

“Overview of ARRI – Forestry Reclamation Approach Advisory Update”

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Presentation to:

Appalachian Regional Reforestation Initiative Conference.

6 August 2008. Logan, WV.

“Overview of ARRI – Forestry Reclamation Approach Advisory Update”

Topics

ARRI: What, Why, and How?
(brief and personal)

ARRI Forest Reclamation Advisories:
Why? How? And What Next?



THE APPALACHIAN REGIONAL REFORESTATION INITIATIVE (ARRI)

FOREST RECLAMATION ADVISORY

Forest Reclamation Advisory No.1

December 2005

THE APPALACHIAN REGIONAL REFORESTATION INITIATIVE

Patrick Angel¹, Vic Davis², Jim Burger³, Don Graves⁴, Carl Zipper⁵

The Appalachian Regional Reforestation Initiative (ARRI) is a cooperative effort by the States of the

mining at the expense of restoring forest land capability. This approach was caused by a desire to

“The Appalachian Regional Reforestation Initiative (ARRI) is a cooperative effort by the States of the Appalachian Region with the Office of Surface Mining to encourage restoration of high quality forests on reclaimed coal mines in the eastern USA.”

Reclamation Act (primarily) to forest, and is based on knowledge gained from both scientific research and experience (B... FRA is considered... Office of Surface M... desirable method for reclaiming coal-mined land to support forested land uses (See References).

postmining land uses such as hay and pasture land... have than forests... utted to a... mining across... ation initiative is... an effort to increase knowledge and change attitudes about planting trees on surface mines.

When mining and reclamation operations are

Forests have been the traditional land use and

* to encourage industry

SMCRA Performance Standards: "... restore the land affected to a condition capable of supporting the uses which it was capable of supporting prior to any mining, or higher or better uses of which there is reasonable likelihood." [Sec. 515(b)2]



ARRI: Why?

High-quality forests produce economic value for the landowner and communities, and provide environmental services:

- ✓ hold soil,
- ✓ produce clean water,
- ✓ regulate water runoff,
- ✓ provide wildlife habitat,
- ✓ provide recreation opportunity, *etc.*

ARRI: How?



APPALACHIAN REGIONAL REFORESTATION INITIATIVE

TREES FOR APPALACHIA'S FUTURE

HOME

ABOUT ARRI

IMPORTANCE OF THIS INITIATIVE

ANNOUNCEMENTS

FORESTRY RECLAMATION
APPROACH

UPCOMING EVENTS

NEWS ARTICLES

PUBLICATIONS

“ARRI seeks to change the existing cultural, technical, and regulatory barriers surrounding the forestry reclamation of coal mined lands.”

ARRI web site: <http://arri.osmre.gov/>

ARRI: How?

“ARRI seeks to change existing technical barriers ...”

“Forestry Reclamation Approach” (FRA)

- Provide at least 4 feet of material suitable for trees
- Avoid compaction
- Limit ground cover
- Plant a variety of high quality tree species
- Use proper tree planting techniques

ARRI: How?



APPALACHIAN REGIONAL REFORESTATION INITIATIVE

TREES FOR APPALACHIA'S FUTURE

FORESTRY RECLAMATION APPROACH

“ARRI seeks to change existing regulatory barriers ...”

“Current Federal and State regulations support the FRA technique for establishing forests as a postmining land use.”

Recent Tennessee and Virginia rule changes: Reduce ground cover requirements for reforestation sites.

bottom right tree grew in a natural Appalachian forest that was never

ARRI: Why and How?



*“ARRI seeks to change existing **cultural** barriers ...*

“3 Stages of Mine Reforestation”



*“ARRI seeks to
change existing
cultural barriers ...*

POWELL RIVER PROJECT

Reclamation Guidelines
For Surface Mined Land in Southwest Virginia

HOW TO RESTORE FORESTS ON SURFACE-MINED LAND
James J. Burger and Carl E. Dippel

INTRODUCTION

Most coal-bearing lands in the Appalachian region were forested prior to mining. The region's forests are predominantly upland oak-hickory and Appalachian mixed-hardwoods. These forests provide many benefits to landowners and the public. Solid wood and paper products are perhaps the most tangible benefits, but a predictable flow of high-quality water from forested watersheds into regional streams is another vital benefit provided by the region's forests. Forests also provide wildlife food and cover, recreational opportunities, and an aesthetically pleasing environment.

Surface mining completely removes the forest. Public Law 95-87, the Surface Mining Control and Reclamation Act of 1977 (SMCRA), mandates that mined land be reclaimed and returned to its original use or a use of higher value. Restoring forests on surface-mined land is challenging; however, reforestation research by Virginia Tech's Powell River Project since 1990 shows that restored forests can be equally or more productive than the native forest removed by mining. In addition, reforestation can provide low-cost and timely release of reclamation bonds for coal miners, and restored forests can provide economic returns to landowners.

