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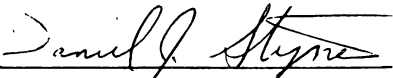
RECREATION: A CASE STUDY

presented by

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has been accepted towards fulfillment
of the requirements for

M.S. degree in Park and Recreation
Resources


Major professor

Date February 21, 1979



MSU

~~APR 16 80~~ 140

~~SNAG 6-11-81~~

~~APR 17 82~~ 706

~~APR 17 82~~ 143

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RECLAMATION OF LAND FROM COAL MINING FOR
RECREATION: A CASE STUDY

By
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AN ABSTRACT OF A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF SCIENCE

Department of Park and Recreation Resources

1979

ABSTRACT

RECLAMATION OF LAND FROM COAL MINING FOR
RECREATION: A CASE STUDY

By

Jacalyn Rose Bernard

Reclamation of abandoned coal mines is mandated by the 1977 Surface Mining Control and Reclamation Act. According to the law, each parcel of abandoned land to be reclaimed must have a use determined at least in part by nearby communities. This study investigates preferences for use of a reclaimed area based on a sample survey of residents of a small city in central Illinois. The hypotheses were: that residents desire recreational use of the reclaimed area, view the reclamation favorably, and can express the value of reclamation in evaluative and monetary terms. Respondents desired recreation on the site, for example, for picnics or for outdoor games and sports. Favorability toward the reclamation was high. Very favorable respondents and those with children were most likely to state monetary values for reclamation, however, it appears that statement of value is most related to preferences for use of the site in recreation.

ACKNOWLEDGEMENTS

Acknowledgements are due to several people and organizations for their help in the preparation of this study. My adviser, Daniel Stynes, provided much friendly advice and counsel throughout this endeavor. Both Stephen Golant and George Tolley of the University of Chicago must be credited with clarifying my views of the project in terms of environmental psychology and resource economics.

Many useful comments were received in day-to-day interactions with the staff of the Land Reclamation Group at Argonne National Laboratory. Comments on the results of the project by John Dwyer of the North Central Forest Experiment Station in Chicago proved to be very helpful.

While the field work was being done in the city of Staunton, Elton Schaeffer and his staff in the City Clerk's office were most accommodating and kind. Thanks are also due to David Bernard for helping in many ways. Competent typing skills were contributed by Diane Duff.

This study was funded by the U.S. Department of Energy through Argonne National Laboratory.

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CHAPTER 1. INTRODUCTION

A high priority in recreation research is the optimization of opportunities for enhancing recreation while minimizing the adverse effects of man's activities (U.S. Dept. of Interior 1974). As of 1977, there were approximately 1.1 million acres of land abandoned after coal mining out of 5.7 million acres disturbed by all types of mining in the United States (Holmberg in press). As used here, the term "abandoned mines" will refer to land affected by surface and underground coal mines which have been taken out of production. The recently enacted Federal Surface Mining Control and Reclamation Act¹ includes the Abandoned Mine Reclamation program, through which abandoned coal mine lands across the nation will be returned to useful purpose. Previous to enactment of the federal law, state legislation was either absent or ineffective in requiring mining companies to reclaim abandoned sites.

In Illinois, there are about 100,000 acres of abandoned mine land. No additional mine lands are expected to be classified as abandoned because a state law, effective in 1962 for surface mines and 1972 for deep mines, requires mining companies to reclaim mined lands disturbed after those dates (Abandoned Mined Lands Reclamation Council 1978). Most of the abandoned lands are not affected by acid mine spoils, and, thus, are naturally revegetated and pose no major health or environmental problems from exposure and erosion of acid materials.

¹Public Law 95-87, 91 Stat. Aug. 3, 1977. Title IV.

About half of the abandoned acreage is used for pasture or other agricultural use. Because abandoned mined lands provide a type of up-land topography not encountered in most of Illinois, about 30 per cent of the abandoned acreage is used for homes, sports clubs, state parks, wildlife areas, and numerous private and municipal recreation sites. However, about 23,000 acres of the abandoned lands, scattered throughout the state, are considered problem areas because acid conditions affect the site and surrounding land. At these 800 problem sites ranging in size from less than 1 to 437 acres, the value of surrounding property is often depressed, there are usually aesthetic impacts, and the land is simply not useful (Abandoned Mined Lands Reclamation Council 1978; Haynes and Klimstra 1975; Nawrot et al. 1977).

The federal law requires mining companies to pay a reclamation fee of 35¢ per ton of surface mine coal and 15¢ per ton of coal from underground mines to go into the Abandoned Mine Reclamation Fund. Through this fund, at least one-half of the revenues contributed from each state will be returned to the state for reclamation of abandoned mines. The total value of the revenue available to Illinois should be in the order of \$7.5 million per year.² Disbursement of the funds will begin after the state develops an approved reclamation program, designating priorities and processes for determination of land uses on the sites in compliance with federal regulations. In about two years, Illinois will be ready to administer the program (pers. comm. Grossboll).

²Assuming average annual coal production in Illinois of 60 million tons; half being strip mined, half mined underground. Sources: Carter, R.P., LaFevers, J.R., Croke, E.J., Kennedy, A.S., and Zellmer, S.D. 1974. *Surface Mined Land in the Midwest: A Regional Perspective for Reclamation Planning*. Argonne National Laboratory. Argonne, Illinois. pp. II-39.

The priorities established by the 1977 Act are for protection of the public from adverse effects of mining, and, for the Abandoned Mine Program, restoration of land to serve public needs. As yet, there is no established process in Illinois for determining land uses on parcels having a high priority for reclamation. In the past, reclamation efforts were undertaken by mining companies who determined desirable land uses employing in-house criteria; there was very little consultation with nearby communities. According to the federal law, state decisions about land uses for these parcels must consider local government desires as well as regional and state development goals. At the same time, ecological and engineering data about the capability of each site to support desired public uses must be incorporated in each decision. There are few examples to follow for determining community desires for uses of reclaimed land and few cases of integrating these desires with specific limitations on uses imposed by reclamation of areas containing hazardous materials.

The implicit assumption in passage of the federal law is that the costs of reclamation, passed on to society through increased energy prices, are at least equal to the benefits to be derived. As in all projects, however, it is desirable to have the maximum benefit for the minimum cost. Since most experience with reclamation is contained within mining companies, the states are not yet equipped to use cost-effective and efficient methods of reclamation on problem abandoned mines. Because cost effectiveness of abandoned mine reclamation must now be assessed in the public domain, it is important to consider and quantify in some way the value of reclamation to society.

Two reclamation demonstration projects in Illinois are being conducted by Argonne National Laboratory and supported by the State of Illinois and the United States Department of Energy. One is an abandoned surface coal mine already contained within a state park in north central Illinois. The other is an abandoned underground mine refuse area in west central Illinois, where the proposed use is recreation for the residents of a nearby town.

This study is concerned with the latter project near the small town of Staunton in Macoupin County, Illinois. Preliminary analysis led to a decision to reclaim the site for recreational use, although community desires for uses had not been formally assessed. This investigation explores the use of a sample survey as one method of achieving the following objectives:

- 1) determine preferences of nearby populations for use of a reclaimed site, assuming a priori that recreation is one of the preferred uses; and
- 2) determine how these populations value reclamation both in attitudinal and economic terms.

CHAPTER 2. LITERATURE REVIEW

Most mine reclamation research to date focuses on the rehabilitation of strip mines, mainly because of their obvious extensive land disturbance compared to underground mines. Abandoned surface mines are usually characterized by steep sloped piles of overburden and tailings in association with mining cuts in-filled with water. Underground mines have slurry ponds, buildings, open mine shafts, and areas devoted to waste ("gob") piles from coal cleaning. In dealing with problems of reclamation from acid pollution and determining land uses for these areas, the two types of mines present similar problems.

2.1 The Concept of Reclamation for Recreation

The first states to begin regulating coal mining operations were West Virginia in 1939, and Indiana in the early 1940's. It had become obvious that the practice of abandoning mines after resource depletion presented serious environmental and health problems. By 1976, 38 states had mining and reclamation laws, but there were varying levels of regulation, and most laws began by regulating only surface (or strip) coal mining, not deep coal mining and its associated impacts (U.S. Geological Survey 1976). As awareness of pollution and soil conservation increased, states began expanding control to other types of mining and reclamation and emphasized land use planning relationships to reclamation.

Some laws were also oriented to encourage involvement of local governments in planning for uses of land reclaimed after mining. Until the 1950's reclamation research focused primarily on mitigating serious post-mine water quality and erosion problems from mines, mainly through revegetation of spoils. The ensuing change in reclamation philosophy, from abandonment to rehabilitation, may have been the result of technology, influence of successful demonstrations with some recovery of costs, and recognition of public relations benefits to be gained through reclamation, in addition to greater state regulation of mining (LaFevers 1974).

Mining companies have generally taken the initiative in reclamation for recreation on strip mines. Early demonstrations of recreational use of reclaimed land emphasized fish and game habitat development (Flowers 1955; Riley 1954), although the efforts by Halman Creek Coal Company in 1944 produced recreational lakes for swimming and a baseball field in addition to pheasant raising facilities (United Electric Coal Companies n.d.). It was not until the early 1960's that reclamation for recreation on coal strip lands was officially endorsed by the American Mining Congress (American Mining Congress 1961) in a wave of interest demonstrated by the U.S. Forest Service, university researchers, landscape architects and others (U.S. Dept. of Agriculture 1962; Greiss and Deasy 1961; Bowden and Meier 1961).

West German reclamation programs were subsequently studied by U.S. researchers because reclamation there is planned according to community needs (Nephew 1972; Seeger 1976). Reports of the Aberfan disaster in Wales in 1966, where about 140 people were killed by a slide of colliery shale, resulted in reclamation programs for public needs in

Britain which also eventually became a source of interest to U.S. reclamation researchers (Tandy 1974).

By 1972, the U.S. Department of Interior had outlined a Surface Mined Lands for Recreation program whereby a land bank for organized recreational use of surface mined lands could be developed (U.S. Dept. of Interior 1973). As a result, seven demonstration projects were supported by Land and Water Conservation Funds through the Bureau of Outdoor Recreation. Several states have since used Land and Water Conservation Funds to reclaim mined areas for recreation. Notable cases of planned recreational developments on surface mined lands are Moraine State Park, Pennsylvania (U.S. Dept. of Interior 1970) and Friendship Park in Jefferson County, Ohio (Maneval 1975).

2.2 Reclamation in Illinois

Illinois' coal mining industry began in the early 1800's, with the first strip mine being operated near Danville in 1866. Regulation of coal mining followed the same path as many other states; bills were introduced for surface mining regulation as early as 1929, but were defeated until 1943 when a law was passed but later declared unconstitutional. In 1961, legislation for reclamation of operating surface mines was passed, amended in 1963 and 1968, and rewritten as the Surface Mined Land Conservation and Reclamation Act of 1971. It provided for industry responsibility for reclamation plans and involvement of the public in approving plans. It did not, however, provide for reclamation of abandoned lands prior to the 1962 legislation.

The 1975 Abandoned Mine Reclamation Act did provide for reclamation of surface and underground abandoned mine lands previous to the

1961 law. Abandoned land in this law referred to land not being mined, or used for commercial purpose, or on which taxes were in default (Bergstrom 1977). The state, through the Abandoned Mine Lands Reclamation Council, funds reclamation of abandoned lands under this Act. With the introduction of the Federal Surface Mining Control and Reclamation Act, the funds available annually to the state for abandoned mine reclamation increased dramatically.

Early research on reclamation of mined land in Illinois concentrated on seeking out plant species suitable for revegetating strip mine lands. The University of Chicago, University of Illinois, and Illinois Agricultural Experiment Station were involved in this type of research in the 1950's (Bergstrom 1977; pers. comm. Arthur). An alliance between the state, agencies such as the Wildlife Management Institute, and coal companies resulted in a project, started in 1953, to determine the potential of strip mined lands for recreation (Klimstra, Vohs, and Cherry 1963).

The first survey of recreational developments on strip mined areas in Illinois was made in 1960 by the Cooperative Wildlife Research Laboratory, Southern Illinois University. The same agency conducted a study in 1962 on potential recreational use of strip mine lands (Roseberry 1963; Roseberry and Klimstra 1964). Parcels of mined land were identified, ownership ascertained, and utilization noted. It was found that 47 recreational areas were located on 16,000 acres of stripped land. An additional unknown amount of stripped land was used for unorganized or unauthorized recreation. The possibility of using mined land for public recreation (state acquisition) was assessed in this survey using field survey criteria. Approximately 15,000 additional acres of

1

land were rated excellent or very good for recreational use requiring little development. It appeared that recreation occurred wherever mines had water bodies with suitably inclined accesses to them and haulage roads left after mining ceased. In most such areas, natural revegetation had taken place and thus those areas were simply adapted for recreational use, often with minimal reclamation.

In 1971, the Cooperative Wildlife Research Laboratory surveyed all lands affected by surface mining for coal in Illinois (Haynes and Klimstra 1975) to add to the information obtained in the 1962 survey. Since 1971, the State Department of Mines and Minerals, Division of Land Reclamation, updates the records each year. The 1971 survey showed that 29,000 acres of strip mined lands were being used for recreation, which does not include recreational homes, educational use, forests, or areas where unauthorized recreational use occurs. Various semi-private, private and employees clubs are located on mine areas, especially near the larger urban areas. There are also permit areas for fishing and youth camps on these lands. Public areas include the state facilities of Kickapoo and Pyramid State Parks, and the DuQuoin State Fairgrounds. Two new state park additions which include mined land are Goose Lake Prairie State Park and Banner Marsh State Park.

