisture analysis. (Note: If any single sample requires more than one bag, additional bags should be identified sequentially such as 1A, 1B, 1C.)

± If a field moisture meter is used, steps 5 and 7 shall be eliminated and the following explanations for items A and D will be substituted.

A. Dry matter weight = harvest weight - percent moisture content determined by field moisture tests.

D. Percent moisture in hay at time of harvest determined by field moisture test. The following method will be used for determination of gross yield of mixed hay samples. Gross yield is determined by deducting the adjustment for moisture content of the mixed hay sample from the harvest weight. Moisture content of mixed hay samples will be determined by lab analysis.

Gross Yield = Harvest weight adjusted for moisture content.

Gross Yield Per Acre = \((A \times D)\) (Tons/Acre) \((C \times B \times E)\)
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Where:

\[ A = \text{Field weight or harvested weight of mixed hay in pounds} \]

\[ B = \text{Plot size (sq. ft./43560 sq. ft/ac.) or number of acres} \]

\[ C = \text{Conversion factor from lbs. to tons (i.e., 1 ton = 2000 pounds)} \]

\[ D = \text{Dry matter content of harvested hay (100\% - \% moisture in hay)} \]

\[ E = \text{Dry matter content of hay standard = 100\% - 15\%} \]

The net yield determinations for each sample will be averaged together to obtain a yield figure for the entire field being evaluated for proof of productivity. The annual harvest will be determined by the cumulative yields of each cutting.

HAY SAMPLING
BALED OR GREEN CHOPPED HAY

To be assured that sampling results are reliable, it is necessary to obtain accurate bale counts, accurate weights, and accurate moisture readings. Reading and following the instructions for the equipment that has been provided will for the most part insure correct interpretation of weights and moisture meter results. Acreage figures will be developed and verified by the Illinois Department of Agriculture. Verification of bale count is an area to be further elaborated on.

Depending on the use of the hay, an enumerator may be dealing with large round bales, small square bales or wagons of green chopped hay. In the case of large round bales, the enumerator need not be present during the baling of all of the product. If the operator provides a bale count for each field, the enumerator must provide a verification of the count. This can be done by physically visiting the field during baling and taking a bale count to compare with the count that will be provided by the operator. The verification of count can also be done by visiting the field and recording the counter number prior to baling, and then again reading the meter when each field is finished. It is not necessary to observe all of the baling. If an operator has multiple fields to pull weight samples from he may wish to do this on a single day to make his operation run in a more efficient manner. This is perfectly acceptable. The enumerator may identify sample bales just prior to weighing, and perform moisture and temperature tests at that time. Random verification of bale counts will discourage any impropriety on the part of the operator, and eliminate the need for constant observation.
This procedure will also work well for weighing and counting wagons of green chopped hay. The enumerator should perform random verification of truck weights and collect weight tickets for each field.

The operator should be reminded to provide the exact number of trucks coming from each field and the weight of each truck. Random verification of truck counts for individual fields is also encouraged. This will make a good comparison for the information received from the operator.

**CORN**

<table>
<thead>
<tr>
<th>Size of Bond Release Field</th>
<th>Minimum Number of Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>4—39 acres</td>
<td>8</td>
</tr>
<tr>
<td>40—279 acres</td>
<td>12</td>
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<tr>
<td>280—639 acres</td>
<td>16</td>
</tr>
<tr>
<td>640 acres or more</td>
<td>28</td>
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**SOYBEANS**

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<th>Size of Bond Release Field</th>
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</thead>
<tbody>
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<td>280—639 acres</td>
<td>16</td>
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<td>640 acres or more</td>
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**WHEAT**

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<td>280—639 acres</td>
<td>10</td>
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<tr>
<td>640 acres or more</td>
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**SORGHUM**
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<table>
<thead>
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<th>Size of Bond Release Field</th>
<th>Minimum Number of Samples</th>
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<tr>
<td>4—39 acres</td>
<td>10</td>
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<td>280—639 acres</td>
<td>28</td>
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<tr>
<td>640 acres or more</td>
<td>40</td>
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MIXED HAY

<table>
<thead>
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<th>Minimum Number of Samples</th>
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<tbody>
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<td>4—39 acres</td>
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<td>40—279 acres</td>
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<tr>
<td>280—639 acres</td>
<td>20</td>
</tr>
<tr>
<td>640 acres or more</td>
<td>requires one (1) sample for each additional 35 acres</td>
</tr>
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</table>

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.

(Source: Repealed at 46 Ill. Reg. ________, effective ____________)

Section 1816.EXHIBIT A County Crop Yields by Soil Mapping Unit (Repealed)
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<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
<th>Column C</th>
<th>Column D*</th>
<th>Column E</th>
<th>Column F</th>
<th>Column G</th>
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<tbody>
<tr>
<td>Soil</td>
<td>County</td>
<td>% of total acres cropped</td>
<td>Grain-Acres by Soil Mapping</td>
<td>Optimized Optimum Mgt. Production Yield</td>
<td>Yield by Mapping Production (Bu/A)</td>
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</tr>
<tr>
<td>Mapping Unit</td>
<td>Cropped Acreage</td>
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<table>
<thead>
<tr>
<th>Column H</th>
<th>Column I</th>
<th>Column J</th>
<th>Column K</th>
<th>Column L</th>
<th>Column M</th>
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<tbody>
<tr>
<td>Total</td>
<td>Total</td>
<td>Total</td>
<td>Total</td>
<td>Total</td>
<td>Total</td>
</tr>
</tbody>
</table>

- County Acres in Corn
- Soybeans
- Wheat
- Mixed Hay
- Total Acres

(Source: Repealed at 46 Ill. Reg. ________, effective _________________)

---

**Columns Description:**
- **Soil:** The soil type.
- **County:** The county.
- **% of total acres cropped:** Percentage of acres cropped in the county.
- **Grain-Acres by Soil Mapping:** Acres of grain production by soil mapping.
- **Optimized Optimum Mgt. Production Yield:** Optimized production yield by soil mapping.
- **Yield by Mapping Production (Bu/A):** Yield per unit area in bushels.
- **Total Acres:** Total acres in the specified crop categories.