The purpose of this publication is to provide practical, cost-effective guidelines to ensure successful forestland reclamation using the principles of reforestation silviculture. The following guidelines were developed from research and practical experience; they should help reclamation managers and landowners achieve reforestation success and renewal of the many benefits that forests provide.



Photo 1:
50-year-old hardwood forest on mined land.



Photo 2:
16-year-old pine forest on mined land.

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Virginia Tech
VIRGINIA POLYTECHNIC INSTITUTE
20th Anniversary

Virginia Cooperative Extension
Publications 460-123
Revised 2002

VIRGINIA POLYTECHNIC INSTITUTE



“ARRI seeks to change existing cultural barriers ...

ARRI's Core Team: 24 representatives from 7 Appalachian coal states and OSM

Kentucky: Linda Keene, *Paul Rothman**, Gail Smith, Richard Wahrer

Maryland: Mark Carney, Pete Hartman

Ohio: Jeff Emmons, Mike Hiscar

OSM: Pat Angel, Karrie Bernhard, *Mike Bower**, Chet Edwards, Jim Holliday, Molly Sager, Jim Taitt

Pennsylvania: Doug Saylor, Dave Hamilton

Tennessee: Vic Davis, Becky Hatmaker

Virginia: Tim Brehm, Richard Davis, Ken Coomer

West Virginia: Brad Edwards, *Scott Eggerud**

* Co-leaders



Forest Reclamation
Advisories describe
practices that can
be used to create
productive, diverse
forests on
reclaimed coal-mine
sites, and they
describe the
rationale for
recommending use
of those practices.

*“ARRI seeks to
change existing
technical barriers ...*

Intended audiences:
People who conduct
and influence coal-
mine reclamation
and reforestation
practices ...



- Coal miners: Engineers and mine planners, Supervisors, Reclamation personnel, Equipment operators, "Land men."
- Mineral and surface owners.
- Contractors to the Coal Industry: Including permitting consultants, hydroseeders, and tree planters.
- Natural Resource agency personnel: Supervisors, mine permitting, mine inspectors.

Advisories are Prepared by the ARRI Science Team:



27 reforestation scientists representing 13 universities and research institutions.

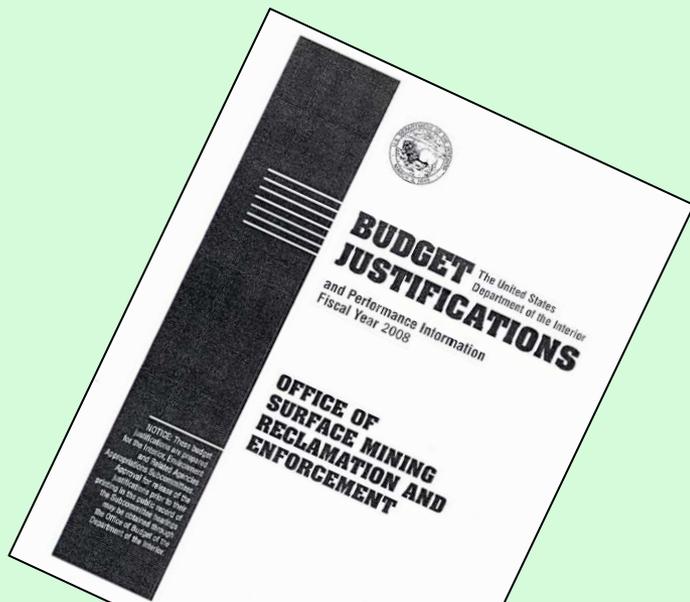
- Ohio State University
- Pennsylvania State University
- Southern Illinois University
- The American Chestnut Foundation
- University of Kentucky
- University of Tennessee
- West Virginia University
- US Forest Service
- Ohio University
- Purdue University
- University of Maryland
- Virginia Tech
- West Virginia State U.

Co-chairs: Jim Burger (Va Tech), Chris Barton (U.K.).

Advisory Preparation Process:

1. Initial draft prepared by first author.
2. Draft is circulated for review, comment, revision by co-authors.
3. Draft is circulated to ARRI Science Team, for review, comment, and additional revision (if necessary).
4. Draft is circulated to all members of the ARRI Core Team. Core team review is for regulatory compliance, so any potential non-compliance issues can be noted; does not influence scientific content. Final text is approved by the Core Team.
5. Final version is published and made available through ARRI web site: <http://arri.osmre.gov/>





	U.S. DEPARTMENT OF THE INTERIOR OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT DIRECTIVES SYSTEM	Subject Code: TSR - 16
		Transmittal Number: 931
		Date: 6/10/08

Subject: Reforestation of Title IV and Title V mined lands.

