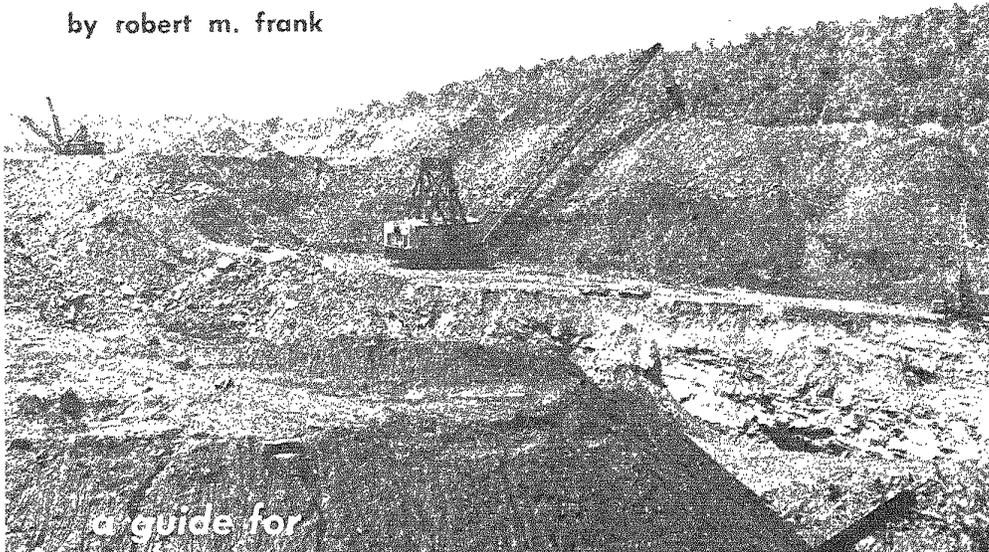


by robert m. frank



**SCREEN AND COVER PLANTING**  
*of trees on anthracite mine-spoil areas*



U. S. FOREST SERVICE RESEARCH PAPER NE-22  
1964

NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.  
FOREST SERVICE, U. S. DEPARTMENT OF AGRICULTURE  
RALPH W. MAROUIS, DIRECTOR

## PREFACE

**T**HIS is the first of several reports dealing with mine-spoil revegetation research in the Anthracite Region of Pennsylvania. The second report will deal with survival and early growth of the older forest plantings made in compliance with the original anthracite strip-mine law of 1948. A third report will describe the early results from experimental plantings established in 1963 on various spoil materials. Other studies relating to forestry problems in the Anthracite Region are in the planning stage.

In the study upon which this report is based, 41 unit-area maps were prepared, along with supporting tables that give detailed planting-site information, by communities, for the entire region. Though all this information is not included in this report, it is available in limited quantities upon request from the Pennsylvania Power and Light Company, Allentown, Pa., and from the Northeastern Forest Experiment Station, Upper Darby, Pa.

The Pennsylvania Power and Light Company, whose interest led to initiation of this project on anthracite mine-spoil revegetation in 1961, has financed most of this study as well as the other above-mentioned studies in the present research program.

**COVER PHOTO.** Strip-mining in the Anthracite Region of eastern Pennsylvania creates unsightly landscapes that put the communities of the Region at a disadvantage in their attempts to attract new industries and their people. Here huge earth-moving machines dig away the overburden to get at the coal seams lying near the surface.

*a guide for*

**SCREEN AND COVER PLANTING**  
*of trees on anthracite mine-spoil areas*



**THE AUTHOR . . .**

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## INTRODUCTION

COMMUNITY development agencies, chambers of commerce, and others interested in industrial development are convinced that aesthetic beauty in a region increases its opportunities for economic growth. Aesthetic beauty, of course, is but one of many factors that influence industrial development and economic growth. Available labor, available industrial sites, low-cost financing, proximity to markets, and efficient transportation services are other important prerequisites. Enhancement of aesthetic features obviously cannot, by itself, transform an economically depressed region into one of flourishing communities. However,



Figure 1.—Strip-mine spoils along the highways of the Anthracite Region give the traveler the impression that this is bleak, poor country.

in the Anthracite Region of eastern Pennsylvania, the other prerequisites are, or can be, amply supplied; aesthetically attractive surroundings seem to be the main item that is lacking.

This was not always so. At one time the valleys and hillsides and rivers and streams of the Region compared favorably with

or surpassed other areas of the Northeast in natural beauty. But 140 years of coal mining have completely changed the picture. A substantial proportion of the land surface has been transformed — in many instances unavoidably — because coal cannot be mined by any method without depositing waste materials somewhere on the landscape; and it cannot be strip-mined without extensive disturbance of the land surface.



Figure 2.—The mine spoils are especially objectionable where they encroach upon the communities of the Region.

This transformation now is most widely evident in thousands of acres of ravaged hillsides — the open pits and spoil banks that have resulted from strip-mining (figs. 1 and 2). On a smaller scale, but perhaps more conspicuous, are the man-made mountains of deep-mine waste, most of which are located in or near centers of population (fig. 3).

Ideally, the way to eliminate the eyesores caused by strip-mining would be to restore the topography to its original contour. However, such restoration in many places would be difficult and expensive; furthermore, complete physical restoration would not be advisable for some strippings because, even though presently inactive, they may be worked again in the future. Physical

restoration would be even more difficult and expensive for the piles of deep-mine waste that have no economic potential because about the only way to dispose of this material would be to put it back underground.

Obviously some other way for improving the appearance of the countryside must be sought. One practical answer is to establish vegetation — trees for the most part — either to cover the



Figure 3. — Deep-mining operations leave man-made mountains of waste matter.

raw, disturbed areas and unsightly piles, or to shield them from view.

Except for some conflicting estimates of the amount of disturbed area in the coal fields, little information has been available as to how much of the area is unstocked or is poorly stocked and suitable for planting. And except for a small pilot study conducted in Schuylkill County in 1958<sup>1</sup>, no information existed as to how much of the disturbed area would require planting to accomplish reasonable aesthetic objectives, precisely where the

<sup>1</sup>Frank, Robert M., and Charles M. Clements. A FOREST SCREEN FOR SPOIL BANKS U. S. Forest Serv. Northeast. Forest Expt. Sta., mimeographed report, 5 pp., 1958.

areas are in relation to highways and residential sections, and where the needs for planting for aesthetic purposes are most crucial.

These were the questions that the Northeastern Forest Experiment Station of the U. S. Forest Service addressed itself to when it undertook its present research program in the revegetation of coal-mining spoils.

## THE STUDY

In 1962 a survey was made, and a series of maps was prepared on which all land disturbed by coal mining in the entire Anthracite Region was delineated and classified according to spoil type, existing tree cover, and visibility from important communities and main roads. The maps show locations for establishing tree plantings to screen or cover<sup>2</sup> all disturbed areas that are conspicuously visible from highways and residential sections. Areas suitable for development as water-recreation sites also were noted. These sites could serve as oases for travelers desiring to picnic or perhaps to fish or swim. Local residents might enjoy ice-skating at such sites during the winter.

Thus this report, with its supplemental maps and related tabular data, can serve as a guide for individuals or organizations interested in area reforestation and beautification. If put into action, the recommendations offered here could contribute to the economic betterment of local communities by restoring attractive surroundings to a region that was once richly endowed with them.

This report is limited to a factual presentation of conditions as they now exist, and a suggested program of tree planting to improve the aesthetic aspects of the region. Other aspects that may need improvement are not considered. Problems of water pollution, soil erosion, and mine-waste disposal are not within

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<sup>2</sup>Throughout this report, the term *screen* or *screen planting* refers to narrow strips of trees so placed that, when they have attained 15 feet or more in height, they will shield or screen a disturbed area from view from a highway or residential section. *Cover* or *cover planting* refers to area-wide, plantation-type plantings; these are recommended where screen planting would not be effective.

the scope of the report, although they would certainly be involved in any comprehensive program of community betterment.

Only samples of the detailed maps and tabular data are included in this report; the supplemental material is available to users upon request. The report as here presented without the supplemental material describes the situation and the recommended planting in general terms for the Region as a whole, and it explains the study methods and the kind of information provided for use in action programs.

## THE REGION

The Anthracite Region may be defined loosely as that section of eastern Pennsylvania which contains deposits of anthracite or hard coal. This definition usually is understood to include the relatively small deposits of semi-anthracite coal found in Dauphin and Sullivan Counties.

The term Anthracite Region may be interpreted to mean only the areas underlain with coal; or it may mean those areas plus variously defined intervening and surrounding areas in which the economy has been strongly affected by the coal industry. So, it is necessary to define our usage of the term:

*The term Anthracite Region as used in this report refers to the several disconnected areas from which coal has been mined, plus the surrounding undisturbed terrain from which mining disturbances are visible. This places the boundaries of each mining area usually on mountain ridges or at the near edge of forested areas.*

This survey was limited to the area defined above. It includes parts of 10 counties: Wayne, Susquehanna, Lackawanna, Luzerne, Carbon, Schuylkill, Columbia, Northumberland, Dauphin, and Lebanon.

Four great coal fields are recognized in the Region: Northern, Eastern-Middle, Western-Middle, and Southern (fig. 4). Together they cover about 480 square miles and include 8 cities. Five of the cities — Carbondale, Scranton, Pittston, Wilkes-Barre, and Nanticoke — are in the Northern Field. The other fields

# The Coal Fields

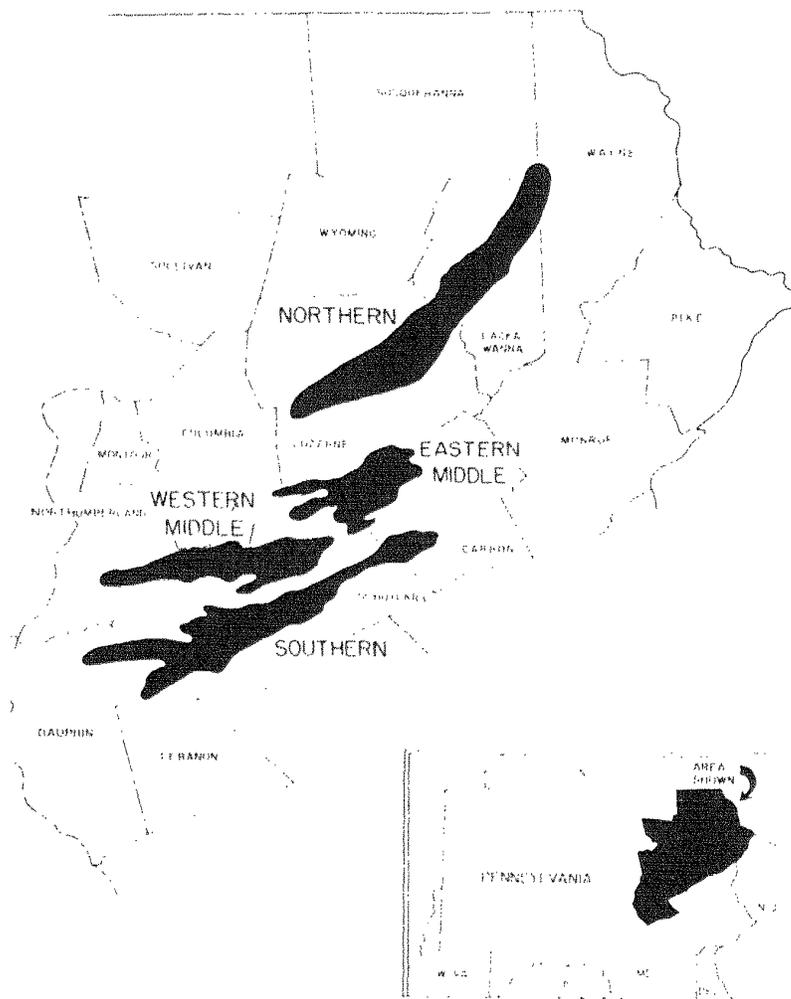


Figure 4.— The four major coal fields in the Anthracite Region of Pennsylvania.

contain one city each: Hazleton in the Eastern-Middle Field, Shamokin in the Western-Middle Field, and Pottsville in the Southern Field.

The total area mapped in the survey was 706 square miles. This includes the 480 square miles of coal fields and 226 square miles of surrounding terrain. The 706 square miles is the Anthracite Region in the sense used in this report.

