EXTRA HIGH VOLTAGE TRANSMISSION CORRIDOR SITING:

TECHNICAL, PUBLIC, INSTITUTIONAL AND REGULATORY CONSIDERATIONS

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(ABSTRACT)

Extra High Voltage (EHV) transmission corridor siting studies are complex and costly procedures, which are often prolonged by technical, public, institutional, and state regulatory factors. The primary goal of this research is to contribute to a more predictable and expedient siting study. The following objectives are accomplished:

- Exploration and description of technical and methodological aspects of siting in terms of the general approach to the siting study, impact assessment techniques, data collection and mapping considerations.

- Exploration and description of the following public and institutional considerations in the siting study: public participation, active opposition, media coverage, attitudes of affected agencies, and communication among involved organizations. Determination of the effects of these considerations on the siting process.

- Review and evaluation of the state siting regulations in terms of: clarity of requirements, technical siting requirements, coordination of actions in the study, coordination with other relevant regulations, and public and

agency participation in the study. Identification of the effects of the state regulations on the siting study process.

- Development of guidelines for improved EHV transmission corridor siting studies.

The principal methodology of the research is the single case study of Wyoming-Cloverdale 765 kV siting project, which represents a model of a contemporary, interstate, EHV siting study. The results of the case study are complemented by the review of state siting regulations and the literature.

The major outcome of the research are the guidelines for improved corridor siting studies. The guidelines are developed for corridor siting study consultants, electric utility companies, and state regulatory commissions.

Findings of the research indicate that technical, public, institutional, and state regulatory factors interactively affect the process of the corridor siting study. Furthermore, the siting study has dominant political overtones, and as such cannot be treated as a merely technical project. Public opposition to new EHV transmission lines can significantly increase the effects of technical, public, institutional, and regulatory deficiencies, reducing the probability of line approval.

The testing of the guidelines in siting study practice, and a multiple case study research dealing with the same considerations and their interactions, are suggested for future research.

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This work is dedicated to the spirit of my mentor and friend Professor William E. Shepherd, under whose guidance this research was initiated and conceptualized.

The memory of my beloved father Pavle Crnojacki will always give me the strength to persevere. My mother Milena, my sister Ruzica, and my husband Lazar have always been there for me. I thank them from the bottom of my heart.

TABLE OF CONTENTS

APPENDICES

Table of Contents

LIST OF FIGURES

LIST OF TABLES

PART I: INTRODUCTION

CHAPTER 1: RESEARCH PROBLEM AND OBJECTIVES

1.1. Problem Statement

Extra High Voltage (EHV) electric transmission line[1] is a linear land use which often traverses large heterogeneous areas, potentially affecting a diversity of environmental and cultural resources, encountering a variety of social, political, regulatory and administrative settings.

This research is focused on the corridor siting study, a critical phase in the EHV transmission line planning. The siting study goal is to identify and propose alternative corridors that are socially, politically, environmentally and legally acceptable. Typically, the corridor siting study generates the proposed corridor locations, and information on potential environmental, visual, and cultural impacts. The need for the line is already determined in the conceptual planning stage, which precedes the siting study. Health and safety studies are conducted simultaneously by a separate team of experts. The results of the siting study are the core of an application for the transmission line approval.

The problem addressed in this research deals with the relations between the corridor siting study process and the following factors: (1) Technical and methodological siting considerations, (2) Public and institutional considerations, and (3) State siting regulations (see Figure 1.1).

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[1] Category of EHV lines includes 230 kV, 345 kV, 500 kV, and 765 kV transmission lines. This research does not address lines of lower voltage.

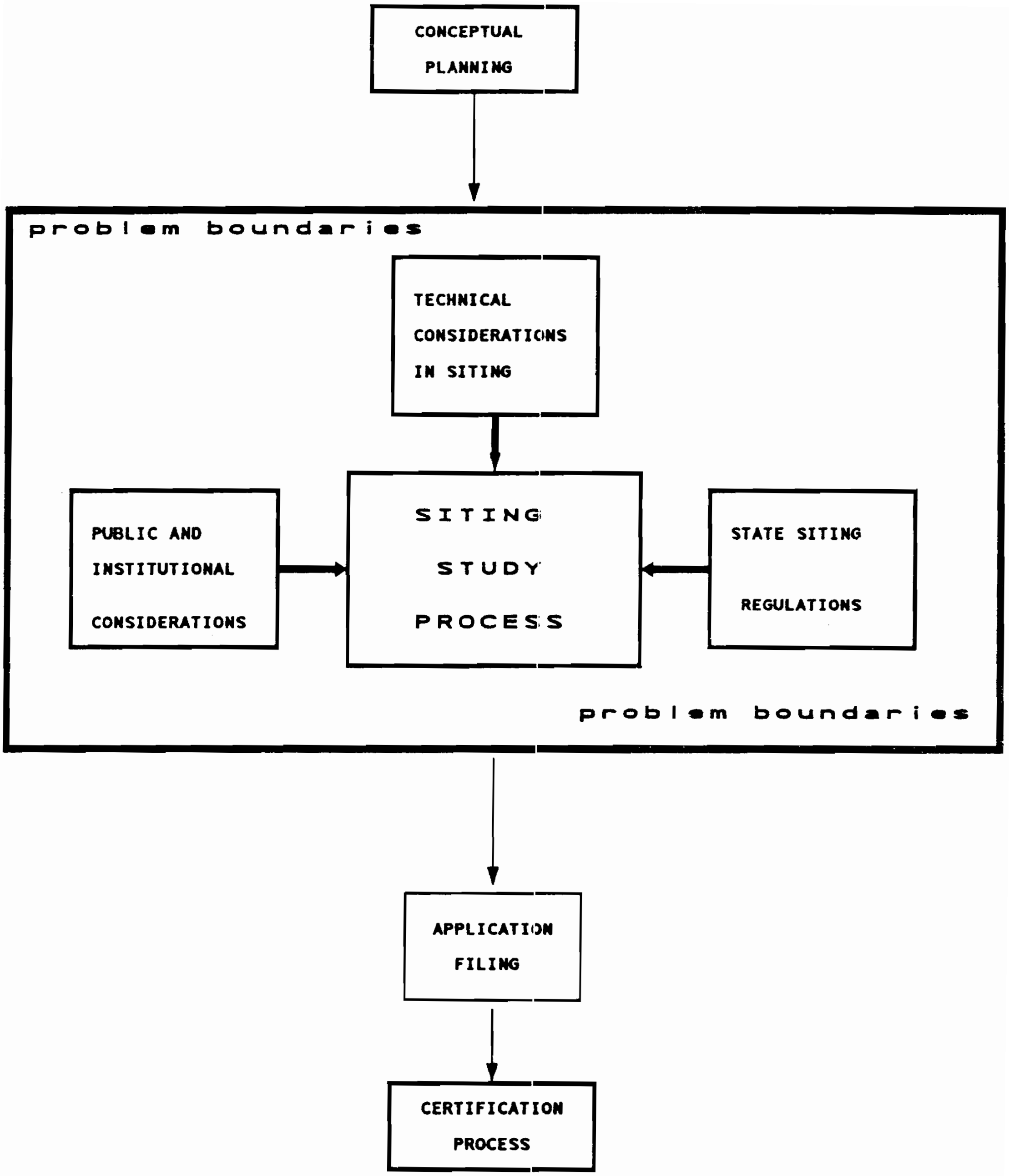

Figure 1.1: Research Problem

The siting study is a long and costly procedure, which is often delayed by complex technical and methodological siting considerations, unanticipated public and institutional factors, and inefficient state siting regulations. Due to the active involvement of many private and governmental parties, with often conflicting interests, the siting study has become a highly unpredictable political process. Moreover, the state siting regulations in most cases do not adequately deal with the siting study phase of the electric transmission planning.

A significant expansion of the U.S. electric transmission network has been planned in the current decade. By the year 2000, approximately 157,494 miles of overhead transmission lines will be in operation. About 12,649 miles of new lines will be added to the existing U.S. network (Electrical World, 1991). Calculations for 175 feet wide right-of-way, indicate that a large area, of about 254,923 acres, will be directly affected by the new transmission lines.

The requirement to efficiently use large existing generating capacities, usually located far from demand centers, coupled with the practicality of sharing surplus energy between systems will dictate construction of longer transmission lines (Yong 1976, Shephard 1987). The optimal length of the high voltage lines is between 100 and 300 miles (Yong, 1976). Consequently, new transmission lines will cross extensive and heterogeneous areas of land. As Newkirk (1979, p. 3) points out: "Utility routing is a most difficult spatial resource allocation problem. Multiple sources and destinations may have to be joined by continuous routes over long distances. The problem is further complicated due to the necessity to locate optimal routes over extensive tracts of land..."

The regulatory setting for transmission line siting studies is very intricate. In the majority of states in the

U.S. the state public utility commission has the authority to regulate and approve new transmission lines. The state commission regulations are of critical relevance for the corridor siting because they define the type and extent of information for the decision on corridor location. Furthermore, the regulations define objectives, technical requirements, and criteria to be followed in the siting study process. Moreover, state legal requirements prescribe the scope and format of information to be provided in an application document. Some states require comprehensive reports and a detailed environmental assessment of preferred and alternative corridors, while others require only summaries of potential impacts on natural resources (Nickerson et al. 1981). Unfortunately, companies have problems interpreting the regulatory requirements that are often vague, unclear and ambiguous (Juves et al. 1982, Schafer et al. 1982).

Besides state regulatory requirements, the corridor siting study must consider other pertinent federal, state, and local regulations. Moreover, the resource management plans must be studied to avoid land use and management conflicts and to minimize impacts on sensitive resources. If a line crosses public lands and waterways, federal agencies are engaged in the permitting process, and according to the National Environmental Protection Act (NEPA), an Environmental Impact Statement (EIS) may be required (CECA/RF 1990, Jessup Hitchcock 1990). The U.S. Department of Energy must grant approval for international lines (CECA/RF 1990, Jessup Hitchcock 1990). The siting of the interstate lines becomes even more difficult because, often uncoordinated, siting regulations of bordering states must be implemented (CECA/RF 1990). Many private and governmental parties, with often conflicting interests, interact during the corridor siting study. Furthermore, implementation of many relevant legislation and policies requires coordination of activities of the agencies in charge. However, the coordination is not always easy to attain because of the diversity of regulatory objectives and institutional interests involved.

Public concerns about negative effects of power lines on the environment have been growing since the early 1970's (Casper and Wellstone 1991, CECA/RF, 1990). Although, regulations usually do not require involvement during the corridor siting study, companies often seek the public input before the application is submitted (Nickerson et al. 1981, McConnon 1981, VEPCO, Burns and McDonell, 1991). This is because companies realize that the opposition to the construction of a new line is a great problem in transmission line siting (Douglas, 1990). Despite the efforts to involve the public in the siting process, and to maintain and build credibility, the companies often face fierce opposition to the construction of new lines. The negative public attitudes always interact with the media, and are followed and reinforced by the intense media attention. This is still a great challenge for the electric power companies planning transmission extensions (Douglas 1990, Martin Research Inc., 1991). A frequent cause of the opposition is the fact that new lines will be crossing large areas, with a potential conflict of interests between the areas where the electricity is needed and the areas traversed by the line.

Many interested and affected federal, state, and local agencies are engaged in the corridor siting study. The communication of the corridor siting team with the governmental agencies is essential to coordinate the siting criteria with pertinent permitting regulations and resources management plans, and to obtain the data from the agencies.

To achieve a more expedient and streamlined siting study it is necessary to identify and isolate elements of technical and methodological siting considerations, public and institutional factors, and state regulatory factors which cause uncertainties and difficulties.

1.2. Research Objectives and Overview

Research Objectives and Outcomes. This research has four principal objectives:

- To explore and describe the technical and methodological siting considerations during the corridor siting study.
- To explore and describe public and institutional considerations during the corridor siting study; to determine the effects of these considerations on the process.
- To review state siting regulations, and determine effects of the characteristics of the regulations during the siting study.
- To develop guidelines for improved corridor siting studies based on the synthesis of the findings from the above objectives.

The objectives are realized by the case study research, complemented by the review of state siting regulations, and by the literature review (see Figure 1.2).

The research outcomes are three sets of guidelines, with concrete implications for the corridor siting study process:

- Guidelines for technical considerations in corridor siting studies.
- Guidelines for public and institutional considerations in corridor siting studies.
- Guidelines for state regulations for corridor siting studies.

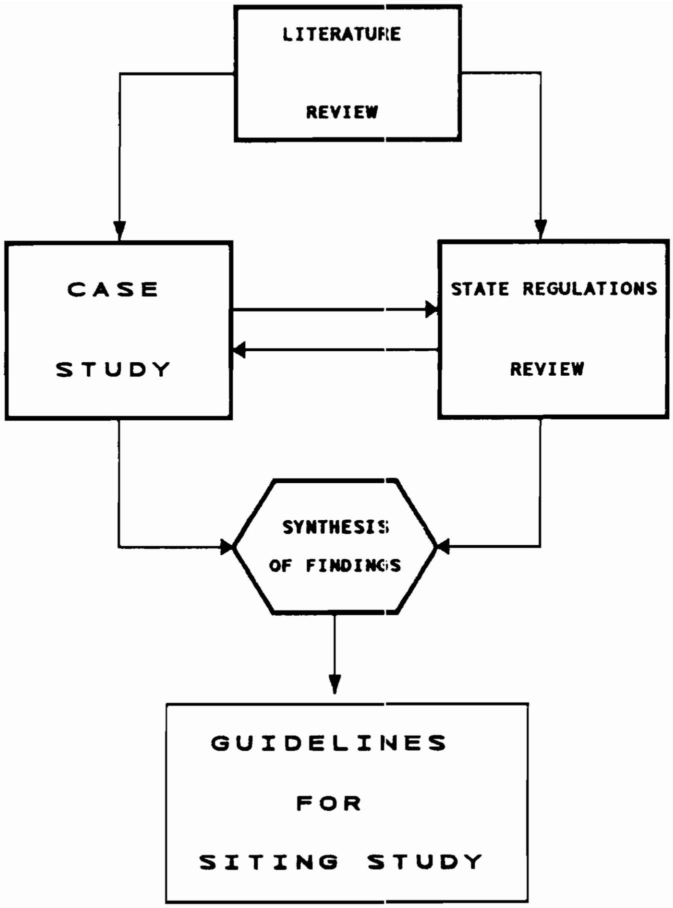

Figure 1.2: Research Process Overview

The guidelines are developed for the siting consulting firms, utility companies proposing new lines, and state commissions involved in siting and certification regulatory procedures.

Structure of the Dissertation. The dissertation is organized into five major parts: Part I. Introduction, Part II. Research design, Part III. State regulations review, Part IV. Case study report, and Part V. Research outcomes and conclusions.

The research problem, objectives, and the background of the problem are presented in Part I. The problem background describes the main stages in the electric transmission planning process, and shows the importance and function of the siting study in the planning procedure. Next, the brief history and trends in the U.S. electric transmission network development are given. The problem background is further developed by presenting environmental, technical, methodological, and regulatory considerations in the siting study, as derived from the literature review.

Part II explicates the research design. The first chapter defines the main concepts, variables, measures, and the theory base derived from the literature review. The next chapter deals with the methodology of the research, addressing the case study research method, the approach to the state regulations review, and the reliability and validity issues.

Part III presents the status of the reviewed siting regulations, and highlights the provisions that speed up and streamline the siting study.

Part IV presents the case study report, which is organized into four chapters, dealing with the following subjects respectively: Wyoming-Cloverdale siting study background, technical considerations in siting, public and institutional considerations, Virginia and West Virginia siting regulations, and the case study findings and lessons.

Part V discusses the research outcomes and conclusions. It encompasses the chapter with guidelines to improve corridor siting studies, and the chapter with conclusions and the areas of future research.

CHAPTER 2: LITERATURE REVIEW: PROBLEM BACKGROUND

This chapter sets a background for the EHV electric transmission line siting study, which is the subject of the research. First, the history and trends in the U.S. transmission network development are presented. The corridor siting process is then described in terms of methods for corridor siting, environmental impacts considerations in siting, and regulatory setting of the siting process.