"Reforestation Initiatives: OSM continues its effort to encourage reforestation practices that would increase the amount of mined land reclaimed as forest ... the Appalachian Regional Reforestation Initiative (ARRI) continued its efforts to restore active and abandoned surface mine lands to productive, useful forests through promoting the Forest Reclamation Approach (FRA). The FRA is a series of techniques developed through research and field experience to prepare minesites for tree planting and methods of selecting and planting trees. ..."



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Why is the ARRI needed?

SMCRA improved the surface-mine landforms by increasing stability, improving water quality, and enhancing human safety in the Appalachian region, compared to the results of pre-SMCRA mining. However, SMCRA's implementation has not been accompanied by widespread replacement of forests disturbed by mining. Many mined lands were restored as grasslands but are not currently used for hay or pasture by their owners. Native forests will eventually be restored on such areas by natural succession, but this process is slow and centuries may be required.





THE APPALACHIAN REGIONAL REFORESTATION INITIATIVE (ARRI)

FOREST RECLAMATION ADVISORY

Forest Reclamation Advisory No. 2

December 2005

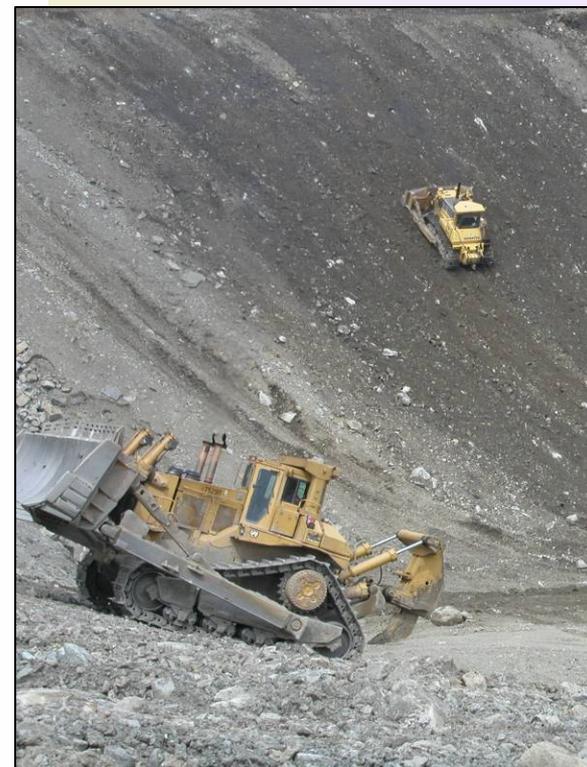
THE FORESTRY RECLAMATION APPROACH

Jim Burger, Don Graves, Patrick Angel, Vic Davis, Carl Zipper

The FRA's Five Steps

The FRA can be summarized in five steps:

1. Create a suitable rooting medium for good tree growth that is no less than 4 feet deep and comprised of topsoil, weathered sandstone and/or the best available material.
2. Loosely grade the topsoil or topsoil substitute established in step one to create a non-compacted growth medium.
3. Use ground covers that are compatible with growing trees.
4. Plant two types of trees—early successional species for wildlife and soil stability, and commercially valuable crop trees.
5. Use proper tree planting techniques.





THE APPALACHIAN REGIONAL REFORESTATION INITIATIVE (ARRI)