## **METHODS**

### **UNIT AREAS FOR MAPPING**

For mapping purposes, the Anthracite Region was divided into 41 segments or unit areas. The unit-area maps cover areas ranging from 1,383 acres to 27,368 acres. A city, borough, or other population center was selected as a hub in each unit area to facilitate administration of action programs on a local basis. Thirty-five unit areas have as a hub a community with a population exceeding 5,000. Four other hubs are boroughs ranging in population from slightly under 2,000 to just over 3,500. Trevorton, an unincorporated place of 2,600 population, and Rush Township, are designated as the hubs of the other two areas.

A unit area consists of: (1) a hub community; (2) the highway approaches to the community; and (3) all land within approximately one-half the distance to adjacent hub communities. All cities in the Anthracite Region and all boroughs in excess of 5,000 population were designated as hub communities. Many smaller boroughs and populated sections of townships, most of which are situated along the highway approaches to the hub communities, were included in the unit areas. Figure 5 is an example of a unit-area map. Tables supporting this map can be found in appendix I at the end of this report (tables 1 to 5).

### **PHOTO INTERPRETATION**

Areas of surface disturbance resulting from all phases of coal mining, regardless of date of occurrence, were delineated on aerial photographs and were classified according to degree of

# PITTSTON UNIT AREA

1962

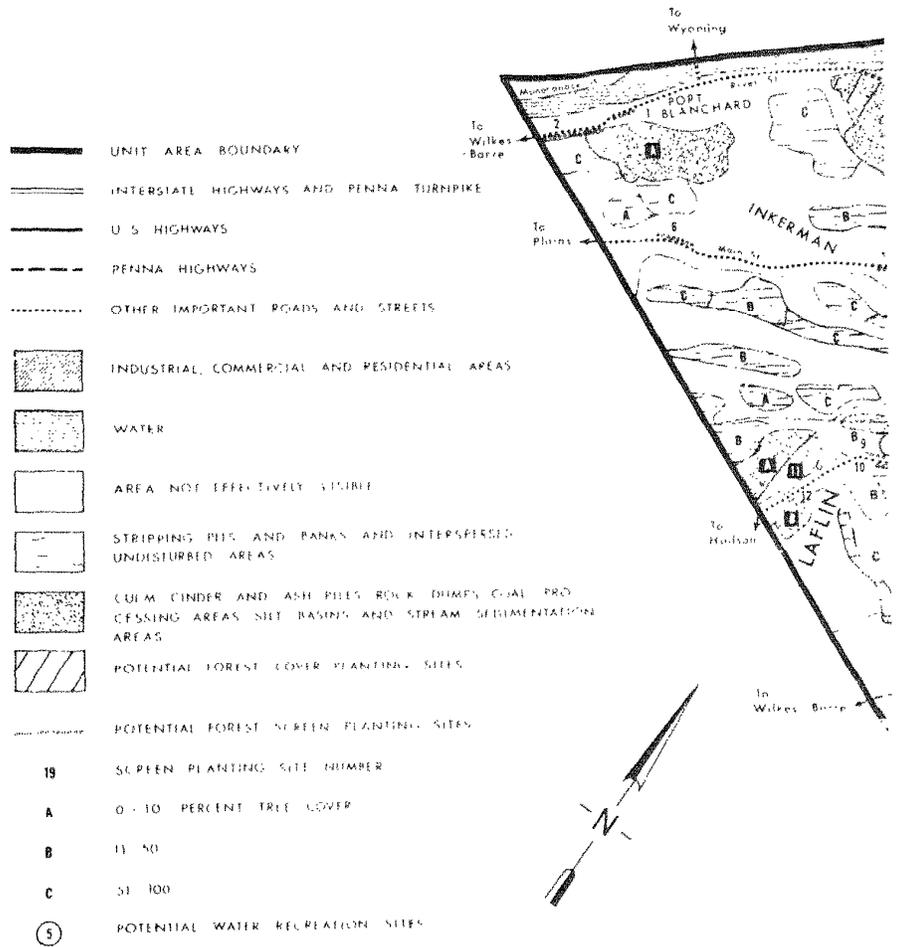
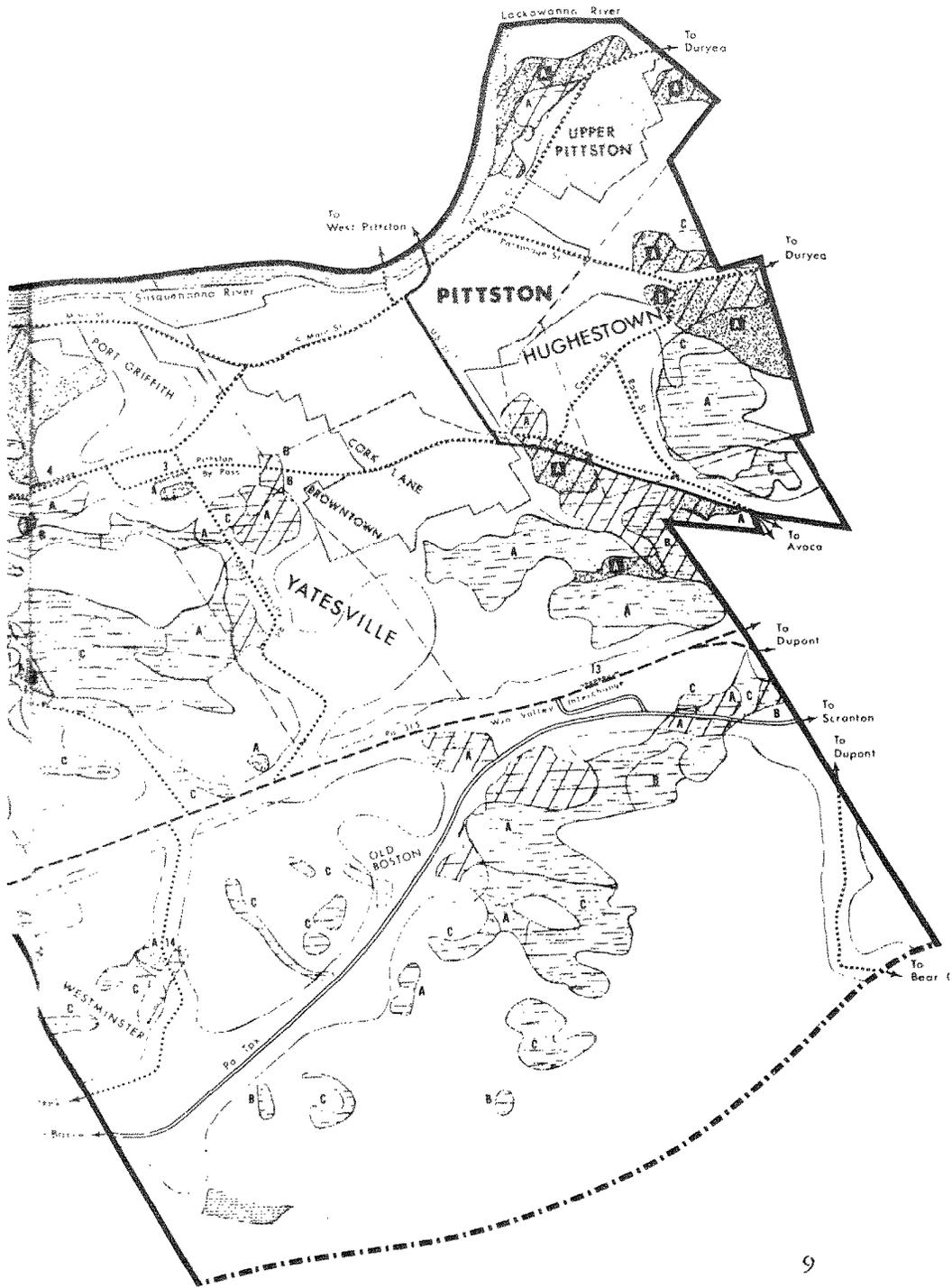


Figure 5.— A unit-area map. This is an example of the 41 unit-area maps prepared to delineate the tree-planting possibilities in the Anthracite Region.



tree cover and spoil type. A pocket stereoscope was used in this work. The photographs dated from 1958 to 1960. They were at an approximate scale of 1:20,000, which means that 3 inches of photo distance approximates 1 mile of ground distance.

A three-dimensional projection instrument known as a multiscope (fig. 6), which is a stereoscopic plotter, was next employed to transfer outlines of disturbed areas from the aerial photo-

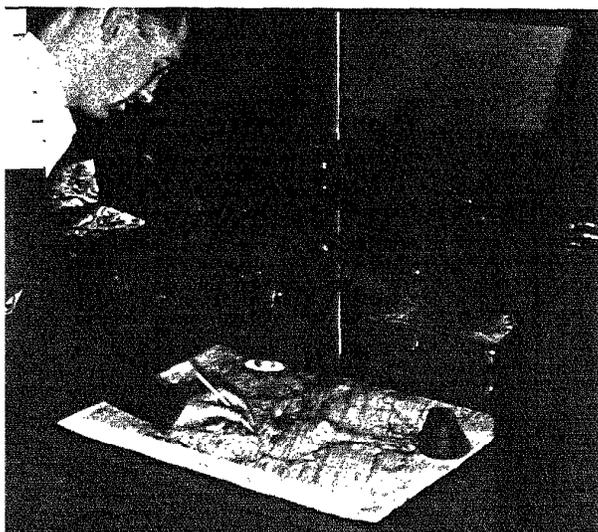


Figure 6.—Transferring features from a stereoscopic pair of aerial photographs to a U. S. Geological Survey map by use of a multiscope.

graphs to U. S. Geological Survey quadrangle maps having a scale of 1:24,000. The transferred delineations on the quadrangles were then rechecked against the photographs by comparing the relative positions of disturbed areas and man-made features such as buildings and highway intersections. Upon completion of this step the photographs and quadrangles were ready for use in the field.

### FIELD PROCEDURES

Areas that were manifestly visible from highways and major communities were checked against the delineations on the aerial photographs to verify the interpretations and to correct, as neces-

sary, for changes in boundaries of disturbed areas and in density of tree cover that had occurred since the photographs were made. The checking and charting were done, for the most part, from an automobile at advantageous locations in the communities and along the highways.

### *Determining Limits of Visibility*

To determine visibility limits, observations were made from more than one point. Along highways, the terrain on both sides was inspected from both directions of travel. Partial barriers to view, such as roadbed cuts, parallel rows of buildings, trees and other vegetation (fig. 7), if they effectively obscured the area behind, were delineated as the visibility limit. On the other hand, panoramas more than 1 mile away were considered as being not visible, since the condition of surface areas at that distance is not readily discernible.

However, within the boundaries of hub communities, all land within 1 mile from a road or built-up section was considered as visible area, even if some of it was in fact obscured. This was done because these areas seemed especially deserving of attention in any program concerned with community beautification. It resulted in a majority of the potential forest cover planting sites being located within borough and city limits.

Visibility limits within 1 mile of roads and hub communities were noted and mapped. Except within the boundaries of hub communities, the areas considered of highest priority for treatment and given primary attention in this report are areas referred to as *frontage*. Most of the frontage is highway frontage; it is the land within 2,000 feet on either side of a road. A small part of the total frontage consists of 2,000-foot-wide marginal bands along built-up sections of hub communities at places where there is no important road. For tabulation purposes, frontage was measured and recorded in miles. One mile of highway comprised 2 miles of frontage.

All the screen and cover planting sites that were selected and marked on the maps for early treatment lie either in the visible portions of the frontage areas or within the boundaries of hub



Figure 7.—A natural strip of hardwoods, 25 to 50 feet wide, effectively screens a large culm pile from a highway during the summer (above), but is inadequate during the winter (below).