2.1. Electric Transmission Line Planning

A complex, multistage, electric transmission line planning process is presented in Figure 2.1. After the need for the line and the general location are determined in the conceptual planning stage, the application preparation stage follows. It involves corridor siting, health, safety and other relevant studies. The objective of the application preparation stage is to identify and propose the most suitable corridor location by optimizing economic, engineering, and environmental criteria. Engineering criteria cover the width of the ROW, audible noise, radio and television interference, electromagnetic field induction, and electrical line configuration. Economic criteria deal with the length of corridor, corridor accessibility, land acquisition, public relations, tower construction, and corridor maintenance. In a broad sense, environmental criteria include cultural, visual, and natural resources considerations (Stambach in Deno et al., 1987). The electric transmission line planning is a long and

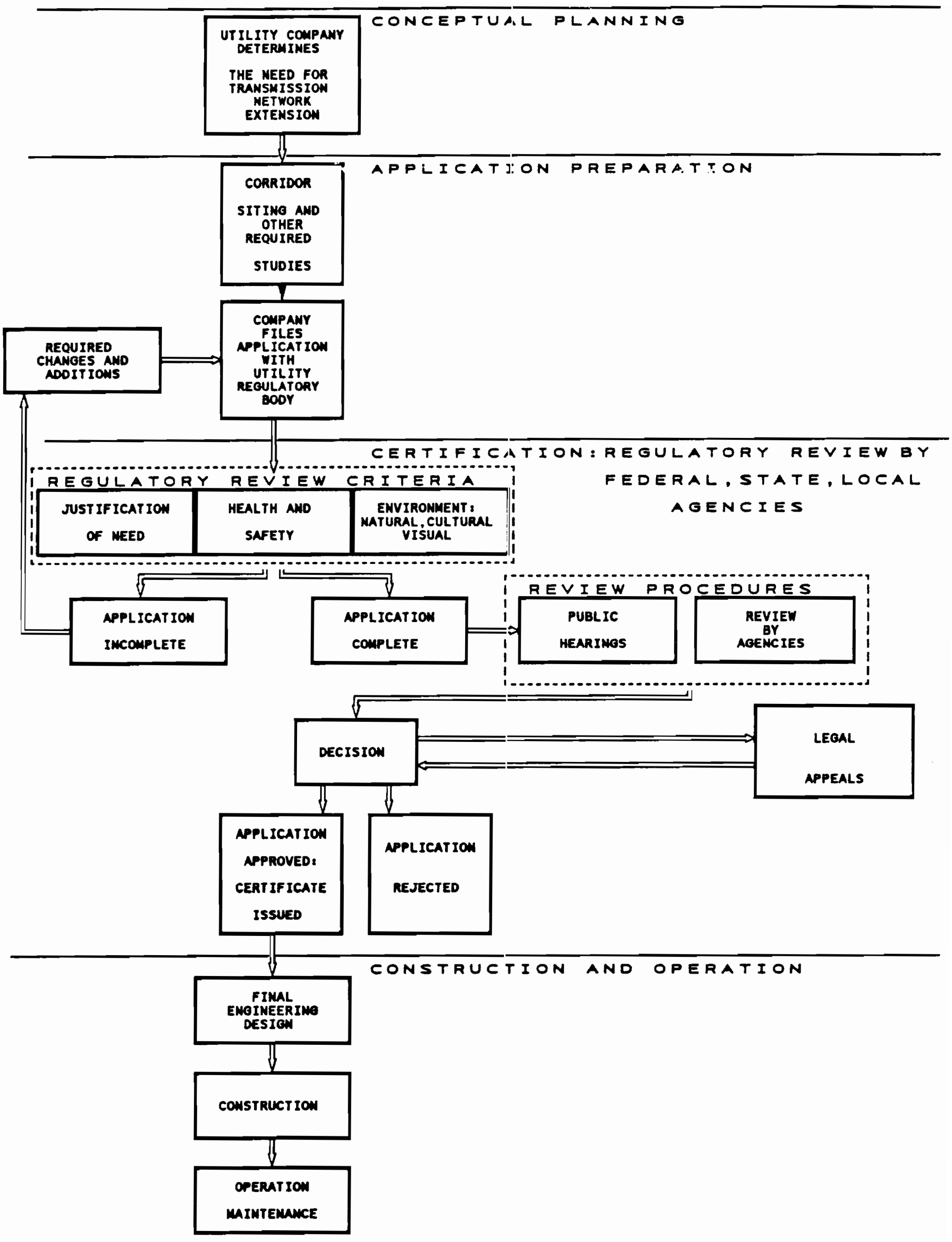

Figure 2.1: Electric Transmission Line Planning Process

(Sources : Robinette 1973, Priestly 1986, Deno, Gerver, La Forest 1987) complex process consisting of the following stages: (1) Conceptual planning, (2) Preparation of an application for a certificate for siting and construction of the proposed transmission line, (3) Certification - regulatory review and decision on the application, and (4) Detailed engineering design once the application is approved (Robinette G. O. 1973, Priestly J. T. 1988, Deno, Garver, and LaForest 1987). Each of these stages is described further below.

The conceptual planning determines the need for a line, the time when it will be needed, approximate location, capacity, and the most suitable type of line (Deno, Garver, and LaForest 1987). Once these factors are figured out, application preparation studies begin. Corridor siting and environmental assessment, health and safety, and engineering studies are performed in the application preparation stage. The results of these studies are incorporated in an application submitted to a regulatory authority for a certificate of siting and construction.

In most states in the U.S. state public utility commissions play the key role in transmission line projects certification. To get a certificate for siting and construction, companies must comply with state legal requirements regarding the need for the line, health and safety risks, and potential environmental impacts (Smart 1976, Johnson and Boreman 1978, Juves 1982, Schafer 1982). Interested and affected members of the public and agencies are involved in the regulatory review and decision making. They participate as protestants, intervenors or expert witnesses, testifying in hearings, providing expert or protest testimonies, filing motions and petitions (Juves et al. 1982, CECA/RF 1990). There are three possible outcomes of the certification: (1) The application is approved and a certificate to site, construct and operate a proposed line is granted, (2) The application is rejected, and (3) The application is returned for additional information and may be resubmitted for a review. In most states the decision may be appealed (Juves et al. 1982, CECA/RF 1991).

Filing of an application with a state public utility commission is the formal onset of the certification stage. The review criteria include justification of the need, health and safety risks, and environmental impacts. If the application is incomplete, it is returned by the commission for additional studies. Interested and affected agencies, citizens, and private organization participate in the regulatory review through the hearings. If the application is approved, the detailed engineering design studies start, to determine the exact tower locations and centerline alignments. After the line is in operation, it is regularly maintained.

The following text describes the technical and analytical aspects of corridor siting methods, presents the environmental impact considerations, and delineates the regulatory setting for corridor siting.

2.2. U.S. Transmission Network Development

Electric transmission network consists of transmission lines and equipment, which transfer bulk electric energy between points of supply and points at which the energy is transformed into a lower voltage for delivery via distribution lines to consumers, or to other electric systems (Energy Information Administration, 1991).

The history of transmission lines in the U.S. started at the end of the 19th century. Since then, a trend has been to build lines of increasingly higher voltage. Today, transmission lines in the U.S. have voltage between 69 kV and

765 kV [2].

The U.S. transmission network experienced the most intensive development between 1965 and 1975 (Salisbury, 1985). In 1970, about 74,160 miles of 230 kV to 765 kV lines were in use (Irwin, 1973). In 1986, the U.S. utilities operated approximately 135,000 miles of 230 kV to 765 kV lines (Moore 1986). In 1990, 144,845 miles of lines between 230 kV and 765 kV were in operation (Electric Light and Supply, September 1991).

According to projections for the year 2010, electricity demand in the next two decades will grow at moderate rates. (Energy Information Administration 1991). By the year 2005, electric power utilities will meet about 80% of projected demands using existing generation facilities, while about 4% of electricity will be purchased from independent producers. The remaining 16% will be provided through demand side management and from new electric energy generation (Shepard, 1987).

The proposed construction of new transmission lines will be based on the need to: (1) Transfer electricity from existing generating capacities to remote demand centers, (2) Balance generation surplus and shortage by sharing energy

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[2] In 1892, the maximum transmission voltage , of first lines was 10 kV. Nine years later, in 1908, the first 110 kV line was operation. In the 1920's 138 kV lines were introduced (Robinette 1973; Irwin 1973; Ellert et al. 1987). Since the mid 1950's, extra high voltage (EHV) transmission lines have been intensively developed (Ellert 1987). In 1953, the world's first EHV, 345 kV line was built by American Electric Company (AEP) in West Virginia (AEP 1991). In 1964, maximum transmission voltage was increased to 500 kV (Irwin 1973).
The first 765 kV line was constructed in 1969 by AEP. It was 68 miles long line connecting Big Sandy Plant in Kentucky and Marquis substation in southern Ohio (AEP 1991).

among systems within the network, (3) Transfer energy from independent producers, (4) Transfer electricity from new generating facilities, and (5) Improve the reliability of the transmission systems (Young 1976, Moore 1986, Shepard 1987, Ellert et al. 1987, Berg and Greenberg 1991, Arny and James 1991). These future needs will be realized primarily through construction of new transmission lines and, to a limited extent, by uprating of some existing lines[3]. A general trend is to build longer lines, with higher voltage and greater transfer capabilities.

Dimensions of the ROW and towers depend on tower type and voltage. Width of the ROW is between 80 and 350 feet, increasing with the voltage of the line. Tower height is between 70 and 175 feet. Wire to ground clearance is between 30 and 130 feet, depending on the terrain and traversed land use. There may be 4 to 11 towers per mile depending on voltage and type of towers. (Ellert et al. 1987, 55:61).

According to the North American Electric Reliability Council (NERC) projections, by the year 2,000, the total length of 230 KV to 765 kV lines will be approximately 157,494 miles. This will result in approximately 3 million acres of land within ROW by the year 2,000.[4] Although, the expansion of the U.S. transmission network will be moderate, the area of

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[3] Uprating of existing lines to a higher capacity and efficiency will be limited because it requires that a line is temporarily taken out of service, which may reduce overall system capacity and reliability (Salisbury 1985).

[4] Data on the length of planned and existing lines have been extracted from North American Electric Reliability Council (NERC) Electricity Supply and Demand 1991-2000 report (Electric Light and Supply, September 1991). To calculate approximate land area under the EHV electric transmission line use in the U.S., the author assumed an average 150 feet wide ROW for lines of 230 kV and 345 kV, and 200 feet wide ROW for lines of 500 kV and 765 kV.

land, potentially directly affected by construction and operation is very significant, which underscores the importance of finding the most suitable corridors for new lines.

2.3. Environmental Considerations in Siting

Potential adverse environmental impacts of transmission lines caused by: (1) Construction and maintenance activities, and (2) Change of a landscape structure by physical presence of towers and ROW corridor, which are new physical and functional elements in a landscape (Forman and Godron 1987, Heaton, 1987, Duke Power Company and EDAW Inc. 1990, VEPCO, Burns & McDonnell, 1990, 1991, TVA 1991, Stone and Webster 1991).

The environmental impacts on natural resources are in the focus of this review.

Construction and Maintenance Impacts

Major activities in the construction of a transmission line potentially causing negative impacts are: (1) Survey of the ROW, (2) Initial ROW vegetation clearing (clear cut or selective), (3) Access roads construction, where no existing roads are available, (4) Tower sites preparation, (5) Tower foundation construction, (6) Tower assembling and construction, (7) Wire stringing, (8) Tower sites clean-up and finishing, (9) Removal of hazardous structures and danger trees beyond ROW. Post-construction activities consist of: (1) Line inspection and maintenance, (2) Initial ROW vegetation management, and (3) Periodical ROW vegetation management.

Most of the impacts originate from vegetation cutting and management, and from grading, drilling, blasting, and heavy equipment use during the construction and maintenance of a line.

Figure 2.2, shows typical activities and subactivities in a transmission line construction, operation and maintenance [5].

Initial vegetation clearing of a ROW, tower sites and access roads construction may cause a series of direct and indirect impacts on all components of a landscape ecological system. Vegetation clearing could be harmful, in prime commercial timberland, prime farmland, sensitive and important plant communities, habitats of rare, threatened, endangered, and important species (Goodland 1973, Egler 1975, Smart 1976, Johnson and Boreman 1978, U.S. Department of Energy, Economic Regulatory Administration, 1984, 1987, Heaton 1987, Duke Power Company, and EDAW Inc. 1990, VEPCO, Burns & McDonnell, 1991).

The most significant impact may be a permanent loss of land cover by clear-cut vegetation removal, during tower sites and access road construction. Agricultural land cover may be either temporarily excluded from usage during construction or permanently lost by tower and access roads siting (Cambridge Scientific Abstracts 1979-1990; TVA 1991). Removal of rare, threatened, endangered plant species and communities is an especially significant potential adverse impact (Cambridge Scientific Abstracts 1979-1990, TVA 1991).

[5] The information on construction and post-construction activities and operations was compiled in 1991, by Dr. William Shepherd and by the author, from interviews with APCO construction, engineering, real estate, and forestry departments. Additional information was obtained from the literature (Heaton 1987, TVA 1991, Stone and Webster Engineering Corporation 1991).

ACTIVITY MATRIX

SUBACTIVITIES / MAJOR ACTIVITIES	I. CONSTRUCTION: ON SITE										OFF SITE		II. OPERATION MAINTENANCE		
	1. Survey of R/W	2. Initial R/W vegetation clearing	3. Access roads construction	4. Tower sites preparation	5. Tower foundation construction	6. Tower assembling & construction	7. Wire stringing	8. Tower sites clean up & finishing	9. Removal of hazardous structures beyond R/W	10. Removal of danger trees beyond R/W	11. Storage yards construction	12. Substation construction	13. Line inspection & maintenance	14. Initial R/W management	15. Periodical R/W management
1. Surveying & staking	●														
2. Grading operations			●									●			
3. Drilling operations					●										
4. Blasting operations			●		●										
5. Surface drainage construction			●	●							●	●			
6. Temporary soil erosion control			●	●							●	●			
7. Seeding & mulching			●					●			●	●			
8. Heavy equipment operation						●						●			
9. Medium equipment operation			●	●	●	●	●	●	●		●	●			
10. Light equipment operation	●	●	●	●	●	●	●	●	●	●	●	●	●		
11. Construction waste material removal								●	●						
12. Aerial herbicide application															●
13. Ground herbicide application														●	●
14. Scattering of cut vegetation		●	●												
15. Windrowing logs		●	●												
16. Downing of trees on slope > 30%		●	●												
17. Chipping & scattering of slash		●	●												
18. Removal of all slash from R/W		●	●												
19. Burning		●	●						●						
20. Vegetation removal		●	●						●	●			●	●	●

Figure 2.2: Transmission Line Construction, Operation, and Maintenance Activity Matrix

Besides the direct disturbance or irretrievable loss of a land cover, vegetation removal may lead to a series of indirect impacts on other natural resources. For example, vegetation clearing may cause increased erosion, particularly on steep slopes and highly erodible soils (Goodland 1973, Cambridge Scientific Abstracts 1979-1990, Burns and McDonnell 1990, TVA 1991, Stone and Webster Engineering Corporation 1991, TVA 1991). Removal of vegetation, combined with grading operations during tower sites preparation and access roads construction may lead to increased erosion and, if near water bodies, to increased siltation, affecting aquatic habitats and water quality (Cambridge Scientific Abstracts 1979-1990, U.S. Department of Energy 1983, Heaton 1987, APCO, and VPI & SU, and WVU, 1991).

Aerial and ground herbicide treatment of vegetation in the ROW clearing and regular maintenance, may have negative impacts on surface and underground water quality and may adversely affect aquatic species habitats (Egler, 1975, Cambridge Scientific Abstracts 1979-1990, U.S. Department of Energy, 1984, 1987. Kotcon B.J., Rauch W.H., and Werner E., 1993).

Stream and wetland crossings are important considerations, because vegetation cutting and herbicide treatment, blasting for tower foundation and access road construction may adversely alter water balance, and disturb aquatic and riparian habitats (Cambridge Scientific Abstracts 1979-1990, U.S. Department of Energy, 1983, U.S. Department of Energy, 1984, 1987 Heaton, 1987, Duke Power Company, and EDAW, Inc., 1990, APCO, VPI & SU, and WVU, 1991, Bruce and McDonnell 1991, TVA 1991). Also, vegetation removal from stream and wetland shores changes the microclimate, which may adversely affect aquatic and wetland habitats (Cambridge Scientific Abstracts 1979-1990).

