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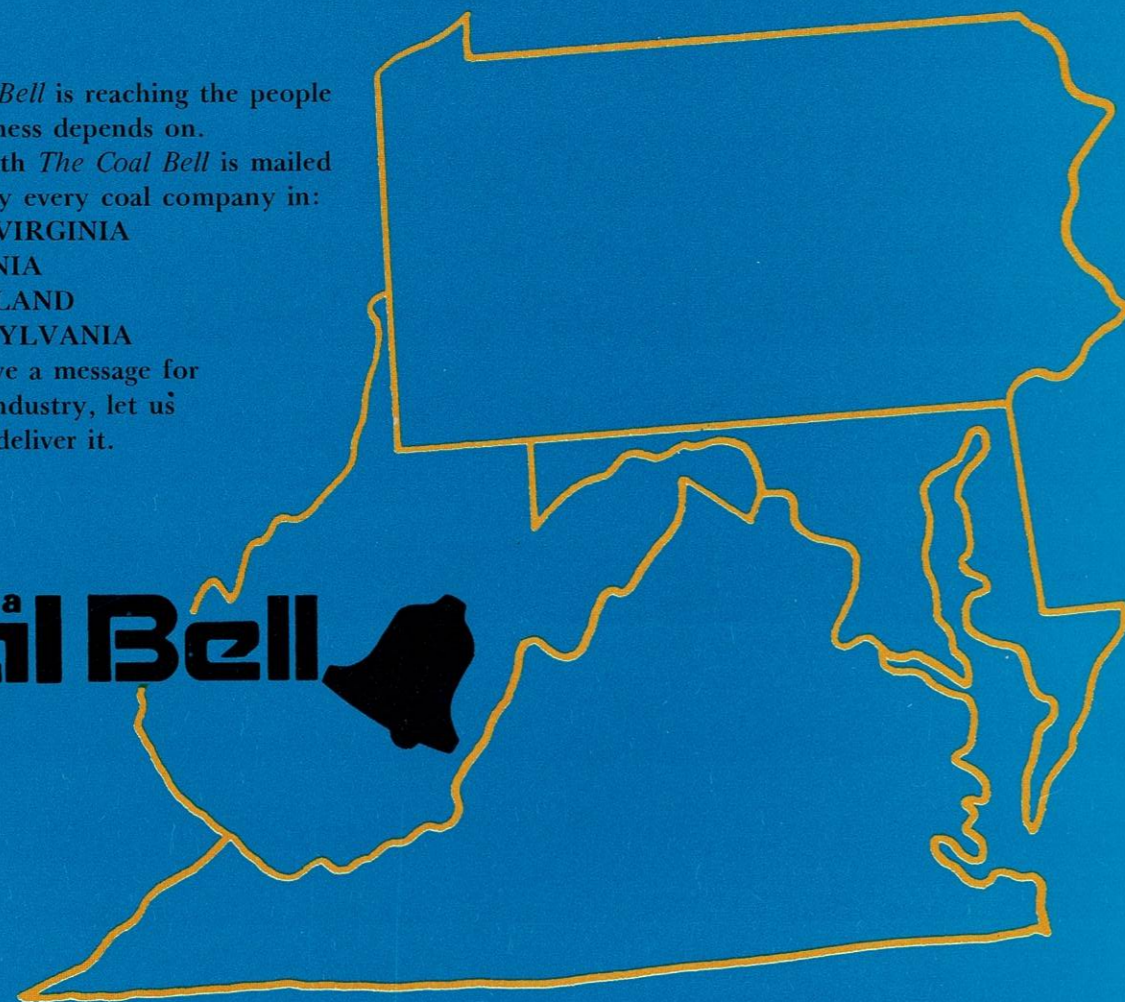
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Fall 1982

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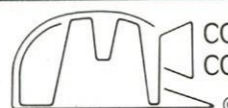
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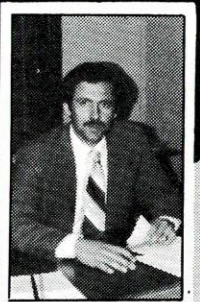
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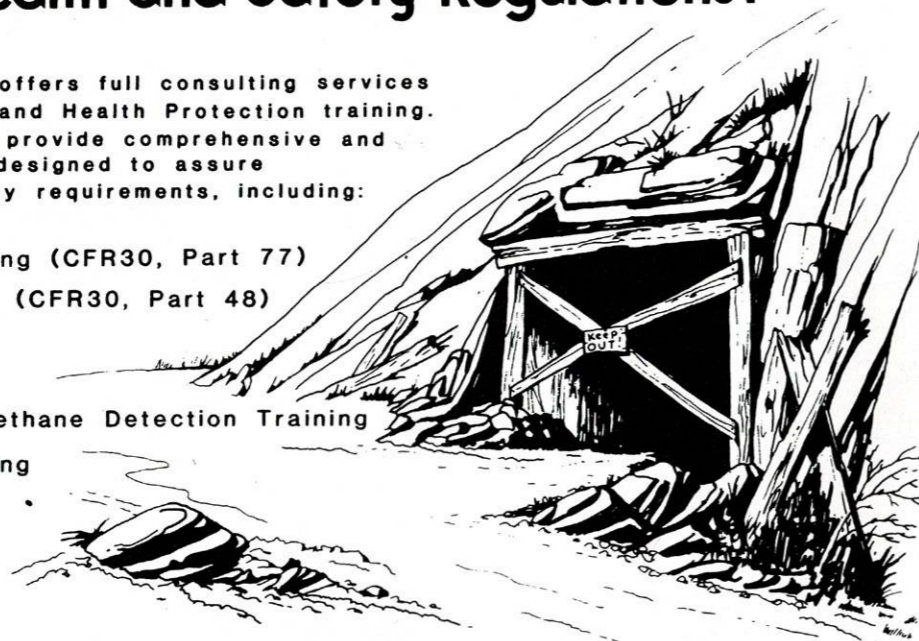
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# Green Lands

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Cover—DNR's annual tour of surface mining and reclamation is generally divided into northern and southern portions and our fall cover reflects the outstanding work being carried out in those respective areas. The top photograph is of West Virginia Energy, Inc., in Brooke County. The bottom photograph is of Amherst Coal Co., in Logan County. For more on the tour see page 7.



**Editor**  
R. Daniel Miller

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Green Lands is a quarterly publication of the West Virginia Surface Mining and Reclamation Association with offices at 1624 Kanawha Boulevard East, Charleston, West Virginia 25311 telephone (304) 346-5318

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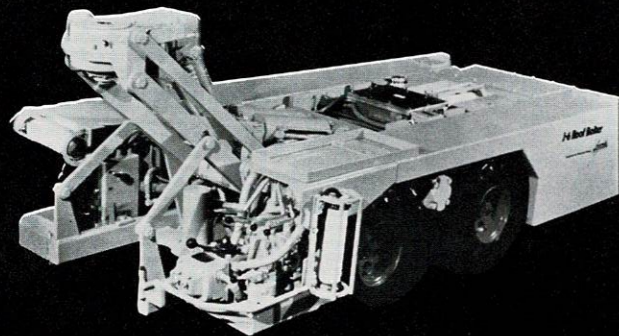
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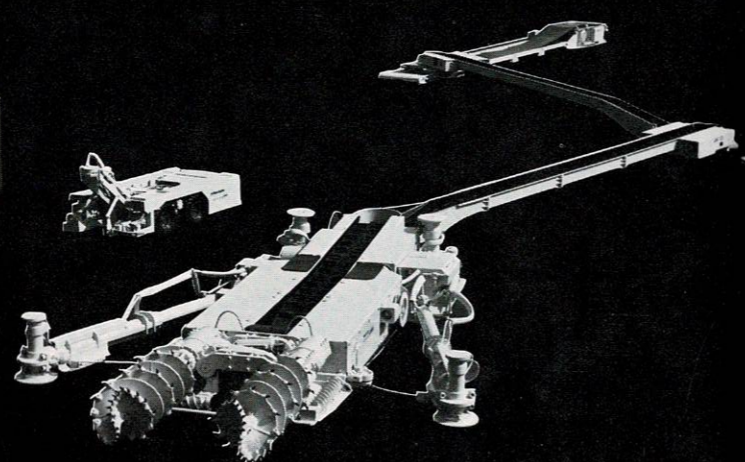
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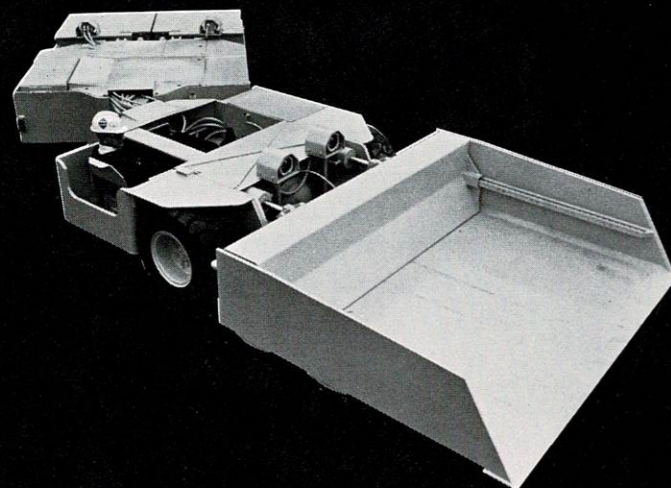
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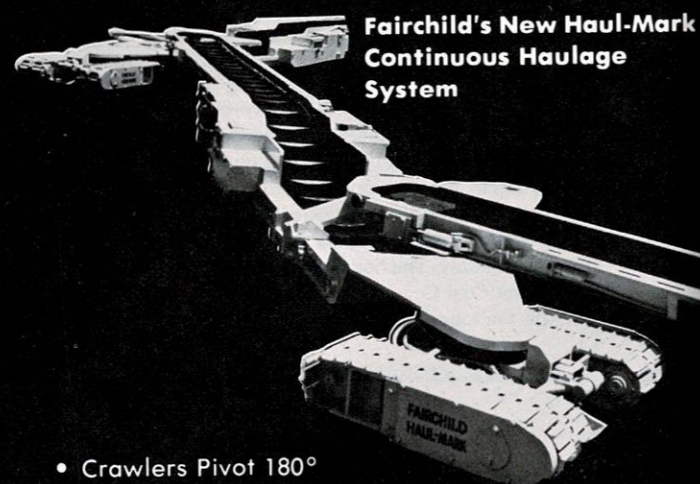
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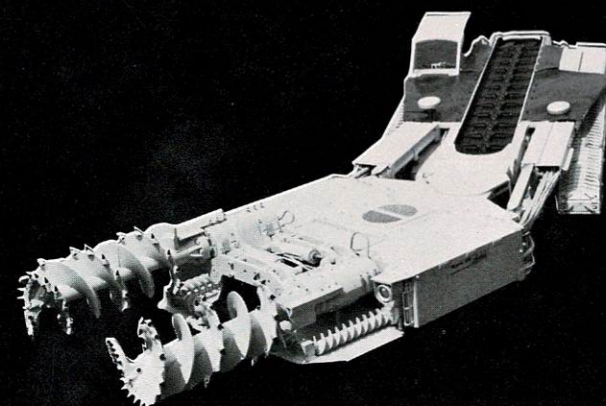
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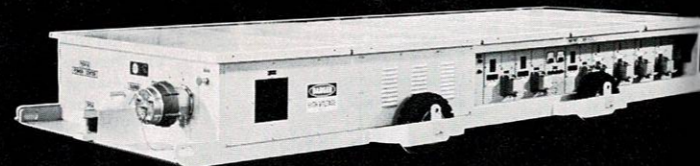