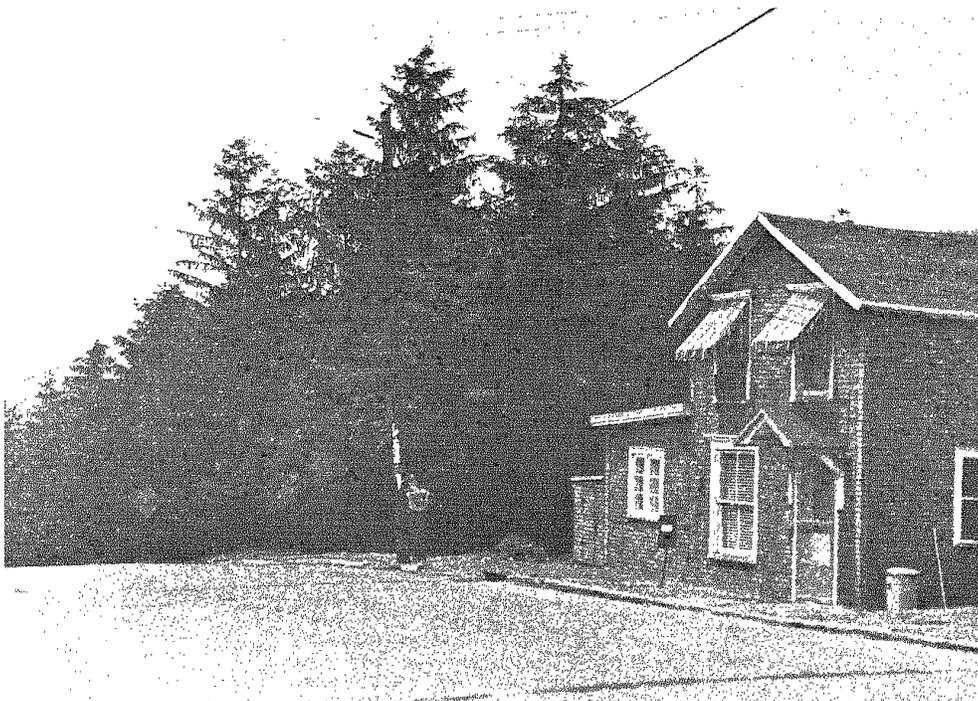
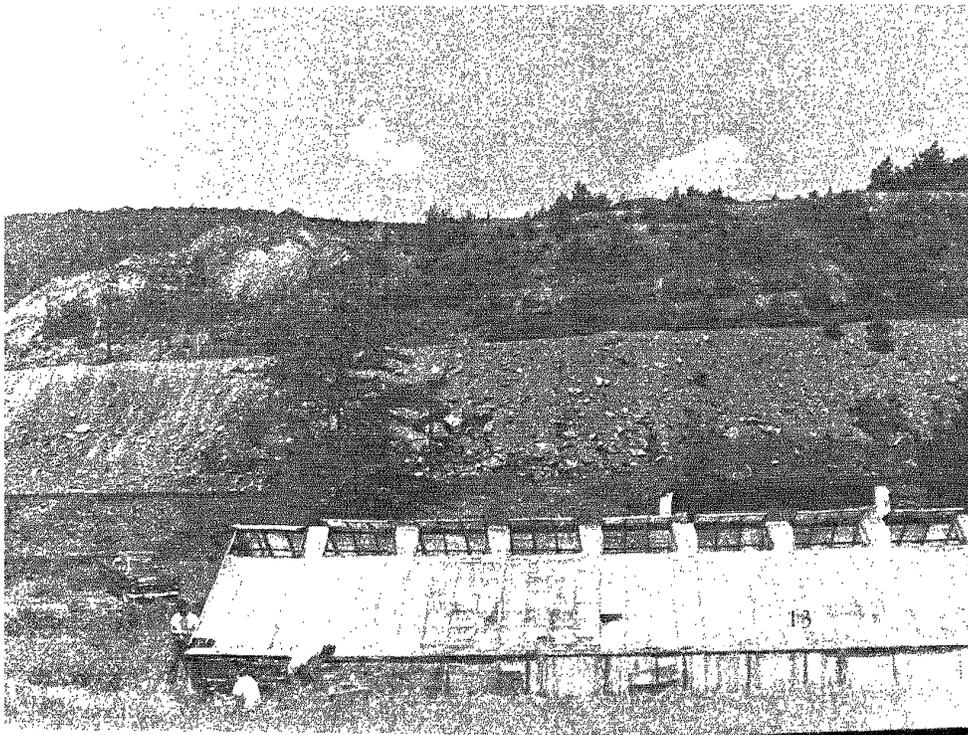


Figure 8.—Evergreen conifers provide effective screening at all seasons. From the roadside (above) you see this green screen of spruces. But just step through the screen of trees and you see the mine spoils (below).



communities. In the latter, cover plantings are recommended to a distance of 2,000 feet from built-up sections.

No attempt was made to indicate situations or conditions that might require some other treatment besides tree planting.

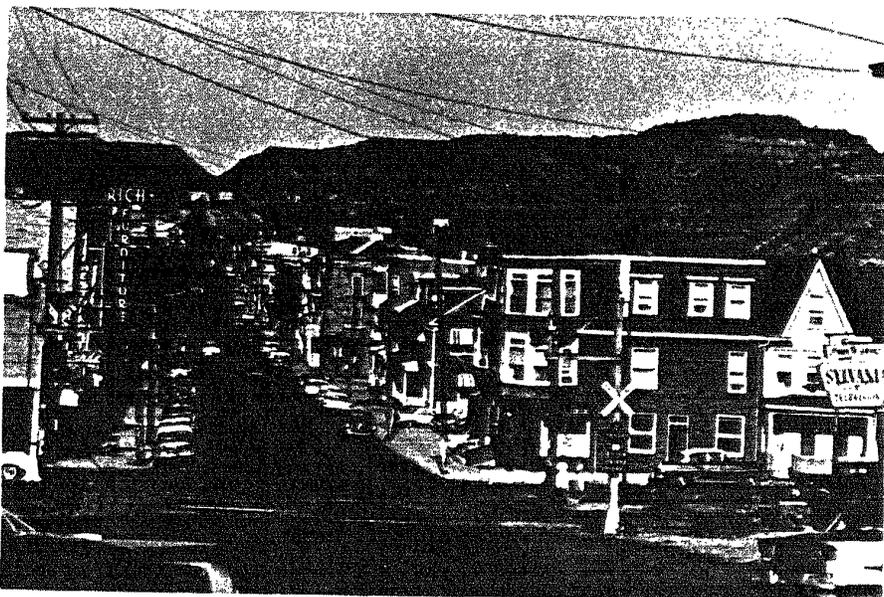
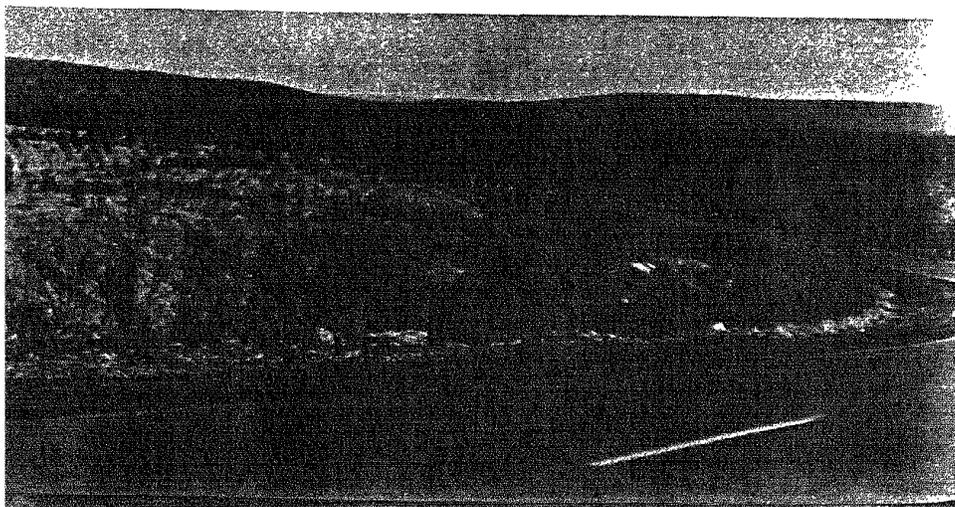


Figure 9.— Potential cover-planting sites. Above: the mountains of mine waste looming above this town could not be effectively shut off from view by a screen of trees; so a broad cover planting is recommended. Below: an earlier planting is already beginning to have effect on this cover-planting site along a highway.



### *Selecting and Classifying Potential Forest Screen Planting Sites*

An area was designated as a potential site for a roadside screen planting if a strip of trees on the site would effectively screen a disturbed area from view (fig. 8). Current use of the site was not a selection factor except, if the land was being utilized for another purpose, screen width often was limited to 25 feet. Nor was capacity of the site to support tree growth a selection factor. However, the effects of different spoil types and conditions on tree growth were investigated in 1962 in another study, and the results are available for guidance in future planting programs.<sup>3</sup>

Sites were classified according to: (1) kind of spoil — whether strip-mine spoil or deep-mine waste; and (2) amount of tree cover — 0-10 percent or 11-50 percent. Spoils of either kind that were supporting more than 50 percent tree cover were considered to be adequately vegetated, and were not listed as planting sites.

Recommendations for site-preparation work were based more on aesthetic values than on considerations of tree survival. Two intensities of site preparation were recognized: (1) minor — involving only grading; and (2) major — involving both grading and backfilling. In some places major site preparation was recommended to create a site at least 25 feet wide.

To assure exact relocation later, the sites were witnessed; that is, their position was recorded in relation to specific nearby utility-line poles or other permanent objects.

Widths of planting sites were estimated by eye; lengths were scaled from aerial photographs, estimated by pacing, or calculated from odometer readings.

### *Selecting and Classifying Potential Forest Cover Planting Sites*

Potential cover-planting sites (fig. 9) were designated wherever a screen of trees would not be fully effective. These sites were classified by kind of spoil and amount of tree cover in the

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<sup>3</sup>Czapowskyj, Miroslaw M., and William E. McQuilkin. SURVIVAL AND EARLY GROWTH OF PLANTED FOREST TREES ON STRIP-MINE SPOILS IN THE ANTHRACITE REGION. U. S. Forest Serv. Northeast. Forest Expt. Sta., office report. 29 pp. 1963.

same manner as the forest screen planting sites. Again, current use of the site and its ability to support tree growth were not selection factors. No site - preparation recommendations were made for these areas, and they were not tied into witness markers. General location was recorded, however, such as position in relation to a borough or to a prominent landmark.

### *Selecting and Classifying Potential Water-Recreation Sites*

Potential water-recreation sites on disturbed areas were usually selected within view of highways (fig. 10). The primary criterion for selection was water, either a surface stream or a situation where surface or subsurface drainage could be impounded. Bodies of water or potential bodies of water, such as stripping pits, had to be at least 1 acre in size to qualify for consideration.

Classification of these sites was by: (1) size classes — 1 to 5 acres, 6 to 10 acres, 11 to 20 acres, and more than 20 acres; and (2) site condition — pits containing water, dry pits, and stream channels. The water-recreation sites are listed in the supporting tables and are indicated on the unit-area maps.

### **PREPARING MAPS AND DETERMINING AREA STATISTICS**

Upon completion of the field work, the features required on the unit-area maps were traced from the U.S.G.S. quadrangle maps. These tracings, at a scale of 1 inch equals 2,000 feet, were ultimately utilized for reproducing copies. County maps were made by first tracing the sections that did not appear on the unit-area maps, then inserting the unit-area maps in their proper places. Finally, each county assembly was reduced photographically to provide county maps at a scale of 1 inch equals 1 mile. From these county maps a regional map was constructed by tracing desired detail onto a new master sheet. This was then reduced photographically to a scale of 1 inch equals 4 miles.