About 7,000 acres of land in Illinois have been affected by underground mining, according to the survey completed in 1976 by Nawrot et al. (1977) for the Illinois Institute for Environmental Quality. Twenty-six underground mine sites surveyed are used for recreation, which is about 1.5 per cent of the total number of sites. Considering that about 1,500 acres of underground mine sites and at least 2,000 acres of strip mine sites are near residential areas, there is some value

in considering the needs of communities in proposing land uses for these abandoned areas.

Klimstra et al. (1977) suggest that recreational use of abandoned mines is a consequence of available water, but this may not always be true. In the case of areas around underground mines, water impoundments associated with them are indeed sometimes used for recreation (Bergstrom 1977). However, there is also evidence that gob piles and steep mine spoils are used as backdrops for shooting practice, provide areas for hunting rodents and terrain for off-road vehicles. A number of abandoned strip mines are devoted to "Illinois Lands for Wildlife" and, as such, their recreational value may not strictly be dependent on available water.

Abandoned mines in general may provide areas where the human need for cover, "away from the eyes of every household in the township" (Darling n.d.), judgement set aside, can be fulfilled. Lack of cover is known to impose social problems in some urban areas and may even be a problem in rural communities where there is little public land nearby for town residents to go for privacy in the outdoors. Research into the effects of crowding suggests that the individual's (architectural) environment can fail to provide areas for structuring territories, privacy, and a sense of control over one's environment (Loo 1977). Certain abandoned mines near communities may fulfill these privacy functions, which by default often fall into the category of outdoor recreation.

On a more practical level, the Illinois Abandoned Mine Land Reclamation Council has identified several areas for research concerning recreation on reclaimed lands. These are: water quality improvements for recreation, habitat development for fish and wildlife, and development of areas for off-road vehicles, shooting areas and shooting and archery ranges (Bergstrom 1977).

Management problems can occur once mined land is used for recreation. Hallburg (1978) and Dickerson (pers. comm.) point out that there are often problems with providing access to water bodies, that there may be acid conditions in certain water bodies, erosion can cause road and hillside slippage because of unstable landforms, and there may be aesthetic problems if vegetation does not establish itself well. Tandy (1974) in Great Britain points out that, to gain public respect, open spaces reclaimed from mining must appear to be well managed, and some effort must be expended to overcome public prejudice against reclaimed parks that are not as well manicured as municipal parks. The reasons for not managing these areas as intensively as municipal parks is often related to the fact that land uses in reclaimed areas "are limited by the physical properties and chemical characteristics of the refuse material" being reclaimed (Zellmer and Carter 1977, p. 6). Nonetheless the body of literature describing the popularity of parks on reclaimed mine areas to date indicates that people are willing to use these areas and that they do value them as public resources.

2.3 Valuation of Reclamation

Randall *et al.* (1974) describe aesthetic damage as a discommodity, and improvement of aesthetic quality as a commodity. Maler (1974) supports this by stating that the quality of a piece of land, even if it is privately owned, is thought of as a public good having some value. Mining activity in the past had a spillover effect; that is, abandoned mine wastes adversely affected the collective value of the environment. Reclamation provides an improvement in the collective value of the environment. Some means of quantifying the benefits of such improvements

would be useful in benefit cost analysis for efficient resource management.

Traditionally, costing of changes in the environment has been carried out using measures of productivity, property value, and health effects (Brookshire, Ives, and Schulze 1976). Various nonmonetary values for the environment have been developed but are not easily adaptable to benefit cost analyses (Shafer, Hamilton, and Schmidt 1969; Canadian Dept. of Indian Affairs and Northern Development 1971a). Consideration of benefits of reclamation should include national economic benefits, and local benefits such as expenditures for local services associated with the project.

Recreation research has provided the background for evaluation of national economic benefits because recreation has long been considered a public or collective good the value of which is included in benefit cost analyses. The development of national economic benefit measures for recreation began with the introduction of travel cost models based on the costs that recreationists are willing to incur to travel to a recreation site as a proxy for willingness to pay for recreation (Clawson and Knetsch 1966). Willingness to pay measures using the travel-cost method are useful for recreation areas or resources where a significant variation in the amount of travel is involved to that destination only. Over the years, sophisticated models have been developed, but the technique has limitations in some cases which led to the development of the survey method of directly asking consumers what their willingness to pay is. It is this method which has proved useful in evaluation of environmental changes.

The underlying assumption of willingness to pay measures is aptly put in terms of recreation by Knetsch and Davis (1966, p. 452):



" . . . there is an individual and collective limit to how much we will give up to enjoy . . . any outdoor recreation facility or preserve any scenic resource."

In effect, if a project is economically viable, consumers should be willing to pay an amount which will (theoretically) compensate those who have thereby lost the opportunity to have the resource in question put to an alternative use. Dwyer et al. (1977) point out that it is difficult to delineate full compensation; it is often a matter of judgement. Net willingness to pay is operationally defined as the maximum amount consumers would be willing to pay to prevent their exclusion from a project or service.

Direct willingness to pay values for recreation were first obtained in a survey conducted by Davis (1963). He showed that the survey populations' willingness to pay for recreation in Baxter State Park in Maine was a function of income, years of experience with the area, and length of visit. Average willingness to pay beyond what the visit presently cost was \$2.98 per day per individual interviewed. The range of values was between zero and \$16.66. Some of the willingness to pay studies which were subsequently carried out concerned the value of wildlife recreation (Horvath 1974), duck hunting (Hammack and Brown 1974), beach use (McConnell 1977) and recreational clamming (Smith, Conrad, and Storey 1978).

A survey in the Four Corners area of the southwest conducted by Randall, Ives and Eastman (1974) elicited willingness to pay responses for changes in the aesthetic environment around a power plant. They found that higher income respondents using a park were willing to pay a greater amount than lower income respondents for the same hypothetical level of abatement. This corresponds with Davis' finding that willing-

ness to pay for recreation was related to income. Mean individual household willingness to pay for abatement was \$50 per year for somewhat reduced damage and \$85 for more reduced damage.

Interpretation of these results requires caution because there are many problems inherent in such studies in addition to the methodological problems involved in designing surveys. Fischer (1975) states that people might exaggerate their willingness to pay answers if they see any systematic relationship between their answers and what they might actually have to pay. Individuals may understate their value if they believe payment will result, they may overstate their value if they believe payment is not linked to their answer, and if they believe that the government will pay for the program regardless of their response, they may state their value as zero.

The variation of individual perceptions of the environment also contributes to bias in willingness to pay studies. People frequently have no comparative basis upon which to state payment because they have never had to pay for such goods. The amount of information the individual has about the resource in question may change over time, and thus willingness to pay may change, rendering it an unreliable measure. Fischer also criticized the fact that many willingness to pay studies do not account for those who are directly involved in using the resource but who still have a demand for an improved environment, including future generations. This latter criticism, however, is a common problem with all current economic evaluation methodology. Nonetheless, it is generally agreed that willingness to pay measures can provide useful values for evaluating the efficiency of resource management, controlling as much as possible for its inadequacies.



Several methods of benefit estimation have been used for reclamation projects. One method assesses productivity levels achieved on reclaimed lands. Alternative types of production (e.g., agricultural, industrial, etc.) are compared and the most productive use chosen, or the resale value of alternative uses is chosen as a proxy for production value. The underlying assumptions in choosing this method are that the market value of land increases after reclamation, tax revenue (if privately owned) increases for the region, and sometimes market and tax values of surrounding properties also increase as a result of reclamation (Guither 1974).

Clapper and Wilkey (1978) estimated the effects of land values in the Macoupin County area chosen for this thesis study and found that the appraised market value of the reclaimed property had increased by \$21,870 from 1976 before reclamation began to 1978 when it was near completion. The appraised and assessed value of the properties in the surrounding areas also increased in that time period as a result of reclamation.

Leaming (1977) suggests that the conversion of derelict land must be paid for by the subsequent user of the land, either through productivity of the land, or if the public values reclamation, through taxes. The cost of reclamation will probably be passed on to the public in the form of increased energy costs. Indirectly then, the public will be paying for the reclamation, rendering cost-effectiveness of reclamation a desirable public goal. The cost of reclamation at the Macoupin County site was \$658,000 for 34 acres reclaimed. It is clear that achieving the maximum benefit for reclamation expenditures is desirable to prevent misallocation of resources and undue costs passed on to customers.



CHAPTER 3. THE PROBLEM

3.1 The Reclaimed Site

The Macoupin County reclamation site is located about 50 miles northeast of St. Louis, Missouri and two miles northwest of Interstate 55 near Staunton, Illinois (Figure 1). The 34-acre site consists of three parcels of land affected by activities associated with underground coal mining from 1904 to 1923 (Figure 2). It was the site of the Consolidation Coal Company mine number 14, and it employed an average of 500 men in the mine, coal cleaning plants, and rail yards.

Wastes from coal cleaning were piled on an area of about five acres and finally reached a height of about 80 feet (25 m.). To provide a water supply for the coal cleaning operation, the mining company created an impoundment which, when the mine was finally abandoned, filled with the acid drainage from the gob pile. This 11-acre slurry pond eventually breached the dam holding it in and contributed to the pollution of Cahokia Creek, a tributary of the Illinois River. Because of the acidic nature of the gob pile and run-off from it, over two-thirds of the entire site was barren, despite the passage of 50 years. Also remaining on the site was a 175 foot (55 m.) high concrete smoke stack, and foundations of several buildings.

The area had been used as a general dump for years. Some small game had used about 11 acres of the site; hunters had used the area for target practice, and there was evidence of off-road vehicle use of the

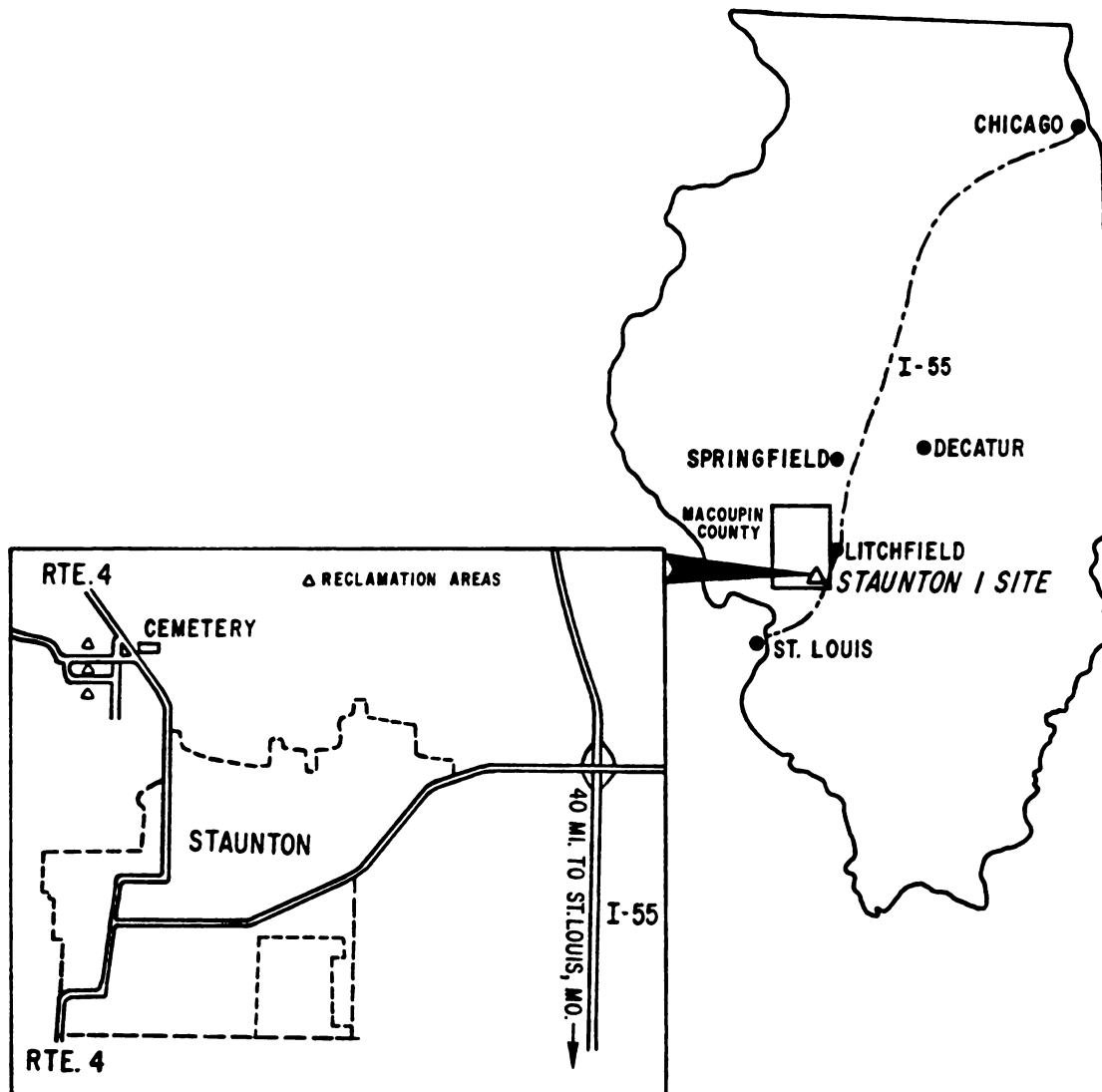


Figure 1. Location of Staunton I reclamation site in Illinois.