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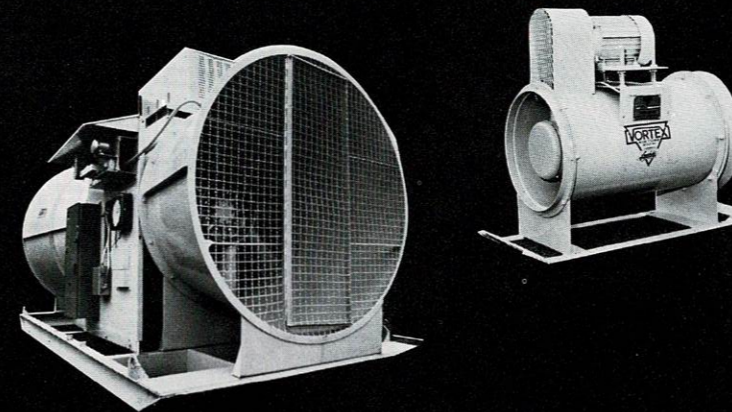
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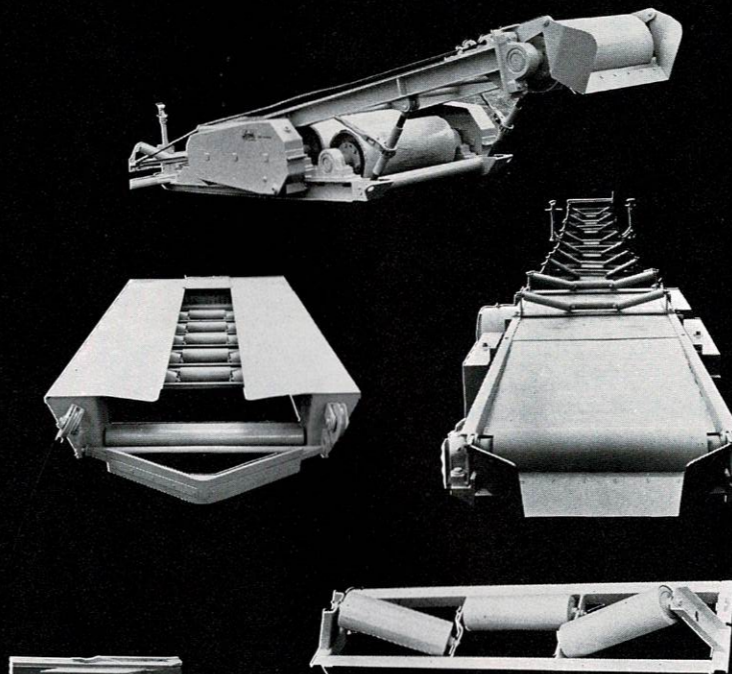
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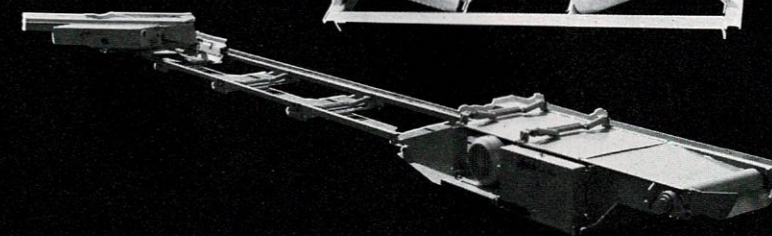
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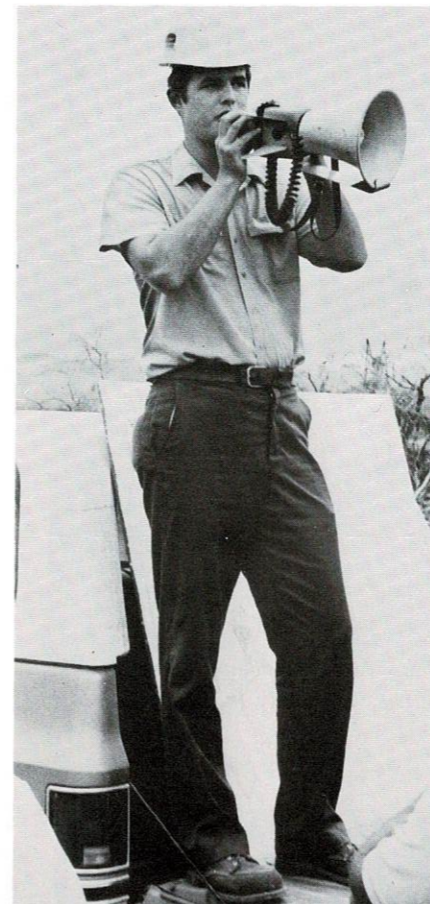
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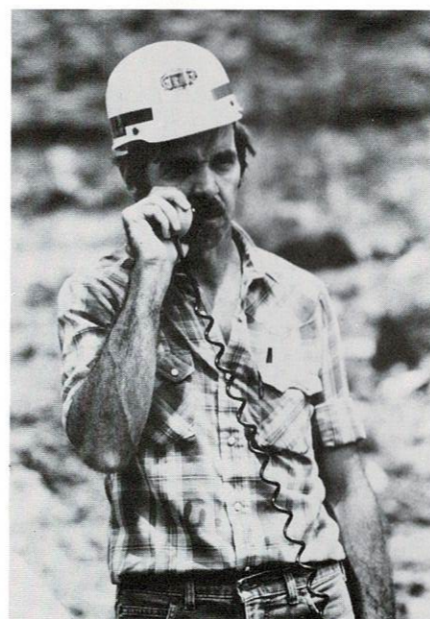
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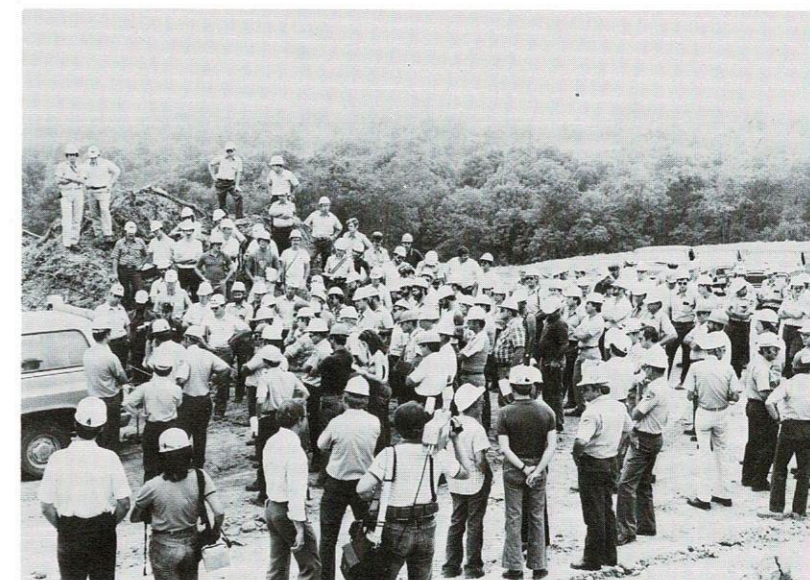
**Detroit Diesel Allison**  
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Bill Sasser of the Department of Natural Resources introduces company officials who will explain the operation.



Marrowbone Development's Larry Compton fielded dozens of questions about his company's obviously efficient operation.



At each stop, participants gathered for orientation before starting individual walking tours of the site.

## DNR tour moves into the '80's

West Virginia's Department of Natural Resources took nearly 200 people on its annual surface mining reclamation tour late this summer, pulling a 50 vehicle caravan some 700 miles through 14 counties over a span of five days.

Officially billed as the "1982 Inter-agency Evaluation Tour of Surface Mining and Reclamation in West Virginia," the 15th edition of "The Tour" visited 13 mining operations in the counties of Brooke, Ohio, Monongalia, Preston, Logan, Mingo, and Boone.

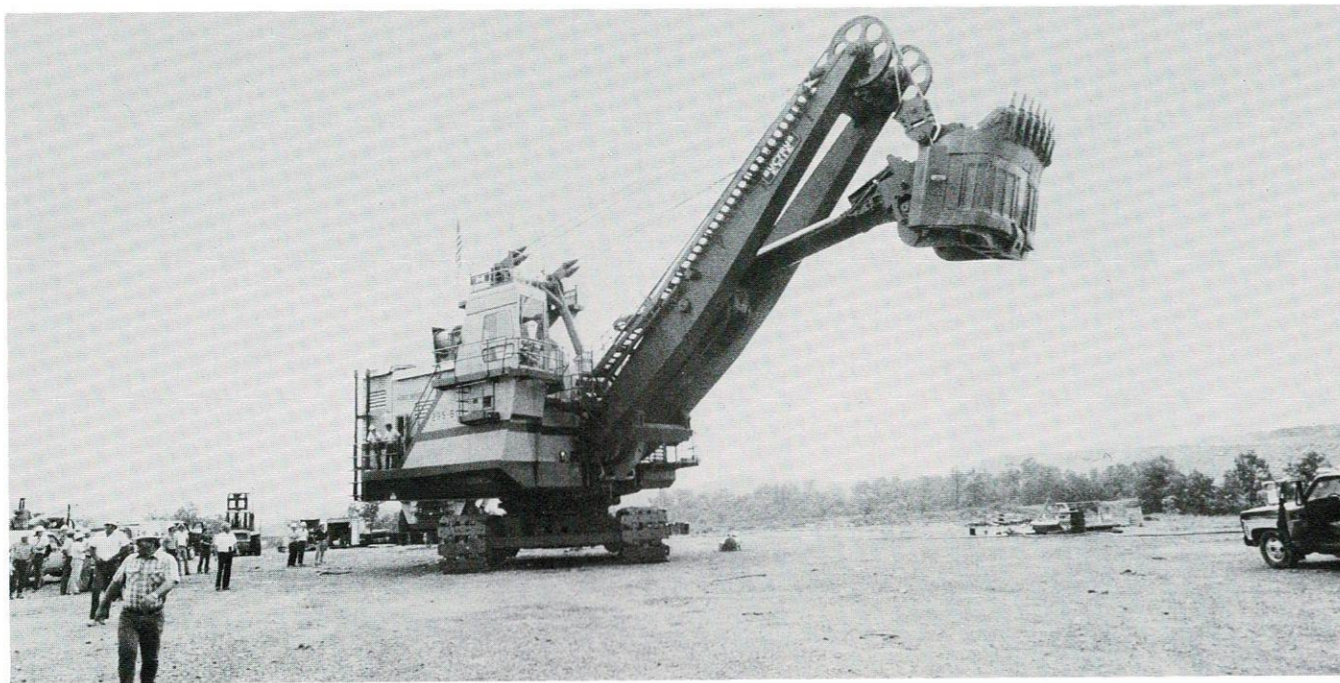
Usually the tour itinerary is a reflection of current events within and among the sectors of mining, reclamation, and government regulation. During the mid-70's, the tour included several members of the so-called environmental community, and tour talk regularly included lively debates on the merits of modern reclamation.

With the advent of federal regulation of the industry, the caravan was dotted with the tan vehicles of the Office of Surface Mining, and discus-

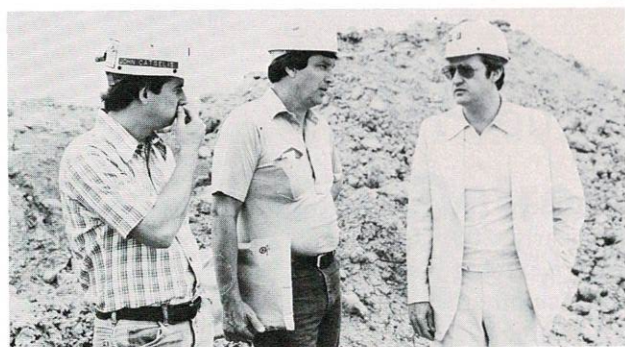
sion turned to specific regulatory requirements and a comparison of State and federal programs.