Area measurements were taken directly from the completed unit-area master tracings. These area statistics were determined by use of dot grids having 36 dots per square inch. Two dot

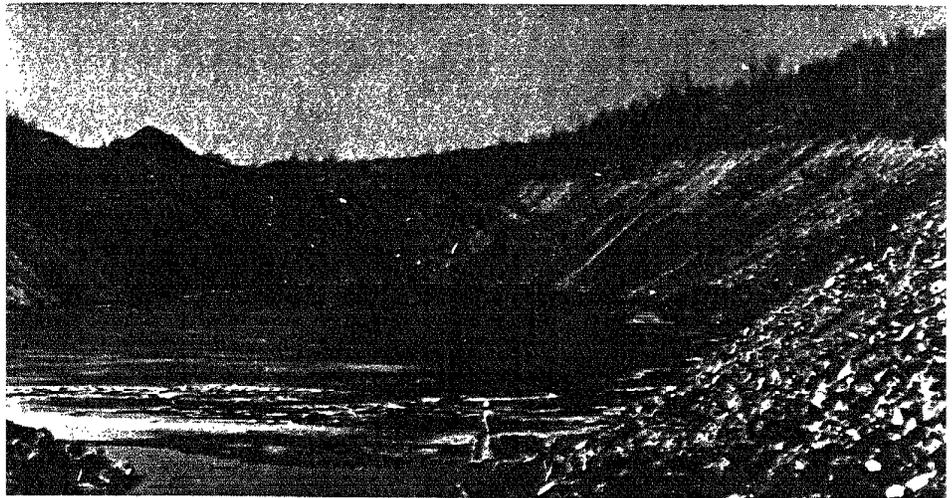
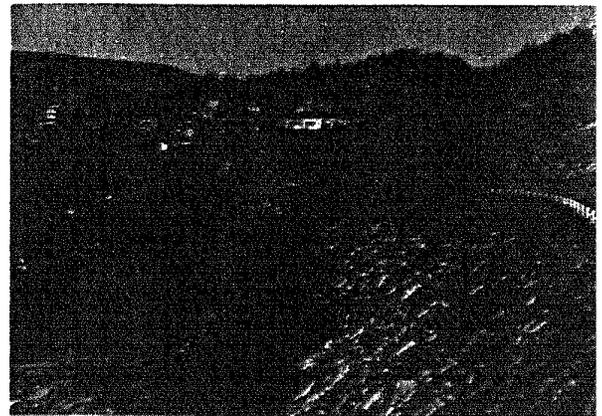


Figure 10. — Potential water recreation sites: water-filled stripping pits.



counts were averaged for calculating each area figure appearing in this report. Linear measurements of frontage were made with a map measurer. Two measurements were taken and averaged for the reported figures.

Because of differences in definitions of disturbed area or in procedures used to obtain the data, our area determinations are not strictly comparable with determinations from earlier surveys. These differences should be recognized in any attempts to compare area determinations for the purpose of estimating increases in disturbed land.

## **RESULTS AND DISCUSSION**

The survey results are presented in a form intended to serve the needs of agencies and individuals who might use the data. Municipal governments and civic organizations should find the unit-area data useful. So might some county groups. However, other county groups may be more interested in data organized on a county basis. Information pertaining to the entire Anthracite Region may be helpful to state or federal agencies.

As indicated earlier, the voluminous data collected on potential planting sites and potential water-recreation sites, the summary tabulations of these data, and the unit-area and county maps, are not included in this report. All this material is available to civic and public officials or agencies, and to interested researchers, from the Pennsylvania Power and Light Company and the Northeastern Forest Experiment Station. In the pages to follow, the survey results and planting recommendations are presented and discussed in a rather general way for the Anthracite Region as a whole.

### **LAND AND COVER CLASSIFICATION**

The classification data dealing with the amount and kind of disturbance, visibility of disturbed areas from highways and hub communities, and density of tree cover on the disturbed areas, are discussed first in reference to all disturbed land, and second in reference to those portions of the disturbed land that lie along highways and community borders — that is, the portions designated as frontage.

#### *All-Area Classification*

About 25 percent of the land surface in the Anthracite Region has been disturbed by coal-mining activities; this amounts to about 112,000 acres. By coal fields, the amount of disturbance varies from slightly less than 20 percent in the Northern Field to 35 percent in the Western-Middle Field. In general, visible and non-visible areas contain about the same proportions of disturbed land (fig. 11).

Figure 11.—The amount of area disturbed in the portions of each coal field that are visible from highways and developed sections of hub communities, and in the portions that are not visible — 1962.

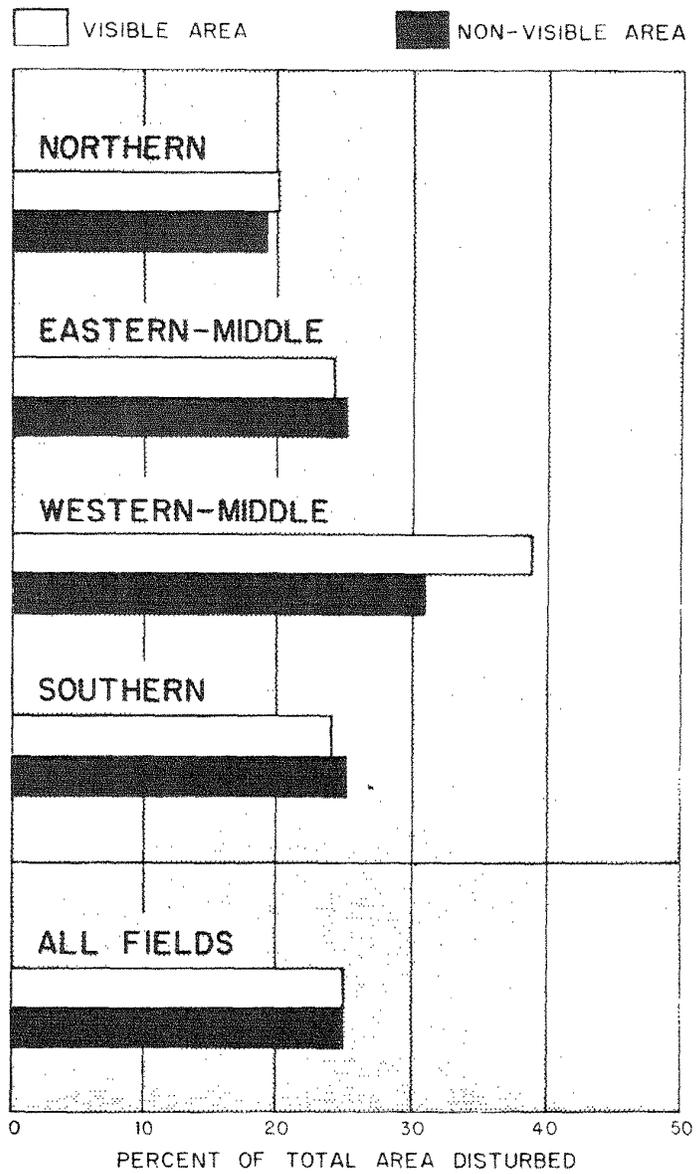
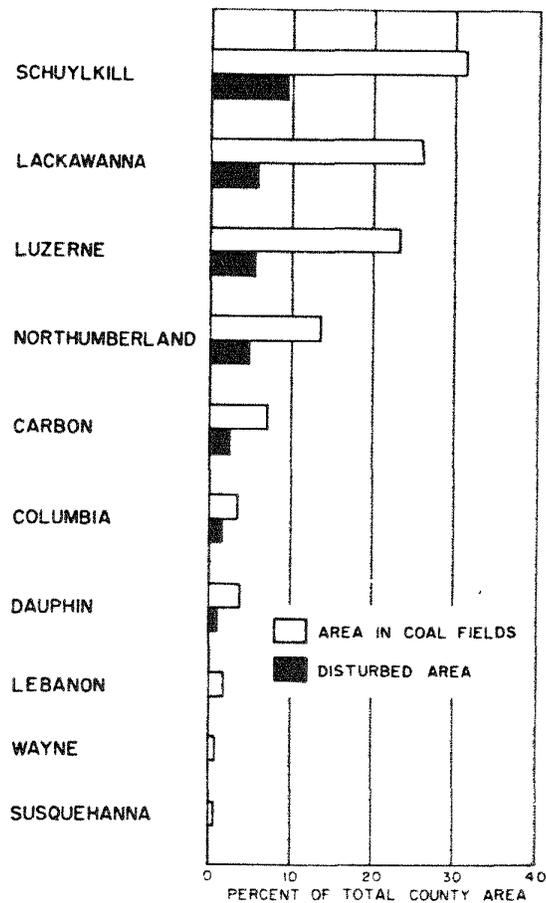


Figure 12.—The portions of the anthracite counties that lie within coal fields, and in the portions disturbed by mining—1962. In Lebanon, Wayne, and Susquehanna Counties only 0.10 percent or less of the total county area has been disturbed.



Of the 10 counties in which coal has been mined, Schuylkill, Luzerne, Lackawanna, and Northumberland Counties have always produced the greatest tonnages; they have produced 92 percent of the anthracite mined since World War II. As might be expected, these four counties now have the highest proportions of disturbed land: in rounded figures, 9 percent in Schuylkill, 5 per-

cent in Luzerne and Lackawanna, and 4 percent in Northumberland (fig. 12). These figures, being based on total county area, are not in themselves very impressive. But they represent from 20 to 32 percent of the sections of those counties that lie within the Anthracite Region. And, in terms of people and the amenities of their surroundings, those percentages are important, for three-fourths of the people in the four counties live in the anthracite sections.

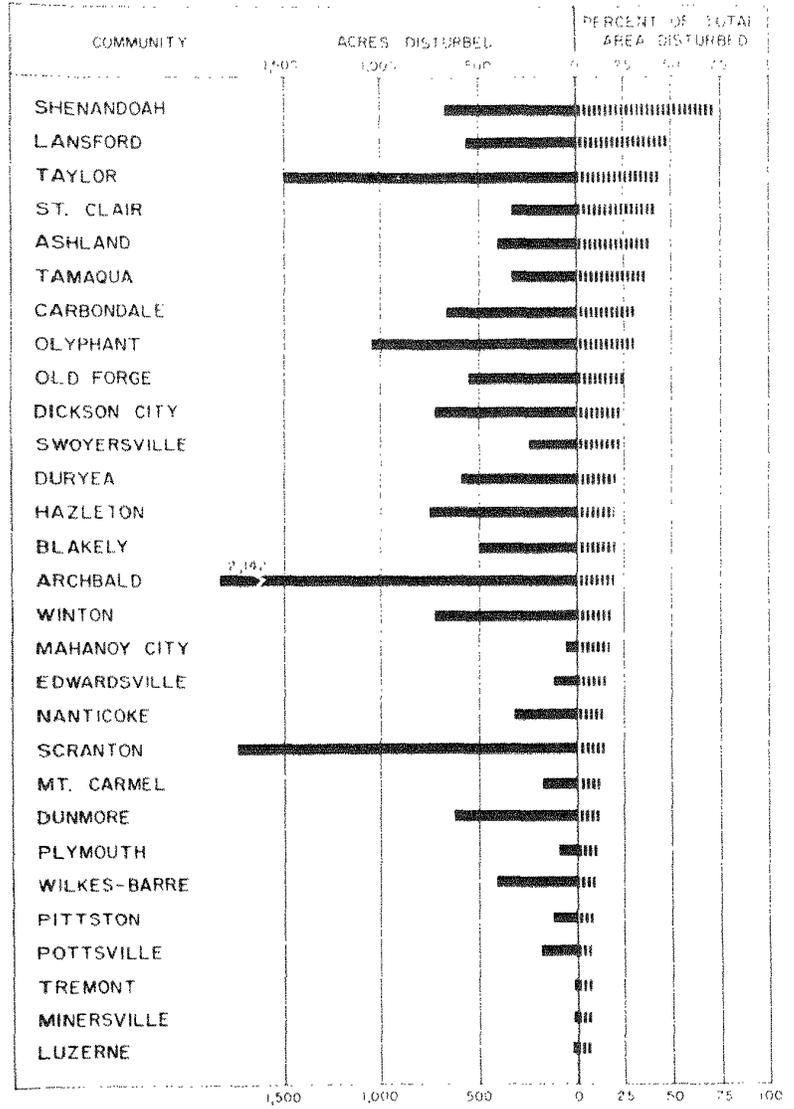
Indicative of the ubiquity of mining disturbances and their impact on the amenities of life in the Region are the figures on disturbances within municipal boundaries. One-third of the communities in the Region have 500 or more acres of strippings or deep-mine waste within their boundaries. Some 60 percent of the communities have had at least 10 percent of their surface area altered by mining, and 20 percent of them have had 30 to 70 percent of their surface area so altered. Some of these data are shown graphically in figure 13.

Table 6 (appendix II) gives a breakdown of all land area in the Region, by unit areas and counties, according to whether visible or not, disturbed or not, and if disturbed, kind of disturbance, and density of present tree cover. Since some unit areas include segments of two counties, and the table is set up on a county basis, some unit areas appear in two county listings. Hence there are 52 unit-area listings for the 41 unit areas that were recognized and mapped.

From the regional totals (table 6), several broad relationships that characterize surface conditions in the Anthracite Region may be pointed out:

1. One acre in 4 has been disturbed in some way by coal-mining activities.
2. Of the disturbed area, 1 acre in 4 is covered by deep-mine waste, and 3 acres are in strippings.
3. Of the disturbed area, 1 acre in 5 has adequate tree cover (51 to 100 percent), and 4 acres have inadequate cover.
4. Of the disturbed area, considerably less than half is visible from roads and hub communities; the ratio of visible to non-visible area is about 3 to 4.