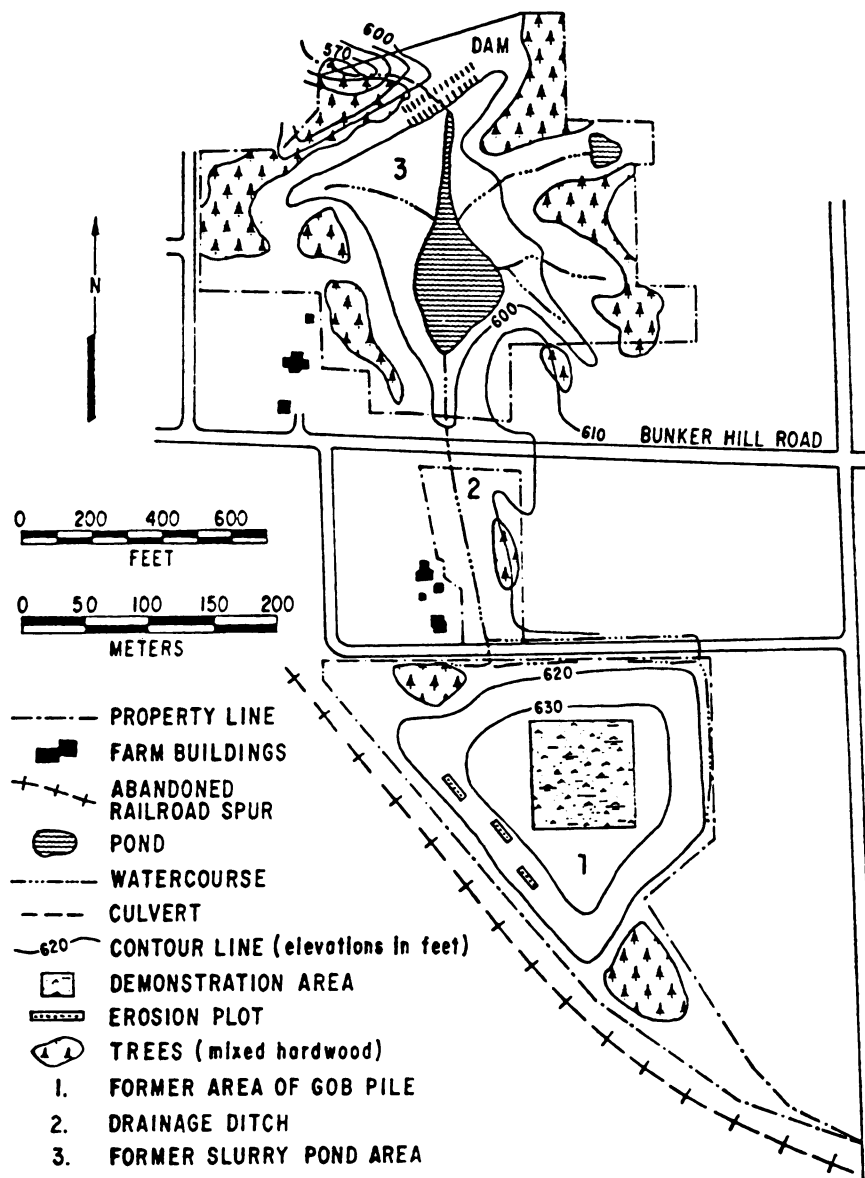


Figure 2. Schematic view of the reclaimed area.
 Source: Argonne National Laboratory. 1978.
Stanton I site reclamation demonstration project. Land Reclamation Laboratory.
 Argonne, Illinois.

site. Accounting for these uses, the acreage of the site before reclamation is shown in Table 1. Four agencies were involved in choosing

TABLE 1
ACREAGE OF STUDY SITE

| Use | Area |
|---|-----------------------------|
| Gob pile | 4.5 acres (1.8 ha.) |
| Old cleaning plant and surrounding area | 7.5 acres (3.0 ha.) |
| Slurry pond | 11.0 acres (4.5 ha.) |
| Volunteer vegetation | <u>11.0 acres (4.5 ha.)</u> |
| Total | 34.0 acres (13.8 ha) |

this site for reclamation among 29 coal mine refuse sites in the area of Cahokia Creek. The creek was being considered for development as a multi-purpose water supply to nearby communities. The Department of Energy, the Illinois Abandoned Mine Land Reclamation Council, and the Illinois Institute for Natural Resources jointly supported the site selection criteria and reclamation program developed by Argonne National Laboratory. The goals of the program were to: (1) reduce the quantity of pollutants entering the environment, (2) increase the economic potential of the area, (3) improve the aesthetics of the locale, and (4) develop and demonstrate cost-effective reclamation techniques.

The Staunton I site was chosen for reclamation because it obviously contributed to poor water quality in Cahokia Creek. It is also adjacent to the town of Staunton (population 4,500) and a subdivision of Staunton named Parksville consisting of about 15 homes. Land values around the site were depressed and expansion plans for the town of

Staunton were limited with the site as it was. About 23 acres of the site needed reclamation in order to mitigate the adverse impacts.

Before reclamation work began, consultation with officials of Staunton, the Macoupin County Board of Supervisors, and the West-Central Illinois Regional Planning Commission revealed that the preferred end-use after reclamation was industrial development. However, disturbances of vegetation on a newly reclaimed site could result in acidic erosion problems once again. Thus, another alternative, recreational use, was seen as having the least potential impact on the reclamation, while still fulfilling community needs. It was suggested by the city council of Staunton that the site be used as a combined recreational, wildlife, and environmental education area for the residents of Staunton.

3.2 The Staunton Population

The Staunton reclamation demonstration area is approximately one-half mile northeast of the city of Staunton, which will be the recipient of the land when reclamation is complete. The Staunton subdivision of Parksville, located on the northwest end of the site, is composed of small farms used for soybean or corn production, with some livestock. To the west of the former gob pile is a city-owned sewage pond which is screened from the site by trees, and apparently is not a major nuisance in the area. Adjacent to the former pile on the east are approximately 50 acres of city-owned land now being used for row crops. Further south, on the outskirts of the town, a steel conduit manufacturer stores and distributes piping.

According to the 1970 census, 27.9 per cent of Staunton households were on social security, and of those over 25, 10.7 per cent were

educated beyond high school, while about 44 per cent had completed high school. The all-white population of Staunton gained most of its employment in mining, manufacturing and transportation, the service industry and retail trade. Mean income for Illinois residents in 1977 was \$12,900 annually. Estimates of mean income for the area in 1977 range from \$10,600 for Macoupin County to \$16,000 for production workers in central Illinois standard metropolitan statistical areas.³ Having no major industries of its own, the Staunton labor force gains most of its employment in industries in surrounding towns. Staunton's historical roots are in the mining industry. Many of its people worked in nearby coal mines or had relatives who worked in mines. The city is now a convenience center and residential area for people who work or farm in the surrounding environs.

According to Richard E. Nichols Associates (1978), Staunton is similar to many small towns in Macoupin County which offer residential amenities. There are at least 14 state-owned recreation areas with a 50-mile radius of Staunton, several located on the Illinois and Mississippi Rivers, and some near large reservoirs such as Rend Lake, Carlinville Lake, and Carlyle Lake.⁴ Staunton has two city parks, one is a several acre area on the north side of the city equipped with group picnic facilities and baseball fields. The other is a vestpocket park downtown on city hall property which is used as a meeting place for

³From Illinois Bureau of Employment Security, average weekly earnings estimates for 1977 for Illinois and Macoupin County. Earnings for production workers in central Illinois are based on July-August, 1978 estimates.

⁴From Illinois Department of Conservation Maps. 1978. *Recreational Areas*. Springfield, Illinois.

teenagers. Four tennis courts and a bowling alley are located in the city. A country club north of the city provides golf, and swimming facilities which have not been used recently because of maintenance and vandalism problems. There are several recreation clubs in the Staunton vicinity; the Staunton Country Club provides for fishing and boating, the Gun Club, and the Sportsman's Club. There are other organizations based in Staunton such as the 4-H Club, in addition to active church groups. Bicycling appears to be a popular activity among children and adults in Staunton. The community school is located on the northwest end of town and contains outdoor playing fields, a gymnasium, and equipment for students' recreation.

By June, 1978, Staunton residents had been exposed to information about the reclamation project near their town through word-of-mouth, the minutes of town council meetings published in the weekly Staunton Star Times, one or two small articles on that topic in that paper, and articles in other local papers such as the Edwardsville Intelligencer and Alton Telegraph.

3.3 Hypotheses

Since the town council had proposed that the reclaimed site be used for recreation, environmental education and wildlife preservation, and town council decisions are reported in the local paper, it was expected that most Staunton residents were aware of this proposed use but not aware of the physical limitations of the site. Whether or not people agreed with the proposed use was uncertain. Their perception of the utility and need of such an area would be important in understanding their valuations of the site. A questionnaire was constructed which

oriented the respondent toward various aspects of the reclamation and willingness to pay for it, then focused on preferences for uses of the reclaimed land. The hypothesis and underlying assumptions to be treated were stated as follows:

1. Recreation is the most preferred use of the site.

Informal interviews with city officials and Staunton residents had previously revealed that there was a lack of recreation facilities for people of all ages in the town, and an especially acute problem with lack of facilities for teenagers. Therefore, it was expected that respondents would desire recreational use of the site, especially those with children or who had raised children.

2. Reclamation is viewed favorably but physical limitations for use of reclaimed land are not generally known.

The consensus among professionals familiar with the Staunton project was that the residents of Staunton generally viewed the project favorably. Measurement of attitudes toward this reclamation project might indicate how other communities would view reclamation and abatement of environmental damages assuming the general population holds homogeneous attitudes about the need for environmental protection. It might be expected that people view such events favorably when close to home but interest declines in similar benefits elsewhere, e.g., in the state. A change in perception toward living in the area near the reclaimed site would also indicate favorability toward the project, although those very satisfied with where they live might not change their opinion about living anywhere else.

Having lived near mine wastes such as the area reclaimed, it was supposed that most respondents would be familiar with some of the

characteristics of mine waste and intuitively know that environmental problems would exist in reclaiming the land for any use.

3. Reclamation is of some value to residents and this value can be stated in willingness to pay for the improvement.

Review of research reported by Brookshire et al. (1976), Randall et al. (1974), Clarke (1971) and others (pers. comm. Blomquist; Tideman 1977) resulted in a decision to use direct, open-ended willingness to pay questions rather than demand-revealing process or an incremental bidding game approach. The reasons are that: 1) there are no indications that demand-revealing questions (Clarke 1971) are easily understood in these types of interviews or have been clearly more successful in eliciting true willingness to pay values than the direct or incremental approach, and 2) there is some uncertainty about introducing bias in incremental bidding games by naming the starting bid. The open-ended question allows for the opportunity for gaming strategy more so than the incremental approach (Bohm 1972; Dwyer et al. 1977), however, it was considered that there was not enough information available on how much people value reclamation to justify any particular starting bid for the incremental approach.

Respondents' incentives to understate willingness to pay to escape being charged are probably not great because the reclamation had already been carried out, although some might fear being charged for reclamation of other nearby sites. The "free rider" problem (Buchanan 1968) may arise because many respondents may believe that the government will pay for the reclamation regardless of their response, and thus state a zero willingness to pay.

On the other hand, overstatement of value may be the result of this type of thinking, since the respondent may not believe the answer

would affect real charges. People may sense that there is little they can do or pay to improve the environment (Fischer 1975). Fischer also points out, on the basis of another study, that only a small minority will be concerned enough to exaggerate their true value, and may actually understate because of sheer lack of knowledge. The type of problem expected to be encountered here is the "free rider"; the person who knows that payment will not result regardless of stated values.

Because both potential users and nonusers were surveyed, the result may also provide a value for environmental improvement for those who will not use the site but value its existence for others. Other studies have used this method because, although nonusers may have low willingness to pay estimates, the value of the good in question does extend to all of society, not just users (Smith 1978; Hammack and Brown 1974).

Hypothetical questions posed to respondents may cause unreliable estimates, although such questions were used by Davis (1963) and Hammack and Brown (1974) with results they found satisfactory. The hypothetical nature of the question in this survey was reduced as much as possible by focusing respondents' interest on the area of the site, the publicity about it, their evaluations of its importance to them and the community, their opinions about living in that area now, and who should have been responsible for the reclamation. Pictures of before and after reclamation reduced the opportunity for leaving the result of the reclamation to imagination based upon the reasoning that, where respondents can visualize being excluded (in this case, not having the land reclaimed) from the project, willingness to pay is more reliable (Knetsch and Davis 1966).

A relationship between income and years of residence in the town with willingness to pay is expected to hold. Education and occupation as indicators of income or status, may also be related to willingness to pay. In the same mode of thought, it is expected that the value of improvements for the community would be recognized by those who are more involved in community organizations, that is, willingness to pay is positively related to memberships in organizations. The proposed use of the reclaimed area for recreation is probably well known, and there might be a relationship between the respondents' preferred use of the site for recreation and willingness to pay.

CHAPTER 4. PROCEDURES

It was decided that a survey of Staunton residents should be undertaken to investigate attitudes toward possible uses of the reclaimed land as well as evaluations of reclamation. The personal interview seemed to be the best method of eliciting responses to questions because other information bearing on the use of the site would intuitively be received during the process of administering the questionnaire.

4.1 Sample Size

The expected users of the reclaimed site, since the site is publicly owned, are local residents in Staunton and Parksville. Parksville residents are part of the Staunton population with respect to decisions about city matters; their role in the process of reclamation had been important because they were most impacted by the reclamation, in terms of land value, aesthetics, and potential uses of the site. For these reasons, as many Parksville residents as possible were interviewed, and their response was considered as having weight on the Staunton population's response.

A sample of the 1800 households in Staunton was drawn by systematically drawing addresses from a list of water customers in the

city.⁵ The list consisted of addresses of all homes, businesses and organizations which were connected to the city water system. Members of the Staunton city clerk's office helped identify businesses and some vacant houses to be excluded from counting and apartment units to be included in the count. Every eighth residence on the list ordered by streets was selected. Subsequent reconnaissance of the addresses chosen showed no obvious systematic bias introduced by the method of drawing the sample. The number eight was chosen because it provided over 200 addresses, the maximum number expected to be completed within the time and cost constraints of the project.