Now with the West Virginia's DNR back in the regulatory driver's seat, the tour has evolved into an expanded version of its early years, with the emphasis on evaluation of reclamation technology and practice, and an exchange of ideas and information.

The 1980's version of the tour also reflects the addition of underground mining to the regulatory picture, as well as concern for recent coal market trends. The evaluation and information exchange now includes surface reclamation of deep mine sites, as well as equipment usage and mining techniques, and their integration with the reclamation process. A highlight of this year's tour, for instance, was the concluding stop at Hobet Mining & Construction, which early next year will bring on line the largest dragline ever to operate in West Virginia.



A highlight of the tour was inspecting Hobet Mining's huge new earth moving machines, a novelty in southern West Virginia.

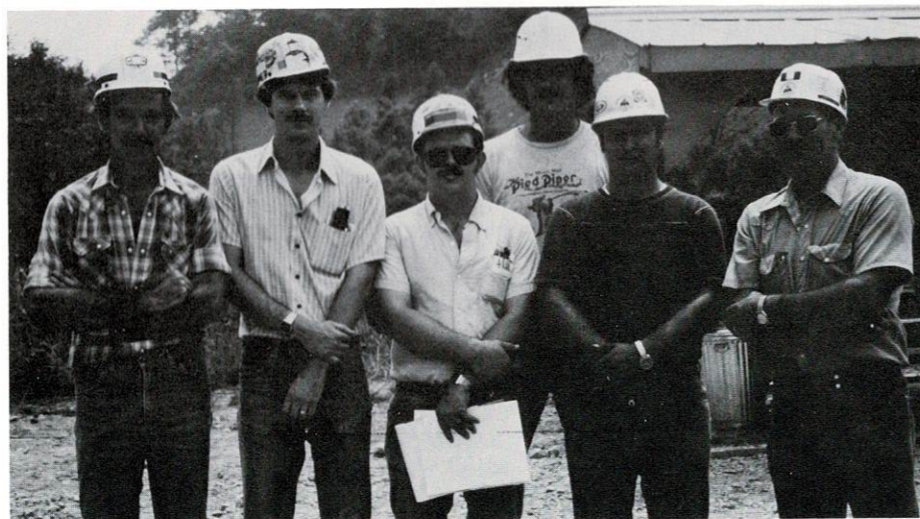


l.-r. John Catselis of the West Virginia Coal Development Authority, Association President Ben Greene, and Richard Delatore of West Virginia Energy, Inc.



l.-r. Gully Walters of the U.S. Department of the Interior, DNR Director David Callaghan, Jerry Starcher of Inter-State Lumber Co.

"The Marrowbone crew," l.-r. Larry Compton, Marrowbone vice president and general manager; John Yanik, Marrowbone chief engineer; Mike Castle, surface mining engineer; Carl Hazlett, Redbird foreman; Randall Martin, Redbird superintendent; Ralph Hall, Blackbird superintendent.



West Virginia Energy, Inc. — Ohio County



Marrowbone Development Co. — Mingo County



*Patriot Mining Co., Inc. — Preston County*



*Windsor Power House — Brooke County, overlooking the Ohio River*



*DNR's Tony Politino introduces the tour to southern West Virginia at the Amherst Coal Co. site in Logan County.*



*Rayle Coal Co. — Brooke County*



*Preston County Coal & Coke Co. — Preston County*



*Hobet Mining & Construction Co., Inc. — Boone County*



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# Trees for Reclamation

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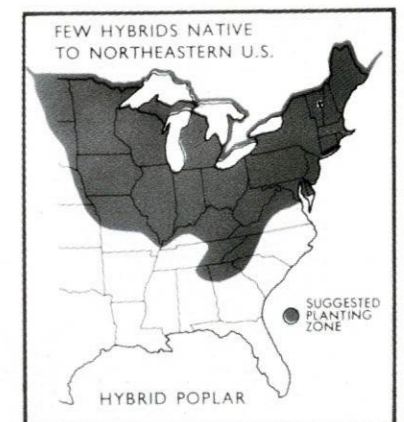
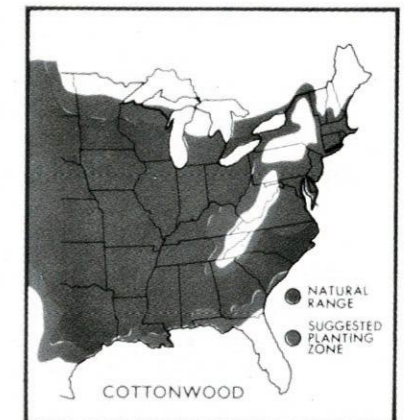
## Cottonwood *Populus deltoides*

## Hybrid Poplar



COTTONWOOD

HYBRID POPLAR



**Species Description.** Cottonwoods and hybrid poplars are pioneer species, well-suited to disturbed sites such as spoil banks. Eastern cottonwood grows naturally along stream banks and on bottomlands. These trees can grow rapidly to large diameters (3 to 6 feet)

and to exceptional heights (80 to 125 feet) with wide spreading branches on open-grown trees. Trees 12 feet in diameter and 175 feet tall have been found. Hybrid poplars may reach a diameter of 5 feet and heights of 95 feet. The genus *Populus* is among the fastest growing species in the coun-

try. In managed stands, stems often average 5 feet height growth annually for the first 25 years. An inch of diameter growth per year is not uncommon. Both cottonwoods and hybrid poplars grow tall and straight, although crown shapes often vary by clone. The massive trunk is often sup-

ported by a shallow root system. Leaves are ovate to triangular in shape, with wavy margins. The leaf stalk is usually flattened which makes the leaf to tremble with the slightest wind.

**Flowers and Seed.** Sexes are typically found on different trees. The catkin-like flowers appear before the leaves and the females produce tufted seed in early summer. Fruiting usually begins at 10 to 15 years, and fair to large seed crops are produced every year.

**Site Requirements.** Cottonwood and its hybrids can tolerate a variety of site conditions. Their best natural development is reached on deep alluvial bottomlands favored with long growing seasons. Hybrids also do well with longer growing seasons but can generally tolerate poorer soils and colder minimum winter temperatures. Cottonwoods grow best on near-neutral sites with pH values of 7.0 or above. These trees should not be planted on sites with

pH values below 5.0, or where the soil is compacted and dense. In the first few years following planting, plantations must be kept free of grass and weeds. Some clones of hybrid poplar have been grown successfully on soils with pH as low as 4.0 and as high as 8.5, but a pH of 6.5 is closer to optimum.

**Tolerance.** Cottonwoods and hybrid poplars are extremely sensitive to any competition from trees or lesser vegetation. Herbicides also are not readily tolerated so cultivation for two or three years is still recommended.

**Culture.** Seeds of these trees will germinate within two weeks after dispersal and require moist or well-saturated soils. However, reforestation is generally accomplished with cuttings. In springtime, plant pieces of stem- or limb-wood 8 to 12 inches long and 3/8 to 3/4 inches in diameter, down to the last healthy bud. Planting is thus economical where spoil is not too rocky. Since

poplars are sensitive to most chemicals used for weed control, cultivation is recommended. On most spoil areas, competition from weeds is not a problem. Cottonwood may spontaneously invade old spoils.

**Major Pests.** Cottonwood is susceptible to a number of insect and disease pests of which leaf rusts seem the most important. Some hybrid poplar clones show resistance to most disease problems.

**Value for Reclamation.** Cottonwood and hybrid poplars are easily planted, fast growing trees for reclamation. Moist, well-drained, slightly acid or alkaline sites are best for poplars, but drier, strongly acid or alkaline sites may also be successfully planted. Avoid heavily compacted, poorly drained sites. Cottonwood is a common natural invader of mined sites.

**Products and Uses.** The wood is used for crating, veneer, baskets, pallets, pulpwood, and furniture frames.

**Species Description.** American sycamore is a deciduous tree with a rounded, spreading crown and white crooked branches. It is one of the most massive American hardwoods, reaching heights of 100 feet or more, and diameters of 11 to 15 feet. Sycamore grows rapidly throughout its life. On spoils in western Kentucky, trees have grown 20 feet in 10 years, with the greatest growth being 28 feet. On midwestern sites, trees have grown 3 inches in diameter in 10 years on a variety of sites. The sycamore's bark is mottled with white and olive green patches. Its leaves are light green, 4 to 7 inches in diameter, shaped somewhat like maple leaves, but arranged alternately on the twig. The roots are shallow, spreading, strongly branched and windfirm.

**Flowers and Seed.** Flowers appear in the spring. Males and females grow separately on the same tree. The mature fruit is a round seedball that ripens in the fall but which often do not completely disperse until spring. Fruiting may begin as early as age 5, and continues for as many as 200 years. Good seed crops occur every other year. Though its germination rate is low, the seed generally does not require a cold period. Seeds may be

stored for more than a year if dried to 10 to 15 percent moisture and stored at 20° to 38° in air-tight containers.

**Site Requirements.** Sycamore grows well on a variety of soils. It tolerates extremely wet and dry soils, but does best on well-drained alluvial soils. Though they tolerate a pH range of 4.0 to 8.0, the optimum range is 6.0 to 7.5. Sycamore will tolerate most elevations at which strip mining occurs within the eastern United States. This species does well on all aspects, exposures, and graded banks.

**Tolerance.** Sycamore is fairly tolerant of competition, except from black locust (*Robinia pseudoacacia* L.).

**Culture.** Only 1-year-old seedlings are used for reforestation. Cuttings have also been used successfully, but should be made from stems or sprouts less than 4 years old originating from the upper portions of the stem. The top diameter should be a minimum of 0.3 inches, the length 16 to 20 inches. Direct seeding will fail on most sites since seeds need constant moisture while germinating. No specific seed source is recommended; however, seeds originating south of the planting site are likely to grow faster than local

sources. When bringing seeds from southern sources into colder climes, transport seeds no more than 100 miles north.

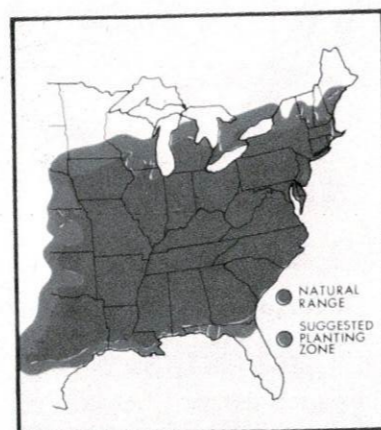
**Major Pests.** During cool, wet weather, sycamore is susceptible to anthracnose. With the onset of warm weather (above 55°F), the disease diminishes and new leaves appear. If cool, moist conditions prevail for several years, the tree may die, although anthracnose usually results only in a loss of growth.

**Value for Reclamation.** American sycamore is well-suited for reclamation use. It grows best on moist, well-drained soils with a pH of 6.0 to 7.5, but tolerates most any slope or aspect. Sycamore grows exceptionally fast, so it competes well with most species except black locust. The survival rate has generally been high for 1-year-old seedlings.

**Products and Uses.** Sycamore is used for furniture parts, boxes, millwork, flooring, dimension stock, and reclamation. The wood goes into butcher blocks and broom handles, as well as particleboard, paper, and fiberboard. Sycamore and its hybrid, the London plane tree, are also familiar urban shade trees.

## Sycamore

*Platanus occidentalis*



## Green Ash

*Fraxinus pennsylvanica* var. *lanceolata*



**Species Description.** Green ash is a small- to medium-size deciduous tree reaching only 40-55 feet at maturity. This is the most widespread of American ashes. At all ages, green ash is more crooked and has more branches than white ash.