If a corridor crosses highly productive soils, potential fertility may be reduced by compaction by heavy equipment used for tower assembling and access road construction (U.S. Department of Energy, 1983, U.S. Department of Energy, Economic Regulatory Administration, 1984, 1987, APCO, VPI & SU, and WVU, 1991, Stone and Webster Engineering Corporation 1991).

The quality and the quantity of groundwater may be decreased by heavy equipment operation, drilling, blasting, and herbicide application in sensitive groundwater recharge areas (Heaton, 1987, U.S. Department of Energy, 1984, 1987, APCO, and VPI & SU, and WVU, 1991).

Potential impacts on sensitive geological resources are caused by grading, drilling, and blasting during tower foundation preparation and access road construction on sensitive terrains. The sensitive geological resources are those with high sensitivity to subsidence, landslide, and earthquake (e.g., floodplains or karst topography) (Cambridge Scientific Abstracts 1979-1990, Stone and Webster Engineering Corporation 1991, TVA 1991).

The air quality may be temporarily diminished by herbicide spraying, vegetation remains burning, dust emission during equipment operation, increased noise levels during heavy equipment operation (Cambridge Scientific Abstracts 1979-1990, Stone and Webster Engineering Corporation 1991, TVA 1991).

Changes in Landscape Structure

Construction of the transmission line introduces a new spatial element, which alters landscape pattern and dynamics (Forman and Godron, 1986). An important consequence may be increase or decrease of wildlife species diversity. Structurally, the ROW consists of an interior and edges, which may be gradual or abrupt, depending on the vegetative edge treatment. The interior of the corridor could support a habitat, which is distinctively different from its edge, as well as from the surroundings. Consequently, a different microenvironment within a corridor may be a potential niche for new organisms, which could increase the species diversity. For example, a two hundred feet wide cleared transmission corridor across a forested area of Tennessee with a quite diverse bird community contributed to the higher total species diversity (Anderson et al., 1977, in Forman and Godron 1986). However, a cleared corridor interior eliminates shelter, which may be harmful for some prey species. Simultaneously, corridors create new edges which affect the species diversity. If the edge is gradual it diversifies habitat leading to the higher species diversity. If the vegetation is clear cut, and the edge is abrupt, the positive edge effect is absent (Forman and Godron 1986).

Also, corridors fragment a landscape, breaking it into smaller patches. For some wildlife species it may be damaging, as the corridor acts a barrier, isolating available food, cover, shelter, breeding and nesting places. On the other hand, corridors may create beneficial conduits for some large wildlife species, so that their ranges may be expanded (Forman and Godron, 1986). It could be concluded that structural landscape changes caused by the corridor siting may be ecologically beneficial, if the corridor management techniques and practices follow the basic ecological principles.

Furthermore, the physical presence of conductors and towers may disrupt migratory bird flight patterns, and cause bird killings by collision and electrocution (Avery 1978, Cambridge Scientific Abstracts 1979-1990, Males 1980, Cibulka, 1990).

This overview of possible adverse environmental impacts illustrates a broad array of issues and concerns that should be considered during corridor siting, to prevent potential adverse consequences of the transmission line land use.

Mitigation

The potential adverse environmental impacts could be many and significant. Therefore, it is important to develop adequate mitigation strategies to lessen or eliminate negative impacts. The mitigation measures may be classified as follows: (1) Mitigation through corridor siting, (2) Mitigation during the construction, and (3) Mitigation after construction of a line. Mitigation through selection of corridor siting criteria is the most effective strategy, because it may result in avoidance of potential impacts. This strategy conforms with a preventive environmental planning, which maintains that potential adverse impacts should be identified, predicted, avoided or minimized during the planning process, before a project is built (FAO 1976, Selman 1981, Roberts and Roberts 1984, Westman 1985, Randolph 1989, Briassaoulis, 1989).

Ideally, a corridor will be sited so that available measures can effectively mitigate impacts and that no irretrievable losses of natural resources occur. However, if a corridor crosses sensitive, endangered and rare species habitats, sensitive plant communities, highly productive wetlands, steep slopes, landslides, prime farmland, extractable mineral resources, groundwater recharge areas, mitigation techniques may either not be available or may be very costly. Because of that, a corridor siting study should seek to prevent, and minimize adverse impacts.

However, the prevention of potential impacts is not always possible in a corridor siting stage (e.g., lack of data). Usually, the most effective mitigation measures require expensive detailed field surveys which are not feasible in a corridor siting stage, because the actual location of the corridor is not approved (Heaton, 1987). Consequently, the mitigation techniques should be incorporated into the construction and operation phases. Alignment of the corridor center line, selection of tower location and types, selective vegetation cutting, selective herbicide applications, vegetative buffers along water bodies, erosion and sedimentation control are the most common mitigation measures. These measures are included into plans for line construction and operation, assess roads construction, erosion-sedimentation control, vegetation and wildlife management, environmentally sensitive areas management, post construction monitoring and mitigation (U.S. Department of Energy, 1983, 1984, 1987, Heaton 1987, Duke Power Company and EDAW Inc. 1990, VEPCO, and Burns & McDonnell 1991, APCO, and VPI & SU, and WVU, 1991).

2.4. Technical and Methodological Considerations in Siting

This section discusses the technical aspects of corridor siting. Specifically, it deals with the general methodological approach, impact assessment techniques, and data collection and mapping issues.

In addition to the literature review, four selected corridor siting studies have also been reviewed. The comparative review includes four studies completed within the last 20 years in the Appalachian region: (1) Jackson's Ferry - Axton 765 kV Transmission Line Corridor Location Study

(Simutis and Johnson, 1974), (2) POWER Routing System (Smart, 1976, Giles et al., 1976), (3) Jocassee Tie Fold In, 525 kV Transmission Line siting procedure (Duke Power Company, and EDAW Inc, 1990), (4) Joshua Falls - Elmont and Dooms - Ladysmith 500 kV Transmission Line siting procedure (VEPCO, and Burns and McDonell, 1991)[6].

The section concludes with a summary of the siting methods review.

General Methodological Approach

Electric transmission corridor siting methodology is a complex procedure. The complexity is caused by a multitude of considerations to be analyzed and assessed before the corridors are selected. Three main stages are involved in the study: (1) Analysis of the study area and delineation of the network of preliminary alternatives, (2) Analysis and assessment of the preliminary corridors, and (3) Assessment of the alternatives and selection of corridors to be proposed for certification.

The corridor siting study starts with an extensive study area, which is narrowed down, to identify and evaluate the alternatives.

The network of preliminary alternative corridors is typically identified by computerized or manual overlay constraint mapping (e.g., Simutis and Johnson, 1974, Duke Power Company, and EDAW Inc., 1990, VEPCO, and Burns and McDonell, 1991). Usually, the constraint criteria include:

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[6] The review of each study is summarized in Appendix A. Tables in the Appendix display: method, siting criteria, and data collection for alternative corridors identification, and assessment and selection of preferred corridors.

subsidence areas, landslides, karst terrain, extractable mineral resources, faults, steep topography, highly productive soils, highly erodible soils, wetlands, streams, lakes, groundwater recharge areas, floodplains, commercial timber production areas, sensitive, protected, and unique plant communities, sensitive and unique habitats, endangered, rare, and threatened species and habitats. The generality of the constraints, used to delineate alternative corridors, adequately corresponds to the regional scale of analysis. However, the comprehensiveness of these constraints is sometimes quite limited (e.g., Smart 1976, Giles et al. 1976).

Once the preliminary alternative corridors are identified, they are analyzed and assessed to select proposed corridors. The corridors are designated by the following techniques: (1) Tabulation and comparison of index values assigned to alternative corridors (e.g., Duke Power Company and EDAW Inc., 1990, VEPCO, and Burns and McDonell, 1991), (2) Interpretation of suitability maps, based on index values per cell, within alternative corridors (e.g., Simutis and Johnson 1974), (3) Computerized minimum path analysis, between points connecting alternative corridors, or corridor segments (e.g., Smart 1976, Giles et al. 1976), (4) Visual interpretation of overlay maps (e.g., Simutis and Johnson 1974, Duke Power Company and EDAW Inc., 1990, VEPCO, and Burns and McDonell, 1991).

Analysis and Assessment Techniques

A range of analytical and assessment techniques, such as constraint mapping, network analysis, and minimum path analysis, is applied in the siting studies. Conceptually, most studies are based on the environmental impact assessment approach (Simutis and Johnson 1974, Giles et al. 1976, Camara 1979, Newkirk 1979, White 1981, Duke Power Company and EDAW 1990, VEPCO, Burns and McDonell 1991).

The standard methodology of environmental impact assessment encompasses the identification, prediction, and quantification of potential impacts, assignment of relative importance to impacts, and evaluation of potential impact. Identification of potential impacts outlines a broad array of possible adverse consequences of the project. The common methods of impact identification are checklists, matrices, networks, map overlays, and expert judgment. Next, the probability of impact occurrence is to be determined, by case study research, modeling, experimentation, and the literature review. The predicted potential impacts are quantified in terms of their location, magnitude, and duration. The next step is the appraisal of relative impact importance (or significance) considering policies and laws, ecological costs, economic costs, health risks and social disruption. The last step is the comparative evaluation of the impacts, by techniques such as checklists, matrices, map overlays, networks, indices, interdisciplinary expert assessment, trend extrapolation, and modeling (Sondheim 1978, Fitipaldi et al., 1982, Shopley and Fuggle 1984, Westman, 1985).

Identification of the preliminary alternatives, assessment of alternatives, and selection of proposed corridors are often attained by the above described environmental impact assessment techniques.

Bisenius and Marcotte (1984) evaluated 15 transmission line siting and environmental assessment studies, developed in the 1970's. They employed the following criteria to evaluate impact assessment techniques: (1) Impact identification attributes: comprehensiveness, specificity, timing and duration of impacts, and data sources disclosure, (2) Impact measurement factors: use of measurable indicators, distinction between the impact magnitude (areal extent) and intensity (degree of environmental change), objectivity of measurement techniques, and (3) Impact interpretation issues: explicitness of criteria to assign significance to impacts, degree of certainty in impact prediction, probability of impact occurrence, techniques for alternative corridors assessment, and modes of expressing indicators of potential impacts.

The authors assessed all studies fairly well concerning comprehensiveness and specificity of identified impacts, and to data disclosure level. Nevertheless, only one study addressed timing and duration of identified potential impacts. Studies were rated poorly on impact measurement criteria. Although most studies developed explicit indices to measure impacts, the objectivity of these indices was deemed low. Besides, only one-third of the studies fully quantified identified impacts. Also, most of the studies failed to document and justify the impact significance[7]. Moreover, only four studies dealt with the certainty of potential impacts predictions, while none of the studies estimated a risk (probability) of actual occurrence of impacts.

In most siting studies, quantification of impacts is by indirect measurements taken from available maps and remotely sensed images. Often the measurements are not verified for accuracy and reliability. Both categorical measures (e.g., presence/absence of habitat, soil erodibility classes) and continuous measures (e.g., acreage of forest cover, length of wetland traversed) are used to quantify impacts.

Ecological factors are intrinsically interrelated

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[7] Bisenius and Marcotte (1984, p 36) defined the impact significance as a combination of "...determinations about an action's setting (context) and the severity of its impacts (intensity)."

structurally and functionally. Consequently, changes in one attribute trigger changes in a system as a whole (Forman and Godron 1987, Zonneveld, 1989, 1990). Thus, studies should explicitly address the interdependence of natural factors or duration of the predicted impacts (Fitipaldi et al., 1982, Westman, 1985).

Assessment of the alternative corridors and the impacts often employs calculation of indices (e.g., Simutis and Johnson 1974, Smart 1976, Giles et.al., 1976, VEPCO and Burns and McDonell 1991). Indices mathematically combine the magnitude (quantitative measure of impact intensity or extent) and the significance (relative economic, social, political importance) of predicted impacts to obtain a single value. Indices are often calculated by multiplication of the impact magnitude measurement by impact significance (weight) ordinal value. Indices are either generated for each cell in a computerized grid-cell system (e.g., Simutis and Johnson 1974, Smart 1976, Giles et.al., 1976) or for entire alternative corridor segments (e.g., Smart 1976, Giles et.al. 1976, VEPCO and Burns and McDonell, 1991). Typically, the simple additive combination of individual impact index values produces total index values per grid cell, per corridor segment, and/or per the entire length of the alternative corridor. Indices are mapped (e.g., Simutis and Johnson, 1974), tabulated (e.g., Duke Power Company, and EDAW Inc., 1990, VEPCO and Burns and McDonell, 1991), or incorporated into minimum path algorithms (e.g., Smart 1976, Giles et al., 1976).

Computerized and manual overlay mapping may be applied in the corridor siting studies as follows: (1) As a modeling tool to assess and select corridors (e.g., Simutis and Johnson, 1974), (2) Used to identify preliminary alternative corridors (e.g., Duke Power Company, and EDAW Inc., 1990), and (3) Combined with other methods to identify and assess corridors

(White 1981). The method has been criticized for the low validity of the underlying assumptions, which violate some basic principles of ecological theory (Westman, 1985).

Essentially, overlays linearly combine resource attributes to identify and assess the corridors. Individual maps showing individual mapped categories (e.g., land cover, hydrology, geology, habitats) are superimposed, and homogeneous areas are identified and displayed on a composite map. In instances where no significance (importance or weight) is assigned to individual map categories, the equal significance is incorrectly implied. Nevertheless, the significance of potential impacts cannot be assumed equal, in a given socioeconomic and political reality (Westman, 1985). In cases where impact significance is assigned by ordinal scale values (e.g., 1-least significant, 10-most significant), and summed up, the operation is mathematically incorrect, because ordinal measures cannot be meaningfully added (Westman, 1985).

Moreover, the overlays often erroneously assume, the simple linear cumulative dependence of impacts. This is contradictory to the landscape ecological theory, which claims that a landscape is the synergistic product of interactive factors including climate, geology, landform, soils, hydrology, vegetation, and wildlife. Accordingly, ecological responses to the transmission line land use activities are more than a simple sum of individual responses presented in a composite overlay map (Vink 1983, Forman and Godron, 1986, Zonneveld, 1989,1990).

However, the advantages of the overlay method are the ease of interpretation and the relative simplicity (Fitipaldi et al., 1982).

Generally, the research of Bisenius and Marcotte, along with the literature review presented, suggests that the impact assessment methodology in the evaluated corridor siting studies need considerable improvements.

Data Collection and Mapping

The common flaw in data collection is almost exclusive, reliance on the available data, with little effort to expand and verify the data base. Some studies do not even take full advantage of the available data sources (e.g., Smart 1976, Giles et al., 1976). Site specific field observations are applied to either verify the mapped data, or to obtain additional site specific information (e.g., Simutis and Johnson 1974, Duke Power Company and EDAW Inc., 1990, VEPCO and Burns McDonell, 1991).

Manual or computerized mapping techniques are extensively used in corridor siting studies to identify, quantify and/or display potential impacts and corridors. Generally, mapping techniques should comply with the criteria of: legibility, accuracy, consistency, explicit description, compatibility with other data, and taxonomic and spatial detail (Campbell 1983)[8].

Legibility or readability of a map is important, because it should clearly convey information to a user. One important element of legibility is quality of graphics.

Mapping accuracy is a complex concept, encompassing taxonomic accuracy, taxonomic precision and spatial precision. Taxonomic accuracy is "correct assignment of parcels to categories." Another important and related concept is precision, which refers to the level of mapping detail. Two

[8] The following discussion is based on the review of the book "Mapping the Land" (Campbell, 1983).

kinds of precision can be distinguished: taxonomic precision and spatial precision. Taxonomic precision is "increased detail in the classification system " resulting in more categories on a finer spatial scale. Accurate planimetric presentation requires the use of an accurate base map, and accurate referencing with the base map. This is especially important for manual and computerized overlay mapping techniques.

Consistency refers to uniform taxonomic accuracy, precision, and planimetric presentation throughout the map. It is also desirable that data for the mapping area be gathered within the same period. If the data are collected over a long time span, the consistency will be lower, because of changes that occur in the land over a long time. Accordingly, remotely sensed images, interpreted for mapping should be taken at the same time, and if possible the most current images should be used.