Because the questionnaire measured a number of variables for which variances were unknown, and validity questions appeared to be more serious than questions of statistical reliability in the survey, a rough estimate of sample size was made based on similar studies (Manning 1975; Smith et al. 1978) and statistical considerations. The estimated sampling error from the mean of a binomially distributed variable at the 95 per cent confidence interval for a sample size of 200 can be expected to be at the most 7.1 per cent for $p = .5$ distribution, and at the least 4.2 per cent for $p = .9$ or $.1$ (Babbie 1973). Since only 110 interviews were completed in Staunton, the sampling error may be plus or minus 10 per cent for $p = .5$ or 6 per cent for $p = .9$ or $.1$ away from the mean of the binomially distributed variables. This assumes no bias from

⁵The list of water customers contained 1785 entries, with an estimated exclusion of 15 households not hooked up to the city water system. An additional 20 households (est.) were not included as separate entries in the list because they are apartment units under one listing per building. The number of businesses included in the list is about 50, with some businesses being part of a dwelling. Addresses selected which were later found to be vacant numbered 25. Thus, the maximum possible number of households in Staunton is taken as 1800, although the actual number is probably about 1750.

nonresponse or nonavailability of respondents, and does not inform us of the possible sampling error for other variables for which variances were unknown. While every effort was made to generate a representative sample of the Staunton population of sufficient size to reliably estimate population parameters, the failure to achieve 200 completed interviews within the survey time constraints is not viewed as too serious. Undue emphasis on sampling error might occlude the importance of investigating nonsampling errors introduced through question design and interviewer effects (Webb et al. 1966). Evidence about the validity of the research presuppositions should also affect confidence in the reliability of the statistical results (Selltitz et al. 1976).

4.2 Survey Administration

Letters describing the survey and asking for participation were printed on Argonne National Laboratory letterhead, each signed by the Program Director, and sent out to addressees in Staunton. An article was published in the local newspaper describing the survey, and officials of Staunton provided a letter of introduction to show to potential respondents (Appendix A). In anticipation of interviewing some people who were unaware of the reclamation project, care had been taken not to reveal the specific subject of the interview in the letters and newspaper articles.

A small number ($N = 10$) of interviews were obtained on July 6 and 7 as a pretest; after several minor changes interviewing was carried out in two time periods separated by one month. Appendix B contains a copy of the questionnaire and the information presented to respondents on cards. Figures 3 through 10 are the before and after reclamation photographs of the site shown to each respondent. The schedule of interviewing



Figure 3. Aerial view of project area before reclamation, 1976.



Figure 4. Aerial view of project area during reclamation, 1976.



Figure 5. Parcel 1 of project site: gob pile before reclamation.



Figure 6. Parcel 1 of project site: after reclamation of gob pile.



Figure 7. Parcel 2 of project site: before reclamation.



Figure 8. Parcel 2 of project site: after reclamation.



Figure 9. Parcel 3 of project site: before reclamation.



Figure 10. Parcel 3 of project site: after reclamation.

ran approximately 9 A.M. to 9 P.M. from July 12 to July 20 and August 21 to August 23, 1978.

4.3 Response Rate

Out of the 136 homes in Staunton actually responding in the time available, 110 questionnaires were completed, yielding a response rate of 80.8 per cent. An additional 26 people refused to take part in the survey, giving various reasons such as old age and sickness. A breakdown of the Staunton response is shown in Table 2.

TABLE 2
RESPONSE RATE FOR STAUNTON SAMPLE POPULATION

| | |
|---|-----|
| Sample drawn ^a | 267 |
| Vacant | 42 |
| No Answer ^b | 47 |
| Not Located | 42 |
| Refusals | 26 |
| Completed Interviews | 110 |
| Total Number Contacted | 136 |
| Response Rate = $\frac{110}{136} = 80.8$ per cent | |

^aReplacement samples were drawn upon receiving returned mail by choosing either an odd or even numbered house (based on a coin toss) nearest to the house being replaced.

^bUp to three callbacks per house.

Parksville residents were not mailed letters because of their familiarity with the reclamation and past cooperation with persons reclaiming the site. In Parksville, nine households adjacent to the mine area were interviewed (zero refusals). Those responses were added to the Staunton response for tabulations, except for willingness to pay amounts, bringing the number of completed questionnaires to 119.

4.4 Data Analysis Techniques

The information obtained in the survey was coded for statistical manipulations using the Statistical Package for Social Sciences (SPSS) on an IBM-370 Model 195 computer at Argonne National Laboratory. Recoding of variables was done for certain analyses. Some hand tabulations were also carried out for open-ended questions. The data analysis consisted of frequency counts, cross-tabulations, nonparametric correlations, and metric correlations on willingness to pay.

In most cases where SPSS programming was used, Kendall's tau β is used to provide correlation coefficients. Kendall's tau is traditionally used when data are in ordinal form and large numbers of cases are to be compared (Nie et al. 1975). The coefficient obtained from Kendall's tau is negative if x increases as y decreases, and positive if x and y decrease or increase together. A significance level of .05 was chosen for statistical tests because of the small sample size, and the assumption that the Type II error (accepting H_0 when it is false) is more serious than the Type I error (rejecting H_0 when it is true).

CHAPTER 5. EMPIRICAL RESULTS OF THE SURVEY

5.1 The Sample Population and Its Representativeness

The average age of the sample population of 119 is 45 years, ranging from 17 to 96 years, with 39.5 per cent rearing children below 18 at home, and 43.6 per cent having launched children out of the home. Most respondents' friends and family live in the Staunton area. Most sampled residents had been in high school (60.5 per cent) compared to 43.5 per cent in the 1970 census, while 22.6 per cent had had some college education, which level had been 10.7 per cent in 1970. Females make up 63.9 per cent of the sample population, although an effort was made to interview evenings and weekends to obtain male head of household responses.

The mean income level of the sample is between \$12,900 and \$17,900 annually. This range is considerably higher than the mean 1977 income for Macoupin County residents, but in line with statewide 1977 average incomes and 1978 production workers earnings for central Illinois (see Section 3.2). Production workers made up only 5 per cent of the respondents, although when employment of spouses of housewife respondents (N = 29 or 24 per cent) was considered, production workers made up a total of 21 per cent of the sample households. About 28 per cent of the sample were retired citizens, which is comparable to the 1970 census levels for this population. An additional 23 per cent of the sample were service workers, 13 per cent were professionals or

tradespeople, and 7 per cent were in wholesale or retail trade. Census data for 1970 are not directly comparable to these employment figures, and although the relative proportion of retired persons in the sample is the same as the census proportion, information about net migration flows of the Staunton population since 1970 is unavailable to update the census.

Examination of the location of those who completed questionnaires reveals a relatively even distribution across residential areas. Some segregation of income groups into general areas exists, such as lower income people in the southeast end of town, higher income in the northwest section. Relatively speaking though, the differences in housing were not great among neighborhoods, and differences in income were not as great as is found in larger centers of population. The slow growth of Staunton since 1970 and the nature of small town life in an all-white midwestern community implies a certain homogeneity, both in living conditions and probable outlooks, which the sample population is assumed to represent.

5.2 Preferences for Site Use

Two questions were phrased to determine people's preferences for site use (Appendix B, Questions 17, 18). For each question, a card listing a number of uses for the site was handed to the respondent who was asked which choice would be preferred for privately owned land, such as housing, commercial, private (fee) recreation, etc., and the same done for the public uses such as a community facility, education resource area, recreation area, etc.

Ambiguities in the categories offered caused some problems of interpretation on the part of the respondent. Where possible, each of

the categories was defined for each respondent to consider, for example, educational use meant classroom use of the area, nature preserve meant a wildlife preservation area.

Responses to choices of land use for private and public ownership of the reclaimed site are shown in Tables 3 and 4. Favored land uses in private ownership are private (fee) recreation, city housing, and returning the land to premine use. The large response to recreation seems unusual when a respondent as the hypothetical landowner could consider more traditionally profitable uses of private land. The influence of publicity about proposed uses of the site is assumed to be operating in this response category. In public use, the overwhelming first choice is recreation, with educational use and a nature preserve close second choices.

Respondents with children at home or who had raised children mostly preferred recreational use over other uses of the site, however, those with no children also preferred recreational use of the site. There was, in general, recognition of the desirability of having more recreation facilities for children near the town, as expressed in respondents' frequent statements that the type of recreation needed was "something for the kids".

Some questions were asked to determine what kinds of recreation, if any, respondents would most like to see on the site, and for comparison, what kinds of recreation respondents actually participate in for a few hours of leisure time (Appendix B, Questions 22, 23, 24).

There is a difference between what respondents want on the mine area and in Staunton, and what they actually do for recreation as shown in Table 5. Obviously this may be because of lack of opportunity to

TABLE 3

RESPONDENTS' PREFERRED USE OF RECLAIMED LAND IF OWNED BY RESPONDENT

| Land Use | First Choice (Per cent) ^a | Second Choice (Per cent) ^a |
|---|---|--|
| What it was before mining (timber and pasture) | 16.8 | 11.8 |
| Agriculture (rowcrops, pasture) | 9.2 | 14.3 |
| City housing | 21.8 | 10.1 |
| Acreages | 5.0 | 3.4 |
| Leave as is now | 6.7 | 10.9 |
| Private recreation | 23.5 | 18.5 |
| Private commercial development | 8.4 | 8.4 |
| Other | 8.4 | 9.2 |
| Missing | 0 | 13.4 |
| N = 119 | | |

^aTotals may not add up to 100 per cent due to rounding error.

TABLE 4

RESPONDENTS' PREFERRED USE OF RECLAIMED LAND IN PUBLIC OWNERSHIP

| Land Use | First Choice (Per cent) ^a | Second Choice (Per cent) ^a |
|---|---|--|
| What it was before mining (timber and pasture) | 3.4 | 3.4 |
| Community facility (church, hall) | 5.9 | 16.0 |
| Nature preserve | 13.4 | 19.3 |
| Park or recreation area | 64.7 | 10.1 |
| Fairgrounds | 0.8 | 3.4 |
| Leave as is now | 5.0 | 8.4 |
| Educational use | 5.0 | 21.0 |
| Other | 1.7 | 6.7 |
| Missing | 0 | 11.8 |
| N = 119 | | |

^aTotals may not add up to 100 per cent due to rounding error.

TABLE 5
TYPES OF RECREATION RESPONDENTS ENGAGE IN, WOULD LIKE IN
STAUNTON, AND WOULD LIKE ON THE RECLAIMED AREA^a

| | Mentioned Participating In Activity (Per cent) | Would Like In Staunton (Per cent) | Would Like On Mine Area (Per cent) |
|--|--|---|--|
| 1. Park, picnic area, playground | 21.0 | 16.0 | 45.3 |
| 2. Passive outdoor (e.g., camp, relax outdoors, mushroom hunt, nature study, being outdoors, sunbathing) | 14.3 | 15.1 | 5.9 |
| 3. Water-based (swim, fish, boat, sail, being at a lake) | 40.3 | 43.6 | 38.7 |
| 4. Indoor active (dance, bowl, rollerskate) | 0.8 | 7.6 | 13.4 |
| 5. Outdoor games and sports (tennis, ball, archery, mini-golf, horseshoes) | 14.3 | 19.3 | 45.4 |
| 6. Indoor passive (shop, eat out, visit friends, cards, community center, read) | 35.3 | 10.9 | 3.4 |
| 7. Scheduled events (shows, carnivals, auctions, church) | 19.3 | 13.4 | 8.4 |
| 8. Trails (horse, bicycle, nature) | 0.8 | 5.0 | 13.4 |
| 9. Hunt | 2.5 | 2.5 | - |

^a Percentage totals do not add up to 100.0 because respondents often gave more than one choice.

participate in the desired activities. Alternatively, it may be that respondents are simply naming off conventional types of recreation for the site, which types are within common experiences of recreation. Another possible reason is that the respondent's recreation desires differ from what the respondent wants for others and for children.

According to the table, respondents do not mention participating in each category as frequently as they mention wanting that type of recreation. Passive indoor recreation and attending scheduled events are exceptions, both activities are in keeping with the opportunities available in and near Staunton. Water-based activities are also available within a reasonable distance from Staunton, but are still desired closer to the town. Although a small percentage said they would like trails, few said they actually go hiking, walking, or bicycling for recreation.

Favorability towards having certain kinds of recreation for Staunton was determined by introducing a seven point scale for the importance of having each type of recreation named (Appendix B, Question 25). The results in Table 6 show the respondents' general positions on some of the overall recreation needs of the town. A city park, fishing area, playing fields, bicycle or hiking trails, and a picnic area, respectively score highest, while a motorcycle track scores lowest, especially among older respondents ($\tau = 0.2546$ sig. = .0003). The importance placed on having bicycle and hiking trails available is contrasted with the few who said they actually bicycle and hike in Table 5.