Figure 13.—Disturbed land area within major communities. A few communities—Forty-Fort, Frackville, Lykens, McAdoo, and Tower City—have no disturbed area. Shamokin, West Hazleton, West Pittston, Kingston, and Freeland have less than 5 percent of their area disturbed.



### *Highway and Community Frontage Classification*

That part of the landscape that abuts upon and is visible from highways and communities obviously exerts much more influence than more remote areas upon people's visual impressions of the Anthracite Region and upon their attitudes toward it as a place in which to live, work, and play. Therefore these highway and community frontage areas were classified separately.

Some 1,570 miles of frontage were classified. About 1,500 miles of this was along highways; it called for cruising about 750 miles of road and inspecting the land on both sides from the varying angles of view seen by traveling the roads in both directions. The remaining 70 miles of frontage were along segments of community boundaries that did not coincide with an important road.

Thirty percent of the total frontage—nearly 500 miles—showed mining disturbances of some sort. By counties, this varied from 14 percent in Dauphin and Lebanon Counties to 37 percent in Columbia County. Although the proportions of stripped land and deep-mine waste varied widely among counties, for the Region as a whole the two kinds of spoil accounted for equal proportions of the inadequately vegetated disturbed frontage, or 12 percent each of the total frontage (fig. 15). Inadequately vegetated deep-mine waste ranks higher in terms of frontage than in terms of visible area; it makes up only 40 percent of all inadequately vegetated, disturbed visible area in the Region. This difference occurs because much of the deep-mine waste is in huge conspicuous piles and near centers of population, so that it falls into the frontage category.

Disturbed areas on which enough trees have come in (51 to 100 percent cover) to be considered adequate revegetation made up a substantial part of the total disturbed frontage, and are a significant factor in visual impressions of it. For the Region as a whole, 6 percent of the total frontage, or 20 percent of the disturbed frontage, supports adequate tree cover (fig. 15).

Table 7 (appendix II) presents a more detailed breakdown of the data summarized in figure 15; the table gives figures for

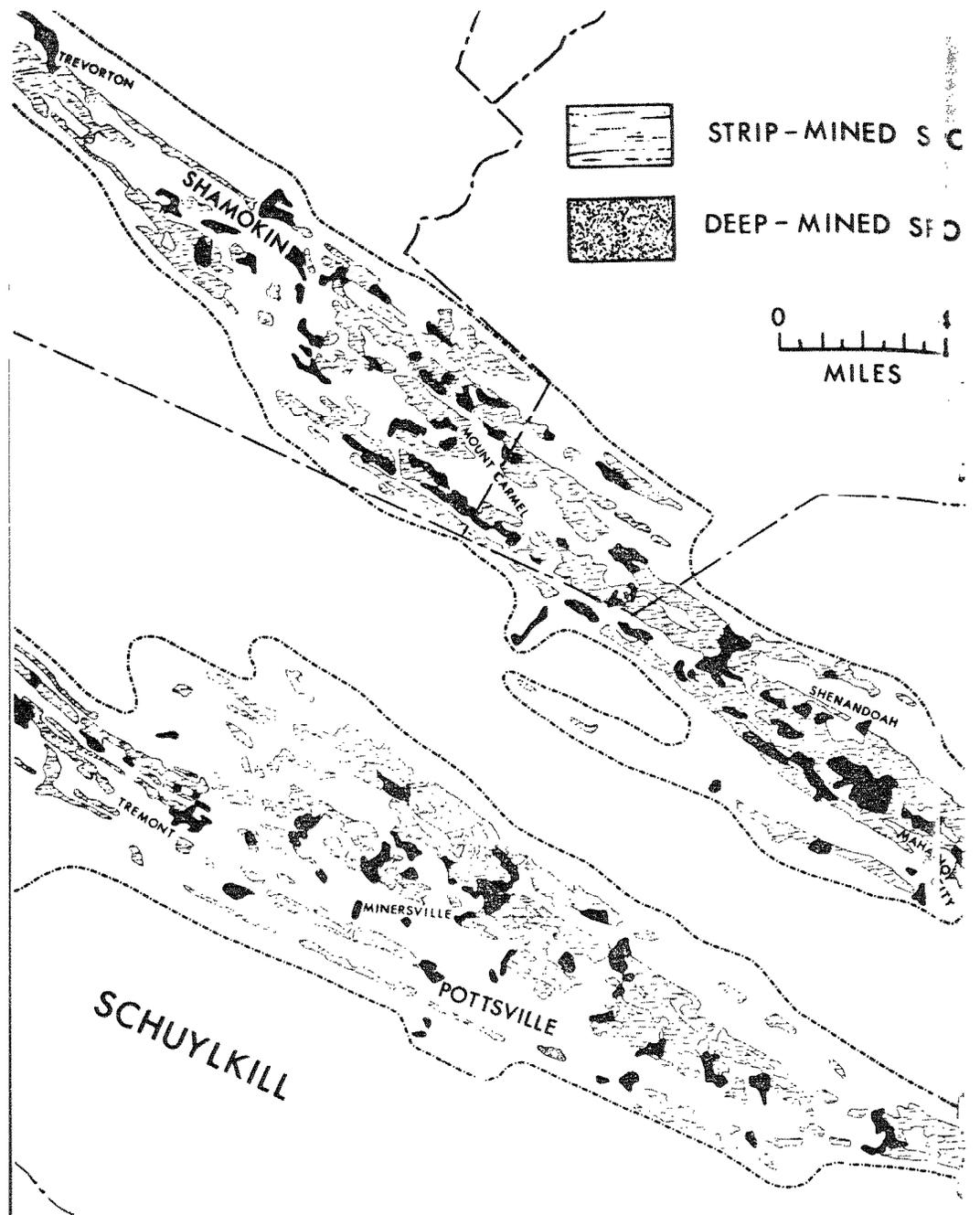
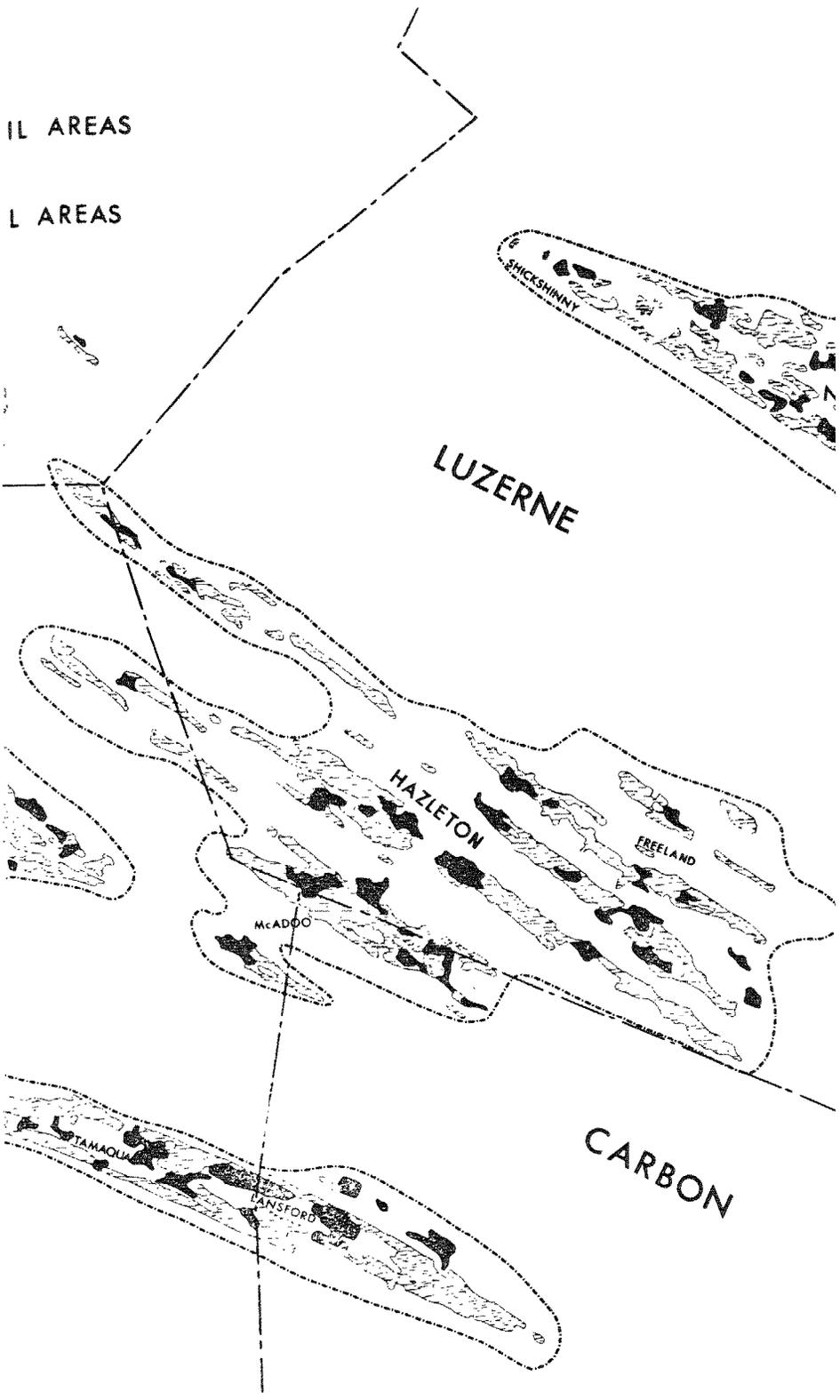


Figure 14. — A section from the regional map prepared to show the areas disturbed by coal mining in the Anthracite Region of Pennsylvania.

IL AREAS

L AREAS



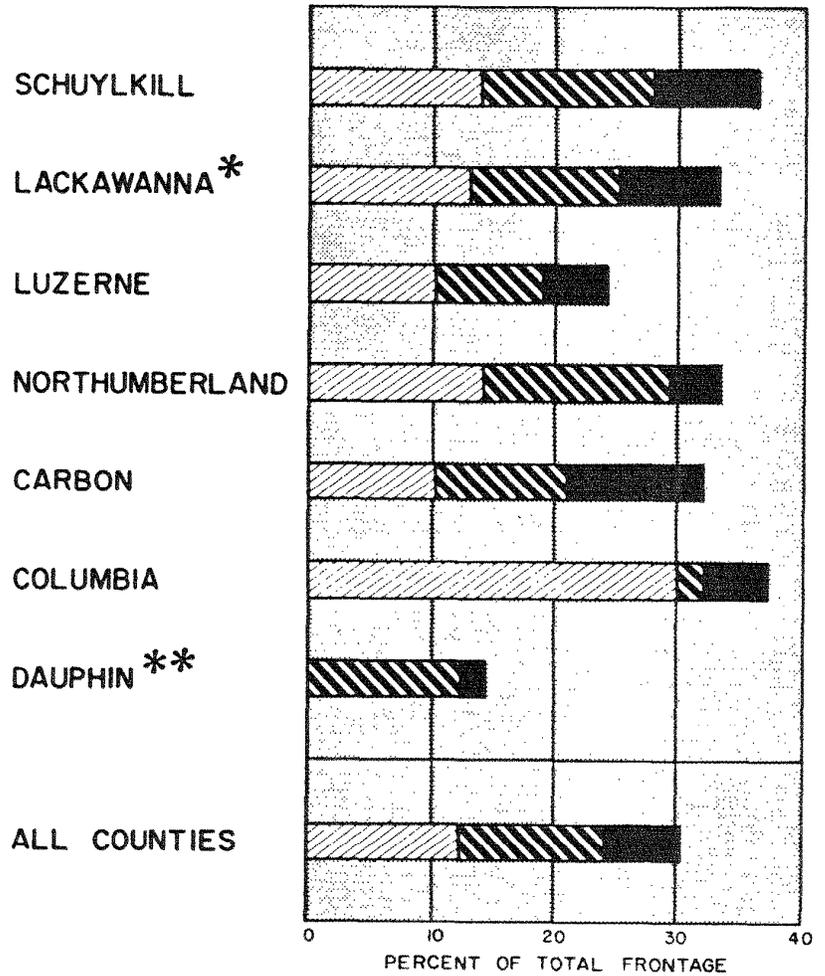
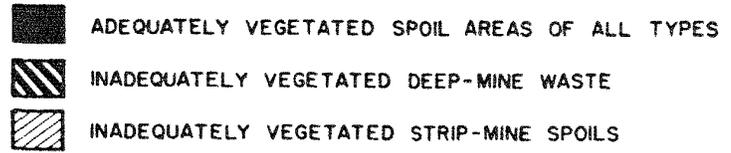


Figure 15. — Amount of highway frontage disturbed, and proportions of disturbed frontage adequately and inadequately vegetated, by counties — 1962. \*Includes Susquehanna and Wayne Counties. \*\*Includes Lebanon County.

unit areas as well as counties, and in miles of frontage as well as percentages.