FOREST RECLAMATION ADVISORY

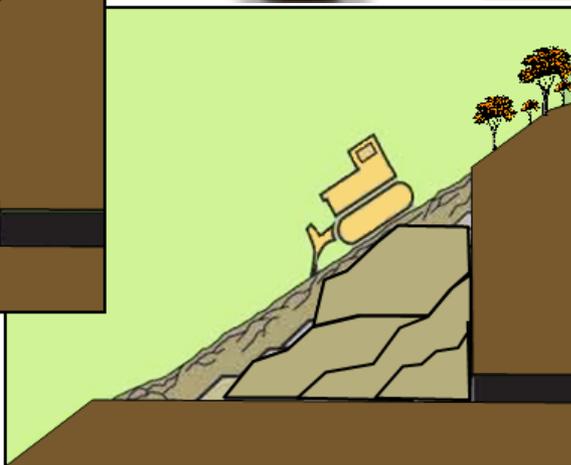
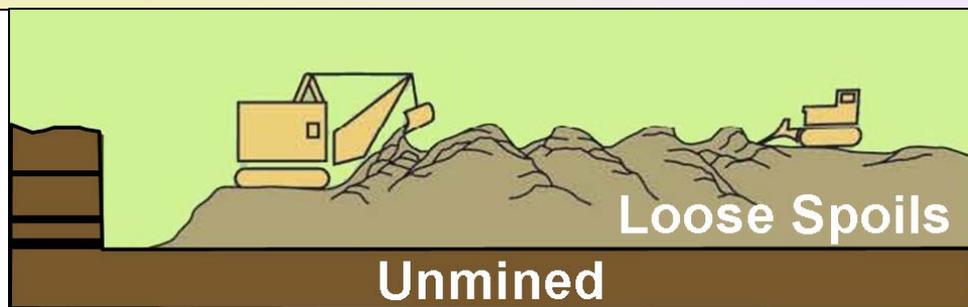
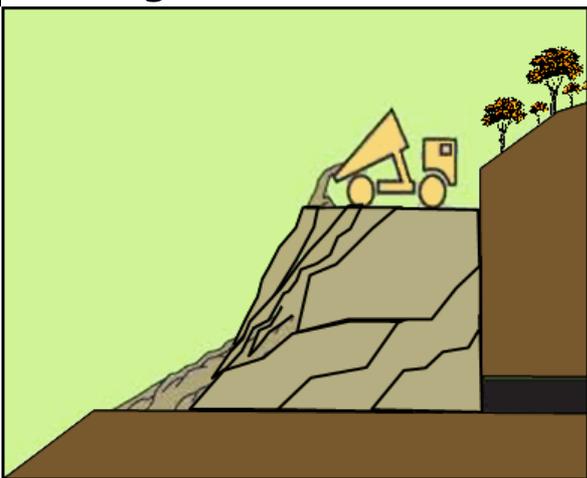
Forest Reclamation Advisory No. 3

July 2007

LOW COMPACTION GRADING TO ENHANCE REFORESTATION SUCCESS ON COAL SURFACE MINES

R. Sweigard, J. Burger, C. Zipper, J. Skousen, C. Barton, P. Angel

Final grading on spoils placed by a dragline on a mountaintop or area mine.



Soil placement and final grading on a steep-slope contour mine where the backfill is constructed of approved topsoil substitute material and does not require compaction to maintain stability



THE APPALACHIAN REGIONAL REFORESTATION INITIATIVE (ARRI)

FOREST RECLAMATION ADVISORY

Forest Reclamation Advisory No. 4

July 2007

LOOSENING COMPACTED SOILS ON MINED SITES

R. Sweigard, J. Burger, D. Graves, C. Zipper, C. Barton, J. Skousen, P. Angel





THE APPALACHIAN REGIONAL REFORESTATION INITIATIVE (ARRI)

FOREST RECLAMATION ADVISORY

Forest Reclamation Advisory No. 5

July 2007

MINE RECLAMATION PRACTICES TO ENHANCE FOREST DEVELOPMENT THROUGH NATURAL SUCCESSION

J. Groninger, J. Skousen,
P. Angel, C. Barton,
J. Burger, C. Zipper

Succession and
invasion of
native species
over 47 years
formed a forest
on this mine site
in eastern
Tennessee



Future Advisories (in the pipeline):

Establishing Tree-Compatible Ground Covers . J. Burger, et al.

Selection of Rooting Medium. J. Burger, P. Angel, and others. (to be preceded by formal scientific review of mine soil construction literature).



Tree species and regeneration silviculture for mined land. Ron Rathfon, Purdue Univ.; and Clark Ashby, SIU (retired).

Tree Planting Techniques. Victor Davis, OSM, and others

Thank you.

ARRI Science Team

Ohio State University: Charles Goebel, David Hix.

Ohio University: Brian C. McCarthy.

Penn State University: Michael Jacobson.

Purdue University: Doug Jacobs, Ron Rathfon.

Southern Illinois University: John W. Groninger, Clark Ashby (ret.).

The American Chestnut Foundation: Fred Paillet.

University of Kentucky: Carmen Agouridis, Chris Barton (co-chair), Rick Sweigard, Richard Warner, Donald Graves (ret.).

University of Maryland: Keith Eshleman.

University of Tennessee: David Buckley, Jennifer Franklin.

USDA Forest Service: Mary Beth Adams, Willis Vogel (ret.).

Virginia Tech: James Burger (co-chair), Jay Sullivan, Carl Zipper.

West Virginia University: Jeffrey Skousen.

West Virginia State University: Katrina Klugh.

US Office of Surface Mining: Patrick Angel, Vic Davis (co-liasons)