Only 3.4 per cent of the sample opposed tourists coming into Staunton, should there be some attraction such as a recreational development on the mine site. Respondents were also asked if they would

TABLE 6

REPORTED IMPORTANCE OF HAVING SELECTED
TYPES OF RECREATION IN OR NEAR STAUNTON

| Recreation Type | Important | Neutral | Unimportant (Per Cent) | Missing | Total ^a |
|--------------------------|-----------|---------|---------------------------|---------|--------------------|
| Nature center | 63.8 | 23.5 | 12.6 | - | 100 |
| Wildlife preserve | 63.8 | 21.8 | 14.2 | - | 100 |
| City park | 82.3 | 8.4 | 9.2 | - | 100 |
| Museums | 43.6 | 28.6 | 27.7 | - | 100 |
| Campground | 58.8 | 8.4 | 32.0 | .8 | 100 |
| Fishing | 75.7 | 13.4 | 10.8 | - | 100 |
| Motorcycle track | 16.8 | 10.1 | 73.2 | - | 100 |
| Playing fields | 70.6 | 13.4 | 16.0 | - | 100 |
| Bicycle or hiking trails | 81.5 | 7.6 | 10.9 | - | 100 |
| Shooting range | 32.8 | 21.8 | 45.4 | - | 100 |
| Off-road vehicle park | 25.2 | 21.0 | 53.8 | - | 100 |
| Picnic area | 81.4 | 5.9 | 4.2 | 8.4 | 100 |
| N = 119 | | | | | |

^aTotals may not add up to 100 per cent because of rounding error.

visit the reclaimed area if it were used for recreation. About 80 per cent of the sample said they would visit the mine area if it had a recreational use they liked, although there was a negative correlation coefficient ($r = -0.2597$ sig. = .001) in a cross-tabulation by years of residence, logically suggesting that elderly residents' were less likely to visit the mine area for recreation. Both income and stage in life cycle affected responses to visiting the area, the higher the income, the less likely the respondent was to visit the area; the more involved in child rearing, the more likely to visit.

From the information available, it appears that recreation is the most preferred use of the site, supporting the first hypothesis. Alternatives such as facilities for outdoor games and sports and a park with a picnic area and playground are the most frequently mentioned

types of recreation desired, although water-based recreation, bicycle or hiking trails, and indoor active sport areas are also deemed important to have in the community.

5.3 Views of Reclamation

Respondents were asked how and when they had come to know about the reclamation project (Appendix B, Questions 9, 10). The majority had come to know about it through the newspapers (45.4 per cent), word-of-mouth (33.6 per cent) or driving by (10.1 per cent). A small percentage (6.0 per cent) of respondents said they had not heard about the project until the interview or within a month of the interview, while 73.1 per cent had heard about it two or more years before the interview.

After showing respondents the before and after reclamation photographs (Figures 3 to 10) they were asked to respond to questions on the scale of one to seven, one being the negative quality, seven the positive (Appendix B. Questions 11, 12, 20). Evaluations were sought of how personally important the reclamation was to the respondent, how good or bad it was that it was done, if other piles near Staunton should be reclaimed, and if other abandoned mine spoils in Illinois should be reclaimed. State involvement and town involvement were evaluated on the same scale, and whether or not the reclamation should have been done at all.

Table 7 shows the results for each of the questions used to indicate favorability toward the project. Individual valuations of the personal importance of the reclamation were lower than individual valuations of the general good engendered by the reclamation, although only 10.9 per cent of the respondents said that the reclamation was of no personal

TABLE 7

FAVORABILITY TOWARD RECLAMATION

| Statement | (Per cent) | | | | | | |
|--|----------------|-----------|----------------------|---------|----------------------|-------------|-------------------|
| | Very Important | Important | Of Little Importance | Neutral | Somewhat Unimportant | Unimportant | Very Unimportant |
| Personally important that reclamation was done | 35.3 | 17.6 | 11.8 | 24.4 | 2.5 | 1.7 | 6.7 |
| Total | | | | | | | 100.0 |
| | | | | | | | |
| Statement | Very Good | Good | Somewhat Good | Neutral | Somewhat Bad | Bad | Very Bad |
| Generally good that reclamation was done | 63.0 | 20.2 | 10.1 | 5.9 | 0.8 | - | - |
| Total | | | | | | | 100.0 |
| | | | | | | | |
| Statement | Agree Strongly | Agree | Agree Somewhat | Neutral | Disagree Somewhat | Disagree | Disagree Strongly |
| Other piles near Staunton should also be reclaimed | 68.1 | 10.9 | 7.6 | 8.4 | 1.7 | - | 3.4 |
| Other piles in Illinois should be reclaimed | 58.0 | 19.3 | 10.1 | 8.4 | 2.5 | - | 7.1 |
| Reclamation should not have been done | 0.8 | 1.7 | - | 6.7 | 10.9 | 6.7 | 73.1 |
| N = 119 | | | | | | | 100.0 |

importance. This suggests that the reclamation is indeed viewed favorably, as does the large negative response to the proposition that the reclamation should not have been done. As expected, the proposal for reclamation of other mine spoils near Staunton was more positively evaluated than reclamation of other mine spoils throughout Illinois. When asked if the reclamation had changed their opinion about living near the reclaimed site, 59.7 per cent said yes, 34.5 per cent said no, and the remainder was not certain.

An index of favorability was created by recoding of the variables in Table 7 (Appendix C). Favorability levels were grouped as low, medium, or high, with the distribution of respondents among these categories shown in Table 8. Seven respondents were generally unfavorable toward

TABLE 8
FAVORABILITY INDEX OF ATTITUDES TOWARD RECLAMATION

| Response | Per cent | Number |
|--|----------------------|------------------|
| Low (very negative to neutral) | 5.9 | 7 |
| Medium (somewhat positive to positive) | 28.6 | 34 |
| High (very positive) | <u>65.5</u> 100.0 | <u>78</u> 119 |

the reclamation, while the majority of the respondents viewed the reclamation most favorably. The index was related by cross-tabulation with preferred land uses, income, age, education, attitudes toward living near the site, the publicity Staunton received, and whether the respondent would visit the area for recreation.

Cross-tabulation of the favorability index with preferences for private land uses, (i.e., if the respondent owned it), on the reclaimed area show that preferences of those respondents who were generally unfavorable or neutral toward the reclamation area were for premine use and "other" land uses on the reclaimed area (Table 9). The next category of moderately favorable respondents preferred housing (26.5 per cent), private recreation (23.5 per cent), what it was before mining (14.7 per cent), and agriculture (11.8 per cent). Those having the highest favorability preferred private recreation (24.4 per cent), housing (20.5 per cent) and premine land use (16.7 per cent) if the land were privately owned.

Favorability levels are compared with preferences for land uses on the site in public ownership in Table 10. A park or recreation area was preferred by all three groups, and a nature preserve preferred next most. High favorability toward the reclamation was demonstrated most among groups in the annual income range of \$5,000 to \$10,000 (not shown).

Correlation coefficients and significance levels of several variables related to the favorability index are shown in Table 11. As shown, there is a strong correlation between a stated change in opinion about living in the area near the reclaimed land and high favorability toward reclamation. Stage in life cycle appears to be unrelated to favorability. Those with higher education levels were not more likely to be more favorable toward the project. Favorability toward the project is linked to perceptions of publicity that Staunton received and stated desires to visit the mine area.

Respondents were asked whether or not they foresaw any problems with implementing proposed site uses (Appendix B, Question 19). Only

TABLE 9

CROSS-TABULATION OF FAVORABILITY INDEX
WITH PREFERENCES FOR USE IN PRIVATE OWNERSHIP

| Favorability | Land Use (Per cent of Respondents) | | | | | |
|--------------|---------------------------------------|-------------|-----------------|-----------|--------------------|-----------------------|
| | Premine Use | Agriculture | City Housing | Acresages | Leave As Is Now | Private Recreation |
| Low | 1.7 | 0.8 | 0.8 | 0.0 | 0.0 | 0.8 |
| Medium | 4.2 | 3.4 | 7.6 | 0.8 | 1.7 | 6.7 |
| High | 10.9 | 5.0 | 13.4 | 4.2 | 5.0 | 16.0 |
| Total | 16.8 | 9.2 | 21.8 | 5.0 | 6.7 | 23.5 |
| | | | | | | Private Commercial |
| | | | | | | 0.0 |
| | | | | | | 2.5 |
| | | | | | | 5.9 |
| | | | | | | 8.4 |
| | | | | | | 1.7 |
| | | | | | | 1.7 |
| | | | | | | 5.0 |
| | | | | | | 8.4 |
| | | | | | | 100.0 |

TABLE 10

CROSS-TABULATION OF FAVORABILITY INDEX
WITH PREFERENCES FOR USE IN PUBLIC OWNERSHIP

| Favorability | Land Use (Per cent of Respondents) | | | | | |
|--------------|---------------------------------------|-----------------------|--------------------|------------------------------|-----------------|--------------------|
| | Premine | Community Facility | Nature Preserve | Park or Recre- ation Area | Fair Grounds | Leave As Is Now |
| Low | 0.8 | 0 | 1.7 | 1.7 | 0 | 0.8 |
| Medium | 0.8 | 0 | 1.7 | 22.7 | 0 | 1.7 |
| High | 1.7 | 5.9 | 10.1 | 40.3 | 0.8 | 2.5 |
| Total | 3.3 | 5.9 | 13.5 | 64.7 | 0.8 | 5.0 |
| | | | | | | Education |
| | | | | | | 0.8 |
| | | | | | | 0.8 |
| | | | | | | 3.4 |
| | | | | | | 5.0 |
| | | | | | | 0 |
| | | | | | | 0.8 |
| | | | | | | 0.8 |
| | | | | | | 1.6 |
| | | | | | | 100.0* |

*Totals may not add up to 100 per cent due to rounding error.

TABLE 11

CORRELATION COEFFICIENTS FOR FAVORABILITY TOWARD
RECLAMATION AND TEST VARIABLES

| Test Variables | Correlation with Favorability Index ^a |
|--------------------------------------|--|
| Opinion changed about living in area | 0.3192 (.001) |
| Stage in life cycle | 0.1059 (.225) |
| Education | 0.1299 (.131) |
| Publicity increased | 0.1530 (.061) |
| Willingness to visit mine area | 0.1684 (.044) |

^aKendall's tau β (N = 119)

5.9 per cent said they thought there would be a problem with site conditions as shown in Table 12. The remainder saw no problems, or, frequently cited supervisory and maintenance problems, possibly because of awareness of recent problems with vandalism and maintenance in local recreation clubs.

As mentioned earlier, interviewing was carried out in two time periods separated by a month; it was discovered that, in the interval, the local newspaper had published an article about a Soviet delegation visiting the reclamation site. As a result of this, there arose the opportunity to evaluate differences in the level of favorability toward the project between the groups interviewed before and after the article. No significant increase in favorability resulted because of the article ($\tau = 0.0440$ sig. = .632), nor was there a significant relative increase

TABLE 12

PERCEIVED PROBLEMS ASSOCIATED
WITH LAND IN PREFERRED PUBLIC USE

| Category | Per cent of Respondents |
|-------------------------------|-------------------------|
| Developmental (e.g., funding) | 13.4 |
| Supervisory and maintenance | 21.8 |
| Site-specific, environmental | 5.9 |
| Distance, other | 16.8 |
| No problem | 39.5 |
| Uncertain | 2.5 |
| | 100.0 |

in the number of respondents whose opinion had changed about living near the mine area ($\tau = -0.0019$, $\alpha = .983$).

Reclamation is viewed very favorably by the majority of the respondents, but there is very little stated awareness of site-specific environmental problems with developing reclaimed sites for various uses. Changes in opinion about living near the reclaimed site, a willingness to visit the area for recreation, and perceptions of increased publicity for Staunton as a result of reclamation appear to be indicators of favorability toward reclamation in this case. A high percentage of very favorable respondents also desired recreation on the site and people were more favorable toward reclamation close to home versus elsewhere in the state.

5.4 Valuation of Reclamation

There were two willingness to pay questions included after orientation about the site (Appendix B, Questions 15, 16). The first question

asked simply if the respondents thought that the reclaimed area was now worth more to them, in any way. This question was included because money may not be the expression of the value of reclamation for some. Regardless of their answer to this question they were then asked how much, in dollars per month, it was worth to them to pay for the reclamation, assuming contributions were solicited.

It was found that 78.2 per cent ($N = 93$) of the respondents thought the reclaimed area was worth more to them now, in some way, than before it was reclaimed. When a monetary value was requested, only half ($N = 46$) of those who had said it was worth more could actually state a value other than zero. Responses ranged from zero to \$50 per month, with 61.3 per cent saying zero, 12.6 per cent from zero to \$1, 18.5 per cent from \$1 to \$5, and 7.6 per cent willing to pay \$5 and up per month.

The high number of zero responses is unusual compared to other willingness to pay studies for several possible reasons. Studies have focused on the willingness to pay of users of the resource in question (Davis 1963; McConnell 1977; Smith et al. 1978). Among resource users, the effect of change on their use may readily be imagined and responded to in terms of monetary value. In this case, willingness to pay was elicited for the environmental improvement as it is now, without any use. The value of certain uses of the site was not in question. Upon being asked to evaluate the reclamation as a public good, much as one would evaluate clean water or air, it might be expected that a large number of respondents would bid zero, although other factors discussed earlier may be contributing to the zero response. Because the photographs showed the site before and after reclamation, respondents should have been able to imagine exclusion from the resource. Part of the zero response might be

explained by some respondents' difficulty with settling on a particular value without some idea of where to start. The time constraint and other pressures inherent in the interview situation might also have contributed to them choosing the easiest answer; zero. The high proportion of low income retired people in the sample suggests that their responses may have been zero because of income constraints. It was found, however, that there was no consistent difference between their response and that of higher income people.

Because it was generally known that recreational use of the site had been considered by the city, a possible link between willingness to pay an amount and preferred use of the site was examined. Table 13 shows that the greatest percentage of those willing to pay an amount in both public and private ownership prefer recreational use. The result suggests that willingness to pay responses may not be an evaluation of the aesthetic improvement alone. This will be examined in greater depth later.