Explicit description of mapped variables enables the user to interpret, replicate and evaluate the classification and mapping procedure. For that purpose, the map legend, labels and accompanying text should be comprehensive and readable.

Compatibility is also essential. It requires that all data sources have the same (or compatible) scale, accuracy, and precision. This is especially important for single attribute maps (e.g., soil, wildlife, floodplain) that are overlaid to identify homogeneous units.

Map detail (increasing with increased mapping scale) should be adequate for the purpose of land classification and mapping. For instance, large spatial scale reconnaissance surveys for initial preliminary alternative corridors identification does not require high taxonomic and spatial detail. On the other hand, detailed assessment and selection of preferred corridors demand higher taxonomic and spatial detail. Also, the choice of the minimum mapping unit needs to correspond the scale of the map. The size of the minimum mapping unit should provide taxonomic and spatial accuracy needed for the mapping purpose.

Summary

The review of technical aspects of the corridor siting studies briefly describes the status and history of the siting process, and suggests some deficiencies and difficulties. The following is derived from the review:

- The general methodological approach to corridor siting is based on principles of environmental impact assessment.
- Principles of the spatial scale hierarchy are not always respected in data collection, analysis, evaluation, and presentation.
- Siting criteria and potential impacts do not always include all relevant factors.
- Prediction of the impacts is often implicit, by expert judgment and interpretation of available data, which may not be the best basis for accurate prediction.
- Measurement (quantification) of the impacts is mainly by indirect measurements of mapped variables. Duration of impacts, and interactions of ecological factors are seldom considered.
- Relative significance of impacts is often assigned by expert judgment, with little public input. Criteria applied to determine relative importance are not always well documented.
- Assessment of impacts is often made by comparing numerical values of indices, by visual analysis of overlay maps, by minimum path analysis.
- Public involvement is often missing in the corridor

siting study.

- The principles of mapping are not always followed in corridor siting studies.

2.5. Regulatory Setting and Review

In most of the U.S. states the public utility commission has the highest regulatory authority for transmission lines approval. If the application satisfies elementary criteria of completeness, it enters the regulatory review. The review usually includes public participation in the form of public hearings. Criteria commonly applied in the review and decision making process are: (1) Justification of the need for a line, (2) Potential safety and health impacts, and (3) Potential environmental impacts on natural, cultural, and visual resources (Juves et al. 1982, CECA/RF 1990). If a line crosses public lands and waterways, federal resources management agencies are engaged in the siting, review and permitting process and the federal Environmental Impact Statement (EIS) may be required (CECA/RF 1990, Jessup Hitchcock 1990). In interstate line projects, two or more state utility commissions are involved. Approval of the U.S. Department of Energy is required for international lines(CECA/RF 1990, Jessup Hitchcock 1990).

The status of state regulations in the U.S. is displayed in Table 2.1.

In 28 states the need, health and safety and environmental and natural resources issues are covered by the regulations. Only 10 states in the U.S. do not have any transmission line siting and approval regulations. Nevertheless, other state and local agencies may have permitting requirements applicable to a proposed transmission

Table 2.1: State Level Regulations for Transmission Line Siting, Status in the U.S. (after Jessup Hitchcock, D., 1990)

States with no Regulations	States with "Need Only" Regulations	States with Need and Environmental Regulations
Alaska	Alabama	Arkansas
Delaware *	Colorado	Arizona
D.C.	Idaho	California *
Georgia *	Illinois	Connecticut
Indiana	Kansas	Florida
Lousiana	Missouri	Hawaii
Michigan	Rhode Island	Kentucky
Oklahoma	Texas	Maine
Tennessee *	Utah	Maryland *
New Jersey *	Wyoming	Massachusetts
		Mississippi
		Montana
		Nebraska
		New Hampshire
		Nevada
		New Mexico
		New York *
		North Carolina *
		North Dakota *
		Ohio *
		Oregon *
		Pennsylvania *
		South Carolina *
		South Dakota *
		Vermont
		Virginia *
		Washington
		West Virginia *
		Wisconsin *

States marked with an asterisk have been selected for the research. Data for marked states has been updated by contacting appropriate regulatory agenices in the fall of 1992.

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D.C.	Idaho	California *
Georgia *	Illinois	Connecticut
Indiana	Kansas	Florida
Lousiana	Missouri	Hawaii
Michigan	Rhode Island	Kentucky
Oklahoma	Texas	Maine
Tennessee *	Utah	Maryland *
New Jersey *	Wyoming	Massachusetts
		Mississippi
		Montana
		Nebraska
		New Hampshire
		Nevada
		New Mexico
		New York *
		North Carolina *
		North Dakota *
		Ohio *
		Oregon *
		Pennsylvania *
		South Carolina *
		South Dakota *
		Vermont
		Virginia *
		Washington
		West Virginia *
		Wisconsin *

States marked with an asterisk have been selected for the research. Data for marked states has been updated by contacting appropriate regulatory agenices in the fall of 1992.

line. Often, a line location is approved through negotiations with landowners, whose land is traversed (CECA/RF 1990, Jessup Hitchcock, 1990).

In 10 states the commission employs only the need or safety criteria in the review and decision making process. Environmental issues are the responsibility of other state and local authorities, which cannot be preempted by the commission (Jessup Hitchcock 1990).

State Regulatory Requirements

There are substantial differences in the siting and approval requirements between state regulations in the U.S. For instance, in North Dakota the utility commission mandates that two applications be submitted: (1) Application for a Certification of Corridor Compatibility, and (2) Application for a Transmission Facility Route Permit. Both applications should present corridors that are beyond defined exclusion areas (designated parks, historic sites, wilderness areas, archeological sites, rare, threatened, and endangered species). Also, the application should propose corridors beyond avoidance areas (designated wildlife refuges, wildlife, forestry, and grassland management areas, wild, scenic, recreational rivers, geologically unstable areas, reservoirs and water supplies, areas within 500 ft (152 meters) of occupied residences and irrigated land). These siting requirements are clear and comprehensive. Moreover, North Dakota commission must make a decision within 3 or 6 months from the time the application has been determined complete, which is a reasonable timeframe (Schafer, Jacobson, Everett, 1982).

The length of the regulatory review and decision making

process varies between a few months and 2 years after the application is filed (Juves et al. 1982, CECA/RF 1990).
A timely approval of the application is of primary concern both for the company filing the application, and for the consumers in the need for electric energy. However, various unanticipated delays often prolong the process. The frequent cause for a delay is a request for more information by the Commission or by opposition groups and organizations, so that the application is returned for revisions and additions (Juves et al. 1982).

Juves et al (1982) interviewed ten companies[10] to examine the attitudes about the state regulations. According to the results, most companies regard the regulations as "vague," "very general in nature," "ambiguous," and think that "it is difficult to interpret what is asked for and to what extent it should be addressed." This shows deficiencies in the ability of regulations to clearly convey the requirements. This is a cause of the siting studies delays and of incomplete and inadequate applications.

The review of an application usually includes public hearings and review by governmental agencies. In 40% of the states, hearings are not mandatory. Nevertheless, even in most of those states hearings on a proposed line are held (CECA/RF 1990).

Typically, many agencies are involved in the review procedure, which increases the chance for delays caused by conflicting missions and uncoordinated actions. In such cases, the regulatory provisions for coordination of actions are recommended (Mazmanian and Sabatier 1989, CECA/RF 1990). Unfortunately, such provisions are lacking in many state

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[10] The study does not reveal which companies were interviewed because of guaranteed anonymity.

regulations. Also, the absence of requirements for early and continuous communication between a company and governmental agencies, may cause incorrect interpretation of the regulations, and delays in the siting study, and regulatory review (McConnon 1979, Nickerson, Perry, Brown 1979, Juves et al 1982, McConnon 1982, Schafer, Jacobson, Everett 1984, CECA/RF 1990).

Utility companies also believe that the approval of a proposed line must be less dependent on "political pressures and emotional forces" (Robert A. Lincicome in Juves et al, 1982, p 6-3). To ensure that the proposed line is socially and politically acceptable, the company must maintain good public relations, and communication with citizens, organizations and politicians (Juves et al. 1982).

Minnesota Controversy. A well known Minnesota transmission line controversy illustrates the importance of the regulatory framework and the significance of public opposition. The following text has been based on McConnon (1979, 1982), Casper and Wellstone (1981), CECA/RF (1990).

In 1972, Cooperative Power Association and United Power Association determined the need for a new coal generated power plant in North Dakota, for a nearby coal mine, and for associated transmission lines and substations. The proposed project final destination was west of Minneapolis, Minnesota. All the elements of the project were in operation, and none had raised any serious controversy except a 180 mile long +-400 kV section passing through agricultural lands in Minnesota. The project started in 1974, when the companies were granted a loan from the Rural Electrification Administration. Long before applications for transmission lines certificates were filed, strong public opposition in Minnesota had been formed. The Minnesota regulations required that three certificates be sequentially granted: (1) A

Corridor Certificate by Minnesota Environmental Quality Board (for a location of 30 kilometers wide corridor), (2) A Certificate of Need by the Energy Agency, and (3) A Route Permit by the Minnesota Environmental Quality Board (for the location of an up to 1 kilometer wide route). All three permits were granted within 7 months, 7 months, and 9 months, respectively. The timing was surprisingly short despite the extremely strong opposition. The whole approval process lasted from April 1975 to September 1977. It is important to note that he certification procedures closely followed the Minnesota regulations. Public hearings were held before each permit was granted. More than 340 witnesses presented 500 exhibits. About 90% of witnesses were citizens opposing the line. After certificates were issued, the decisions were appealed by nine lawsuits in the Minnesota Supreme Court. However, the decisions to grant permits were upheld. The construction of the Minnesota section of the line started in October 1977 and was finished within a year. The line was in operation in 1979. During the construction, many acts of vandalism and violence were done by the fierce opposition groups. The intense opposition continued throughout the operation of the line (15 towers and thousands of insulators were demolished).

What were the reasons for such forceful opposition activities? McConnon (1982) differentiates external and internal causes of the controversy.

External causes are: Public suspicion towards government and business, cultural characteristics of the opposition groups (e.g., traditional spiritual connection of farmers to the land), presence of experienced and skillful environmental leaders. The Minnesota regulations were another external cause of the controversy. Regulatory requirements were too vague, especially for forms and purpose of the public participation in the decision making process. Also, the public attitude was already adversarial, because a previously proposed transmission line affected formation of negative attitudes.

Internal causes for the controversy were poor public relations of the two companies, reinforced by the misjudgment of the public opposition. A major issue raised by the opposition was the need for the line, which did not match to direct perceived benefits. The companies made a critical mistake by avoiding open communication with the public. The other most frequently raised issue was the potential interference of the towers with agricultural operations. However, the most distinctive issue was related to the regulatory process. The public felt that the process of certification process was "fixed" and that it did not facilitate meaningful public involvement.

The Minnesota regulatory body and the companies had learned the lesson from the project. The Minnesota Environmental Quality Board improved the regulatory procedure by stating more specific siting requirements, and by mandating more effective public participation. In addition, a company owning the controversial line developed a phased procedure for public participation in the pre-application stage (corridor siting study), application review stage, and post-route designation stage of the certification and siting process (McConnon, 1982).

Summary

The literature review leads to the following conclusions about state regulations and the siting process:

- In 28 states the commission has the authority to issue a certificate for construction and siting of a proposed transmission line based on the need, safety and health risks, and potential adverse environmental impacts. In these states the Commission may preempt any other state or local agency decision related to a proposed line. In some of these states the commission shares the authority for environmental aspects of siting with another state agency, or another agency has a full responsibility for environmental issues.

- In 10 states the commission has no responsibility for environmental siting considerations, and other state and local agencies cannot be preempted by the commission in the area of environmental issues.

- In 10 states certification and siting are not regulated by the commission. Rather, the authority is distributed among other federal, state, and local agencies with land use and resource management authorities.

- State commission regulations for transmission line siting vary in terms of clarity and scope.

- Utility companies encounter problems interpreting state siting regulations.

- Coordination of activities between the utility company, the Commission, and governmental agencies, during corridor siting study and regulatory review is not present in the state regulations.

- Coordination of pertinent regulatory and permitting regulations during the corridor siting and review is not present in the state regulations.

- In most states, public participation in corridor siting is not legally required. However, public participation in public hearings is a common procedure during the certification process. Unfortunately, this form of public involvement comes too late in the process, when conflicts are hard to resolve.

- The public opposition to new transmission lines has been an important cause of regulatory review delays.

PART II: RESEARCH DESIGN

CHAPTER 3: CONCEPTUAL FRAMEWORK AND THEORY BASE

This chapter elaborates on the conceptual framework and methodology of the research. The key elements of the framework are described: (1) Corridor siting study process, (2) Technical and methodological considerations in siting, (3) Public, institutional, and political considerations, and (4) State regulatory setting. Moreover, concepts, theoretical base, variables, measures, and research objectives and questions are stated.

Subsequently, the two principal stages of the research methodology are explained: (1) Case study research, (2) State regulations review and evaluation. In conclusion, validity and reliability issues, associated with qualitative research, are addressed.

3.1. Conceptual Framework and Objectives

The conceptual framework indicates the key concepts and variables, and delimits the research problem. In addition, it provides a basis for objectives derivation, and interpretation of the research results (Mayer and Greenwood, 1980). Besides, the conceptual framework simplifies the complex problem of corridor siting.

The theory base for the conceptual framework has been derived from: (1) Electric transmission line siting and regulatory review literature (McConnon 1979, Yong and Feher 1979, Nickerson et al., 1979, Bisenius and Marcotte 1982, Juves et al 1982, Schafer, Jacobson, and Everett 1982, Stern and Munson 1982, Priestly 1988, CECA/RF 1990); (2) Policy implementation theories (Mazmanian and Sabatier 1989), and (3) Landscape ecology, land evaluation, and environmental impact assessment literature (Fitipaldi et al., 1982, Shopley and Fuggle 1983, Westman 1985, Conn 1986, Davidson 1986, Forman and Godron 1987, Meentemeyer and Box 1987, Meentemeyer 1989, Zonneveld 1989, 1990).

As presented in the Figure 3.1, the research deals with the corridor siting study, and three key elements affecting the process of the study: (1) Technical considerations in siting, (2) Public and institutional considerations, and (3) State regulations for corridor siting.

Research Objectives: The objectives of this research are:

(1) Explore and describe technical and methodological considerations in siting in terms of general approach, impact assessment techniques, and data collection and mapping.

(2) Explore and describe public and institutional considerations in corridor siting. Identify and isolate effects of these factors on the siting study process.

(3) Review and evaluate state regulations for corridor siting. Identify and isolate the effects of the regulations on the siting process.

(4) Develop the guidelines for improved corridor siting studies.

The following section defines the elements of the conceptual framework, and formulates the specific questions addressed in the research.