**Flowers and Seed.** Male and female reproductive parts grow on separate trees. The flowers are small without petals and appear before leaves. Wind bears pollen from male flowers to receptive female flowers. Flowering begins in March and April in Florida, and in late April or early May in Pennsylvania.

**Site Requirements.** Green ash tolerates a pH range of 4.0 to 8.1. In Iowa, severe chlorosis occurred in the upper range of 8.1. Trees survive but grow poorly on acid to very acid spoils. This species grows naturally in

alluvial soils along rivers and brooks, and occasionally along swamp borders. In the Great Plains, it is used extensively as a shelterbelt tree. Thus it survives and grows under both moisture extremes. Green ash can grow an average of as much as 1 foot in height a year on spoils. Some native trees in West Virginia and Pennsylvania grow at elevations of up to 2500 feet above sea level. Green ash apparently is not limited by elevation.

**Tolerance.** Reaction to shade varies from intolerant to moderately tolerant. As it ages, green ash competes less well with faster growing neighbors.

**Culture.** Plant as 1-year-old seedlings. Direct seeding is not recommended. Initially, the trees grow well mixed with other hardwoods. They

become intolerant with age, if they are unable to keep pace with the adjacent species. The best seed sources for green ash are those closest to the planting locality.

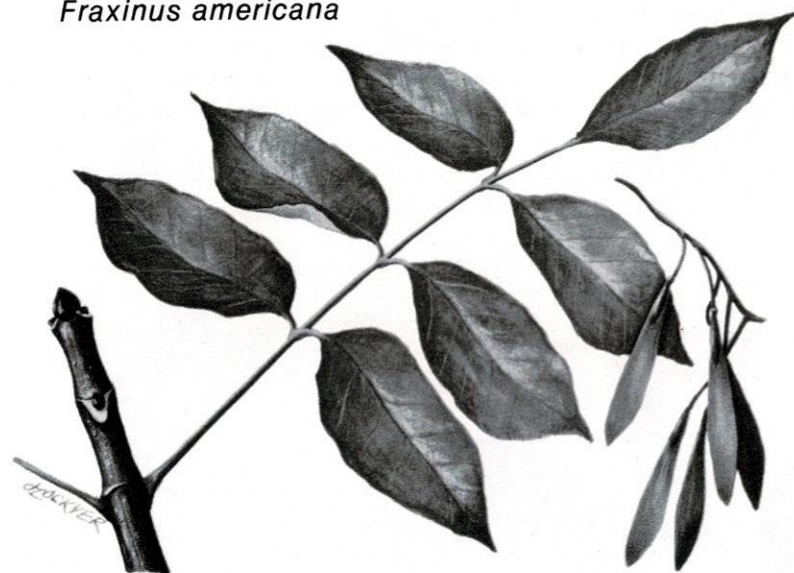
**Major Pests.** Oyster shell scale seems to be the most severe pest for this species.

**Value for Reclamation.** A tree of intermediate commercial importance, green ash will nevertheless survive and grow well on a wide range of sites. It affords protection for watershed, serves as a windbreak, and provides aesthetic enhancement, screening, food and habitat for wildlife, and a variety of forest products.

**Products and Uses.** Despite its poorly formed trunk, green ash produces quality wood for tool handles, sporting goods, furniture, pulpwood, and fuelwood.

## White Ash

*Fraxinus americana*



**Species Description.** White ash is a native American broadleaf reaching an average height of 70 to 80 feet at maturity. Though less widespread than other ashes, white ash is the most common, widely used, and

reaches the largest size. Its trunk is long, straight, and clear. The wood is prized for its straightness of grain, stiffness, hardness, strength, moderate weight, and good bending qualities.

**Flowers and Seed.** Ash flowers are either male or female on separate trees. Pollen from male flowers is blown to receptive female flowers on other trees. The flowers, which appear earlier than leaves, bloom from

April in Florida, to middle or late May in northern New Hampshire.

**Site Requirements.** Although seedlings survive exceptionally well on acid spoils with pH values as low as 4.0, the less acid the soil, the faster white ash grows.

**Tolerance.** As small seedlings, they tolerate shade, but their tolerance decreases with age.

**Culture.** One-year-old seedlings are the best for planting. Direct seeding is not recommended. Seedlings

older than 1 year are usually too large to economically plant on spoils. The shade-tolerant young trees take advantage of any opening, but may not be able to survive competition from grass. Obtain seeds from sources close to the planting locality.

**Major Pests.** Although oyster shell scale and anthracnose cause severe damage locally, no pest has yet caused serious damage over large areas.

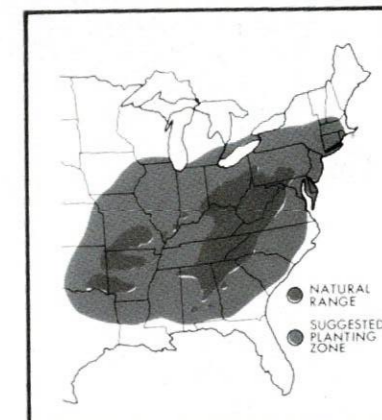
**Value for Reclamation.** Success

in establishing white ash is very good to excellent. Once established, they help protect watersheds, screen unpleasant views, provide aesthetic enhancement, and supply food for wildlife. This species grows best when planted with other hardwoods. An "all-purpose" tree, white ash is an excellent species for reclamation.

**Products and Uses.** Common uses are tool handles, sporting goods, furniture and fuelwood.

## Black Locust

*Robinia pseudoacacia*



**Species Description.** Black locust is a medium-size deciduous tree native to much of the Appalachians. Since its introduction to other areas further north and west, the species is naturalized throughout a much greater range. Most mature locusts are 50 to 60 feet tall.

**Flowers and Seed.** The flowers bloom in May and early June, about a month after leaves appear. They are pollinated by honey bees and other insects. Fruit is in the form of a pod containing four to eight seeds with hard outer coats that are relatively

impervious to water. Pods ripen in September and October.

**Site Requirements.** Black locust requires soil with a pH of 4.0 or greater. Rated highest in survival among spoil-planted trees, locust prefers moist, rich loamy soil or soils of limestone origin. Yet it grows on a wide variety of sites and tolerates a broad spectrum of soil types. An exception is poorly drained, heavy-textured soils. The elevation limit for black locust is 3000 feet, or lower in northern states.

**Tolerance.** This species is intolerant of shade. Unless locusts are the dominant tree, they will not grow in dense woods.

**Culture.** Use 1-year-old stock for planting. The best planting material is 1-year-old seedlings and treated seed. Despite its intolerance, black locust competes well with associated species since it rapidly outgrows them. It does not compete well with grasses and vines. Seeds should come from a local source.

**Major Pests.** Locust borers often eliminate stems before they reach 5 to 6 inches in diameter.

**Value for Reclamation.** Black locust is an outstanding tree for reclamation. It will benefit a mine site by providing watershed protec-

tion, site amelioration, aesthetic enhancement, screening, and food and habitat for wildlife. Locust is valued for its beneficial effect on neighboring trees, in the form of nitrogen-fixing activity around the roots and in

elements released from decomposing litter.

**Products and Uses.** The main products from black locust are fence posts and firewood. Locust also makes excellent pasture for bees.

## European Black Alder

*Alnus glutinosa*



**Species Description.** European alder is a deciduous tree of medium size with spreading branches and a symmetrical ovoid to oblong crown. Early alder growth is excellent. They often reach heights of 20 to 30 feet in 10 years, and 70 to 80 feet by age 30. Trees 120 feet tall have been reported. The leaves are dark green, alternately arranged, and often remain green until late autumn. The root system is aggressive and fibrous, often including several deeply penetrating taproots.

**Flowers and Seed.** The fruit is small, woody, and cone-like. Male and female catkins appear on the same tree. Male catkins appear in the fall, while females become prominent in late winter or spring. The first fruits often appear by age 4 and

continue throughout the life of the tree.

**Site Requirements.** Although not a legume, alders have the ability to fix nitrogen in the soil, enabling them to grow on less fertile sites. Neighboring trees also benefit from their nitrogen-fixing activity. Alder can tolerate extremely moist conditions and acid soils to pH as low as 4.0. It grows best on low slopes with pH's near neutral. On dry, heavy clays, soil with pH above 8.0, or extremely acid shales with pH below 3.5, its growth is stunted. In its native range, alder grows at elevations from sea level to 6000 feet above sea level. Consequently, it will tolerate most areas of the eastern United States. East and north slopes provide good conditions. The most serious prob-

lem for alders is dieback on dry ridge tops.

**Tolerance.** Though not completely tolerant of shade, alder competes well with most other species in open areas.

**Culture.** For reforestation, 1-year-old seedlings are used most often. Older seedlings are usually too large for easy planting. Alder can also be propagated by air layering branches. Young trees resprout vigorously from the stump after harvesting. Seeds collected in the fall have been planted successfully in early spring using 1 pound of seed for each acre. Germination improves by as much as 35 percent if the area is disked before seeding. Under extreme competition from established legumes and grasses, alder survives poorly. By

mixing alder with oats and short fescues, the trees are protected against initial soil erosion and yet are established. Alder cannot tolerate herbicides commonly used on hardwoods. Scalping or disking before planting in areas with heavy vegetative competition is the best way to control weeds. Cool, moist sites are best for alder, but they tolerate extremely wet areas. Seed

sources from Bavaria within natural range grow extremely well in the United States.

**Major Pests.** Leaf miners and scale insects cause the most damage. Though not always causing mortality, they often slow growth and bring on die-back of tops.

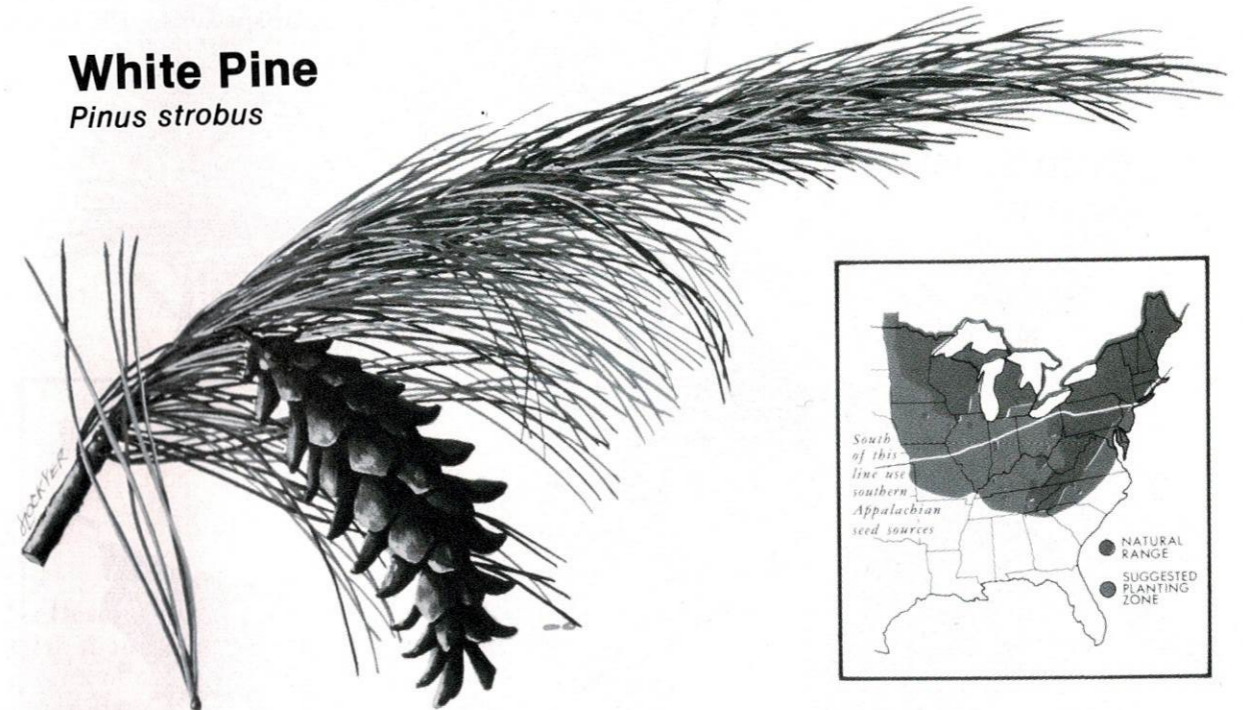
**Value for Reclamation.** European alder is excellent for reclamation. It thrives on moist, cool, acid

spoils. Their nitrogen-fixing abilities make them a desirable nurse crop for other species requiring more fertile sites, and their survival rate is high.