If one considers each willingness to pay response as a cost which the potential user is willing to incur to obtain reclamation of the site, then the responses can be aggregated to measure the net value produced by reclamation of the area. The total benefit to resource users is the sum of the maximum prices people would pay to prevent exclusion from the resource. In this case, the resource is the reclaimed area. Assuming that the sample population is representative of the Staunton household population, then Table 14 is a simple aggregate estimate of annual willingness to pay for Staunton households. In effect, the number of "users", i.e., those willing to pay one dollar toward reclamation make up 8.2 per cent of the sample, and if the sample is

TABLE 13
WILLINGNESS TO PAY RELATED TO PREFERRED
USES OF LAND IN PUBLIC AND PRIVATE OWNERSHIP

| Public Ownership | | | | Private Ownership | | | |
|-------------------------|-----------------------------------|---|---|------------------------|--------------------|---|---|
| Preferred Use | Per cent of Sample Preferring Use | Per cent Willing to Pay an Amount (N = 119) | Per cent Who Stated Area Is Personally Worth More | Preferred Use | Per cent of Sample | Per cent Willing to Pay an Amount (N = 119) | Per cent Who Stated Area Is Personally Worth More |
| Premine Use | 3.4 | 0.8 | 1.7 | Premine | 16.8 | 5.9 | 11.9 |
| Community Facility | 5.9 | 1.7 | 4.2 | Agriculture | 9.2 | 2.5 | 7.6 |
| Nature Preserve | 13.4 | 6.7 | 9.3 | City Housing | 21.8 | 5.8 | 16.9 |
| Park or Recreation Area | 64.7 | 26.0 | 54.2 | Acresages | 5.0 | 1.6 | 4.2 |
| Fairgrounds | 0.8 | 0 | 0.8 | Leave as Is Now | 6.7 | 5.0 | 6.8 |
| Leave As Is Now | 5.0 | 1.6 | 3.4 | Private Recreation | 23.5 | 13.4 | 19.5 |
| Educational Use | 5.0 | 0.8 | 4.2 | Commercial Development | 8.4 | 0.8 | 5.9 |
| Other | 1.7 | 0.8 | 0.8 | Other | 8.4 | 3.4 | 5.9 |
| Not Willing to Pay | - | 61.3 | 21.2 | Not Willing to Pay | - | 61.3 | 21.2 |
| | 100.0 | 100.0 | 100.0 | | 100.0 | 100.0 | 100.0 |

TABLE 14

BENEFITS FROM RECLAMATION EXPRESSED
BY SAMPLED STAUNTON RESIDENTS^a

| Willingness to Pay Per Month | Per cent of Sample ^b (N = 110) | Projected Willingness to Pay of Staunton Households ^c |
|---|--|---|
| 0 | 61.8 | \$ 0.00 |
| .17 ^d | .9 | 2.75 |
| .25 | .9 | 4.05 |
| .50 | 2.7 | 24.30 |
| 1.00 | 8.2 | 147.60 |
| 1.50 | 2.7 | 72.90 |
| 2.00 | 3.6 | 129.60 |
| 2.50 | .9 | 40.50 |
| 3.00 | .9 | 48.60 |
| 3.50 | 2.7 | 171.80 |
| 4.00 | .9 | 64.80 |
| 4.15 | .9 | 67.23 |
| 4.50 | .9 | 72.90 |
| 5.00 | 3.6 | 324.00 |
| 10.00 | 5.6 | 990.00 |
| 25.00 | .9 | 405.00 |
| 27.50 | .9 | 445.50 |
| | 100.0 | \$3,011.53 |
| Parksville residents willingness to pay/month is \$59.00 | | 59.00 |
| | | \$3,070.53/month |
| Total benefits per year | | \$36,846.36 |

^a Approximately 1,800 households in Staunton area. An additional 15 households are in Parksville but no inference could be drawn about the Parksville population other than the 9 surveyed.

^b Total may not add up to 100 per cent due to rounding error.

^c Assuming that the sample population is representative of the total population.

^d Some willingness to pay estimates are averaged, e.g., respondents said \$2 per year; \$50 per year; \$25 to \$30 per month, etc.



representative of the population, 8.2 per cent of the population is willing to incur that cost for reclamation. If this is done for each willingness to pay category, an aggregate willingness to pay for the community is obtained. Recreation, wildlife preservation, and environmental education are the proposed uses of the site which were publicized in the local newspaper. Since a high percentage (67.2 per cent) of those who were willing to pay amounts desired recreational use of the reclaimed site, it might be inferred that those respondents are willing to pay only if recreational use of the site is adopted. An additional 19.4 per cent of those willing to pay amounts stated preferences for a nature preserve and educational use in line with the proposed uses. The other choices offered in Table 13 for public ownership may not have seemed as attractive as the recreation option, although it is assumed that the stated preference is a real desire uninfluenced by the question design.

To determine the possible effect of adoption of proposed uses on aggregate willingness to pay, it must be assumed that those who preferred other uses would no longer be willing to pay amounts. This would mean that 4.9 per cent of the sample,⁶ or 6 respondents would no longer be willing to pay amounts. In Table 14, if the loss of that percentage of the very highest willingness to pay categories being deleted, the aggregate willingness to pay of households could be reduced by as much as 45 per cent, but would still prove a benefit of about \$20,100 annually. This very hypothetical analysis serves the purpose of placing a proviso on the estimated benefits to account for the probability that

⁶From Table 13 "Public Ownership". The sum of those willing to pay amounts for converting land to prime use, community facility, leaving as is now, and other is 4.9 per cent.

willingness to pay is tied to preferences for use of the land. Willingness to pay benefits may thus fall in the range of \$20,100 if tied to proposed uses and \$36,800 if it is not tied to uses.

Table 15 presents a breakdown of willingness to pay responses by various groups, and average amounts expressed by each group. Because of the small sample size this table can only provide relative comparisons within each subgroup of the sample.

From the table, it appears that willingness to pay any amount is related to income, education, sex, and the time surveyed. Several of these and other variables thought to be possible explanatory variables on willingness to pay were recoded where necessary to an ordinal scale, and submitted for nonparametric correlation shown in Table 16. A socioeconomic scale was developed after Nie et al. (1975), combining income, education, and occupational status variables, which were in themselves not significantly related to willingness to pay but in combination could be (Appendix C). Also included was the favorability index and group division of Time 1 and Time 2 in the interviewing period. As shown in the table, neither the time interviewed nor socioeconomic scale were significantly related to willingness to pay an amount. Contrary to what was expected, years of residence in the area and memberships in organizations were not related to stating higher amounts of payment. This may be because many years of residence usually means retirement and reduced ability to pay, while involvement in organizations apparently does not necessarily imply a commitment to pay for environmental improvements.

Those respondents who were highly favorable toward reclamation, said the area was worth more to them in some way, and strongly agreed they would visit the area for recreation stated higher amounts of

TABLE 15

WILLINGNESS TO PAY BY SELECTED SUBGROUPS OF SAMPLE POPULATION

| | Per cent of Sample | N | Percentage of Subgroup Willing to Pay an Amount |
|---|--------------------|-----|---|
| <u>Occupation</u> | | | |
| Trades, | | | |
| Professional | 13.4 | 16 | 43.8 |
| Housewives | 24.4 | 29 | 62.0 |
| Retired | 27.7 | 34 | 27.3 |
| Mining, Mfg., | | | |
| Trans. | 5.0 | 8 | 16.7 |
| Gov. and | | | |
| Service | 22.7 | 25 | 33.3 |
| Sales | 6.7 | 7 | 25.0 |
| N = 119 | 100.0 | 119 | |
| <u>Annual Income</u> | | | |
| Low (0-10,000) | 36.1 | 41 | 30.2 |
| Medium (10-20,000) | 35.3 | 43 | 45.2 |
| High (20,000 +) | 24.4 | 29 | 41.3 |
| N = 119 | 100.0 | 119 | |
| <u>Sex</u> | | | |
| Males | 36.1 | 43 | 33.2 |
| Females | 63.9 | 76 | 42.1 |
| N = 119 | 100.0 | 119 | |
| <u>Education</u> | | | |
| Eight Yrs. or less | 16.8 | 19 | 30.0 |
| Some highschool | 60.5 | 73 | 38.9 |
| Beyond highschool | 22.6 | 27 | 44.4 |
| N = 119 | 100.0 | 119 | |
| <u>Survey Periods</u> | | | |
| Time 1 (N = 87) | 73.1 | 87 | 35.6 |
| Time 2 (N = 32) | 26.9 | 32 | 46.9 |
| N = 119 | 100.0 | 119 | |
| Average willingness to pay of entire sample | \$2.06 | | |

TABLE 16

NONPARAMETRIC CORRELATION OF TEST VARIABLES

| | Willingness to Pay An Amount | Years of Residence | Publicity Increase | Visit for Recreation | Sex | Change in Opinion | Interview Date | Organ. Memberships | Age | Favor- ability Index | Personally Worth More | Socioeconomic Scale |
|-----------------------------|---------------------------------|-----------------------|-----------------------|-------------------------|-------------------|----------------------|-------------------|-----------------------|-------------------|----------------------------|--------------------------|------------------------|
| Years of Residence | -0.0857 (.234) | | | | | | | | | | | |
| Publicity Increase | 0.0900 (.246) | 0.0657 (.334) | | | | | | | | | | |
| Visit for Recreation | 0.2716 (.001) | -0.2331 (.001) | 0.1012 (.177) | | | | | | | | | |
| Sex | -0.0781 (.369) | 0.0871 (.253) | 0.1202 (.143) | -0.2281 (.007) | | | | | | | | |
| Change in Opinion | 0.2094 (.014) | -0.0137 (.854) | 0.0487 (.544) | 0.0884 (.281) | 0.0639 (.477) | | | | | | | |
| Interview Dates | 0.1151 (.186) | 0.0183 (.810) | 0.2638 (.001) | -0.0223 (.790) | -0.0617 (.503) | -0.0019 (.983) | | | | | | |
| Organization Memberships | 0.0406 (.605) | 0.0845 (.219) | 0.0094 (.900) | -0.0758 (.317) | 0.1108 (.182) | -0.0524 (.518) | 0.1692 (.042) | | | | | |
| Age | -0.1316 (.086) | 0.3970 (.001) | 0.0457 (.527) | -0.3622 (.001) | 0.0978 (.227) | -0.0502 (.525) | 0.0845 (.297) | 0.1661 (.023) | | | | |
| Favorability Index | 0.2286 (.008) | -0.1316 (.083) | 0.1530 (.061) | 0.1684 (.044) | 0.0148 (.872) | 0.3192 (.001) | 0.0440 (.632) | 0.0763 (.357) | -0.1414 (.080) | | | |
| Personally Worth More | 0.2942 (.001) | -0.1288 (.090) | 0.2427 (.003) | 0.1893 (.024) | 0.0106 (.908) | 0.2183 (.015) | 0.1380 (.132) | 0.0626 (.450) | -0.1120 (.165) | 0.1348 (.140) | | |
| Socioeconomic Scale | 0.0497 (.505) | 0.0145 (.824) | -0.0198 (.778) | 0.0888 (.217) | 0.2022 (.010) | -0.0114 (.883) | 0.1382 (.080) | 0.0484 (.497) | -0.3034 (.001) | 0.1427 (.069) | 0.0231 (.769) | |
| Stage in Life | 0.2508 (.002) | -0.1591 (.028) | -0.0317 (.685) | 0.2474 (.002) | -0.2533 (.004) | -0.1944 (.023) | 0.1077 (.219) | -0.0198 (.803) | -0.3714 (.001) | 0.1059 (.225) | -0.0198 (.821) | 0.1051 (.162) |

Kendall's tau β N = 119

payment. A positive change in opinion about living near the area was also related to increasing amounts respondents were willing to pay. Respondents with children were most likely to pay an amount, as well as more likely to want to visit the area for recreation. Their opinion about living near the area was not likely to change, possibly because of their perceptions of mobility. Although there was a positive correlation between favorability toward reclamation, personal worth of the project and willingness to pay, respondents having children demonstrated no relationship to levels of favorability toward reclamation or to agreement that the reclaimed area is worth more. On the other hand, respondents with children had the highest significant relationship to wanting to visit the area. In contrast, highly favorable responses and stated increases in personal worth of the area also were significantly related to wanting to visit the area.

Thus, it appears that there may be two groups of respondents who are willing to pay amounts; those whose opinion has changed about living near the area, who are highly favorable toward reclamation and feel the area is worth more to them, and those who have children who may wish to ensure the provision of public facilities for the future. The former group may be influenced by publicity about the reclamation, as may be indicated in the table.

A cross-tabulation with appropriately recoded values (Table 17) revealed that desires for recreational use were expressed by two-thirds of those willing to pay amounts. About two-thirds of those with children also desired recreational use. However, when willingness to pay of those with and without children was cross-tabulated (not shown), and correlated (Table 6), those with children were more likely to state

TABLE 17

CROSS-TABULATION OF WILLINGNESS TO PAY BY PREFERRED
USES OF LAND IN PUBLIC OWNERSHIP

| Willingness to Pay | Per cent of all respondents (N = 119) | | | Total |
|--------------------|---|---|--|-------|
| | Least Preferred Uses Premine, Fairgrounds Education, Other | Moderately Preferred Uses Nature Preserve, Community Facility Leave As Is Now | Most Preferred Uses Park or Recreation Area | |
| 0 | 8.4 | 14.3 | 38.7 | 61.3 |
| \$0.05 to \$1.00 | 0.0 | 2.5 | 10.1 | 12.6 |
| \$1.00 to \$5.00 | 2.5 | 5.9 | 10.1 | 18.5 |
| \$5.00 to highest | 0.0 | 1.7 | 5.9 | 7.6 |
| Total | 10.9 | 24.4 | 64.7 | 100.0 |

amounts of payment than those without. Statistical manipulation of the land use preference variable with willingness to pay and stage in life cycle would not be meaningful, and therefore, it must be assumed from the evidence presented that two groups of respondents are willing to pay for reclamation, perhaps based upon the desire for recreation at the site.