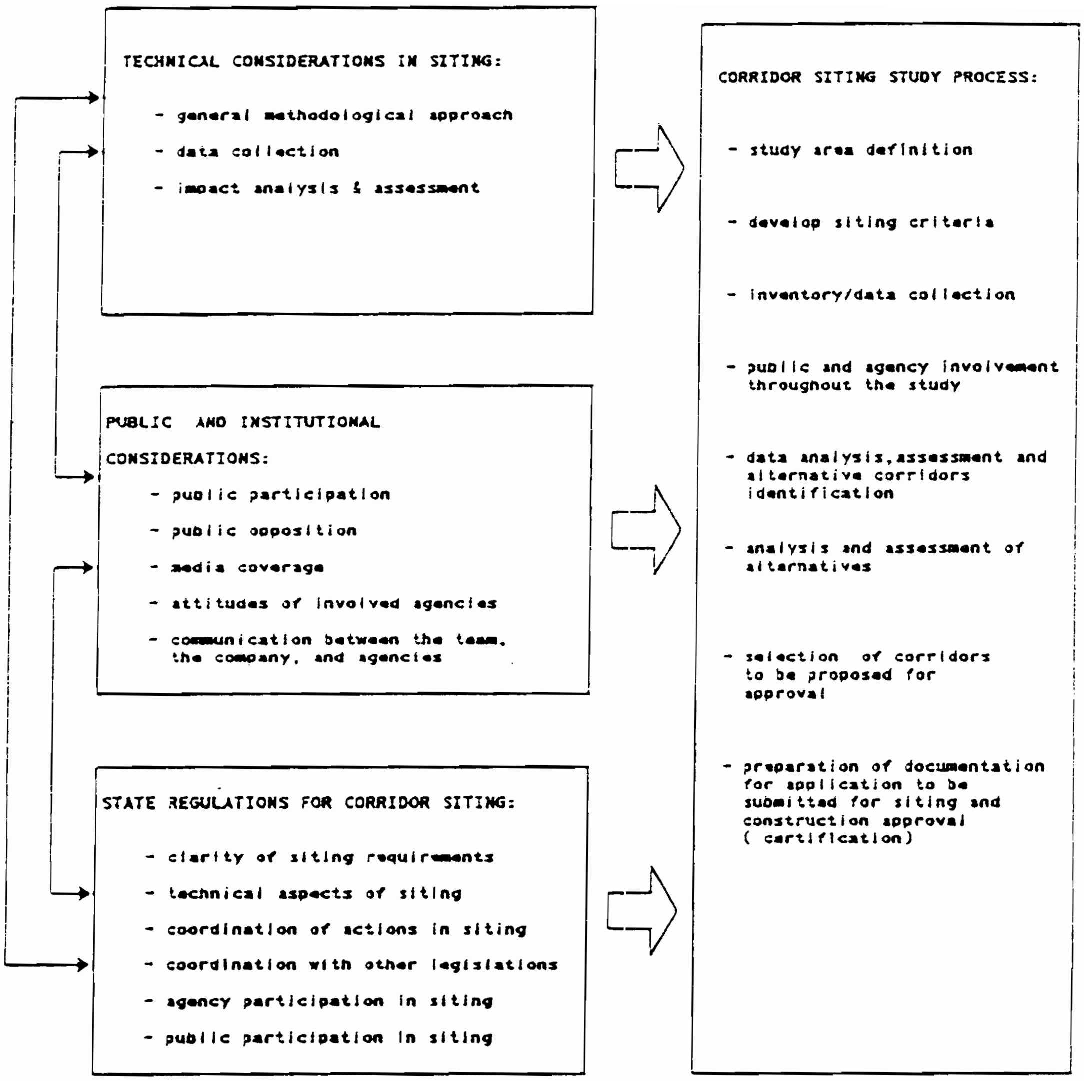


Figure 3.1: Conceptual Framework

3.2. Corridor Siting Study

Typically, the corridor siting study includes the following phases: (1) Study area definition, (2) Inventory and data collection, (3) Public participation, (4) Participation and review by agencies, (5) Preliminary alternative corridors selection, (6) Analysis and assessment of alternatives, (7) Selection of proposed corridors; (8) Preparation of the final report to be included in the application (White 1981, Juves et al, 1982, EDAW 1992). All these stages are affected by institutional and public factors, state siting regulations, and by technical considerations in siting.

In the broadest sense, the corridor siting is a multifaceted process, involving ecological, social, and economic analyses and evaluation. The goal of siting is to propose the corridor with least ecological, social, and economic impacts. However, the corridor siting study, which is the subject of this research, does not embrace economic, social, and health studies. These studies are conducted by a different team of experts. Here, the siting study is defined as a land use or land suitability study.

The electric transmission corridor is a linear land use category, often over a hundred miles long. Thus, the initial study area may be few thousand square miles large. Long corridors exert many potential impacts on a regional level. On the other hand, right-of-ways being only few hundred feet wide, cause local impacts near the corridor. Consequently, the siting methodology is very intricate, as it must deal with a hierarchy of spatial scales, and a variety of regional and local impacts.

Many participants act in the corridor siting. Today, public involvement has become an inseparable part of the process. Also, governmental agencies have been actively and directly involved in the process. Accordingly, diverse interests are reflected in political overtones of the process.

A very complex, uncoordinated, and inadequate regulatory setting further complicates the siting process. Besides the state regulations, which play a key role in corridor siting and approval, federal, state, and local regulations may also be relevant.

The siting study is affected by various factors, which may obstruct the siting study. Ideally, the corridor siting should proceed without major delays and unanticipated departures. Greater knowledge about factors influencing the process is needed, to make the entire siting process more streamlined and predictable. This research examines technical, public, institutional, and regulatory considerations during corridor siting.

3.3. Technical Considerations in Siting

This section defines variables, measures, and research questions that lead to the attainment of the research objective to: Explore and describe the general approach, impact assessment techniques, and data collection and mapping in corridor siting studies.

Technical and methodological considerations in siting addressed in this research include: (1) General methodological approach, (2) Impact assessment considerations, and (3) Data collection and mapping. Variables and measures corresponding to these three concepts are displayed in Table 3.1.

The research questions dealing with the technical considerations in siting are addressed in the case study research.

Table 3.1: Technical Considerations in Siting: Concepts, Variables, Measures

CONCEPTS	VARIABLES	MEASURES
I. General Approach	- Adequacy of organization of study.	- Matching sequence of main study stages to the standard corridor siting study structure.
	- Considerations of scale hierarchy in study structure.	- Application of hierarchically smaller spatial scale for analysis and assessment as study progresses.
	- Comprehensiveness of corridor siting and evaluation criteria.	- Comparison of applied siting and assessment criteria with principles of the ecological theory.
II. Environmental Impact Assessment Considerations	- Adequacy of impact prediction techniques.	- Identify categories of impact prediction techniques.
	- Level of impact measurement.	- Identify categories of impact measurements (e.g. indirect vs direct, qualitative vs. quantitative).
	- Method of significance assignment.	- Identify categories of significance assignment (subjective vs objective, implicit vs explicit).
III. Data Collection and Mapping Considerations	- Range and adequacy of data sources.	- Identify categories of data sources.
	- Adequacy of data update and verification.	- Identify date and modus of data verification.
	- Considerations of mapping accuracy.	- Identify explicit considerations of taxonomic and spatial accuracy.
	- Adequacy of map detail.	- Identify the correspondence of the minimum mapping unit to the mapping scale and purpose.

General Methodological Approach

The general methodological approach to corridor siting defines the organization and structure of the study, and criteria for siting, analysis, and assessment. The general methodological approach to corridor siting is investigated in terms of the following variables: (1) Adequacy of organization of the siting study, (2) Considerations of scale hierarchy in the study approach, (3) Comprehensiveness of corridor siting and evaluation criteria.

Variables and Measures. (1) Adequacy of the study methodological structure is determined by matching the sequence of study stages to the standard stages in the corridor siting. The EHV electric transmission corridor siting study typically comprises of: (1) Definition of study area, (2) Regional data collection and mapping (3) Development of siting criteria, (4) Data analysis and evaluation to select a preliminary network of alternatives, (5) Selection of the alternatives, and (6) Assessment of alternatives and selection of the proposed corridor. The siting studies follow pertinent legal requirements (e.g., siting and construction approval, various permits), and usually facilitate public participation and the review by agencies. (White 1981, Juves et al. 1982, EDAW 1992)

(2) Considerations of spatial scale hierarchy are another element in corridor siting. According to the landscape ecology, spatial data analysis, and environmental impact assessment, each of the subsequent stages in a corridor siting study requires smaller spatial scale analysis, more certain predictions, and more specific quantification (Fitipaldi et al. 1982, Shopley and Fuggle 1983, Westman 1985, Forman and Godron 1986, Meentemeyer and Box 1987, Meentemeyer 1989, Zonneveld, 1989, 1990).

A hierarchy of spatial scales in the corridor siting studies ranges from the large scale analysis and assessment in initial alternatives identification to the detailed scale alternative corridors assessment and preferred corridors selection. Each scale related phase requires an adequate methodology for data collection, analysis and evaluation (Simutis and Johnson 1974, Meentemeyer and Box 1987, Meentemeyer 1989).

This variable is measured by determining if a hierarchically smaller spatial scale is applied to more refined stages of corridor analysis, and assessment.

(3) Comprehensiveness of corridor siting and evaluation criteria is another important technical consideration. Although ecological theory requires that all factors in the ecosystem be considered, comprehensiveness of identified impacts markedly varies. Some siting procedures identify a limited set of impacts (e.g., Smart 1976, Giles et al., 1976), while others consider a broad set of impacts and criteria (e.g., Simutis and Johnson, 1974).

The comprehensiveness is determined by recording explicitly stated siting and assessment criteria in the corridor siting study.

Research Questions - Technical Considerations in Siting:

- What is the general methodological approach to corridor siting?

- Does the general methodological approach to corridor siting comply with the standardized and technically valid methodology of corridor siting?

- Does the general methodological approach to corridor siting follow principles of spatial scale hierarchy?

- Are the corridor siting and assessment criteria in accord with the principles of comprehensiveness?

Environmental Impact Assessment Considerations

Environmental impact assessment considerations addressed in this research include: (1) Adequacy of impact prediction techniques, (2) Level of impact measurement, (3) Method of impact significance assignment.

Although, corridor siting studies typically adopt environmental impact assessment techniques, the standard methodological requirements are not always fully met (e.g., Simutis and Johnson 1974, Smart 1976, Giles et al. 1976, Duke Power Company and EDAW Inc. 1990, VEPCO, and Burns and McDonell 1991).

(1) According to the environmental assessment methodology, impact prediction techniques have to ensure the high probability of impact occurrence (Fitipaldi et al., 1982, Westman 1985).

Adequacy of impact prediction techniques is determined by identifying techniques applied to predict impacts. Techniques which use a range of multiple sources to identify impacts are more likely to have higher predictive power (Westman 1985). Moreover, procedures that interpret recent remotely sensed images predict impacts with greater certainty (e.g., Duke Power Company and EDAW Inc., 1990, VEPCO, and Burns and McDonell, 1991), than those which use, outdated available maps (e.g., Smart 1976, Giles et al. , 1976). The prerequisite for more certain prediction of impacts is the knowledge of functional relationships between baseline conditions and physical activities and spatial requirements of the transmission line land use (FAO 1976, Davidson 1986). Although the information on the construction and operation process is readily available, the responses of ecological factors to these land use activities are often only vaguely defined.

(2) The level of measurement is determined by identifying categories of impact measurement (e.g., direct vs indirect, quantitative vs qualitative). More direct and quantitative impact measurements contribute to more reliable siting methodology.

(3) Typically, the significance of predicted impacts is assigned by ad hoc expert judgment. Generally, subjective value judgment is acceptable if the rationale and assumptions are explicit (Conn 1986, Davidson 1986). However, the rationale behind the relative importance of predicted impact is often implicit and poorly documented (e.g., Simutis and Johnson, 1974, Smart 1976, Giles et al. 1976, Duke Power Company and EDAW Inc., 1990, VEPCO, and Burns and McDonell, 1991). The assignment of significance to impacts must consider public values and concerns, which is not always facilitated (e.g., VEPCO and Burns and McDonell, 1991).

The method of significance assignment is determined by the identification of techniques and documentation used in assigning the relative importance to the impacts and to the criteria for siting and assessment.

<u>Research Questions - Environmental Impact Assessment Considerations:</u>

- What is the predictive potential of impact prediction techniques applied in corridor siting? Do prediction techniques reduce uncertainty related to potential impacts?

- What is the level of impact measurement? Are quantitative and direct measurements dominant in the siting study?

- What is the method of impact significance assignment? Is the applied method explicitly stated and documented?

Data Collection and Mapping Considerations

Data collection and mapping considerations examined in this research include: (1) Range of data sources, (2) Adequacy of data update and verification, (3) Accuracy of mapping considerations, and (4) Adequacy of map detail.

Variables and Measures. (1) Data used in corridor siting studies may be obtained from a variety of sources: satellite images (e.g., Duke Power Company and EDAW Inc., 1990), aerial photographs (e.g., Simutis and Johnson, 1974, VEPCO and Burns McDonell, 1991) topographic maps, geology and soils maps, and data obtained from federal, state, and local agencies (e.g., Simutis and Johnson 1974, Smart 1976, Giles et al. 1976, Duke Power Company and EDAW Inc. 1990, VEPCO and Burns McDonell, 1991). Public input as a valuable source of local information is seldom used (e.g., VEPCO, and Burns and McDonell 1991).

Data sources should include all available sources. The range of data sources is determined by identifying sources used in corridor siting study.

(2) Data used in siting need to be of the most recent available update and verification. This is determined by examining documentation on data updates and verification.

(3) Mapping accuracy is a complex concept, encompassing taxonomic accuracy and spatial precision[11]. Mapping accuracy should be considered in the corridor siting study. It is measured by determining whether considerations of accuracy are explicitly addressed in the study process.

(4) Adequacy of map detail is important in the corridor siting. As the corridor siting study comprises successively smaller scale stages, the detail and scale of mapping should correspond to these more detailed stages. For instance, large

[11] See Chapter 2, for definition of these concepts.

spatial scale reconnaissance surveys for initial preliminary alternative corridors identification does not require high taxonomic and spatial detail. On the other hand, detailed assessment and selection of preferred corridors demands higher taxonomic and spatial detail. Also, choice of the minimum mapping unit must correspond to the scale of the map.

Adequacy of spatial detail is measured by identifying if the mapping scale and the minimum mapping unit correspond to the stage of siting study.

Research Questions - Data Collection and Mapping Considerations:

- What is the range of data sources used in the corridor siting? Are all available sources used?

- Are data updated and verified?

- Are the accuracy considerations explicitly addressed in the corridor siting study?

- Do mapping scale and detail of mapping correspond to the scale of the study stage?

3.4. Public and Institutional Considerations

This section presents variables, measures, and research questions used for achievement of the following research objectives:

- To explore and describe public and institutional considerations in corridor siting.

- To determine effects of these factors on the siting study process.

Public and institutional considerations addressed in this research comprise : (1) Public involvement in the siting process, (2) Active public opposition to the proposed project, (3) Media coverage and public opinion of the project, (4) Attitudes of involved agencies towards the proposed project, (5) Communication between agencies and organizations during the corridor siting study.

Variables and measures are displayed in Table 3.2. on the following page. The research questions are answered by the case study research.

Public Participation

Public participation is an indispensable part of a transmission line siting and application preparation (McConnon 1979, Yong and Feher 1979, Nickerson et al. 1979, Bisenius and Marcotte 1982, Stern and Munson 1982, Priestly 1988, CECA/RF 1990). It is especially important to obtain early and continuous public input, so that issues could be included into all stages of a study (Juves et al 1982).

Utility companies recognize the importance of public participation in the corridor siting studies. Therefore, even if the public participation is not mandated by legislation, companies often initiate and facilitate public participation in corridor siting (Juves et al. 1982, CECA/RF 1990).

According to the CECA/RF study (1990) public involvement in a corridor siting study has the following objectives: (1) Gathering information on resources within a study area, (2) Identifying issues and concerns, (3) Educating and informing the public about a project, (4) Creating a consensus among conflicting interest groups, and (5) Building and sustaining the credibility and trust between a company and the public. Cases of controversial proposed transmission lines, which failed to meet these public involvement objectives, document the importance of the meaningful public participation in a transmission line siting and certification. During citizen

Table 3.2: Public and Institutional Considerations: Concepts, Variables, Measures

Concepts	Variables	Measures
I. Public participation in corridor siting study.	- Forms.	- Identify categories of forms of public participation initiated and facilitated by the company.
	- Timing.	- Identify sequence, frequency, continuity of public participation initiated and facilitated by the company.
	- Scope and content of information exchange	- Identify categories of data and information exchanged between the public and the company.
II. Active Opposition.	- Issues raised by active opposition groups.	- Identify categories of issues most frequently raised by the opposition.
	- Strategies and dynamics of actions of active opposition groups.	- Identify categories, sequence, and effects of the opposition activities.
III. Media coverage of a proposed project.	- Direction.	- Identify categories of newspaper coverage: support, neutral, opposition.
	- Intensity.	- Record frequency of published articles.
	- Dynamics.	- Record spatial and temporal variations of newspaper coverage.
IV. Attitudes of participating organizations.	- Direction and intensity of attitudes towards a proposed project.	- Identify categories: support, neutral, opposition.
V. Communication among organizations.	- Forms.	- Identify categories of communication techniques.
	- Timing.	- Identify sequence, frequency, continuity of communication.
	- Content of information exchange.	- Identify categories of information exchanged.

participation in certification, delays often occur because of issues and concerns raised.

Variables and Measures. Characteristics of public participation comprise of: (1) Forms and techniques for public involvement, (2) Timing of the public participation, (3) Scope of information exchanged in the public participation.