**Products and Uses.** Alder seed are food for many birds, small rodents, and an occasional white-tailed deer. The wood is used for charcoal, paper, particleboard, fuelwood and smoking meats.

## White Pine

*Pinus strobus*



**Species Description.** Eastern white pine is the largest native conifer of the northeastern United States. A long-lived tree, it will commonly survive 200 years if undisturbed. In virgin forests, trees 40 inches in diameter and more than 150 feet tall were common. Today most are harvested at 70 to 100 years old, after reaching an average diameter of 18 to 20 inches and a height of 80 to 100 feet. The white pine root system's form and distribution varies from one type of soil to another. Usually the root system has the vestige of a taproot. Several large roots spread out and down, anchoring the tree under most conditions. In deep,

coarse-textured soils, sinker roots branch out and down from the laterals.

**Flowers and Seed.** White pines usually bear cones by the time they are 20 years old. The best seed-bearing age is 50 to 150 years. Abundant cone crops may appear once every three to five years. Cones mature in two years. By the fall of the first year, conelets are 1 to 2 inches long. They reach their full length of 5 to 11 inches in early summer of the second year, unless infested by the white pine cone beetle.

**Site Requirements.** White pine grows on almost all soils throughout its range. If properly tended, the

species can outgrow hardwoods. It grows well on excessively drained and well-drained sandy soils, and on droughty, loamy sands. Growth is poorest on clay soils and on poorly drained sites. Natural habitats for white pine range from dry, rocky ridge tops to moist bottomlands. Up to 3500 feet, elevation is not critical. In the northern parts of its natural range, aspect and slope position have little effect on where it grows. But in Pennsylvania, Ohio, Indiana, Illinois, and the southern Appalachians, the trees grow best on a northerly aspect, or in coves and bottomlands.

**Tolerance.** Though a tolerant species, white pine is sensitive to competition as a seedling since it grows slowly during the first five to seven years. It becomes more aggressive and may grow 2, 3 or even 4 feet a year once it reaches the sapling stage. Although white pine grows better with other conifers than with hardwoods, it is an ideal tree for mixed planting.

**Culture.** In the northern half of its range, 2- and 3-year-old planting stock is usually used. In the southern

areas 2-year-old stock is usually considered large enough. Nurseries produce few or no transplants. As an aid in overcoming white pine weevil damage, trees are often spaced 6 x 6 or even 5 x 5. Where the weevil is not a problem, wider spacing, such as 6 x 8 or 8 x 8 should be used.

**Major Pests.** The major enemies of white pine are white pine weevil and blister rust. Where blister rust causes high losses, its alternate host, ribes, should be eliminated.

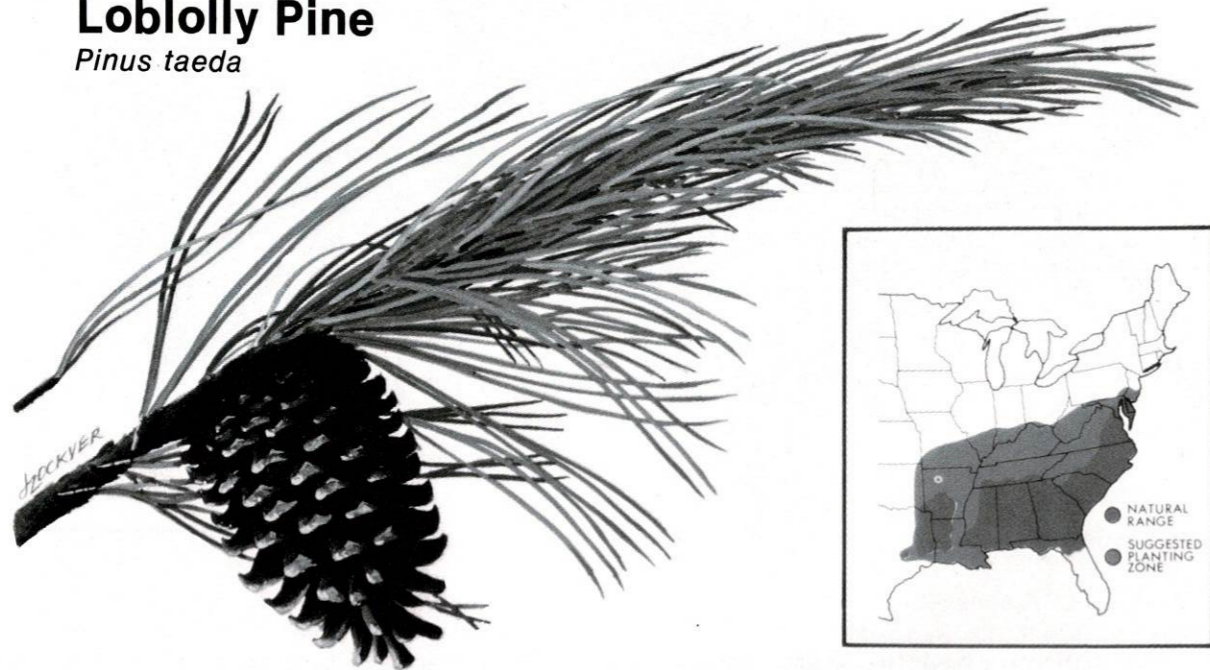
**Value for Reclamation.** White

pine adapts well to a wide climatic range and to soils with pH as low as 4.0. Because it tolerates shade, this species is ideal for mixed plantings.

**Products and Uses.** For many years, eastern white pine was the primary building material in the northeast. Despite recent limited quantity and poorer quality, white pine is still used extensively for construction, furniture, doors, window sashes, and other products. It is a popular species for Christmas trees.

## Loblolly Pine

*Pinus taeda*



**Species Description.** Loblolly pine, a coniferous tree, is the most widespread species in the south. A medium to large tree, loblolly pine may grow to 90 to 110 feet tall on 2 to 2½ feet in diameter (reportedly to 150 feet by 5 feet) at maturity. In plantations, trees develop extensive lateral root systems with a large number of absorbing roots.

**Flowers and Seed.** Seed production depends on the age and size of the tree. Seeds may be produced abundantly after the twenty-fifth year.

**Site Requirements.** Loblolly pine grows well on a variety of soils, from heavy clays to sandy loams with widely differing moisture conditions. Planting should be restricted to areas below the southern third of Ohio, Indiana, and Illinois.

**Tolerance.** This species is very intolerant of heavy competition from other tree species, grasses, or legumes, especially the first few years.

**Culture.** Regeneration of loblolly pine can be achieved by either natural or artificial methods. One-

year-old seedlings are recommended for planting. In heavily cutover areas, where the danger of pales weevil damage is greatest, delay planting for nine months. Natural regeneration may be hampered by erratic seed crops and frequent need for follow-up treatments. To assure success, site treatments must be timed with the period of seed production, and competition and density must be controlled.

**Major Pests.** Loblolly is susceptible to pales weevil damage, and to

rootrot and fusiform rust among other diseases.

**Value for Reclamation.** Loblolly

pine is a wide-ranging tree that performs well on a variety of soils and moisture conditions.

**Products and Uses.** Harvestable products include pulpwood, sawlogs, veneer, posts, poles, and piling.

## Virginia Pine

*Pinus virginiana*



**Species Description.** Virginia pine is the most abundant conifer of the minor species of southern pines. On intermediate sites, trees will reach their maximum growth in 40 to 50 years for pulpwood, and in 70 years for sawtimber. Trees growing on good sites may produce as much as a cord per acre per year. The average height for mature virginia pine is 50 to 75 feet, though under ideal conditions trees may reach heights of 120 feet or more. Often, trees are grown to pulpwood size and then clearcut. Thinning has little effect after age 15. Older stands may windthrow and break. The needles are twisted and occur in pairs 1½ to 3 inches long.

**Flowers and Seed.** Small, 2-inch-long cones armed with sharp spines produce seeds. Trees bear at 5 years old at the earliest, but may be delayed for 50 years in dense stands.

Prolific seed crops occur at three- to five-year intervals. Cones ripen the second year in October and November. Unless the cones stay closed, as they may for months or years, they are dispersed throughout the winter months.

**Site Requirements.** Virginia pine will tolerate soils as acid as pH 3.5. The usual range in natural stands is pH 4.6 to 7.9. This species grows best on clay loams or sandy loams that are moderately to well drained. They survive long, dry spells better than most pine species, though growth is slow. Elevations most conducive to growth are from 100 to 2500 feet. In northern regions, restrict elevation to 1000 feet for reclamation sites and to areas not more than 100 miles north and western to northeastern exposures.

**Tolerance.** Seedlings are sensitive

to shade. Under a full crown cover, they die within a year, or within a few years from partial shade.

**Culture.** One-year-old seedlings stock is preferred for planting, though 2-year-old stock may work if it is properly pruned in the nursery. Early spring is the best time to plant. If rainfall is adequate, direct sow with seed that has been cold-stratified for 30 days. Fall is also an acceptable time, except where frost heaving is a problem. To improve survival and stocking where litter is a problem, scarify or burn prior to seeding.

**Major Pests.** After age 50, a substantial number of stands fall victim to heart rot caused by *Fomes pini*.

**Value for Reclamation.** Virginia pine is a good species for planting on acid spoils and on coarser-textured soils of low fertility. Once estab-

lished, seedlings will tolerate long dry spells, though growth is stunted both by drought and by acidity below 4.5. Use Virginia pine on sites that are too poor for hardwoods. Soils should be moderately well-drained,

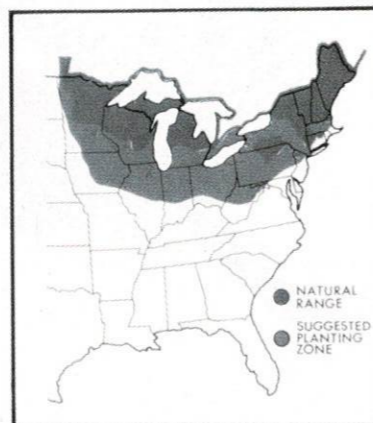
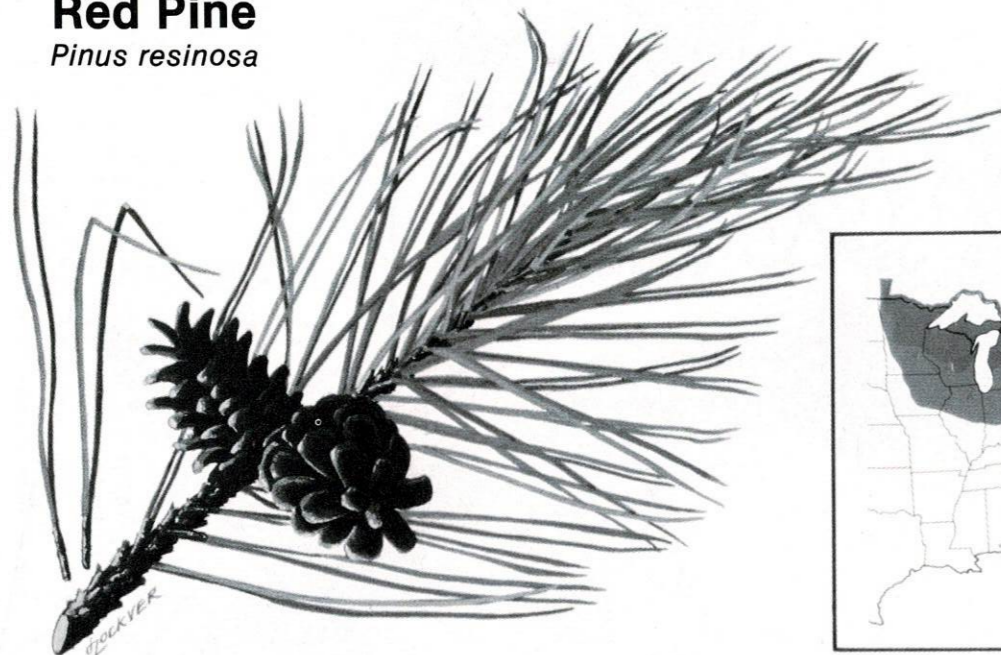
and free of shade and dense ground vegetation.