## MAPS

As noted under *Methods*, three series of maps were prepared: unit-area maps, county maps, and a regional map. This regional map appears in this report as figure 14, and a sample unit-area map appears as figure 5.

The 41 unit-area maps are the basic reference for the screen and cover plantings recommended in this report. Besides such conventional features as major roads and municipal boundaries, these maps show the disturbed areas by kind of disturbance (strip-mined or deep-mine waste), and density class of the tree cover (0-10, 11-50, or 51-100 percent) on the disturbed land. Thus they picture much of the information that is tabulated in tables 6 and 7 (appendix II). In fact, the areas and distances in those tables were scaled from the unit-area maps.

The unit-area maps also show the limits of visibility from highways and communities. And, most important for planning community action programs, they show the locations where trees could eventually shield or obscure the more conspicuous spoils — that is, potential forest screen and forest cover planting sites. Also marked are the locations of potential water-recreation sites.

The 10 county maps, which are composites of the unit-area maps at a reduced scale, show the relationships of all the unit-areas in a county to each other with respect to location, boundaries, and comparative size. And they picture on one map the areas to which the county data (appendix II) apply. No sample of a county map is included in this report.

## PLANTING-STOCK REQUIREMENTS

Once a community program has been adopted and planting sites have been selected, careful planning is required to assure that the requisite quantities and species of planting stock may be on hand at the proper time. Orders for stock should be placed with the state nurseries several months before the planting season. Delay may mean that the desired seedlings are no longer avail-

able. In the event of a really large-scale program, requiring hundreds of thousands of trees, it might be necessary to make arrangements with the nurseries at least 2 years in advance.

### *Requirements for Screen and Cover Sites*

The initial planting effort should be concentrated on hiding or obscuring the most conspicuous and most unsightly areas. The potential planting sites indicated on the unit-area maps were selected for this purpose. Planting-stock requirements for these recommended screen and cover plantings are given in tables 8 and 9, respectively, by unit areas and by counties. Totals for counties also are shown, together with the requirements for other site categories, in figure 16. All estimates of planting-stock requirements are based on 6- by 6-foot spacing of the trees.

Planting-stock requirements are given for two optional screen widths — recommended and minimum (table 8). The latter is included because, in some instances, limited financial means or present use of a site may preclude planting more than the 25-foot minimum width. Although greater widths, up to as much as 100 feet, usually would be preferable, 25-foot screens nevertheless will be fairly effective in most places.

Less than a million trees (856,000) would be required to plant screens of the recommended widths on all the areas designated for forest screening. At the minimum width of 25 feet, only about 285,000 trees would be required. Considering the aesthetic benefits to be derived from the successful establishment of these screens, even the larger number of seedlings is not overwhelming or impractical.

Considerably larger quantities of stock — 19 million — would be needed for the recommended cover plantings. However, if the entire recommended areas could not be planted, substantial benefits could be achieved in many places with fewer trees by establishing screens on or near the disturbed areas.

### *Requirements for Other Visible Areas*

After the most critical areas have been treated, the next step would be to plant the remaining visible disturbed areas. Included in this category are the areas behind screen plantings (which will

be visible until the screens are well developed), and areas that for one reason or another are not so offensive as those designated for attention in the initial effort. Chiefly, these are areas between the 2,000-foot limit of frontage areas and the 1-mile visibility limit. A program to plant these other visible areas would require about 25 million additional trees. These requirements, by counties, are shown in figure 16.

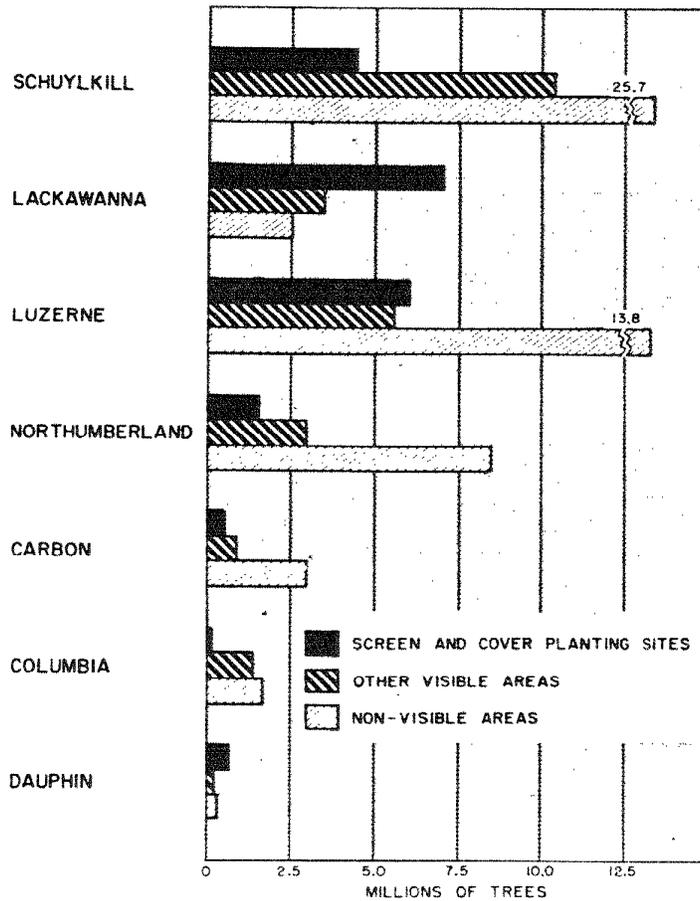


Figure 16. — Trees required to plant disturbed areas having less than 50 percent tree cover in 1962, by counties. Requirements for Lebanon, Wayne, and Susquehanna Counties are 200,000 trees each, or less.

### *Non-Visible Areas*

The extensive areas of disturbance that cannot be seen from highways and centers of human activity do not materially detract from the natural beauty of the coal-mining sections. However, many of these areas — strip-mined lands in particular — are subject to erosion and contribute to stream pollution and siltation. Hence they must be considered in any plan for a complete reforestation program in the Anthracite Region. To plant these areas would require about 55 million trees. These requirements, too, are shown by counties in figure 16.

### SPECIES RECOMMENDATIONS

The proper choice of species, and their positions in a roadside screen, are important for rapid initial effects and for long-time shielding. Slow-growing evergreens like the spruces, which hold their branches for many years, should be planted in the front portion of a screen. The central portion should consist of faster growing evergreens, such as pines. The portion farthest from the road should be planted to still faster growing species, which can be deciduous. Black locust and Japanese and European larches are suitable for this position. Hybrid poplars and some of the European species of alder also have promise as fast-growing trees, but have not been sufficiently tested on anthracite spoils to justify recommending them. The composition of a screen 50 feet in width might be, for example: 3 rows of spruce in front, 3 rows of pine in the middle, and 3 rows of black locust in the rear.

Although species selection is of less importance in cover plantings, coniferous species that retain their foliage throughout the year generally are preferable. However, deciduous trees are fairly effective when well established, and the commonly planted ones — black locust and the larches — possess the added virtue of growing faster than the evergreens. If some of the hybrid poplars and alders prove to be well adapted to anthracite spoils, they could also be listed among the fast-growing deciduous species for cover planting.

## SUMMARY

A survey of the Anthracite Region of Pennsylvania was made in 1962 to locate and map potential planting sites where trees could be used most effectively to screen from view or to cover unsightly mine-spoil areas. The report and its supplements are intended to serve as a guide for planning community tree-planting programs for aesthetic improvement of the Anthracite Region.

Total area covered by the survey was 706 square miles. This included essentially all lands disturbed by coal mining, plus the surrounding terrain to effective visibility barriers such as ridge tops or forest. Total area classified as disturbed by mining activities was 112,000 acres.

The major emphasis in visibility classification was on highway frontage — the land within 2,000 feet on either side of a road — plus some frontage abutting on community borders. Some 1,570 miles of frontage were inspected, of which 30 percent, or almost 500 miles, exhibited some sort of mining disturbance.

The mapping was done by unit areas, which varied in size from 1,400 to 27,000 acres. Forty-one such unit areas were recognized and mapped. Each includes a city, borough, or other population center, which is designated as its hub, and is expected to provide leadership in community planting programs.

Shown on the unit-area maps are major highways, political boundaries, visibility limits, and the land-classification categories pertaining to disturbance, kind of spoil, and density of present tree cover. Superimposed on these features are recommended locations for forest screen plantings, forest cover plantings, and potential water-recreation areas.

County maps were prepared by combining unit-area maps and reducing the scale. A generalized regional map also was prepared.

Three categories of disturbed land were recognized with respect to priority for planting: (1) the most conspicuous, most unsightly, visible areas; (2) other, less critical, visible areas; and (3) non-visible areas.

In the first category, which comprises the sites designated on the unit-area maps for planting, 481 sites are recommended for

screen plantings and 358 for cover plantings. To plant all these sites to recommended standards would require about 20 million trees. Of these, some 19 million trees would go into the cover plantings, whereas less than a million trees would be needed for the screen plantings.

A complete reforestation program for all three categories would require 100 million seedlings.

The unit-area maps (except one sample), the county maps, and a mass of related tabular data are not included in this report. This material is available in limited quantities from the Pennsylvania Power and Light Company and the Northeastern Forest Experiment Station.



# APPENDIX

## I

### DATA FOR PITTSTON UNIT AREA

Table 1. — Land area classification  
*PITTSTON UNIT AREA*

Classification	Unit area		Visible area		City	
	<i>Acres</i>	<i>Percent</i>	<i>Acres</i>	<i>Percent</i>	<i>Acres</i>	<i>Percent</i>
Total	9,873	100	4,473	100	1,184	100
Not disturbed	7,510	76	3,467	78	1,082	91
Disturbed:	2,363	24	1,006	22	102	9
Strip-mined:	1,793	18	558	12	23	2
0-10% tree cover	862	9	308	7	20	2
11-50% tree cover	217	2	77	1	3	( <sup>1</sup> )
51-100% tree cover	714	7	173	4	0	0
Deep-mine waste:	570	6	448	10	79	7
0-10% tree cover	520	5	423	9	79	7
11-50% tree cover	25	( <sup>1</sup> )	15	( <sup>1</sup> )	0	0
51-100% tree cover	25	( <sup>1</sup> )	10	( <sup>1</sup> )	0	0

<sup>1</sup>Less than 1 percent.

Table 2. — Highway visibility classification  
*PITTSTON UNIT AREA*

Classification	Miles	Percent
Total frontage <sup>1</sup>	54.8	100
Not disturbed	38.9	71
Disturbed:	15.9	29
Strip-mined	6.3	11
Deep-mine waste	5.9	11
Revegetated spoils <sup>2</sup>	3.7	7

<sup>1</sup>Frontage, measured in miles, is a strip of land 2,000 feet wide, parallel to and on both sides of highways and near developed areas of unit-area communities.

<sup>2</sup>Disturbed areas supporting more than 50 percent tree cover.

Table 3. — Potential water-recreation sites  
*PITTSTON UNIT AREA*

Site No.	Size class, in acres	Site condition	General location
1	1-5	Channel	Gardner Creek bridge in Laffin.