5.5 Recommendations for Use of the Site

Considering the high percentage of respondents who expressed that they would visit the area if it had recreational use (p. 43) and the general findings in Tables 3, 4, 5, and 6, it is fairly clear that there are several recreation options receiving a high level of support.

It is recommended that the reclaimed area near Staunton be developed as a low intensity use park, containing modest facilities for picnics, and a playground. Part of the site could be devoted to a nature preserve, with a short nature trail bordering Cahokia Creek and uplands surrounding the pond. A bicycle trail leading from the town of Staunton to the park is also suggested. These developments can be achieved without unduly disturbing the reclamation and at the same time they can utilize highly attractive areas of the site. Other uses which respondents deemed as important to have in or near Staunton, such as campgrounds and playing fields, are possible but not compatible at this time with the limitations on site use. The recommendations made for recreational uses on the site are not ambitious, but fulfill immediate desires of the Staunton population for certain uses, and allow for addition of facilities as site conditions and growth of Staunton dictate.



CHAPTER 6. SUMMARY AND CONCLUSIONS

6.1 Summary of Results

Preferred Use of the Reclaimed Area

A sample survey of residents in the central Illinois city of Staunton showed that recreational use of a nearby reclaimed mine area is preferred over other public or private uses. Frequently mentioned types of recreation facilities desired on the site were for outdoor games and sports, picnics, and a playground. Although water-based recreation was also a desired use of the area, the characteristics of the site environment preclude development of that water resource base in the near future. The majority of respondents, but especially those with low to middle incomes and/or who were raising children, stated they would visit the mine area if it had a recreational use they liked.

View of Reclamation

According to the survey results, reclamation is viewed very favorably by most respondents. There is little evidence of respondent awareness of site-specific environmental problems, such as toxic materials exposure, which may be encountered in developing reclaimed sites for various uses.

In general, respondents who stated a positive change in opinion about living near the area, a willingness to visit the area for recreation, and who thought that Staunton had received a great deal of publicity as a result of reclamation also were very favorable in their evaluations of the reclamation. A high percentage of very favorable

respondents also desired recreation on the site. Favorability toward reclamation for problem areas throughout the state of Illinois, however, was less strong than favorability toward reclamation on nearby sites.

Valuation of Reclamation

Over three-fourths of the sample thought the reclaimed area was now worth more to them, in some way, than before reclamation. Only half of those respondents were actually able to state a monthly value they would be willing to pay to have the area reclaimed to its present state. No particular use was associated with the request for willingness to pay, although two-thirds of those willing to pay amounts desired public recreational use of the site.

Further analysis of the relationships between willingness to pay responses and other variables revealed that two groups of respondents were stating amounts of payment. The first group is composed of those who expressed positive changes in opinion about living near the area, very favorable evaluations of the reclamation, and thought the reclaimed area was worth more to them in some way. The second group appears to be made up of those respondents having raised or raising children, who are not necessarily highly favorable toward reclamation, neither have they positively changed their opinion about living near the mine area, nor are impressed by publicity increases for Staunton, but they state they would visit the area for recreation and are willing to pay.

6.2 Limitations of the Study

There are several concerns arising out of the methods used in this study which limit interpretation of the results.



Sample Size

The size of the sample introduces the possibility of a sampling error which may be relatively large, although questions of validity for the variety of questions for which variances are unknown seem to be a more serious consideration than statistical reliability. The bias from nonresponse or nonavailability of respondents may contribute to the uncertainty attached to the results, although representativeness of the total population is assumed.

Question Design

Prior knowledge of the reclamation project among respondents was expected but to an unknown extent. The photographic interpretation of the reclamation was supposed to provide a common basis from which respondents could answer questions, although respondents indeed may not have had enough information to tell who should pay, and what problems of development at the site may be. In addition, the photographs shown may have influenced the level of favorability toward the reclamation because of the marked contrasts before and after reclamation they represented. Evaluated in terms of its present visual aspects, without knowledge of its previous state, the reclaimed area today differs little in character from the surrounding topography of cropland interrupted occasionally by small stands of trees and pasture.

Ordering of questions may have influenced responses. For example, respondents were asked to state their willingness to pay for the reclamation after they were asked who should have paid for the reclamation. The phrasing of questions also contributed to uncertainties in interpreting the results. Some of the land use choices offered respondents were not clearly mutually exclusive, and the response

scale of 1 to 7 provided too many increments to be useful to many respondents. The results reported from open-ended questions about recreation participation and specific desires for site use probably do not reflect actual participation or the range of facilities the community actually needs for recreation. The high number of requests for swimming facilities on the reclaimed area suggests that respondents were less concerned with the suitability of that location for swimming than the present and perhaps only opportunity to express desires for recreation facilities where they may be heard.

In addition, the choice of an open-ended question about willingness to pay has resulted in a great deal of uncertainty about the reliability of the response, which is a similar conclusion to that of some researchers investigating willingness to pay question design. For this reason, the aggregated willingness to pay estimate provided should be regarded as a measure which, in the absence of others, provides a general indication of value, but which should be compared with revealed preferences in land sales and other increases in area value as a result of reclamation to determine its validity.

6.3 Recommendations

According to the results of this survey, the value of abatement of environmental damages is widely recognized by people, but general knowledge of potential uses and limitations on use of reclaimed areas is distinctly lacking among those who must help choose the land uses for these areas. To prevent difficulties with achieving maximum community satisfaction about development of publicly-owned reclaimed areas, an information package about the problems and potentials of

reclaiming abandoned lands should be provided to communities involved in reclamation planning. Community desires for land uses out of character with the limitations imposed by the reclaimed material could then be reduced to a minimum.

In the case studied here, the desired uses of the site stated by informed city officials were also stated by sampled residents. Finding the appropriate mix of uses and facilities once the general land use is determined requires analysis of existing facilities and planning based on knowledge of community needs. Since most small communities affected by the Abandoned Mine Reclamation Program do not retain the personnel appropriate for aiding in development of reclaimed areas, state involvement in the details of development may be necessary. For example, communities having ambitious plans for use and development of reclaimed areas may need assistance in obtaining funds for new public services.

Willingness to Pay

From what was learned in this investigation, some willingness to pay questions may be approached more efficiently in a mail survey, because respondents could have more time to consider their willingness to pay without the constraining presence of an interviewer. Providing the respondent with several categories, such as different uses of reclaimed land upon which willingness to pay responses are requested, might provide the researcher with more assurance that the tradeoffs in allocating an amount are recognized by respondents. Where possible, an incremental bid approach is probably superior for limiting the tendency to adopt gaming strategies and obtaining as precise an estimate of

willingness to pay as possible, although incremental bid responses may be biased as a result of the choice of starting points and the increments.

Willingness to pay surveys have mostly been concerned with the valuation responses of resource users faced with the prospect of exclusion or reductions in quality of the resource. If these surveys are to provide measures of the value of public resources to society, measurement of nonusers willingness to pay must, logically, be included. At the same time, more rigorous attempts to establish the reliability of these estimates is needed, by comparing values of resources using conventional techniques before and after environmental change took place. If willingness to pay is a function of ability to pay, or income level, then a survey might attempt a budgetary approach to evaluating environmental improvements; i.e., while one is budgeting for food, clothing, etc., which could provide reliable estimates of willingness to pay. A more systematic approach than what has been demonstrated to date is called for in selecting respondents; e.g., stratifying groups carefully according to income and other variables thought to be indicative of willingness to pay to more accurately define the extent to which each variable influences willingness to pay.

6.4 Conclusions

Valuation of aesthetic improvements such as reclamation may be difficult to assign in their own right, as this study has shown. Association with the current or proposed use may occur despite statements asking for the value of the improvement alone. The overwhelming desire for recreational use of the reclaimed site studied here suggests that

there are few hesitations on the part of people to consider using reclaimed areas, once properly developed. The experience of many successful reclamation for recreation demonstration projects by mining companies and the Federal Heritage Conservation and Recreation Service bear this out as well.

As evidenced in this survey by people's willingness to pay for the reclaimed resource and their desire to use it for recreation, there are measurable benefits to be derived by providing for desired land uses through reclamation. This may be especially true for communities impacted by mining, although it would be expected to hold true for all communities having space to be reclaimed.

APPENDICES

APPENDIX A

MATERIAL PRESENTED TO STAUNTON SAMPLE POPULATION

U.S. Department of Energy

ARGONNE NATIONAL LABORATORY

9700 SOUTH CASS AVENUE, ARGONNE, ILLINOIS 60439

Telephone 312/972-3394

July 3, 1978

Dear Staunton Resident:

Throughout this month a survey will be conducted in Staunton by Argonne National Laboratory in cooperation with the city of Staunton. This survey will gather information about people's reactions to improvements in the local environment.

Your address was one of 200 selected by chance in the city of Staunton. Your participation is strictly confidential and your answers to our interviewer's questions will be used for statistical purposes only. The survey results will increase researchers' understanding of how residents of Staunton and vicinity value improvements in the local environment.

Our interviewer's name is Mrs. Jacalyn Bernard; she will come to your home between the hours of 9:00 AM and Noon, 1:00 PM and 5:00 PM, or 6:30 PM and 9:30 PM, to ask for your participation in an interview. Officials of Staunton and the police will provide Mrs. Bernard with a letter of introduction which she will show you when she arrives at your door. If you are not home, she will try to call back at a different hour or day.

Since only 200 people in Staunton will be interviewed, your part in this survey is important. We would greatly appreciate your assistance.

Yours truly,



Stanley Zellmer
Project Coordinator

SZ/mjh

The University of Chicago

Argonne Universities Association

APPENDIX A

Survey to Be Conducted In Staunton

Throughout this month, a survey will be conducted in Staunton and vicinity by Argonne National Laboratory in cooperation with the city of Staunton. This survey will gather information about people's reactions toward improving the local environment. About 200 households in Staunton and the surrounding area have been randomly chosen to be asked to participate in an interview. Each household's participation is strictly confidential, and answers to the interviewer's questions are to be used for statistical purposes only. The information gathered will help in evaluating environmental improvements in this and other communities in Illinois. City officials and the Chief of Police will provide the Argonne interviewer with a letter of introduction which she will show you when she arrives at your address. The interviewer will be in Staunton between the hours of 9 a.m. and 9:30 p.m. each day of the week. If your household has been selected and you are not at home when she arrives, she will try to call back at another hour or day.

Since only about 200 households in Staunton will be interviewed, each household's participation is important. If your household is selected, your assistance in this survey would be appreciated.

APPENDIX A

HERMAN HOCHMUTH
Mayor

ELTON O. SCHAEFER
City Clerk

RONALD MUELLER
City Treasurer

John Bergen
City Attorney

THE CITY OF STAUNTON



Office of the
CITY CLERK
304 W. Main St.

STAUNTON, ILLINOIS
62088

Dear Staunton Area Resident:

The Staunton police department certifies that Mrs. Jacalyn Bernard of Argonne National Laboratory is conducting a survey of residents of Staunton and vicinity. We have seen the questions she will ask you and we wish to point out that your answers are to be used for research purposes only. Your name or address will not be connected in any way to the results of the survey. Should you decide to participate, both the City of Staunton and Argonne National Laboratory would appreciate your help.

Herman Hochmuth

Herman Hochmuth
Mayor of Staunton

Yours truly,

Vinson Boster

Vinson Boster
Chief of Police

APPENDIX B

QUESTIONNAIRE: PREFERENCES FOR USE OF RECLAIMED LAND
NEAR STAUNTON, ILLINOIS

Hello. My name is _____ and I'm from Argonne
National Laboratory. Did you receive a letter from us asking you
to participate in our survey? I have a letter here from the Mayor
and Chief of Police in Staunton stating that your participation is
confidential; your name and address will not be used in any way.

____ (1-3)

1. Just to be sure that we both will be talking about the same
place in this interview, what is the name of the community you
live in?

1 2 3 (4) Staunton ____ 1 Parksville ____ 2 Other ____ 3

2. What do you feel is most pleasing about living in this com-
munity? _____

1 2 3 4 (5) 1. economic 2. health 3. social 4. environmental
5. dislike or nothing pleasing

3. Are most of your friends living in this community?

1 2 (6) Yes ____ 1 No ____ 2

4. Is most of your family living in this community?

1 2 (7) Yes ____ 1 No ____ 2

5. How long have you lived in this community?

____ (8-9) ____ years

6. About how many times per year do you travel just north of
Staunton on Highway 4?

____ (10-12) ____ /year



APPENDIX B

7. About how many times per year do you travel west from Staunton on Bunker Hill Road?

____ (13-15)

____/year

8. Have you noticed any changes in that area over the past couple of years?

1 2 (16)

Yes ____ 1 No ____ 2

If yes, what changes? _____

1 2 (17)

1. Reclamation project 2. Other

Here are some pictures of the old mine number fourteen northwest of Staunton before it was regraded in 1976.

(Set 1) The picture at the top shows an air photo of the entire mine area in 1976. (Point out Highway 4 and Bunker Hill Road.) The bottom picture shows the reclamation work in progress. There are three sections to the mine area. (Point out slag pile, drainage ditch, slurry pond areas.)

(Set 2) The top picture here is the slag pile before it was reclaimed. The bottom shows what it looks like now.

(Set 3) The top shows the drainage area (refer to Set 1) before, the bottom shows it as it is now.

(Set 4) At the top is an area of the slurry pond before reclamation, at the bottom is what it looks like now.