**Products and Uses.** The most common product from Virginia pine is pulpwood. Some sawtimber is produced, though the quality may be low

due to persistent branching. The knots, however, are small. Some trees are of sufficient quality to be used for poles. Virginia pine is also a beneficial wildlife species.

## Red Pine

*Pinus resinosa*



**Species Description.** Red pine is a medium size conifer with a normally straight and clean bole and reddish-brown bark. The root system is well-developed with a strong taproot and numerous lateral roots with branches similar to taproots. Needles are dark green and glossy, 4 to 6 inches long, and are borne in pairs. Seedlings grow slowly at first, usually less than ½ foot a year. After four or five years, the growth rate increases to 1 or 1½ feet a year, or more. For 60-year-old trees on good sites, heights of 60 to 80 feet with diameters of 1 to 2 feet at breast height are common.

**Flowers and Seed.** Flowering occurs from May to June with both male and female flowers appearing on the same tree. Cones ripen from mid-August to October of the second year. Normally seed production

begins at age 20 to 25, with good seed crops occurring at intervals of three to seven years. Under proper conditions, seed can be stored for many years.

**Site Requirements.** The ability of red pine to tolerate acid site conditions has made this species one of the more widely used conifers for reclamation planting within its range. On a site in Pennsylvania, trees had a 60 percent survival rate for the first year on pH 3.3 spoil, and 70 percent survival on pH 3.5. The best planting conditions occur above pH levels on 4.0 on well-drained soils. Avoid wet areas. This is a typical northern pine species and should be planted at elevations above 2000 feet in the more southerly portions of the recommended planting range. In the southern areas of the planting range, north

and east facing slopes are also recommended. Altitude and aspect become less limiting in the northern portions of the planting range. Red pine is not recommended for regions south of West Virginia, Ohio, Indiana, and Illinois, or for the southern third of these last three states.

**Tolerance.** Seedlings are moderately tolerant of shade though growth will be slower than normal. Reduce heavy herbaceous cover before planting to avoid competition for moisture.

**Culture.** Plant in early spring using 2-year-old seedlings. Direct seeding cannot be recommended at this time. Hydroseeding has had limited success.

**Major Pests.** Red pine is comparatively free of insect problems in its natural range. Elsewhere common

insect enemies include Nantucket pine moth, European pine shoot moth, and several species of sawflies. In general, the further south red pine is planted, the more potential there is for insect problems. Fomes and scleroderris can be serious disease problems on heavy soils and wet sites.

**Value for Reclamation.** Red pine appears to be an excellent conifer for reclamation plantings. The Research

Committee of Coal Mine Spoil Revegetation in Pennsylvania lists red pine as the conifer species most likely to survive on a wide range of spoil conditions, although other species may rate higher in the western and southern coal mining areas. Dense foliage makes red pine a good choice for screening and other aesthetic purposes. Site protection is minimal until there is crown closure.

Its value for wildlife is primarily to provide cover. Deer and rabbits occasionally browse red pine, and porcupines feed on the bark.

**Products and Uses.** Red pine is used in general construction, for piling, sashes, door and window frames, flooring, boxes, crates, ship masts, ship flooring, and for Christmas trees. It is not durable in contact with soil unless treated.

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# Sparrow Hawks, Perches, and Reclaimed Surface Mines

by John Forren and Dr. David Samuel

In the past, many of the grasslands in West Virginia resulted from fields left fallow, but much of the grasslands that we now have in the state resulted from reclaimed surface mines.

When we convert a forested land to grasslands we lose some species of wildlife. But grassland habitats add a new dimension to the wildlife found in West Virginia and are particularly beneficial when adjacent to a forest edge. Many birds of prey, or raptors as they are sometimes called, nest in the forest but prefer to hunt edge or grassland habitats. Newly reclaimed surface mines provide an abundant supply of prey, particularly mice and insects. As past studies at West Virginia University have shown, mice are just as numerous on reclaimed grassland mines as they are on surrounding old field habitats. In other words, grasslands resulting from reclaimed surface mines provide excellent hunting areas for raptors.

One raptor that has been quick to respond to the establishment of grassland habitats in West Virginia is the sparrow hawk. Sparrow hawks are cavity nesting raptors and therefore require trees with cavities or nest boxes. However, sparrow hawks are almost exclusive hunters of

grassland and shrubland habitats. Consequently, a grassland that is adjacent to a forest edge or a few snags with cavities can be ideal sparrow hawk habitat.

The name sparrow hawk is actually a misnomer because this raptor is not a hawk at all, but a falcon and thus more appropriately called "American kestrel." Kestrels, like other falcons, have long pointed wings and long tails. But an American kestrel, unlike some of its larger cousins such as the peregrine falcon, is a small raptor seldom exceeding a foot in length. One who gives only a passing glance to a kestrel perched on a power line could easily mistake it for a mourning dove.

The kestrel's small size, however, belies its efficiency as a predator. Kestrels are quite adept in capturing insects, mice, and small birds which are quickly dispatched with the aid of the notched beak typical of falcons. Kestrels prefer to hunt from perches when available and have been known to make more than 97 percent of their hunting attempts from perches. When perches are not available, kestrels can rely on their striking ability to hover in search of prey. With its tail fanned and wings rapidly beating, the kestrel can keep its head essentially in the same spot so that

any movement below can be easily detected. Therefore, a kestrel hunting from a hover is accomplishing the same thing as if it were hunting from a perch but at a greater energy cost.

Knowing that kestrels and several other raptors prefer to hunt from perches, we felt the use of artificial perches might serve to attract more raptors to reclaimed surface mines, particularly those with natural perches available.

Ultimately, we wanted to know if artificial perches could be used to increase raptor populations. Before that question could be investigated however, we first had to determine if raptors would use the artificial hunting perches. We were interested in what height the perches had to be and other possible factors such as, topography, vegetation, and prey abundance.

The study was conducted on 4 reclaimed surface mines during the spring and summer of 1980 with the cooperation of King Knob, Dippel & Dippel, and Consolidation coal companies, and Mrs. Monitia Basem. On each mine, we placed six 20-foot perches with crosspieces at heights of 10 and 20 feet. We used 24 automatic event recorders which allowed continual data collection without us having to be there. The relative weights

of birds landing on the perches gave us some idea of the birds identity. A kestrel only weighs approximately 4 ounces whereas red-tailed hawk and great horned owl weights are expressed in pounds.

One problem we had early in the summer was that blackbirds fought with the kestrels over the use of the perches. Tops of perches were apparently ideal locations for blackbirds to stand watch over their nests and to proclaim their territorial rights over the area. Consequently, perch use by blackbirds was heavy during May and June.

In July, with their nesting completed, the blackbirds no longer used the perches at all. It was during this month that the kestrels made their heaviest use of the artificial perches. By this point of the summer, most of the young kestrels have learned to fly and are hunting on their own but remain together as a family group until dispersal in the fall.

Also during July, the kestrels' diet shifted from mice to insects which was reflected in the remains of the castings. On the average, grasshoppers were by far taken more often by kestrels than any other prey item from July until the completion of the data collection in October.

It was interesting to note that the

mine that received the heaviest perch use by kestrels had only 90 percent ground coverage while the other three had nearly 100 percent coverage. This heavy use was likely due to the high accessibility of insects on that mine because of the less than complete ground coverage and the comparable insect populations. This mine seemed ideally suited as a summer feeding area although it may have been somewhat lacking as a winter feeding area. Very few mice were captured on this mine compared to the relatively high numbers captured on the other mines. Though many kestrels migrate to points south, some overwinter in West Virginia so winter hunting areas are important in the state.

Kestrels overwhelmingly preferred to hunt from the 20-foot perch height rather than the 10-foot one. However, on some occasions, we observed kestrels hunting from the 20-foot perch than dropping to the 10-foot height from where a strike was eventually made. Apparently, the kestrel dropped to the lower perch before striking to get a fix on the prey.

There was no question that the kestrels found the artificial perches useful on the surface mines. The 13,158 hours of total event recorder time revealed that kestrels perched

5,933 times on the artificial perches. Our own direct observations showed an additional 1,184 perches by kestrels during nearly 100 hours of observation. One evening in the latter part of July, we observed 22 kestrels perched on one 68-acre reclaimed mine. It was common to observe 5-6 kestrels using perches together on one mine. Several times, we observed 3 kestrels sitting on the same perch. Red-tailed Hawks also used these perches in the daytime and Great Horned Owls at night.

Erecting artificial perches and kestrel nest boxes would be an ideal project for conservation and youth groups. The mines chosen for perches should have cavities available or nest boxes placed in the surrounding trees. The mine probably should have slightly less than total vegetative cover—say 95-99% coverage. The perches should be at least 20 feet high though additional crosspieces would allow more use with little additional cost and effort. One perch per 2.5 acres is probably the maximum density needed, particularly in the summer. For more information regarding the placement of perches and nest boxes on surface mines for kestrels, write to Dr. David Samuel, Division of Forestry, West Virginia University, Morgantown, WV 26506.

Table 1. Raptor perch use totals obtained from event recorder data.

Species	Perches		Time (min)		Minutes per Perch	Range of Perch Times
	Total	Percent	Total	Percent		
American Kestrel	5,933	99.08	25,860	96.37	4.4	1-65
Red-tailed Hawk	33	0.55	475	1.77	14.4	1-75
Great Horned Owl	22	0.37	500	1.86	22.7	5-70

Table 2. Raptor use totals obtained from direct observations.