(1) Forms of the public participation include techniques for public involvement facilitated by the utility company in the corridor siting. The variable is measured by identifying techniques of public involvement during the study. The possible categories are: informational meetings, workshops, open-house meetings, invited written and oral comments. Categories that facilitate meaningful feedback and interaction, disregarding the nature of the response, will be given higher values.

(2) Timing is defined as chronological sequence and frequency of public participation throughout a corridor siting study (CECA/RF 1990).

This variable is measured by recording the sequence, frequency, and continuity of various forms of public participation. Early and continuous participation, corresponding to the main stages of the corridor siting study is given higher value.

(3) Content of information exchange includes information solicited from the public by the utility company, information received from the public, information asked by the public and provided to the public.

This variable is given higher value if there is a balance between solicited and received information.

Research Questions - Public Participation:

- What are the forms and timing of public Participation? Do forms of public participation enable meaningful communication between parties? Is timing early or late? Continuous or disrupted? Does it correspond to the main stages of the siting process?

- What is the content of the information exchange during public participation? Is there a balance between requested and received information?

- What are the effects of public participation initiated and facilitated by the company in the corridor siting process? Which lessons are learned? Which difficulties are encountered?

Active Public Opposition

Organized and strong citizen opposition to large transmission line projects is commonly expected in a corridor siting study (Schafer, Jacobson, and Everett 1982, Juves et al. 1982, CECA/RF 1990). Perceived benefits from the project directly influence the attitudes, (opposition or support) towards the project. Direction and intensity of attitudes of potentially affected citizen groups, may influence the success of a project implementation (Mazmanian and Sabatier 1989). As Mazmanian and Sabatier (1989;32-33) note, opposition groups are usually better organized, and invest more financial resources into their activities, than supportive groups. A strong opposition, particularly if coupled with poor communication between the public and the company, can significantly complicate and delay a corridor siting study process (Juves et al. 1982).

The active opposition is examined in terms of issues raised, and strategies used against proposed electric transmission line.

Variables and Measures. (1) Issues raised by the opposition encompass publicly expressed concerns related to the proposed transmission line. The issues are recorded on a nominal scale.

(2) Strategies and dynamics of the active opposition encompass types and temporal variations of actions during the life of the corridor siting study.

This variable is measured by identifying actions, and recording the chronology of the actions. Possible categories of activities include: a letter writing campaign, petition writing, public informational meetings, letters to editors, lobbying politicians. The higher value will be given to a variety of activities that generate a legal or political response in support of the opposition, and to activities which temporally coincide with critical stages in the corridor siting study.

Research Questions - Public Opposition:

- What are the issues raised by the active opposition groups?

- What are the actions and strategies of the active opposition groups?

- What are the effects of active public opposition actions on the corridor siting process? Which lessons are learned? Which difficulties are encountered?

Media Coverage

Public opinion, being a social and a political factor, can significantly affect project outcomes (Mazmanian and Sabatier 1989). Media coverage, as it both influences and reflects the public opinion, affect all aspects of transmission line siting process (Juves et. al 1982, Mazmanian and Sabatier 1989). Public attitudes tend to change with spatial variations of socioeconomic conditions (Mazmanian and Sabatier 1989). Also, the attitudes of potentially affected public depend on other variables, such as media coverage and communication. Large transmission line projects, traversing extensive areas with pronounced regional socioeconomic differences, often experience corresponding variations in the media coverage and the public opinion.

Variables and Measures. The media coverage of a proposed project is examined by the following variables: (1) Direction, (2) Intensity, and (3) Dynamics (Juves et al. 1982, Mazmanian and Sabatier 1989, CECA/RF 1990).

(1) Direction of media coverage of a proposed project is defined by the support or opposition to the proposed line.

It is measured by classifying newspaper articles into categories: neutral, support, and opposition.

(2) Intensity of coverage is defined by the frequency of newspaper articles.

(3) Dynamics of media coverage is defined as variation of the coverage within the study area during the siting study. It is measured by the frequency and the chronology of newspaper articles over the study area.

Public opinion is described indirectly, through description of media coverage characteristics.

Research Questions - Media Coverage and Public Opinion

- What is the direction of media coverage and reflected public opinion toward the project? What is the intensity of media opposition or support for the project?

- What is the dynamics of media coverage and public opinion? Is there a temporal variation in the direction and the intensity of the media coverage? What are the spatial variations in media coverage and public opinion toward the project?

- What are the effects of the media coverage and public opinion on the corridor siting process? Which lessons are learned? Which difficulties are encountered?

Attitudes of Agencies

Attitudes of involved agencies towards the proposed project are critical for effective project implementation. Support contributes to a fuller compliance with the project goals (Mazmanian and Sabatier 1989).

Variables and Measures. Attitudes of participating organizations are defined by direction, and measured by three categories: support, neutral, opposition.

Research Questions - Attitudes of Agencies:

-What are the attitudes of interested and involved agencies towards the proposed electric transmission line?

- What are the effects of these attitudes on the corridor siting process? Which lessons are learned? Which difficulties are encountered?

Communication among Agencies and Organizations

Effective informal communication[12] among parties involved in the proposed project is a prerequisite for successful project implementation. Effective information transfer between and within organizations ensures comprehendible and timely information release and receipt. Typically, the following organizations communicate in a corridor siting study: state regulatory commission, utility company, consulting organizations, federal, state, and local agencies, and private organizations.

The concept of communication interacts strongly with attitudes of involved parties, media coverage and public

[12] "Informal communication" as opposite to "formal" which is mandated by regulations.

opinion (Juves et al. 1982). Furthermore, the formation and changes in attitudes depend largely on understanding of a proposed project by the involved parties. An open flow of clearly presented information enables better comprehension of the issues. Communication also enhances coordination of actions.

Variables and Measures. The effectiveness of communication is determined by (1) Forms, (2) Timing, and (3) Purpose of communication.

(1) Forms of communication refer to ways in which a communication is administered. This variable is classified into categories such as meetings, phone calls, correspondence, and communication through a liaison. Direct interactive personal communication (meetings and phone calls) is given higher values than indirect communication forms (correspondence and communication through liaison or third party) (Nickerson et. al. 1979, Edwards 1980, Juves et al 1982, Stern and Munson 1982).

(2) Timing of communication among organizations reflects the frequency and continuity of communication.

This variable is given higher value if communication is initiated from the onset of the corridor study, continues throughout the study and corresponds to critical phases of the corridor siting study.

(3) The purpose of communication is measured by categories such as: exchange of data, clarification of regulatory requirements (e.g., between the commission and the company), seeking expert advice (e.g., between the company and a governmental agency) ongoing management communication (e.g., between the company and the siting team).

Research Questions - Communication among Agencies and Organizations:

- What are the forms and timing of communication? Is communication direct or indirect? Is timing continuous or disrupted?

- What is the purpose of communication? What information is exchanged in communication?

- What are the effects of communication between agencies and organizations on the corridor siting process? Which lessons are learned? Which difficulties are encountered?

3.5. State Siting Regulations

State regulations for corridor siting are the main component of the complex regulatory framework for corridor siting. This section defines variables, measures, and research questions. The following objectives are to be attained:

- Evaluate content of the state regulations for corridor siting.

- Determine the effects of regulations on siting process.

State regulations are evaluated in terms of:

(1) Clarity of regulatory objectives and standards,

(2) Technical aspects of siting requirements, (3) Regulated coordination of actions in corridor siting, and (4) Regulated public and agency participation in corridor siting study.

Variables and measures are displayed in Table 3.3. The research questions are answered by the case study research complemented with the state regulations review.

Clarity of Regulations

The state utility regulations translate the broader policy goals into more definite objectives and standards, which a utility company must follow to obtain an approval for

Table 3.3: State Utility Regulations: Concepts, Variables, Measures

Concept	Variables	Measures
I. Clarity of regulatory requirements for corridor siting.	- Precision of natural resources regulatory objectives.	- Level of specificity, quantification of regulatory objectives.
	- Priority of regulatory objectives.	- Degree of explicit ranking in order of priority for protection.
II. Technical siting requirements.	- Data requirements.	- Identification of requirements for data sources, update, verification, spatial coverage, accuracy, storage and retrieval.
	- Methodological requirements for corridor selection and assessment.	- Identification of provisions for siting criteria for alternative corridors analysis, assessment, and selection, impact mitigation specifications, impact implementation and monitoring.
	- Requirements for corridor siting results presentation.	- Identification of requirements for base map, map scale, coverage, and update.
III. Regulated coordination of actions in corridor siting.	- Requirements for coordinated actions.	- Identification of regulatory provisions for procedures and timing for actions of responsible agencies.
	- Coordination with state utility regulations of bordering states.	- Identification of regulatory provisions coordinating with regulatory siting and approval procedures of bordering states.
	- Coordination with other relevant regulations.	- Identification of regulatory provisions coordinating with federal, state, and local permitting and planning regulations.
IV. Regulated public and agency participation in siting	- Forms and timing of regulated public participation.	- Identification of provisions specifying forms and timing of mandated public participation in the corridor siting study.
	- Forms and timing of regulated access and independent evaluation by governmental agencies.	- Identification of provisions specifying forms and timing of mandated agency participation and review of the corridor siting study.

transmission line siting and construction. The regulations are considered more effective if requirements are precisely stated and clearly prioritized (Juves et al. 1982, Mazmanian and Sabatier 1989).

Precise, unambiguous and clearly prioritized requirements enable corridor siting study participants to easily recognize and eliminate disparity between the actions and the regulatory requirements. Precision of the regulations is important, both for the utility company, which is directly regulated, and for other interested and involved parties, including consultants, natural resources management agencies, private organizations and the public.

Although vague regulations are not desirable, too specific regulations may also have negative effects. Therefore, flexibility, defined as a balance between vagueness and specificity, is necessary, if the regulation is to be applicable to a variety of specific cases.

Variables and Measures. The criterion of clarity is defined by: (1) Precision, and (2) Priority of stated regulatory objectives.

(1) Precision of the regulatory objectives is expressed by the level of specificity and quantification.

The precision is measured by the following categories:

- qualitative objectives referring to individual natural factors in general such as: minimize adverse impacts on geology, topography, soils, hydrology, vegetation, wildlife;
- qualitative objectives referring to specific attributes of natural factors such as: avoid disruption of aquatic wildlife habitats;
- quantitative objectives referring to individual natural factors in general such as minimum distance of the line from all hydrologic features;
- quantitative objectives referring to specific attributes of

natural factors: prescribed minimum distance of the line from riparian wetlands.

(2) A degree of priority of the regulatory requirements is defined as an explicit sequence of the requirements in order of the importance for the corridor siting.

A degree of priority is measured by identifying if the regulations contain any explicit priority sequence, and by determining the extent of the ranking. Measures include the following categories: not prioritized, partially prioritized, and fully prioritized.

Research Questions - Clarity of Regulations

- What is the level of clarity of corridor siting regulatory requirements? Are requirements precise? Are the requirements prioritized?

- What are the effects of clarity on the corridor siting study process? What problems are encountered due to unclear regulatory requirements?

Technical Aspects of Siting Requirements

If the compliance with the regulatory objectives and requirements is to be attained, a regulation should be founded on valid technical principles (Mazmanian and Sabatier 1989).

Variables and Measures. This criterion encompasses: (1) Data collection requirements, (2) Methodology requirements, and (3) Corridor study presentation requirements. Variables comprising the criterion of technical aspects are derived from literature on electric transmission corridor siting, environmental impact assessment, land mapping (Simutis and Johnson 1974, Smart 1976, Giles et al. 1976, Sondheim 1978, Fitipaldi et al 1982, Campbell 1983, Bisenius and Marcotte

1984, Shopley and Fuggle 1984, Westman 1985, EDAW Inc, 1990, Burns and McDonell 1991)[13].

(1) Data requirements are defined by the required attributes of data to be collected in the corridor siting study.

This variable is measured by identifying the content of the relevant regulatory requirements. The highest value will be given to clearly specified and adequate requirements for data sources, update, verification, spatial coverage, scale, accuracy, forms of recording, storage and retrieval of data.

(2) Siting methodology regulatory requirements cover siting criteria for alternative corridors identification, assessment and selection of preferred corridors, impact mitigation techniques, implementation and monitoring of impacts.

This variable is given the highest value if the regulatory criteria are comprehensive, explicit, and quantitative. Furthermore, if regulations require that impact mitigation techniques are specified, along with defined implementation and monitoring techniques and timing, the variable is given the highest value.

(3) The requirements for corridor siting study results presentation include the mapping specifications. This variable is given the highest value if the provisions clearly specify scale, detail, update and coverage of maps.

Research Questions - Technical Aspects of Regulatory Requirements:

- What is the content of the regulatory provisions for data collection in terms of data sources, update, verification, accuracy, storage and retrieval? What are the difficulties in following these requirements during the

[13] For the background of these variables see Chapter 2.

corridor siting study?

- What is the content of provisions for criteria and methods for alternative corridor identification, assessment, and selection of preferred corridors? What is the content of provisions for impact mitigation specification, mitigation implementation and monitoring of impacts? What are the difficulties in complying with these requirements during the corridor siting study?

- What is the content of the mapping provisions? What are the difficulties in complying with these requirements during the corridor siting study?

<u>Regulated Coordination of Actions</u>

Effective and timely coordination of actions and regulations of involved federal, state, and local agencies, commissions, utility companies, consulting firms, and other organizations is recognized as a critical factor in a transmission line siting study (Juves et al. 1982, CECA/RF 1990). As Mazmanian and Sabatier (1989) assert, regulated coordination of activities is the necessary condition for any project implementation success. It is especially critical that the state regulations coordinate procedures with regulations of bordering states, and with federal, state, and local land use and resource management legislation. This concept encompasses the following variables: (1) Regulated coordination of actions, (2) Regulated coordination with bordering states electric transmission line siting regulations, and (3) Regulated coordination with federal, state, and local land use, resource management, and permitting regulations.

<u>Variables and Measures.</u> (1) Regulated coordination of

actions of agencies and organizations involved in corridor siting, is defined by presence of regulatory provisions which assign responsibility for timely actions to competent agencies to attain particular regulatory objectives (CECA/RF 1990).

The higher value is given if the regulations impose greater number of such provisions (e.g., State Department of Natural Resources to be consulted by the company during the corridor siting, State Department of History to supply data on historical resources in the inventory phase of the study, utility company to receive comments from a State Department of Wildlife within a month after alternative corridors are determined.

(2) Regulated coordination with regulations of neighboring states in cases of interstate transmission projects is an important variable, because of the current trend to build long lines that cross interstate borders (Schafer, Jacobson, and Everett 1982, CECA/RF 1990).

This variable is measured by the presence of coordinating regulatory provisions for interstate lines siting. The higher value is given if regulations enable coordination between regulatory actions (e.g., specified actions during corridor siting, and regulatory review of interstate lines).

(3) Coordination with other federal, state, local land use, management, and permitting regulations applicable to transmission line siting (Juves et al. 1982, CECA/RF 1990).

The value of this variable is determined by identifying the regulatory provisions for coordination with federal, state, and local regulations (e.g., with the NEPA EIS requirements if a line crosses federal lands, U.S. Army Corps of Engineering Permitting regulations if a line crosses federally managed water resources; State EIS requirements if applicable, state land management regulations to be followed if line crosses designated state lands such as wildlife refuges or state parks; local zoning regulations). The highest value will be given to the variable, if such coordinated regulatory provisions for all three levels exist.

Research Questions - Regulated Coordination of Actions:

- What is the content of the regulatory provisions for coordination of actions in corridor siting? How do these provisions affect the corridor siting study process?

- What is the content of the regulatory provisions for coordination of regulatory siting procedures with those of neighboring states? How do these provisions influence the corridor siting study process?

- What is the content of the regulatory provisions for coordination with federal, state, local permitting and land use and management regulations? How do these provision influence the corridor siting study process?

Regulated Public and Agency Participation

Regulations that mandate participation and independent evaluation by interested and affected parties contribute to more effective policy implementation (Mazmanian and Sabatier 1989). Accordingly, the state utility regulations should provide participation in all stages of the corridor siting study, both for citizens and agencies. Moreover, the regulations should incorporate a mechanism for an independent evaluation of the study, so that the potential concerns can be identified and integrated into the siting process, before the application is filed (Juves et al. 1982).