Table 4. --- Potential forest screen planting sites  
PITTSFON UNIT AREA

Site No.	Width and Length	Size	Existing tree cover	Trees required	Spoil type <sup>1</sup>	Site preparation required <sup>2</sup>	Location
	<i>Feet</i>	<i>Acres</i>	<i>Percent</i>	<i>No.</i>			
1	100 x 500	1.15	0-10	1,380	ND	Minor	Highway overpass N on E side of River Street.
2	100 x 1300	2.98	0-10	3,576	ND	None to minor	Highway overpass S on E side of River Street.
3	100 x 700	1.61	0-10	1,932	P&ND	None	Yatesville Road S on E side of Pittston bypass.
4	100 x 1300	2.98	0-10	3,576	P&ND	None to minor	Pole A 234 N on W side of Main Street.
5	100 x 900	2.07	0-10	2,484	ND	None	Pole A 228 N on E side of Main Street.
6	100 x 800	1.84	11-50	1,656	ND	None	Pole 299 N on W side of Main Street.
7	100 x 500	1.15	0-10	1,380	S	None	Pole X 94 E of S side of Yatesville Road.
8	75 x 300	.52	0-10	624	ND	None	Transco R/W E & W on N side of Main Street.
9	100 x 400	.92	0-10	1,104	ND	None	Pole LAF 9/X11 W on N side of Main Street.
10	25 x 400	.23	11-50	207	S	None	Pole LAF 9/X11 W on S side of Main Street.
11	100 x 400	.92	0-10	1,104	ND	None	18 Main Street S.
12	100 x 200	.46	11-50	414	ND	None	27 Main Street S.
13	100 x 900	2.07	0-10	2,484	P&ND	None	Pa. Turnpike overpass N on W side of Pa. 315.
14	100 x 200	.46	0-10	552	P	None	Pole 1010 W on S side of Westminster-Bear Creek Road.
Total	---	19.36	---	22,473	---	---	---

Table 5. — Potential forest cover planting sites  
PITTSBURGH UNIT AREA

Spoil type <sup>1</sup>	Existing tree cover	Approx. area	Trees required	General location
	<i>Percent</i>	<i>Acres</i>	<i>No.</i>	
P	0-10	41	49,200	In Port Griffith.
S&P	0-10	74	88,800	W of Main Street in Upper Pittston.
P	0-10	18	21,600	E of Main Street in Upper Pittston.
P	0-10	31	37,200	NW section of Hughestown.
P	0-10	49	56,400	N-central section of Hughestown.
S	11-50			
	0-10	51	58,200	In Browntown and NW section of Yatesville.
S	11-50			
	0-10	18	21,600	In S-central section of Yatesville.
S&P	0-10	153	172,800	On both sides of U.S. 11 in and S of Hughestown.
	11-50			
S	0-10	13	15,600	Near Old Boston on E side of Pa. Turnpike.
S	0-10	82	98,400	At Wyoming Valley Interchange of Pa. Turnpike.
S	0-10	23	27,600	E of Pa. 315 near Dupont line.
S	11-50	8	7,200	E of Pa. 315 along Dupont line.
Total	—	561	654,600	—

<sup>1</sup>S = strip-mined. P = deep-mine waste.

Table 6. — Land area classification: total area and visible area in different tree-cover density classes, by disturbance categories, counties, and unit-areas  
(In acres)

Unit area	Strip-mined land, percent tree cover			Deep-mine waste, percent tree cover			Not disturbed	Total
	0-10	11-50	51-100	0-10	11-50	51-100		
CARBON COUNTY								
Freeland:								
Total area <sup>1</sup>	0	0	25	0	0	0	298	323
Visible area	0	0	0	0	0	0	0	0
Hazleton:								
Total area	806	252	637	409	39	15	3,364	5,522
Visible area	284	79	150	107	3	0	992	1,615
Lansford:								
Total area	969	755	906	547	230	281	8,387	12,075
Visible area	41	148	280	427	200	209	4,325	5,630
County total:								
Total area	1,775	1,007	1,568	956	269	296	12,049	17,920
Visible area	325	227	430	534	203	209	5,317	7,245
COLUMBIA COUNTY								
Ashland:								
Total area	1,625	427	348	611	0	20	6,252	9,283
Visible area	667	244	205	399	0	8	1,712	3,235
West Hazleton:								
Total area	15	0	41	0	0	0	306	362
Visible area	0	0	0	0	0	0	0	0
Scotch Valley: <sup>2</sup>								
Total area	38	71	0	20	0	0	0	129
Visible area	0	0	0	0	0	0	0	0

UNIT AREA AND COUNTY DATA

APPENDIX  
II

County total:									
Total area	1,678	498	389	631	0	20	6,558	9,774	
Visible area	667	244	205	399	0	8	1,712	3,235	

DAUPHIN COUNTY

Lykens:									
Total area	242	59	102	380	293	61	10,278	11,415	
Visible area	0	0	0	380	293	61	5,949	6,683	
Rush Township:									
Total area	0	0	31	0	0	0	377	408	
Visible area	0	0	0	0	0	0	28	28	
County total:									
Total area	242	59	133	380	293	61	10,655	11,823	
Visible area	0	0	0	380	293	61	5,977	6,711	

LACKAWANNA COUNTY

Archbald:									
Total area	766	891	707	296	43	54	10,020	12,777	
Visible area	628	669	635	296	43	54	8,129	10,454	
Blakely:									
Total area	240	82	38	87	31	23	2,054	2,555	
Visible area	240	82	38	87	31	23	1,998	2,499	
Carbondale:									
Total area	1,688	390	810	449	64	33	10,245	13,679	
Visible area	731	84	394	360	54	33	4,026	5,682	
Dickson City:									
Total area	378	59	112	173	20	0	2,559	3,301	
Visible area	378	59	112	173	20	0	2,363	3,105	
Dunmore:									
Total area	89	51	217	385	109	33	6,832	7,716	
Visible area	33	20	166	352	89	33	5,266	5,959	
Old Forge:									
Total area	329	43	102	173	66	43	2,844	3,600	
Visible area	329	43	102	173	66	43	2,546	3,302	

CONTINUED

Table 6. — Continued

Unit area	Strip-mined land, percent tree cover			Deep-mine waste, percent tree cover			Not disturbed	Total
	0-10	11-50	51-100	0-10	11-50	51-100		
LACKAWANNA COUNTY, continued								
Olyphant:								
Total area	598	99	291	296	38	74	3,948	5,344
Visible area	522	76	212	245	15	74	2,563	3,707
Scranton:								
Total area	376	499	521	676	160	28	15,145	17,405
Visible area	373	466	411	653	140	28	12,867	14,938
Taylor:								
Total area	603	123	354	381	23	74	2,459	4,017
Visible area	603	123	354	381	23	74	2,339	3,897
Winton:								
Total area	245	166	181	148	0	0	4,079	4,819
Visible area	230	161	171	148	0	0	2,709	3,419
County total:								
Total area	5,312	2,403	3,333	3,064	554	362	60,185	75,213
Visible area	4,067	1,783	2,595	2,868	481	362	44,806	56,962
LEBANON COUNTY								
Rush Township:								
Total area	146	31	44	0	0	0	3,722	3,943
Visible area	3	0	13	0	0	0	102	118
County total:								
Total area	146	31	44	0	0	0	3,722	3,943
Visible area	3	0	13	0	0	0	102	118

LUZERNE COUNTY

Duryea:								
Total area	198	36	135	497	21	8	5,249	6,144
Visible area	183	28	125	477	13	0	3,063	3,889
Edwardsville:								
Total area	255	8	109	117	26	20	2,455	2,990
Visible area	23	0	15	107	18	0	952	1,115
Forty-Fort:								
Total area	0	0	0	26	0	0	1,870	1,896
Visible area	0	0	0	0	0	0	1,490	1,490
Freeland:								
Total area	2,173	621	1,435	985	73	16	17,395	22,698
Visible area	418	67	110	132	13	0	2,163	2,903
Hazleton:								
Total area	1,503	566	1,144	1,565	29	0	12,141	16,948
Visible area	881	276	228	985	13	0	6,645	9,028
Kingston:								
Total area	0	0	0	0	0	33	1,407	1,440
Visible area	0	0	0	0	0	33	1,407	1,440
Luzerne:								
Total area	0	28	18	30	0	8	1,299	1,383
Visible area	0	5	10	30	0	8	735	788
McAdoo:								
Total area	1,074	11	166	245	0	0	4,209	5,705
Visible area	13	8	18	59	0	0	199	297
Nanticoke:								
Total area	2,058	598	1,025	1,364	78	206	16,140	21,469
Visible area	755	139	382	796	61	80	6,963	9,176
Pittston:								
Total area	862	217	714	520	25	25	7,510	9,873
Visible area	308	77	173	423	15	10	3,467	4,473
Plymouth:								
Total area	559	79	181	291	61	13	4,638	5,822
Visible area	332	69	79	217	51	8	3,574	4,330

CONTINUED

Table 6. — Continued

Unit area	Strip-mined land, percent tree cover			Deep-mine waste, percent tree cover			Not disturbed	Total
	0-10	11-50	51-100	0-10	11-50	51-100		
LUZERNE COUNTY, continued								
Swoyersville:								
Total area	156	296	69	148	0	0	2,803	3,472
Visible area	69	61	5	130	0	0	1,359	1,624
West Hazleton:								
Total area	549	260	508	99	15	0	8,263	9,693
Visible area	33	5	87	64	15	0	1,635	1,839
West Pittston:								
Total area	28	23	8	154	92	44	2,902	3,251
Visible area	23	0	0	77	54	18	1,859	2,031
Wilkes-Barre:								
Total area	1,859	1,167	459	697	46	25	15,260	19,513
Visible area	1,423	736	118	507	46	0	9,165	11,995
County total: -								
Total area	11,274	3,910	5,971	6,738	466	398	103,541	132,298
Visible area	4,461	1,471	1,350	4,004	299	157	44,676	56,418
NORTHUMBERLAND COUNTY								
Mount Carmel:								
Total area	2,244	1,655	788	1,589	46	0	8,757	15,079
Visible area	605	395	119	648	13	0	2,165	3,945
Shamokin:								
Total area	2,118	562	350	1,157	29	63	12,059	16,338
Visible area	270	206	52	727	23	23	3,858	5,159
Trevorton:								
Total area	1,458	253	138	287	0	6	6,537	8,679
Visible area	620	138	40	287	0	6	2,967	4,058

County total:									
Total area	5,820	2,470	1,276	3,033	75	69	27,353	40,096	
Visible area	1,495	739	211	1,662	36	29	8,990	13,162	
SCHUYLKILL COUNTY									
Ashland:									
Total area	1,486	285	334	399	34	4	3,493	6,035	
Visible area	493	210	242	301	34	4	1,955	3,239	
Frackville:									
Total area	686	74	459	653	10	28	7,363	9,273	
Visible area	515	8	252	597	10	28	2,513	3,923	
Mahanoy City:									
Total area	2,025	301	778	715	8	54	6,549	10,430	
Visible area	941	61	398	233	8	36	2,166	3,843	
McAdoo:									
Total area	1,194	248	482	354	38	18	8,546	10,880	
Visible area	92	8	46	94	0	18	2,337	2,595	
Minersville:									
Total area	3,322	1,550	1,472	1,362	120	46	19,496	27,368	
Visible area	1,215	315	178	570	25	0	3,354	5,657	
Mount Carmel:									
Total area	54	26	0	5	0	5	666	756	
Visible area	0	0	0	5	0	5	332	342	
Pottsville:									
Total area	447	424	1,193	738	55	23	10,001	12,881	
Visible area	126	57	332	336	55	0	5,934	6,840	
St. Clair:									
Total area	2,779	912	912	570	48	0	9,873	15,094	
Visible area	725	134	131	292	37	0	1,849	3,168	
Shenandoah:									
Total area	1,875	584	758	1,196	31	31	3,865	8,340	
Visible area	923	270	324	563	0	0	1,283	3,363	
Tamaqua:									
Total area	2,447	501	1,291	1,089	143	213	8,029	13,713	
Visible area	1,088	257	626	743	143	171	2,981	6,009	

CONTINUED

Table 6. — Continued

Unit area	Strip-mined land, percent tree cover			Deep-mine waste, percent tree cover			Not disturbed	Total
	0-10	11-50	51-100	0-10	11-50	51-100		
SCHUYLKILL COUNTY, <i>continued</i>								
Tower City:								
Total area	1,530	334	722	597	20	10	17,186	20,399
Visible area	372	38	140	355	20	10	6,671	7,606
Tremont:								
Total area	2,117	961	292	746	29	17	16,022	20,184
Visible area	189	54	28	166	0	17	3,345	3,799
West Hazleton:								
Total area	166	31	43	31	0	0	622	893
Visible area	0	0	0	0	0	0	0	0
County total:								
Total area	20,128	6,231	8,736	8,455	536	449	111,711	156,246
Visible area	6,679	1,412	2,697	4,255	332	289	34,720	50,384
SUSQUEHANNA COUNTY								
Carbondale:								
Total area	79	28	36	31	10	10	1,656	1,850
Visible area	79	28	36	31	10	10	1,500	1,694
County total:								
Total area	79	28	36	31	10	10	1,656	1,850
Visible area	79	28	36	31	10	10	1,500	1,694
WAYNE COUNTY								
Carbondale:								
Total area	39	0	28	43	36	23	2,306	2,475
Visible area	31	0	28	43	36	23	900	1,061

County total:								
Total area	39	0	28	43	36	23	2,306	2,475
Visible area	31	0	28	43	36	23	900	1,061
Total, region								
Total area <sup>1</sup>	46,493	16,637	21,514	23,331	2,239	1,688	339,736	451,638
Visible area	17,807	5,904	7,565	14,176	1,690	1,148	148,700	196,990

<sup>1</sup> Includes visible-area figures.  
<sup>2</sup> A small mining section not included as part of a unit area nor contiguous to a major coal field but classified as part of the Eastern-Middle Field.