9. How did you first come to know about this change?

1 2 3 4 5
6 7 (18)

| | |
|--------------------------|-------------------|
| 1 ____ in this interview | 5 ____ television |
| 2 ____ word of mouth | 6 ____ driving by |
| 3 ____ newspaper | 7 ____ other |
| 4 ____ radio | |

APPENDIX B

10. Approximately how long ago did you first hear about the change out there?

1 2 3 4 5 (19)

- 1 _____ more than two years ago
 2 _____ about two years
 3 _____ about a year
 4 _____ a few months
 5 _____ less than a month

11. How important is it to you personally that the old mine area has been changed to what it is now? I'd like you to answer on a scale (show card #1) that we're going to use quite a bit in this survey. Really important is the number 1, important is 2, a little bit important is 3; really unimportant is 7, unimportant is 6, and a little bit unimportant is 5 (repeat question).

1 2 3 4 5
 6 7 (20)

Important 1 2 3 4 5 6 7 Unimportant

12. On the same scale (card #2), how good or bad do you think it is that this change has taken place (explain scale again)?

1 2 3 4 5
 6 7 (21)

Good 1 2 3 4 5 6 7 Bad

13. Do you think that changing the land to what is now has changed your opinion about living in that area?

1 2 3 (22)

Yes _____ 1 No _____ 2 No Answer _____ 3

Why? _____

14. Who do you think should have paid for the change as shown in the pictures?

1 2 3 (23)

1. government 2. mine company 3. other

APPENDIX B

- ____ (24-26) 15. Do you consider the mine area to be worth more to you now than before it was reclaimed:
 Yes ____ 1 No ____ 2
16. Suppose that you were in a situation where you were asked to contribute an amount of money per month to have the mine area changed from what it was to what it is now. Would you have contributed anything per month, and if so, what would that amount be?
 ____/month
17. If you owned the land in the mine area now, which one of the uses listed on this card (#3) would you most like to see there? Which is your second choice?
- 1 ____ what it was before mining -- timber and pasture
 2 ____ agriculture (rowcrops, pasture)
 3 ____ city housing
 4 ____ acreages
 5 ____ leave as is now
 6 ____ private recreation
 7 ____ private commercial development
 8 ____ other (please state)
- 1 2 3 4
 5 6 7 8 (28)
- 1 2 3 4
 5 6 7 8 (29)
18. Since the city of Staunton owns that land, that is, it is public land, which use on this card (#4) would you most like to see there? Which use is your second choice?
- 1 ____ what it was before mining (forest and pasture)
 2 ____ community facility
 3 ____ nature preserve
 4 ____ park or recreation area
 5 ____ fairgrounds
 6 ____ leave as is now
 7 ____ educational use
 8 ____ other (please state)
- 1 2 3 4
 5 6 7 8 (30)
- 1 2 3 4
 5 6 7 8 (31)

APPENDIX B

19. What do you think are the problems, if any, with using this area for (#13 preferred choice)?

1 2 3 4 5 (32)

-
1. developmental 2. supervisory and maintenance
3. site specific and environmental 4. distance, other
5. no problems

20. The next question has several parts concerned with what you think about the change in the mine area. We are going to use the same scale as before (card #5) so that you can tell me the number which best describes how much you agree with each of the statements that I will read to you.

- a) Other piles near Staunton should have similar work done on them as shown in the pictures.

1 2 3 4 5
6 7 (33)

Agree 1 2 3 4 5 6 7 Disagree

- b) Other piles in Illinois should have similar work done on them as shown in the pictures.

1 2 3 4 5
6 7 (34)

Agree 1 2 3 4 5 6 7 Disagree

- c) The state government should have been involved in reclaiming the mine area.

1 2 3 4 5
6 7 (35)

Agree 1 2 3 4 5 6 7 Disagree

- d) The town of Staunton received alot of publicity because of the mine area being changed.

1 2 3 4 5
6 7 (36)

Agree 1 2 3 4 5 6 7 Disagree

- e) The change has had no impact on the Staunton area.

1 2 3 4 5
6 7 (37)

Agree 1 2 3 4 5 6 7 Disagree

- f) The town of Staunton should decide what the mine area should be used for.

1 2 3 4 5
6 7 (38)

Agree 1 2 3 4 5 6 7 Disagree

APPENDIX B

g) The mine area should have been left alone as shown in Picture 1.

1 2 3 4 5
6 7 (39)

Agree 1 2 3 4 5 6 7 Disagree

h) Tourists from outside of the Staunton area would be welcome here.

1 2 3 4 5
6 7 (40)

Agree 1 2 3 4 5 6 7 Disagree

i) You would visit the mine area if it had a recreational use you liked.

1 2 3 4 5
6 7 (41)

Agree 1 2 3 4 5 6 7 Disagree

21. The next few questions are about your recreation in Staunton and vicinity. On this card (#6) are several words describing something about your recreation, which you may enjoy in general. Please tell me which item you usually enjoy the most during your recreation away from home.

- 1 ____ socializing with friends/family
2 ____ being away from home or work
3 ____ being outdoors
4 ____ travelling
5 ____ activity
6 ____ meeting people
7 ____ relaxing
8 ____ using good recreation equipment
9 ____ learning about nature, history, etc.

1 2 3 4
5 6 7 8
9 (42)

22. If, in Staunton, you had any type of recreation you could want, and you were given a day off during the week for recreation, what would you like to do? _____
- _____

APPENDIX B

23. When you do have a few hours to spend with your family in recreation away from home, what do you like to do? Where do you go to do those things?

| | |
|-------|-------|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

24. What kinds of recreation, if any, would you like to see on the old mine area?

25. How important is it to you that each of the following kinds of recreation are available in or near Staunton? Please tell me the number on this card (#7) that best shows how important or unimportant you think it is to you to have each type of recreation that I name (explain scale if necessary)?

| | | | | | | | | | | |
|------|---------------|-----------|---|---|---|---|---|---|---|-------------|
| (43) | nature center | Important | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Unimportant |
| | wildlife | | | | | | | | | |
| (44) | preserve | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| (45) | city park | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| (46) | museums | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| (47) | campground | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| (48) | fishing | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| | motorcycle | | | | | | | | | |
| (49) | track | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| | playing | | | | | | | | | |
| (50) | fields | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| | bicycle or | | | | | | | | | |
| | hiking | | | | | | | | | |
| (51) | trails | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

APPENDIX B

| | | | | | | | | | | |
|------|-----------------------|-----------|---|---|---|---|---|---|---|-------------|
| | shooting range | Important | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Unimportant |
| (52) | off-road vehicle park | | | | | | | | | |
| (53) | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| (54) | picnic area | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |

26. About how far does the highest income earner of this household travel to work each day?

(55-57) _____ miles one-way _____ no or variable travel

27. Could you please indicate the last grade of school you completed? (card #8)

- (1) _____ 0-8 years (jr. high)
 (2) _____ 9-12 years (high school)
 (3) _____ 13-15 years (jr. college plus)
 (4) _____ 16 years (college)
 (5) _____ 17 years (graduate)
- 1 2 3 4
 5 (58)

28. If you have any children, what are their ages?

1. retired, no children
 2. retired, at least one child about 18 yrs.
 3. at least one child above 18
 4. at least one child 6 to 18 yrs.
 5. at least one child below 6
 6. no children
- 1 2 3 4
 5 6 (59)

29. Do you or anyone in your family belong to any clubs or organizations and if so, what are they?

Club or Organization

- 0 1 2 3
 4 5 6 7
 8 9 (60)

APPENDIX B

30. Do any of them meet in Staunton?

1 2 (61) Yes ____ 1 No ____ 2

31. Have you ever served as an officer in any of those clubs?

Yes ____ 1 No ____ 2

1 2 (62) Which ones? _____

32. Do you rent or own your home?

1 2 (63) Own ____ 1 Rent ____ 2

33. If you don't mind, could you please indicate (card #9)
which one of the following before tax income brackets your
family is in?

(a) ____ 0-4,999 (e) ____ 20,000-24,999

(b) ____ 5,000-9,999 (f) ____ 25,000-29,999

(c) ____ 10,000-14,999 (g) ____ 30,000-49,999

(d) ____ 15,000-19,999 (h) ____ 50,000 and up

1 2 3 4
5 6 7 8 (64)

34. What is your occupation? _____

1. trades, professional

2. housewife

3. retired

4. mining, manufacturing, transportation

5. government and service

6. sales

1 2 3 4
5 6 (65)

35. Could you please tell me which age range you are in as
listed on this card? (card #10)

(1) ____ less than 20 (6) ____ 60-69

(2) ____ 20-29 (7) ____ 70-79

(3) ____ 30-39 (8) ____ 80-89+

(4) ____ 40-49

(5) ____ 50-59

1 2 3 4
5 6 7 8 (66)

APPENDIX B

36. Note sex:

1 2 (67) Female ____ 1 Male ____ 2

37. Housing type:

| | 1 | 2 |
|------------|------------------|---------------|
| 1 2 3 (68) | 1 ____ house | 1 ____ city |
| | 2 ____ trailer | 2 ____ fringe |
| 1 2 3 (69) | 3 ____ apartment | 3 ____ farm |

Thank you. That concludes our interview. Your cooperation is much appreciated. Do you have any comments about the interview that you would like to add?



APPENDIX B

INFORMATION PRESENTED TO
RESPONDENTS ON CARDS

CARD 1

Important _____ _____ _____ Neutral _____ _____ _____ Unimportant
 1 2 3 4 5 6 7

CARD 2

Good _____ _____ _____ Neutral _____ _____ _____ Bad
 1 3 3 4 5 6 7

CARD 3

- a. what it was before mining - (timber and pasture)
- b. agriculture (rowcrops, pasture)
- c. city housing
- d. acreages
- e. leave as now
- f. private recreation
- g. private commercial development
- h. other (please state)



APPENDIX B

CARD 4

- a. what it was before mining (timber and pasture)
- b. community facility
- c. nature preserve
- d. park or recreation area
- e. fairgrounds
- f. leave as is now
- g. educational use
- h. other (please state)

CARD 5

Agree Neutral Disagree
 1 2 3 4 5 6 7

CARD 6

- a. socializing with friends/family
- b. being away from home or work
- c. being outdoors
- d. travelling
- e. activity
- f. meeting people
- g. relaxing
- h. using good recreation equipment
- i. learning about nature, history, etc.



APPENDIX B

CARD 7

Important _____ _____ _____ Neutral _____ _____ _____ Unimportant
 1 2 3 4 5 6 7

CARD 8

- a. 0-8 years (jr. high)
- b. 9-12 years (high school)
- c. 13-15 years (jr. college plus)
- d. 16 years (college)
- e. 17 years (graduate)

CARD 9

- a. 0-4,999
- b. 5,000-9,999
- c. 10,000-14,999
- d. 15,000-19,999
- e. 20,000-24,999
- f. 25,000-29,999
- g. 30,000-49,999
- h. 50,000 and up

CARD 10

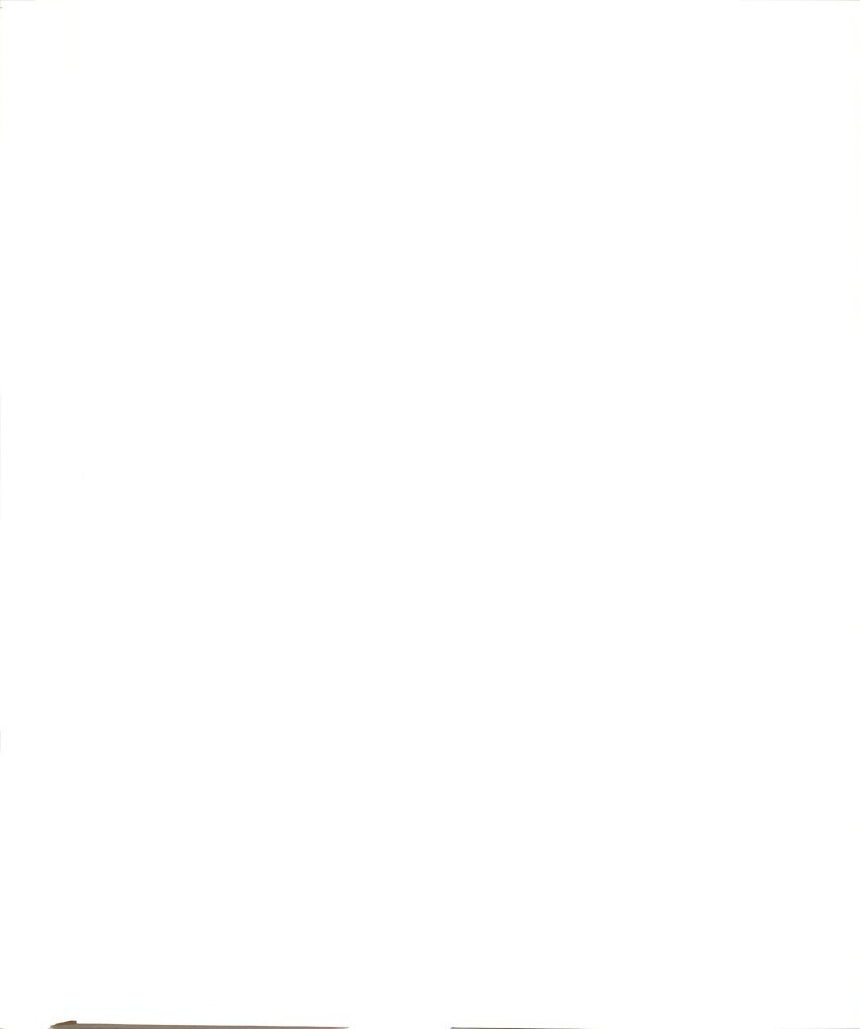
- a. less than 20
- b. 20-29
- c. 30-39
- d. 40-49
- e. 50-59
- f. 60-69
- g. 70-79
- h. 80-39

LIST OF REFERENCES

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