Variables and Measures. This criterion encompasses provisions defining the (1) Forms, and (2) Timing of the public, and agencies participation and evaluation of the corridor siting study results (Juves et al. 1982, CECA/RF 1990).

(1) Forms of regulated public and agency participation in the corridor siting study, include categories such as conferences, informational meetings, workshops, open house, correspondence, phone calls. The direct communication categories, with higher interactive potential (e.g., meetings) are given higher value than indirect communication categories (e.g., written correspondence).

(2) Timing of regulated public and agency participation in the corridor siting study is determined by identifying a regulatory timetable of public participation and agency involvement. The continuous participation from the beginning of the corridor siting study, and after each principal stage of siting is completed, is assigned the highest value. Provisions for continuous, interactive access by federal, state, and local agencies, to review and evaluate the results of the corridor siting study are given the highest value.

Research Questions - Regulated Public and Agency Participation and Review:

- What is the content of provisions that mandate public participation in the corridor siting study? How do these provisions affect the corridor siting study process?

- What is the content of provisions that mandate agency participation and review of corridor siting study? How do these provisions affect the corridor siting study process?

CHAPTER 4: METHODOLOGY

4.1. Research Process

The overview of the research process is displayed in Figure 4.1.

A literature review, is the first step in the research, which provides the basis for problem identification, definition of main ideas, research objectives, and methodological approach.

The research is focused on the effects of the technical considerations in siting, public and institutional factors, and state siting regulations on the study process. The research goal is to determine the nature and character of these effects. The objective is achieved by the case study research, which is supported by the review of state siting regulations, and the literature review.

The case study research explores and describes: technical siting considerations, institutional and public factors, and implementation of state regulations in corridor siting. In addition, it describes the siting study process and determines the effects of the above concepts on the process.

The review of state regulations complements the case study findings. The specific objectives of the review are to evaluate state regulations, and identify regulatory provisions with a potential to improve the corridor siting study process.

The primary results of the research are the guidelines for improved corridor siting study. The guidelines are produced by synthesis of findings from the case study research, the state regulations review, and the literature review.

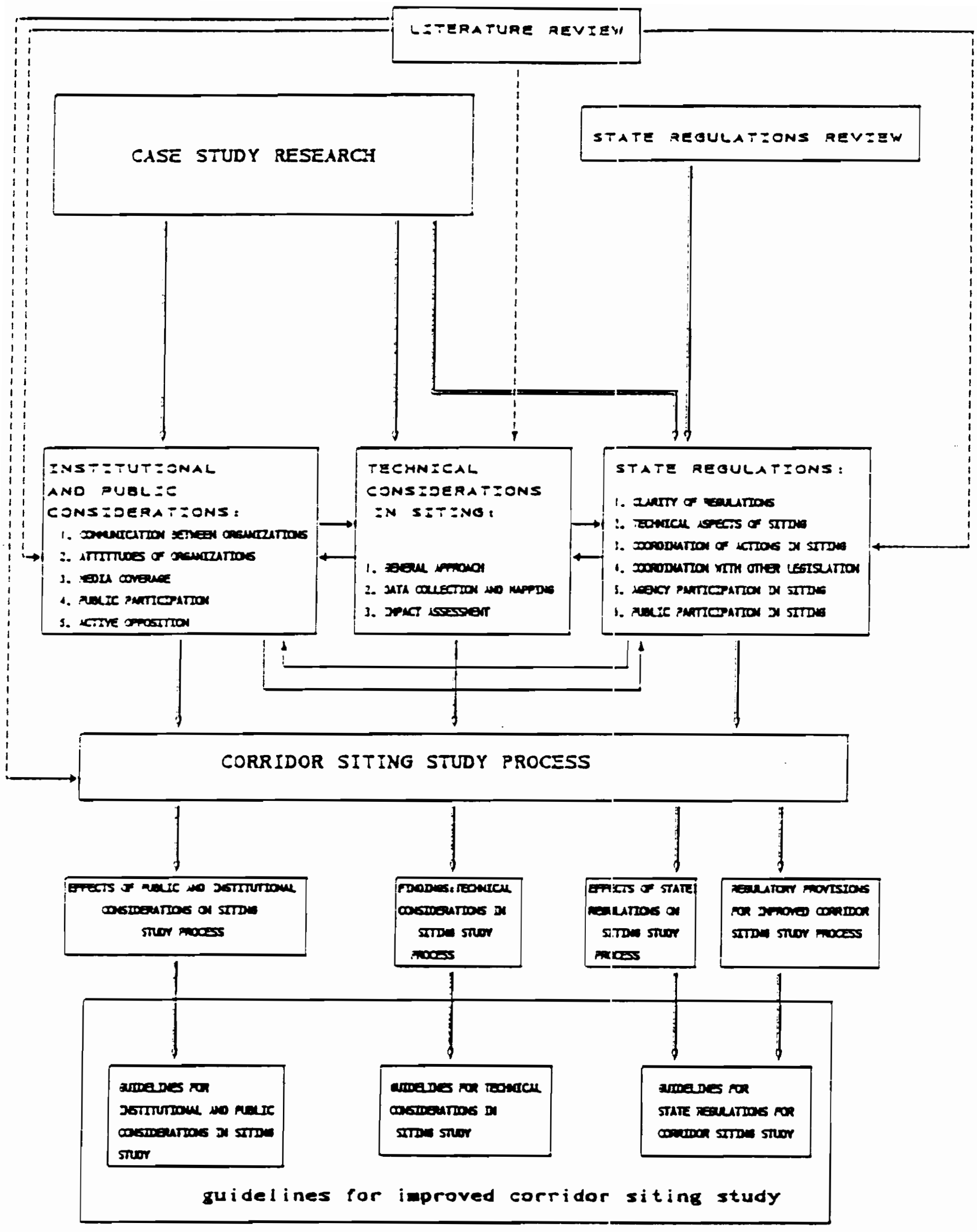


Figure 4.1: Research Process

The following text describes the main features of the case study research and the state regulations review, and discusses methodological issues of validity and reliability related to this, essentially qualitative, research.

4.2. Case Study Methodology

The subject of the case study is the Wyoming-Cloverdale 765 kV proposed transmission line siting and environmental assessment project traversing West Virginia and Virginia. This interstate project started in August 1990, and has not been completed to date. The line is about 110 miles long, crossing a diversity of private and public resources. The study involves the following characteristics of the typical contemporary corridor siting study: (1) It is a very long line, crossing extensive areas and potentially impacting a variety of resources, (2) It takes place within a complex regulatory setting, which involves two state public utility commissions, federal, state, and local legislation, (3) It potentially impacts a variety of private and public lands, involving many diverse interests.

The case study examines implementation of the Virginia and West Virginia state regulations in the real life context of the corridor siting study. Furthermore, it explores and describes siting methods and technical considerations, and institutional and public considerations as they affect the process of the study.

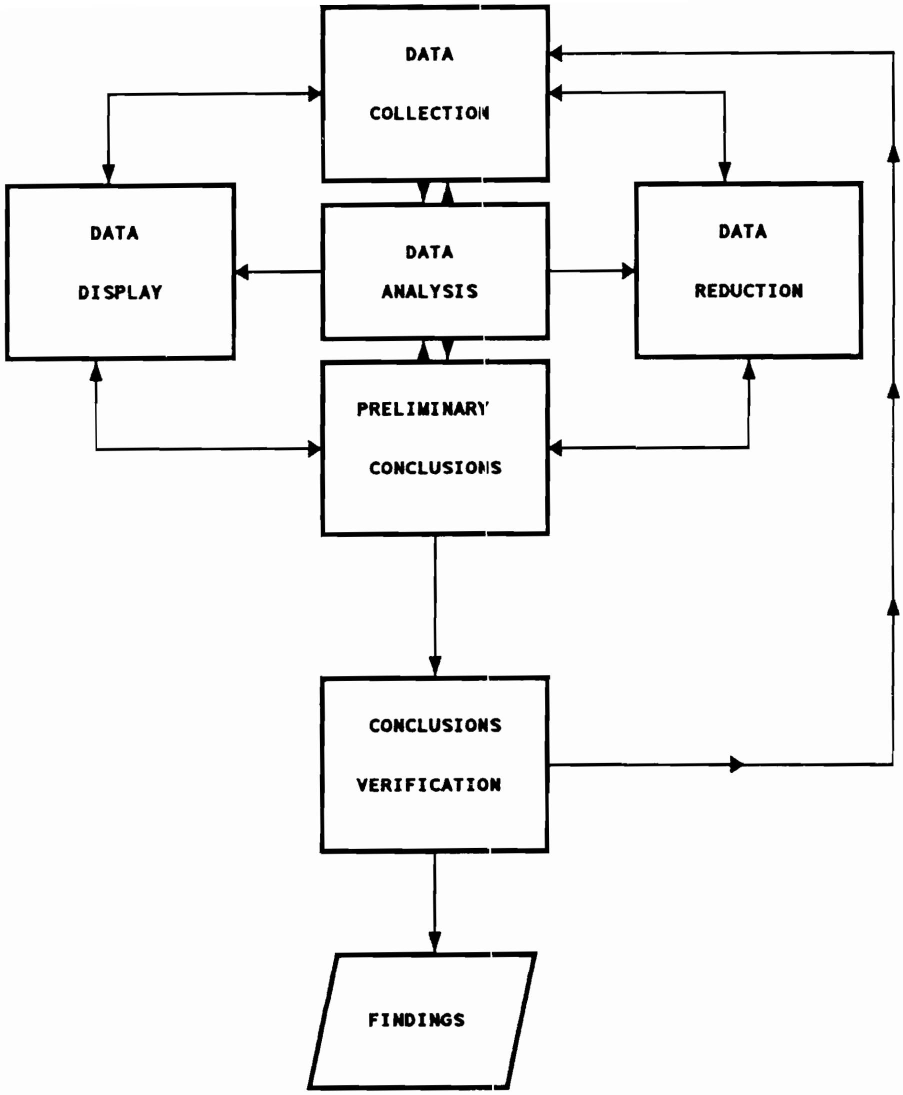
The case study is conducted using a case study protocol as a guide and an instrument (Yin, 1994). The protocol is comprised of the siting project background, research questions and variables, sources of evidence by variable and research question, data sources available in the case study database, and interview guides. The protocol is presented in Appendix B.

The following multiple data sources and collection techniques are used in the case study research:
(1) Document and archival records review (state legal documents, correspondence with public and agencies, minutes of meetings with agencies, corridor siting study documentation, newspaper articles related to the siting study, relevant published materials, maps, internal reports), (2) Participant observation of actors and activities of the siting study, and (3) Open-ended focused interviews with the siting team and the company.

The case study data analysis techniques are based on the methodology described in the book "Qualitative Data Analysis: An Expanded Sourcebook" by Miles and Huberman (1994).

Six distinctive activities are carried out simultaneously (see Figure 4.2.): (1) Data collection, (2) Data reduction, (3) Data display, (4) Data analysis, (5) Preliminary conclusions formation, and (6) Verification of the preliminary conclusions.

Having a large amount of qualitative data collected, there is a need for data reduction, by organized and structured data display. The first step is the coding of variables and associated research questions. The coding helps to sort out a raw qualitative data, as they appear in analyzed legal documents, internal documents, archival records, observation and interview notes. Next, the data is tabulated in a systematic, accessible, and compact form. The tables are the basis for preliminary conclusions. The preliminary conclusions are formulated by recording frequencies of data values for individual variables, clustering and differentiation of variable values, and by noting repetitive patterns. The preliminary conclusions are verified by focused interviews with the utility company and the corridor siting



(after Miles and Huberman, 1994)

Figure 4.2: Data Analysis Procedure

study team representatives. Verified conclusions are interpreted and presented in the case study report.

All steps in the data analysis are systematically documented.

4.3. Approach to State Regulations Review

The review of state regulations complements the case study results on the state regulations implementation in corridor siting. The case study gives in depth insight into the implementation of the state regulations during a typical corridor siting study process. The review provides an insight into the status of regulations, and identifies a range of regulatory provisions that may improve the siting process. The review of regulations is a two-stage process: (1) Regulations are evaluated in terms of clarity, technical aspects, regulated coordination of actions, and regulated public and agency participation, (2) Regulatory provisions with a potential to improve, speed up and streamline corridor siting study process are identified.

Units of analysis are state utility commission regulations in 17 selected states. First, all states in the Appalachian region are reviewed to determine the status of the regulations in the region where the case study project is located. Besides Virginia and West Virginia, which are investigated in the case study research, the following Appalachian states are reviewed: Ohio, New York, New Jersey, Pennsylvania, Maryland, Delaware, North Carolina, South Carolina, Kentucky, Tennessee, and Georgia.

Secondly, the west coast states California and Oregon are reviewed because of their traditionally advanced environmental policies. And finally, four mid-west states, Wisconsin, Minnesota, North Dakota and South Dakota are reviewed because of the history of controversial electric transmission line projects in this region.

The data are collected by the review of, and content analysis of legal documentation, and by personal communication with representatives of the state regulatory commissions. Data analysis for review of regulations uses the qualitative data analysis techniques, suggested by Miles and Huberman (1994), (see Figure 4.2).

Data sources, data display narrative and tables are presented in the Appendix C.

4.4. Reliability and Validity Issues

Qualitative research often suffers from validity and reliability threats (Babbie 1983, Miles and Huberman 1994). The following issues are discussed in this section: reliability, construct validity, internal validity, and external validity (or generalizability).

Reliability. Reliability is defined as "demonstrating that the operations of a study - such as data collection procedures, can be repeated, with the same results. " (Yin, 1994, p 33). The reliability can be tested only if there is sufficient documentation on data collection and analysis, to allow replication of the research under the same conditions, to find out if the research results will be the same.

Two tactics are used to enhance the reliability of the case study: (1) A case study protocol is developed and presented, and (2) A case study database is developed (Yin 1994).

The reliability of the state regulations evaluation is improved by documenting data sources, data collection instruments, and tabular data displays (Yin 1994, Miles and Huberman 1994).

Construct Validity. Construct validity is defined as "establishing correct operational measures for the concept being studied " (Yin 1994, p 33). It is also defined as "... the extent to which an empirical measure adequately reflects the real meaning of the concept under investigation " (Babbie 1992, p 117). As Yin (1994) points out, the construct validity is the common issue in the case study research, where measures are often subjective, and therefore of questionable validity.

The construct validity of the case study techniques and instruments is enhanced by: (1) Employing multiple sources of evidence in data collection, (2) Sustaining and documenting a chain of evidence throughout the study (Yin, 1994, p 33). The construct validity is promoted by using multiple sources of evidence for individual variables. If the sources yield the coinciding values, then the measures may be accepted as valid. The chain of evidence is maintained by identifying and documenting all steps in data analysis and conclusions drawing, and by citing sources of evidence supporting the conclusions.

In the state regulations review, the construct validity is tested through a review of conclusions and findings by state commissions representatives contacted in the data collection stage of the research (Yin, 1994, Miles and Huberman 1994).

Internal Validity. Internal validity is defined by Yin (1994, p 33) as: "establishing a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguishing from spurious relationships..." The internal validity refers to conclusions of the research, and is addressed in the data analysis phase.

In this research, internal validity, or credibility of findings, is improved by pattern matching. Specifically, patterns identified in the literature (e.g., patterns of siting methodology considerations) are matched with patterns identified in the research. If the two sets of patterns match, the internal validity of findings is increased. Also, the internal validity of findings is increased by getting feedback on the findings from knowledgeable individuals.

External Validity - Generalizability. External validity is defined as "establishing the domain to which the study findings can be generalized " (Yin 1994, 33). Are the results of the particular case study research applicable to other corridor siting studies? A degree of external validity or generalizability of the case study findings is a common methodological issue, especially in a single case study research design (Yin 1994, Miles and Huberman, 1994). To resolve the issue, Yin (1994) suggests employing analytical generalization, which is more appropriate for case study research than statistical generalization (e.g., inferring from sample to population). Analytical generalization transfers results of case study to a broader theory. Specifically, the findings of this research refer to three areas of analytical generalization:

- Technical considerations in siting, based on the literature on corridor siting, spatial analysis, landscape ecology, environmental impact assessment.

- Institutional and public considerations based on the policy implementation and corridor siting literature.

- State regulations for corridor siting, based on the policy implementation and corridor siting literature.