Species	Perches		Time (min)		Minutes per Perch	Range of Perch Times
	Total	Percent	Total	Percent		
American Kestrel	1,184	99.4	4,824	97.7	4.07	1-45
Red-tailed Hawk	7	0.6	114	2.3	16.23	1-60

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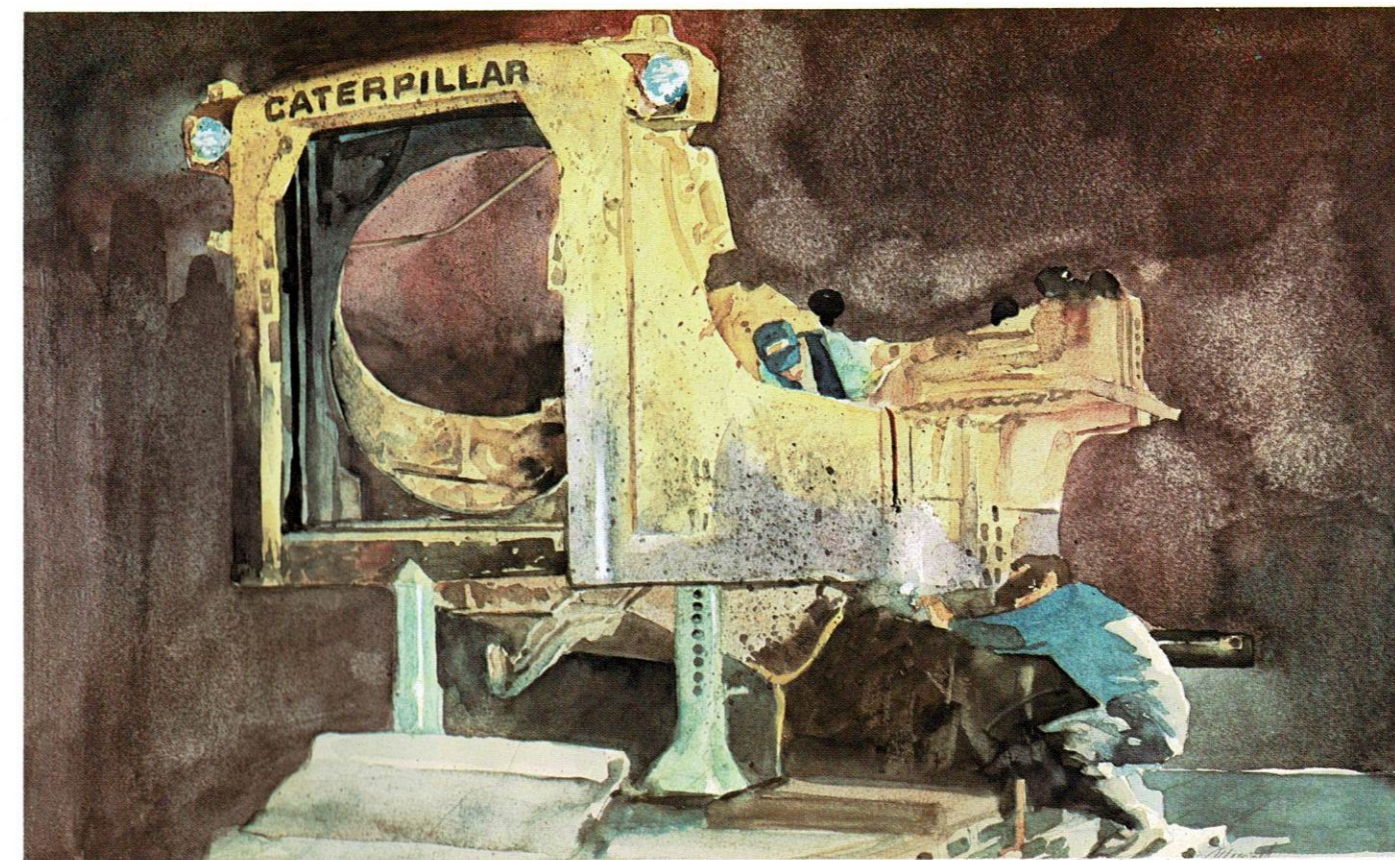
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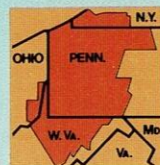
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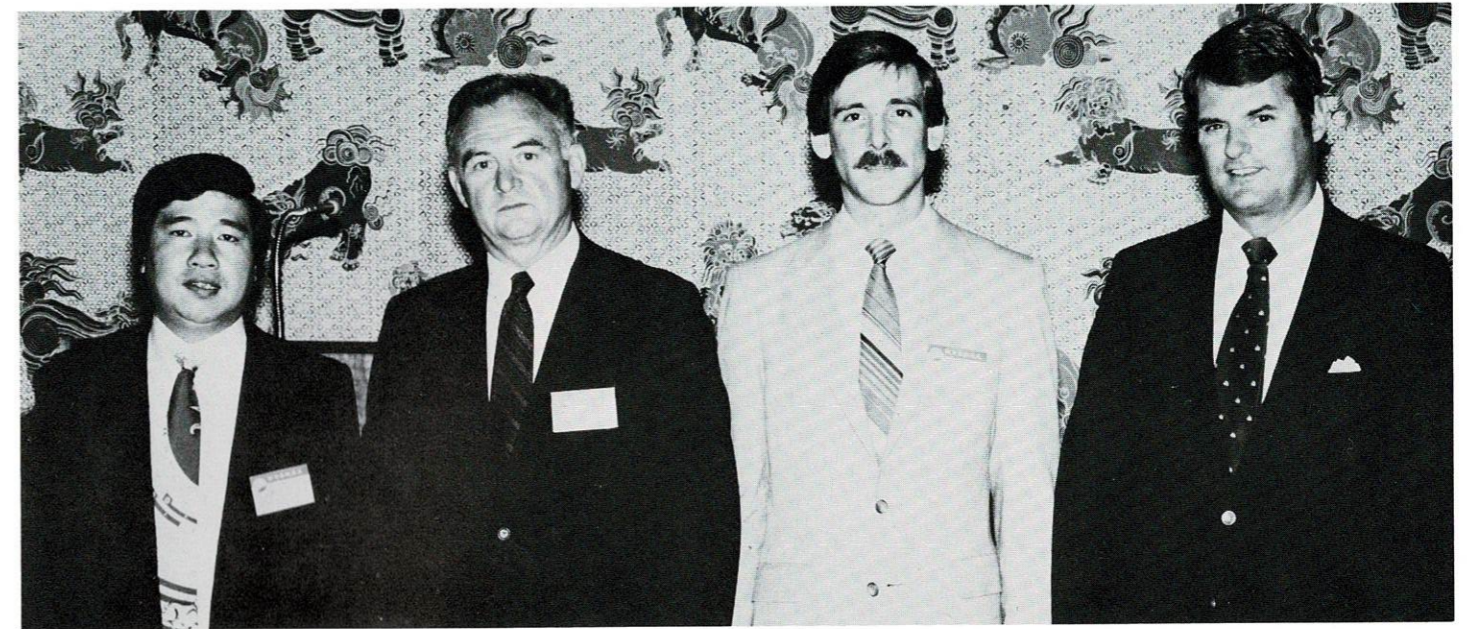
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The panel discussion of markets included 1.-r. Eddie Pen, P&C Bituminous Coal Inc., Robert H. Jeran of Bethlehem Mines Corp., moderator, Thomas Reishman of the West Virginia Coal Development Authority, and Michael Card of the U.S. Department of Commerce.

## Don Donell becomes Association chairman

Donald R. Donell is the Association's new chairman of the Board of Directors. Donell is president of Starvaggi Industries in Weirton. He was elected to the chairman's post at the Annual Meeting, held at the Greenbrier hotel in August.

Other elected officers for 1982-83 include: 1st Vice Chairman, Tracy W. Hylton of Whitesville A & S Coal Co., Inc.; 2nd Vice Chairman, Carl Del-Signore of Buffalo Coal Co.; Secretary/Treasurer, Charles T. Jones of Amherst Coal Co.; and Associate Division Chairman, Frank W. Vigneault of Cecil I Walker Equipment Co.

Newly elected to the Board were Andrew K. Teeter of McDonough Caperton Shepherd Group, Inc., Richard N. Welch of Beckwith Machinery Co., and Milford Jenkins of Mary Ruth Corp.

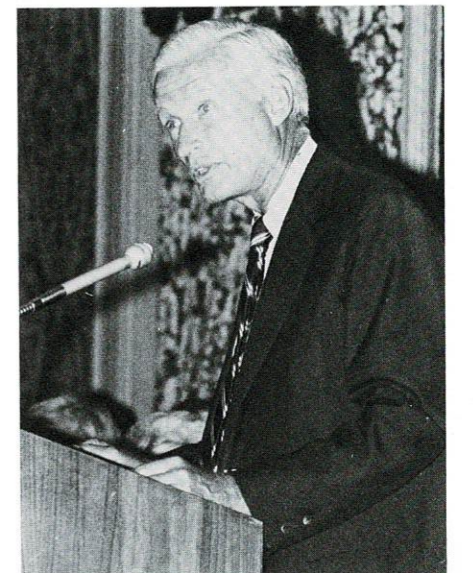
Seven others were reelected to the Board, including David M. Porreca of Mountaineer Euclid, Inc., William C. M. Butler, III, of Princess Susan Coal Co., Inc., James C. Justice of

Bluestone Coal Corp. Max A Messenger of Daugherty Coal Co., Inc., William S. Ritchie, Jr., of Hobet Mining & Construction Co., Inc., Rogers C. Stevens, Jr., of LaRosa Fuel Co., Inc., and Rhein H. Tinsley of the Pittston Coal Group.

The Association also accepted eight companies as new members. These included Mobil Coal Producing Inc., Coalstream Pipeline Co., J. F. Allen Co., Kolb Enterprises, Ltd., Nitrochem Energy Corp., Terra Engineers, Toothman Rice & Co., and Wolf Creek Collieries Co.

Total registration for the three day meeting was over 400. The business session featured a panel discussion moderated by Robert H. Jeran of Bethlehem Mines Corp. The panel provided an overview of the current market situation, broken down into domestic, European and Pacific Rim markets.

A special thanks should go to the many member companies who served as sponsors for the Associate cocktail party, as well as several companies



Main speaker at the Saturday banquet was Kempton B. Jenkins, vice president of government affairs for Armco, Inc. His topic was "The importance of Politics on Coal."

who also provided prizes for the golf tournament, including Beckwith Machinery Co., Cecil I. Walker Machinery Co., Independent Explosives Co., Rish Equipment Co., Union Carbide Corp., Call Detroit Diesel Allison, Crown Hill Equipment, Mountaineer Euclid, Sii Smith-Gruner, and McDonough Caperton Shepherd Group.



Bridge chairman Mary Alice Vigneault of Cecil I. Walker Machinery, with winners Edna Justice of Bluestone Coal, Jeanne Hamilton of Ford Coal, and Chris Shewey of Lynn Land.



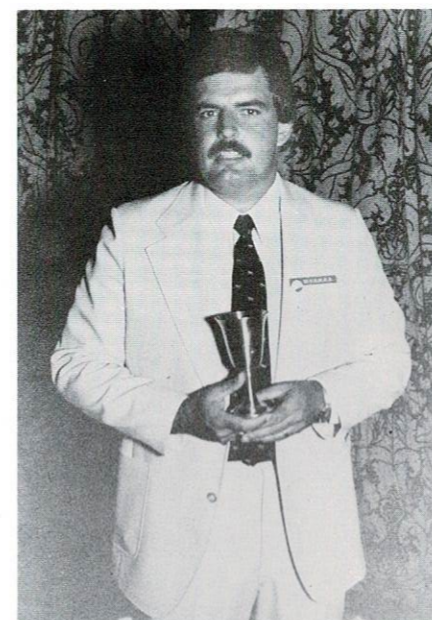
Outgoing chairman William C. M. Butler, III of Princess Susan Coal presides over the election of his successor.



Donald R. Donell of Starvaggi Industries assumes duties as Chairman of the Board of Directors for 1982-83.



Trap Tournament Chairman John Sturm of Sturm Environmental Services, with winners in the shooting competition. l.-r. Steve McTeer, Crown Hill Equipment, Lynne Dulaney of Starvaggi Industries, and Paul McCombs of Elk Run Coal.



Men's golf Low Net winner Tom O'Bryne, Driltech



Tennis mixed doubles winners Susan Bliss of Call Detroit Diesel Allison, and Kempton Jenkins of Armco.

