



COALEX STATE INQUIRY REPORT - 187

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TOPIC: REVEGETATION PRODUCTIVITY MEASUREMENTS FOR PHASE III BOND RELEASE

INQUIRY: Federal regulations [30 CFR 816.116(a)(1)] require statistically valid sampling techniques for measuring successful revegetation; however, nowhere in the federal regulations does it indicate what methods may be used to measure vegetative ground cover, number of trees per acre, etc. Please conduct a survey to determine what production testing methods other states are proposing to use to measure revegetation success for final bond release.

SEARCH RESULTS: A questionnaire was prepared to be used in canvassing IMCC members. Responses to initial calls indicated that other states also were seeking information on OSM-approved statistically valid sampling techniques for measuring successful revegetation. As a result, the survey was foreshortened when Pennsylvania produced the OSM methodology report, Virginia produced the Raelson-McKee study and Kentucky provided its memorandum on sampling techniques recently submitted to OSM. Copies of Federal Register notices which discuss both federal rules and approval or disapproval of state program amendments are also attached.

METHODOLOGIES

"An Evaluation of Methods for Measuring Ground Cover for Reclamation Bond Release", Office of Surface Mining Reclamation and Enforcement, Eastern Field Operations (January, 1987).

The report provides an evaluation of the following eight methods of determining ground cover percentage:

1. Line-Frame
2. Line-Point
3. Diagonal Line
4. Milacre Circle
5. Farmer et al.
6. Modified Rennie-Farmer



7. Notched Boot
8. Raelson-McKee

"Measurement of Plant Cover to Evaluate Revegetation Success", J.V. Raelson and G.W. McKee (January, 1982) [Agronomy Series 67, Department of Agronomy, Pennsylvania State University].

According to Raelson and McKee, methods for measuring vegetative cover should meet three requirements:

1. They must be simple.
2. They must be precise and repeatable.
3. They should provide a statement of statistical error.

Along with the measurement methods listed below, the report discusses selection of sample points:

1. Visual Estimation
2. Quadrat Sampling
3. Crown Diameter
4. Line Intercept
5. Point-Frequency

"Field Sampling Techniques for Determining Ground Cover, Productivity, and Stocking Success of Reclaimed Surface Mined Lands", Technical Reclamation Memorandum # 19, Kentucky Department For Surface Mining Reclamation and Enforcement (June 28, 1991).

Kentucky's report covers Parallel Transect and Angular Transect as methods for determining observations points for collecting vegetation data, productivity determination and sampling for measuring the success of:

1. Ground Cover
2. Tree and Scrub Stocking
3. Row Crops
4. Pastureland and Cropland
5. Prime Farmland

REGULATORY HISTORY

The following Federal Register preambles to proposed and final federal rules on revegetation success (816.116/817.116) are enclosed to provide background information:

44 FR 14902 (MARCH 13, 1979). Permanent Program Preamble - Final Rule. 816.116 Revegetation: Standards of success.



45 FR 51547 (AUGUST 4, 1980). Notice of suspension and statement of policy regarding effect on State programs.

47 FR 12596 (MARCH 23, 1982). Proposed rule. Revegetation.

Among other goals, the proposed rule would broaden the approaches acceptable for determining the success of revegetation.

48 FR 40140 (SEPTEMBER 2, 1983). Final rule. Revegetation.

The revision of the federal rules was "not a weakening of revegetation requirements but reflects that the rules are designed to account for regional diversity in terrain, climate, soils, and other conditions under which mining occurs."

51 FR 41952 (NOVEMBER 20, 1986). Final rule; suspension. Compliance with court order.

52 FR 28012 (JULY 27, 1987). Proposed rule. Revegetation.

53 FR 34636 (SEPTEMBER 8, 1988). Final rule. Revegetation.

STATE PROGRAM AMENDMENTS AND GUIDELINES

Federal Register preambles for Virginia, Ohio and Louisiana are also attached. In these preambles, OSM discusses the specific elements of the state methodology or techniques for measuring revegetation success and why they do or do not comport with the federal regulations.

ATTACHMENTS

- A. Questionnaire
- B. "An Evaluation of Methods for Measuring Ground Cover for Reclamation Bond Release", Office of Surface Mining Reclamation and Enforcement, Eastern Field Operations (January, 1987).
- C. KENTUCKY: "Field Sampling Techniques for Determining Ground Cover, Productivity, and Stocking Success of Reclaimed Surface Mined Lands", Technical Reclamation Memorandum # 19, Kentucky Department For Surface Mining Reclamation and Enforcement (June 28, 1991).
- D. VIRGINIA:
 - 1. State program revegetation regulations;
 - 2. Excerpts from Federal Register discussions of program amendments: MARCH 7, 1988 at 53 FR 7181 & NOVEMBER 25, 1986 at 51 FR 42548;
 - 3. Attachment #1: "Measurement of Plant Cover to Evaluate Revegetation Success by J.V. Raelson and G.W. McKee (January, 1982), Agronomy Services 67, Dept. of Agronomy, Pennsylvania State University.
- E. 44 FR 14902 (MARCH 13, 1979). Permanent Program Preamble - Final Rule. [Excerpts]



- F. 45 FR 51547 (AUGUST 4, 1980). Notice of suspension and statement of policy regarding effect on State programs. [Excerpts]
- G. 47 FR 12596 (MARCH 23, 1982). Proposed rule.
- H. 48 FR 40140 (SEPTEMBER 2, 1983). Final rule. Revegetation.
- I. 51 FR 41952 (NOVEMBER 20, 1986). Final rule; suspension. Compliance with court order.
- J. 52 FR 28012 (JULY 27, 1987). Proposed rule. Revegetation.
- K. 53 FR 34636 (SEPTEMBER 8, 1988). Final rule. Revegetation.
- L. OHIO:
 - 1. 56 FR 21113 (MAY 7, 1991). Proposed rule; withdrawal of proposed rule revisions and Administrative Record information. Evaluation of revegetation success.
 - 2. 56 FR 12691 (MARCH 27, 1991). Proposed rule; reopening of public comment period. Evaluation of revegetation success.
 - 3. 55 FR 32643 (AUGUST 10, 1990). Proposed rule; reopening of public comment period. Evaluation of revegetation success.
 - 4. 55 FR 3588 (FEBRUARY 2, 1990). Final rule; correction. Revegetation.
 - 5. 55 FR 649 (JANUARY 8, 1990). Proposed rule. Evaluation of revegetation success.
 - 6. 54 FR 51395 (DECEMBER 15, 1989). Final rule. Revegetation.
 - 7. 52 FR 46783 (DECEMBER 10, 1987). Proposed rule. Revegetation.
- M. Louisiana: 56 FR 21270 (MAY 8, 1991). Final rule; approval of amendment.



ATTACHMENT A:
QUESTIONNAIRE RE: REVEGETATION PRODUCTIVITY MEASUREMENT
(Reformatted from original)

For Phase III bond release:

A. Has your state submitted any revegetation productivity measurement techniques for OSM's approval? [Circle one]

YES NO

1. If **YES**, answer these questions, if **NO**, proceed to the next page:
 - a. What measurement techniques were submitted?
 - b. Were the techniques approved? Was there any qualification to OSM's approval? If the techniques were not approved, what reasons did OSM's give for disapproval?
 - c. What is the next step in the technique approval process, if any?

2. If **NO**, answer these questions:
 - a. At what stage is your state in the development of measurement techniques?
 - b. What techniques are you contemplating using? Why were these particular techniques chosen?

B. What sources are your state using to develop measurement techniques, e.g., books, state agricultural experts, etc.?