Table 7.—Frontage classification according to amount and kind of disturbance and amount of disturbed frontage revegetated

Unit area <sup>1</sup>	Disturbed, inadequately vegetated (0-50 percent)				Disturbed, adequately vegetated (51-100 percent)		Not disturbed		Total	
	Strip-mined land		Deep-mine waste							
	Miles	%	Miles	%	Miles	%	Miles	%	Miles	%
CARBON COUNTY										
Hazleton	5.1	27	3.0	16	1.4	7	9.4	50	18.9	100
Lansford	1.5	3	4.7	10	5.8	12	36.5	75	48.5	100
Total	6.6	10	7.7	11	7.2	11	45.9	68	67.4	100
COLUMBIA COUNTY										
Ashland	6.6	30	0.6	2	1.1	5	14.0	63	22.3	100
Total	6.6	30	0.6	2	1.1	5	14.0	63	22.3	100
DAUPHIN COUNTY <sup>2</sup>										
Lykens	0.0	0	5.3	13	0.3	1	33.3	86	38.9	100
Rush Township	.0	0	.0	0	.5	9	4.8	91	5.3	100
Total	0.0	0	5.3	12	0.8	2	38.1	86	44.2	100
LACKAWANNA COUNTY <sup>3</sup>										
Archbald	9.1	20	4.0	9	5.6	12	26.5	59	45.2	100
Blakely	2.0	11	1.9	10	.7	4	14.0	75	18.6	100
Carbondale	10.4	17	6.9	11	6.0	10	37.3	62	60.6	100
Dickson City	2.6	18	2.5	18	.8	6	8.2	58	14.1	100
Dunmore	.8	3	6.1	19	.9	3	24.0	75	31.8	100
Old Forge	.9	5	3.2	19	1.9	11	11.1	65	17.1	100
Olyphant	1.1	9	1.1	9	1.3	10	8.8	72	12.3	100

Scranton	8.5	8	11.9	12	4.7	4	78.4	76	103.3	100
Taylor	7.6	31	3.7	15	3.6	15	9.6	39	24.5	100
Winton	1.4	11	.8	7	.4	3	9.5	79	12.1	100
Total	44.4	13	42.1	12	25.9	8	227.4	67	339.8	100
LUZERNE COUNTY										
Duryea	1.9	6	5.0	15	2.4	7	24.1	72	33.4	100
Edwardsville	.9	10	1.0	11	.4	4	7.1	75	9.4	100
Forty-Fort	.0	0	.0	0	.0	0	11.0	100	11.0	100
Freeland	4.1	14	.6	2	2.5	8	23.0	76	30.2	100
Hazleton	7.7	11	7.2	10	3.6	5	52.6	74	71.1	100
Kingston	.0	0	.0	0	.0	0	9.3	100	9.3	100
Luzerne	.3	2	.2	2	.4	3	11.2	93	12.1	100
McAdoo	1.0	13	.5	6	.5	6	5.7	75	7.7	100
Nanticoke	5.5	8	10.3	16	6.1	9	44.2	67	66.1	100
Pittston	6.3	11	5.9	11	3.7	7	38.9	71	54.8	100
Plymouth	4.0	13	3.1	11	1.5	5	21.4	71	30.0	100
Swoyersville	1.3	11	1.7	14	.2	1	9.0	74	12.2	100
West Hazleton	1.1	3	1.5	5	2.5	8	27.6	84	32.7	100
West Pittston	.2	1	2.1	9	.8	4	18.6	86	21.7	100
Wilkes-Barre	17.4	16	8.7	8	1.9	2	80.7	74	108.7	100
Total	51.7	10	47.8	9	26.5	5	384.4	76	510.4	100
NORTHUMBERLAND COUNTY										
Mount Carmel	10.0	18	6.5	12	2.5	5	35.1	65	54.1	100
Shamokin	4.0	10	7.4	19	1.1	3	26.7	68	39.2	100
Trevorton	2.2	10	3.5	15	1.0	4	16.4	71	23.1	100
Total	16.2	14	17.4	15	4.6	4	78.2	67	116.4	100
SCHUYLKILL COUNTY										
Ashland	2.5	10	7.6	31	0.4	2	14.2	57	24.7	100
Frackville	5.2	19	5.5	20	.7	2	16.1	59	27.5	100
Mahanoy City	8.9	20	5.3	12	5.1	12	25.0	56	44.3	100

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Table 7. — Continued

Unit area <sup>1</sup>	Disturbed, inadequately vegetated (0-50 percent)				Disturbed, adequately vegetated (51-100 percent)		Not disturbed		Total	
	Strip-mined land		Deep-mine waste		Miles	%	Miles	%	Miles	%
McAdoo	2.3	8	2.3	8	1.4	4	24.6	80	30.6	100
Minersville	16.2	25	11.7	19	4.8	8	30.6	48	63.3	100
Mount Carmel	.0	0	.5	6	.2	2	7.6	92	8.3	100
Pottsville	2.7	4	6.9	10	3.7	6	54.1	80	67.4	100
St. Clair	6.6	19	4.2	12	3.3	10	20.1	59	34.2	100
Shenandoah	8.4	22	5.1	14	4.8	13	18.8	51	37.1	100
Tamaqua	5.9	15	9.8	24	5.6	14	18.6	47	39.9	100
Tower City	3.0	8	3.9	10	2.2	6	29.7	76	38.8	100
Tremont	4.7	9	5.0	9	2.0	4	41.0	78	52.7	100
Total	66.4	14	67.8	14	34.2	8	300.4	64	468.8	100
Total, region	191.9	12	188.7	12	100.3	6	1,088.4	70	1,569.3	100

<sup>1</sup>Unit areas with no frontage in a designated county are not listed.

<sup>2</sup>Includes Lebanon County.

<sup>3</sup>Includes Susquehanna and Wayne Counties.

Table 8. — Planting-stock requirements for forest screen plantings at minimum and at recommended widths, by unit areas and counties

Unit area <sup>1</sup>	Sites	Length of screens	Trees required at —	
			Minimum width of 25 feet	Recommended width
	<i>No.</i>	<i>Feet</i>	<i>No.</i>	<i>No.</i>
CARBON COUNTY				
Hazleton	23	19,700	13,308	41,223
Lansford	8	7,800	4,920	12,963
Total	31	27,500	18,228	54,186
COLUMBIA COUNTY				
Ashland	13	18,900	10,914	35,127
Total	13	18,900	10,914	35,127
LACKAWANNA COUNTY				
Archbald	21	9,100	5,874	18,948
Blakely	2	1,600	852	2,001
Carbondale	12	11,300	7,524	28,056
Dickson City	2	1,000	684	2,136
Dunmore	3	600	306	1,134
Olyphant	3	600	339	960
Winton	3	800	489	957
Total	46	25,000	16,068	54,192
LUZERNE COUNTY				
Freeland	12	14,400	9,258	29,901
Hazleton	32	25,500	16,272	50,670
McAdoo	4	4,000	2,760	5,928
Nanticoke	9	8,700	5,718	17,028
Pittston	14	8,800	5,832	22,473
Swoyersville	3	1,600	1,104	4,416
West Hazleton	4	2,300	1,428	3,528
West Pittston	3	2,600	1,506	5,850
Wilkes-Barre	22	21,500	13,839	47,943
Total	103	89,400	57,717	187,737
NORTHUMBERLAND COUNTY				
Mount Carmel	37	28,100	17,871	54,615
Shamokin	16	16,000	10,137	26,805
Trevorton	3	12,800	8,820	18,192
Total	56	56,900	36,828	99,612

CONTINUED

Table 8. — Continued

Unit area <sup>1</sup>	Sites	Length of screens	Trees required at —	
			Minimum width of 25 feet	Recommended width
	<i>No.</i>	<i>Feet</i>	<i>No.</i>	<i>No.</i>
SCHUYLKILL COUNTY				
Ashland	9	10,000	6,303	25,245
Frackville	19	26,300	15,822	40,113
Mahanoy City	31	37,800	24,033	73,902
McAdoo	14	6,900	4,695	10,131
Minersville	46	36,400	23,736	78,456
Mount Carmel	2	1,000	522	774
Pottsville	16	12,400	8,430	25,230
St. Clair	16	15,400	9,039	26,829
Shenandoah	12	22,800	14,808	47,352
Tamaqua	25	27,000	17,916	49,989
Tower City	16	15,100	9,813	19,083
Tremont	20	12,500	7,950	23,268
Total	226	223,600	143,067	420,372
SUSQUEHANNA COUNTY				
Carbondale	5	1,700	1,158	2,991
Total	5	1,700	1,158	2,991
WAYNE COUNTY				
Carbondale	1	1,000	684	1,380
Total	1	1,000	684	1,380
Total, region	481	444,000	284,664	855,597

<sup>1</sup>Countries and unit areas with no screen plantings are not listed

Table 9. — Planting-stock requirements for forest cover plantings, by unit-areas and counties

Unit area <sup>1</sup>	Sites	Area of sites	Trees required
	<i>No.</i>	<i>Acres</i>	<i>No.</i>
CARBON COUNTY			
Hazleton	1	36	43,200
Lansford	7	446	448,800
Total	8	482	492,000
COLUMBIA COUNTY			
West Hazleton	1	31	37,200
Total	1	31	37,200
DAUPHIN COUNTY			
Lykens	5	552	567,300
Total	5	552	567,300
LACKAWANNA COUNTY			
Archbald	13	410	414,300
Blakely	6	195	211,800
Carbondale	11	630	732,900
Dickson City	5	345	390,300
Dunmore	10	446	510,000
Old Forge	13	445	502,500
Olyphant	9	675	805,500
Scranton	34	1,618	1,762,800
Taylor	24	1,014	1,182,900
Winton	8	353	420,600
Total	133	6,131	6,933,600
LUZERNE COUNTY			
Duryea	16	642	759,600
Edwardsville	7	151	175,200
Freeland	1	48	57,600
Hazleton	6	695	804,900
Luzerne	3	32	36,900
Nanticoke	21	661	750,600
Pittston	12	561	654,600
Plymouth	18	553	625,800
Swoyersville	5	238	268,800
West Hazleton	3	72	86,400
West Pittston	2	53	63,600
Wilkes-Barre	24	1,445	1,632,300
Total	118	5,151	5,916,300

CONTINUED

Table 9. — Continued

Unit area <sup>1</sup>	Sites	Area of sites	Trees required
	<i>No.</i>	<i>Acres</i>	<i>No.</i>
NORTHUMBERLAND COUNTY			
Mount Carmel	8	489	558,600
Shamokin	10	509	600,600
Trevorton	1	230	276,000
Total	19	1,228	1,435,000
SCHUYLKILL COUNTY			
Ashland	9	448	496,500
Frackville	2	132	155,400
Mahanoy City	8	296	339,900
McAdoo	2	67	80,400
Minersville	9	265	304,200
Pottsville	7	160	182,400
St. Clair	9	621	723,000
Shenandoah	12	885	1,019,100
Tamaqua	9	432	507,600
Tower City	1	38	45,600
Tremont	5	96	102,900
Total	73	3,440	3,957,000
SUSQUEHANNA COUNTY			
Carbondale	1	10	12,000
Total	1	10	12,000
Total, region	358	17,025	19,350,600

<sup>1</sup>Counties and unit areas with no cover plantings are not listed.