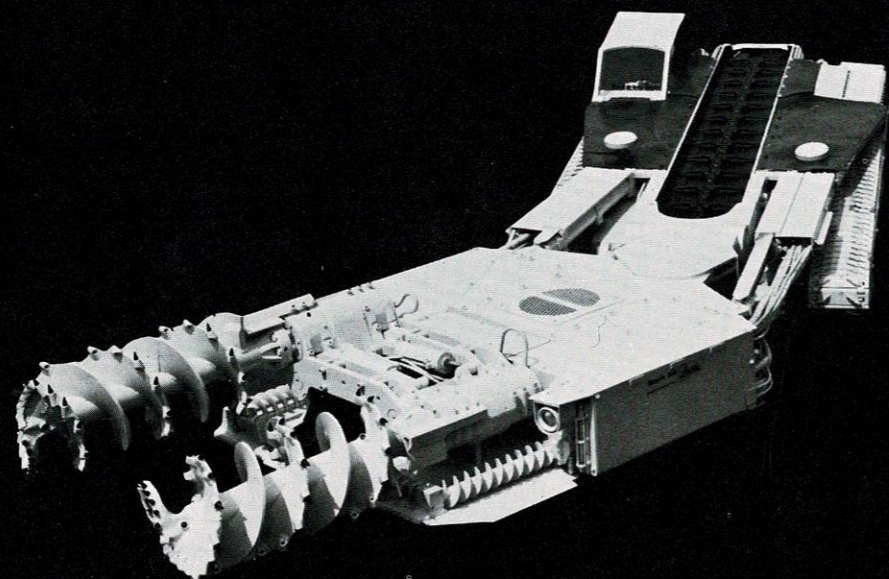


Ladies' golf low net winner Mary Holbrook of Lynn Land.



Finishers in the "Surface Miners' Fun Run," l.-r. Bill Raney, WVSMRA, John Sturm, Sturm Environmental Services, Meg Keating, Barbour Coal, Joe Gaither, J. D. Hinkle & Sons, Anne Moran, Princess Beverly Coal, Rick Horsfall, Reed Mining Tools, Dana Riedeman, Hawley Fuel Coal, and Steve Riedeman, Hawley Fuel Coal.

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## Coal Calendar

### October

28-29 "Fundamentals of Ground Water Quality Protection," Marriott Pavilion Hotel, St. Louis, Mo., contact Richard M. Miller, American Ecology Services, Inc., 127 E. 59th St., New York, N.Y., 10022, (212) 371-1620.

### November

3-5 Abandoned Mine Reclamation Symposium, St. Clairsville, O., contact Harry D. Slawter, 3610 Piatt Rd., Delaware, O. 43015.

4-5 Annual Meeting, West Virginia Chapter of the Soil Conservation Society of America, Jackson's Mill, near Weston, contact SCS, 7515 N.E. Ankeny Rd., Ankeny, Ia. 50021-9764.

4-5 Seminar, "Mine Management," Hyatt Regency Hotel, Lexington, Ky., contact McGraw-Hill Seminar Center, 331 Madison Ave., Suite 603, New York, N.Y. 10017.

7-9 West Virginia Legislature Interim Committee Meeting, State Capitol Building, Charleston.

8-9 Seminar, "Coal Freight Rate-Making," William Penn Hotel, Pittsburgh, Pa., contact Larry L. Goldstein, J&L Coal Associates, 1511 K St., NW, Suite 637, Washington, D.C. 20005, (202) 737-6687.

9-10 Seminar, "Essentials of Coal Exploration for Mining Feasibility," Hyatt Regency Hotel, Louisville, Ky., contact McGraw-Hill Seminar Center, 331 Madison Ave., Suite 603, New York, N.Y. 10017.

15-16 AMC Annual Communications Workshop, Reno, Nev., contact Susan Mirvis, American Mining Congress, 1920 N St. NW, Washington, D.C. 20036, (202) 861-2844.

15-16 Seminar, "Successful Coal Export Marketing," Hyatt Hotel, Pittsburgh, Pa., contact McGraw-Hill Seminar Center, 331 Madison Ave., Suite 603, New York, N.Y. 10017.

15-16 UK Short Course, "Stability Analysis of Refuse Embankments, Hollow Fills, and Spoil Banks," University of Kentucky Agricultural Data Center, Lexington, Ky., contact Connie Blakemore, P.O. Box 13015, Iron Works Pike, Lexington, Ky. 40512, (606) 252-5535.

17-18 Seminar, "Negotiating and Administering Coal Supply Agreements," Hilton Hotel, Pittsburgh, Pa., contact McGraw-Hill Seminar Center, 331 Madison Ave., Suite 603, New York, N.Y. 10017.

18-19 Coal Contracts Seminar, Key Bridge Marriott

Hotel, Washington, D.C., contact John Ekberg, Coal Outlook, 1401 Wilson Blvd., Suite 1000, Arlington, Va. 22209, 1-800-424-2908.

18-19 Coal Contracts Seminar, Marriott Hotel, Arlington, Va., contact John Ekberg, Coal Outlook, 1401 Wilson Blvd., Suite 1000, Arlington, Va. 22209, 1-800-528-1244.

18-19 Seminar, "Water Quality Management," Hyatt Hotel, Louisville, Ky., contact McGraw-Hill Seminar Center, 331 Madison Ave., Suite 603, New York, N.Y. 10017.

22-23 UK Short Course, "Stability Analysis of Refuse Embankments, Hollow Fills, and Spoil Banks," University of Kentucky Agricultural Data Center, Lexington, Ky., contact Connie Blakemore, P.O. Box 13015, Iron Works Pike, Lexington, Ky., 40512, (606) 252-5535.

### December

1-2 Seminar, "Coal Sampling and Analysis," Hyatt Hotel, Pittsburgh, Pa., contact McGraw-Hill Seminar Center, 331 Madison Ave., Suite 603, New York, N.Y. 10017.

1-3 Western Mining Show, Phoenix, Ariz., contact Mining Shows, P.O. Box 3694, Charleston, 25335.

2-3 Seminar, "Developing and Implementing a Mine Safety Program," Hyatt Hotel, Lexington, Ky., contact McGraw-Hill Seminar Center, 331 Madison Ave., Suite 603, New York, N.Y. 10017.

6-10 4th Annual Symposium on Surface Mining, Hydrology, Sedimentology, and Reclamation, Hyatt Hotel, Lexington, Ky., contact Juanita Snedegar, College of Engineering 223 Transportation Research Center, University of Kentucky, Lexington, Ky. 40506-0043, (606) 257-3971.

7-9 5th International Coal Utilization Exhibition & Conference, Astorhall, Houston, Tex., contact Coal Technology, '82, 10703-A Stancliff, Houston, Tex. 77099.

### January

11-12 Seminar, "Mine Management," Hyatt Hotel, Pittsburgh, Pa., contact McGraw-Hill Seminar Center, 331 Madison Ave., Suite 603, New York, N.Y. 10017.

26-30 Semi-Annual Meeting, West Virginia Surface Mining and Reclamation Association, Mountain Shadows Resort, Scottsdale, Ariz., contact Patty Bruce, WVSMRA, 1624 Kanawha Blvd. E, Charleston, WV 25311, (304) 346-5318.

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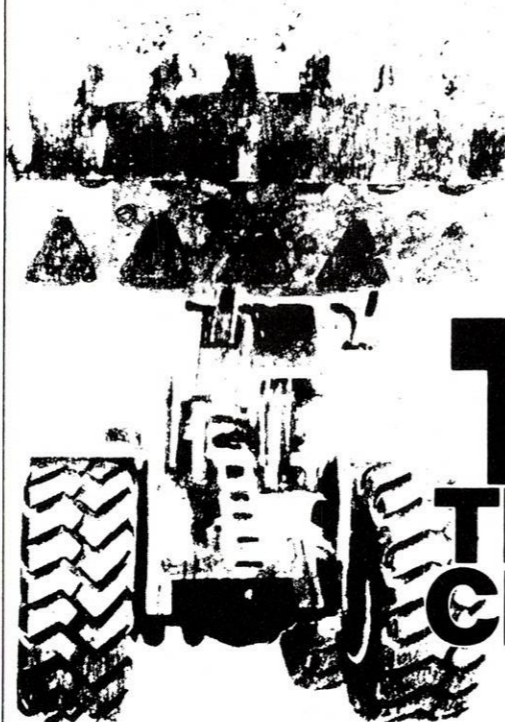
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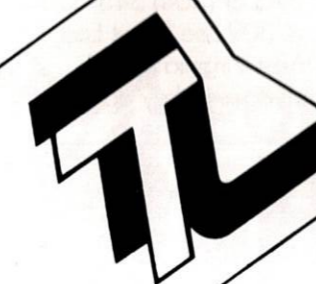
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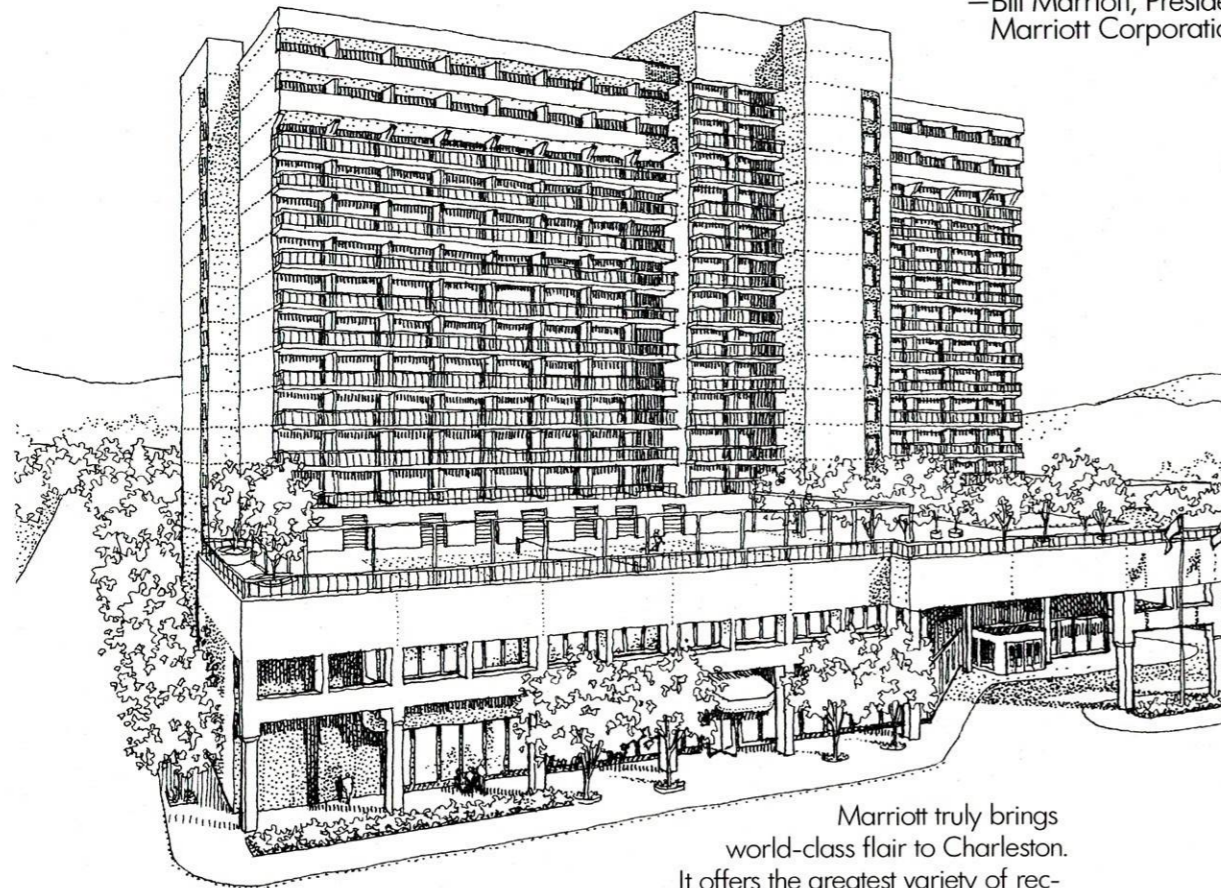


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