The generalizability of findings of this research can be tested by replication of the research for the case of another corridor siting study, as suggested in section on future research in Chapter 12. If the findings match the findings of this research the external validity may be deemed satisfactory.

PART III: NATIONAL REVIEW OF STATE REGULATIONS

CHAPTER 5: RESULTS OF THE STATE REGULATIONS REVIEW

The review of the state regulations has the objectives to:

- Evaluate regulations for corridor siting against the following theory based criteria: (1) Clarity of regulations, (2) Technical aspects of siting requirements, (3) Regulated coordination of actions and coordination of other relevant regulations, (4) Regulated public and agencies participation in corridor siting study.

- Identify provisions with a potential to expedite and streamline corridor siting study process.

The review provides ancillary information for the case study findings on the effects of state regulations on the corridor siting study process.

The review includes: Appalachian states - Ohio, New York, Pennsylvania, Delaware, Maryland, North Carolina, South Carolina, Tennessee, Kentucky; mid-continent states - Wisconsin, Minnesota, North Dakota, and South Dakota; and west coast states - Oregon, California[14].

The Chapter consists of two sections. The first section summarizes the review results. The second section identifies the regulatory provisions that expedite and streamline the corridor siting study process. The appendix to this Chapter contains a detailed narrative on the reviewed regulations. In

[14] New Jersey, Tennessee, Georgia, are the Appalachian states with no regulations for electric transmission corridors siting and certification.

addition, it includes tables with: (1) Data sources, (2) Data on regulatory authority, certificate title and its applicability, (3) Data on procedures and actions required for transmission line siting and certification, (4) Data on requirements for transmission line siting and certificate.

The results of the review are complementary to the results of the case study research and literature review. The synthesis of these three sets of findings builds guidelines for state regulations for corridor siting.

5.1. Status of the State Siting Regulations by State

Clarity

The clarity of the corridor siting requirements, as expressed by the specificity, level of quantification and priority, is generally low for all reviewed states. The research questions addressed are as follows: What is the level of clarity of corridor siting regulatory requirements ? Are requirements precise ? Are the requirements prioritized ? The results of the evaluation are summarized in Table 5.1.

Appalachian States. Most states in the region have unclear qualitative corridor siting regulatory requirements. Priority of regulatory requirements is also lacking in all regulations. Only Ohio has specific corridor siting requirements, referring to natural factors attributes. Hydrology as a criterion is particularly well defined, requiring that runoff and siltation, flow pattern and erosion, and changes in public water supplies must be considered. Also, water bodies critical for the siting are classified into distinctive categories: lakes, ponds, reservoirs, marshes, swamps and wetlands. Nonetheless, the

Table 5.1. Clarity of State Regulations

STATE	PRECISION		PRIORITY
	SPECIFICITY	QUANTIFICATION	
OH	- Vague, only water resources specifically described by their attributes.	- Within 1,000 feet of each side of proposed corridors;	- No explicit priority given to any natural factor.
NY	- Vague.	- None, all qualitative.	- No explicit priority given to any natural factor.
PA	- Vague.	- None, except geologic resources and wilderness within 2 miles of each side of proposed corridors.	- No explicit priority given to any natural factor.
MD	- Minimum criteria very vague, but specified on case by case basis by Project Coordinating Committee.	- None, all qualitative.	- No explicit priority given to any natural factor.
KY	- Vague.	- None, all qualitative.	- No explicit priority given to any natural factor.
NC	- Vague.	- None, all qualitative.	- No explicit priority given to any natural factor.
SC	- Vague.	- None, all qualitative.	- No explicit priority given to any natural factor.

Table 5.1. Clarity of State Regulations, continued

STATE	PRECISION		PRIORITY
	SPECIFICITY	QUANTIFICATION	
WI	- Vague.	- Not quantified, only few requirements quantitative, e.g. "productivity ratings for soil associations"	- Designated areas and unique features listed as "special areas " in Environmental Screening Sheet. - Also hydrology listed in the Sheet as a priority.
MN	- Minimum siting criteria vague. However, Advisory Route Task Force determines specific siting and assessment requirements on a case by case basis.	- None, all qualitative.	- Federal, state, local resources designated for preservation.
ND	- Specific, natural factors described by the attribute.	- None, all qualified.	- Clear, list of avoidance and exclusion areas determined.
SD	- Vague.	- None, all qualitative.	- None.
OR	- Specific, natural factors described by the attribute.	- Quantified by defined distance from the corridor within which categories of resources must be mapped.	- Exclusion areas determined by the regulations.
CA	- Specific, natural factors described by the attribute.	- None, all qualified.	- None.

Ohio criteria are all qualitative, except for ecological impacts, which should be identified within 1,000 feet of the proposed corridor.

<u>Selected Mid-continent States.</u> South Dakota has vague, qualitative siting criteria, with no priority given to resources in terms of their sensitivity to corridor siting. Wisconsin regulations, although vague and mostly qualitative, assign a priority for avoidance of designated and unique areas, landforms, and habitats. Water resources and vegetation are given special consideration in corridor siting.

Minnesota and North Dakota are two exemplary states, with specific and clearly prioritized siting standards. Nevertheless, neither state regulations quantify the standards and objectives.

In Minnesota, similarly to Maryland, general requirements are specified and interpreted by the Advisory Route Task Force, on a case by case basis. Priority is clearly given to avoidance and protection of federal, state, and local resources designated for preservation.

The North Dakota Commission maintains and updates a list of exclusion and avoidance areas. The areas are clearly specified into qualitative categories. This provision is exceptionally useful, because it unambiguously determines priorities in the siting process.

<u>Selected West Coast States.</u> Both Oregon and California have well specified corridor siting criteria. However, California regulations do not assign priority and quantification to standards and objectives.

In Oregon, regulations are quantified by specifying distance from the centerline by the category of resources. In addition, federal and state designated areas and features are classified as exclusion areas, and given the highest priority to protection in the corridor siting study.

Technical Aspects of Siting Requirements

Technical aspects of siting requirements are defined by comprehensiveness of the requirements, data requirements, methodological and mapping requirements. The following research questions are answered by the review: What is the content of regulatory provisions for data collection requirements in terms of data sources, update, verification, accuracy, storage and retrieval ? What is the content of provisions for criteria and methods for alternative corridor identification, assessment, and selection of preferred corridors ? What is the content of provisions for impact mitigation specification, impact mitigation implementation and monitoring of impacts ? What is the content of mapping provisions ? Results of the review are summarized in Table 5.2.

Appalachian States. Ohio, New York, Pennsylvania, and Maryland have comprehensive corridor siting requirements embracing geology, topography, soils, hydrology, vegetation, and wildlife. In Kentucky, North Carolina, and South Carolina the requirements are defined as a single general category "environmental impact," which is supposed to encompass all requirements for the siting process.

In all states, except Ohio, data requirements are not stated in the regulations. The same is true of methodological requirements, which are either absent or too general to be meaningful guidance for the corridor siting study process.

Only Ohio, New York, and Maryland regulations define mapping requirements. Ohio determines the universal mapping scale (1:24,000) for all categories of resources, and defines a specific coverage by the category of the resource. For instance, ecological, health and safety impacts should be mapped within 1,000 feet on each side of the corridor, while

Table 5.2. Technical Aspects of Corridor Siting Regulatory Requirements

STATE	SCOPE OF REQUIREMENTS	DATA REQUIREMENTS	METHODOLOGICAL REQUIREMENTS	PRESENTATION - MAPPING REQUIREMENTS
OH	- Comprehensive, all natural factors stated.	- Data sources should be stated in the application.	- General, but demand description of methods, direct and indirect impacts identification, and summary of alternatives assessment.	- Very specific mapping coverage and scale, by resource categories.
NY	- Comprehensive, all natural factors stated.	- Not stated.	- Probability, extent, duration of environmental impacts must be addressed; - Mitigation measures must be specified; - Environmnetal Management & Construction Plan required.	- Mapping scale specified at 1:24,000, 1:250,000; - Very specific requirement that the corridor showing 1,200 feet of the both sides must be drawn on aerial photos not older than 6 months from filing date.
PA	- Comprehensive, all natural factors stated.	- Not stated.	- None.	- Not specified.
MD	- Comprehensive, all natural factors stated.	- Not stated.	- None.	- Only mapping scale specified as a minimum 1:24,000.
KY	- Cannot be determined, only category stated is "environmental effects".	- Not stated.	- Unavoidable impacts.	- None.
NC	- Cannot be determined, only category stated is "environmental impacts".	- Not stated.	- Mitigation to be described in the application.	- None.
SC	- Cannot be determined, only category stated is "environmental studies".	- Not stated.	- None.	- None.

Table 5.2. Technical Aspects of Corridor Siting Regulatory Requirements, continued

STATE	SCOPE OF REQUIREMENTS	DATA REQUIREMENTS	METHODOLOGICAL REQUIREMENTS	PRESENTATION - MAPPING REQUIREMENTS
WI	- Comprehensive, covering all natural factors.	- Not stated.	- Primary, secondary, Inavoidable Impacts to be identified.	- Specific overlay maps, 1:250,000.
MN	- Comprehensive, covering all natural factors.	- Not stated.	- None.	- None.
ND	- Comprehensive, covering all natural factors.	- Not stated.	- Direct, indirect impacts, irretrievable losses of natural resources must be identified.	- None.
SD	- Comprehensive, covering all natural factors.	- Not stated.	- Irretrievable and cumulative impacts with mitigation to be considered.	- None.
OR	- Comprehensive, covering all natural factors.	- Not stated.	- Mitigation and monitoring plan required: - Direct, indirect impacts, irretrievable losses of natural resources must be identified.	- None.
CA	- Comprehensive, covering all natural factors.	-Not stated.	- Mitigation and monitoring plan required: - Direct, indirect impacts, irretrievable losses of natural resources must be identified.	- None.

land use and cultural resources must be mapped within 1 mile of each side of the corridor. The mapping coverage is very clearly defined, and leaves no confusion in interpretation.

Methodological requirements are either lacking, or are too broad. New York regulations impose a distinctive mandate for consideration of probability, duration, and extent of the impacts in corridor siting.

New York has a unique requirement for updated corridor presentation base. It demands that the corridor and 1,200 feet of either side of it be drafted on aerial photographs flown no earlier than 6 months of the application filing date. This enables the commission to have the most recent information for the application review. In addition, if the Certificate for the construction of the proposed transmission line is granted by the New York Commission, the next step is filing an "Environmental Management and Construction Plan" (EM & CP). The EM & CP must be approved before commencement of construction. The EM & CP deals with site specific construction and operation activities, disturbed areas restoration, erosion control, vegetation management, and mitigation techniques.

<u>Selected Mid-continent States.</u> All four reviewed states have comprehensive siting criteria including all natural factors. Unfortunately, none defines data requirements, and only Wisconsin defines mapping standards. Wisconsin mapping standards are fairly unique. It is the only state requiring overlay maps to be submitted with the application. The maps should be of 1:250,000 scale.

Methodological requirements for corridor selection are indeterminate, except that all states, except Minnesota, demand that primary, secondary (direct, indirect), and unavoidable (irretrievable), and cumulative impacts of the line are identified and considered in corridor selection. For instance, direct impact and primary impact are more significant than indirect or secondary impact. Also, cumulative impacts are often overlooked. Besides, the regulations demand that loss of resources and unavoidable impacts must be accounted for in corridor siting. This requirement is founded on the methodological principles of environmental impact assessment.

Selected West Coast States. In terms of technical aspects of siting requirements, the regulations of Oregon and California are very similar. They are comprehensive, covering all natural factors, but do not state data or mapping requirements. The demand that a " Mitigation and Monitoring Plan" has to be developed is very important, because it enables the implementation of the standards and objectives mandated by the regulations.

Coordination of Actions in Siting

This section addresses the following questions: What is the content of regulatory provisions for coordination of actions in corridor siting ? What is the content of regulatory provisions for coordination of regulatory siting procedures with neighboring states ? What is the content of regulatory provisions for coordination with relevant federal, state, local permitting and land use and management regulations ?

The summary of the review of the provisions regulating coordination of actions is given in Table 5.3.

Appalachian States. Only Maryland regulates coordinated actions of state and local agencies in the corridor siting study and regulatory review. A Project Coordinating Committee is formed for each proposed project, by the PSC, with a mission to coordinate the entire process of siting and review.

5.3. Regulated Coordination of Actions in Corridor Siting

STATE	COORDINATION AMONG AGENCIES	COORDINATION WITH NEIGHBORING STATE REGULATIONS	COORDINATION WITH FEDERAL REGULATIONS	COORDINATION WITH OTHER STATE REGULATIONS	COORDINATION WITH LOCAL REGULATIONS
OH	- None.	-None.	-None.	-None.	-None.
NY	- None.	-None.	-None.	- State agencies issuing permits served with a copy of the application.	- Local agencies issuing permits served with a copy of the application.
PA	- Coordination with Department of Natural Resources during environmental review of the application.	-None.	- List of agencies requiring permits, and a list of documents to be submitted by these agencies must be included in the application.	- A list of agencies requiring permits, and a list of documents to be submitted by these agencies must be in the application.	- List of agencies requiring permits, and a list of documents to be submitted to these agencies must be in the application.
MD	-Project Coordinating Committee formed by PSC to coordinate agencies actions; - All interested and affected agencies represented in the Committee.	-None.	- Statement of compliance with pertinent environmental permits must be included in the application; - List of agencies requiring permits, and a list of documents to be submitted by these agencies must be included in the application.	- Statement of compliance with pertinent environmental permits must be included in the application; - List of agencies requiring permits, and a list of documents to be submitted by these agencies must be in the application.	- Statement of compliance with environmental permits must be in the application; - List of agencies requiring permits, and a list of documents to be submitted by these agencies must be in the application.
KY	- None.	-None.	- None.	- Agencies with jurisdiction to issue permits served with a copy of the application.	- Local agencies issuing permits served with a copy of the application.
NC	- None.	None.	- None.	- None.	- None.
SC	- None.	-None.	- None.	- None.	- None.

Table 5.3. Regulated Coordination of Actions in Corridor Siting, continued

STATE	COORDINATION AMONG AGENCIES	COORDINATION WITH NEIGHBORING STATES' SITING AND CERTIFICATION REGULATIONS	COORDINATION WITH FEDERAL REGULATIONS	COORDINATION WITH OTHER STATE REGULATIONS	COORDINATION WITH LOCAL REGULATIONS
WI	-Continuous coordination with Department of Natural Resources in environmental review phase.	- None.	- None.	- Coordinate with Wisconsin Environmental Protection Act.	- None.
MN	- If the line crosses federal lands, the Environmental Quality Board chairman contacts federal agencies to eliminate duplications with NEPA EIS procedures.	- None.	- None.	- EIA document prepared by the applicant must address conditions for other permits.	- EIA document prepared by the applicant must address conditions for other permits.
ND	- Through Advisory Committee.	- None.	- None.	- None.	- None.
SD	- Through Local Review Committee.	-None.	- None.	- None.	- None.
OR	- State and local agencies to submit Report with comments on the corridors to the Dept. of Energy.	- None.	- None.	- Project Order determines which state regulations to be implemented by the applicant; - Corridor shall comply with all relevant regulations.	- Corridor shall comply with all relevant regulations; - Project Order determines which state regulations to be implemented by the applicant.
CA	- None.	- None.	- None.	- Coor dinated with California Environmental Quality Act, 1970.	- A list of all permits must be in the Proponents Environmental Assessment.

All interested and potentially affected state and local agencies are represented on the Committee. In addition, the regulations facilitate coordination and compliance with other relevant regulations. The applicant must submit a statement of compliance with all relevant federal, state, and local legislation. Moreover, a list of agencies in charge of permits must be included in the application. These requirements, along with activities of the Project Coordinating Committee, structure very well the coordination of actions and regulations.

Pennsylvania is the only other state in the region with provisions for coordination of actions. However, none of the provisions refer to the corridor siting study process. The provisions deal with regulatory review and certification. The Pennsylvania Department of Natural Resources reviews the proposed lines, but the decision is made by the Commission. The federal, state, and local agencies requiring permits and their permitting requirements must be included in the application.

Unfortunately, none of the states in the region coordinates with procedures of the bordering states.

Selected Mid-continent States. In all four reviewed states the regulations facilitate some form of coordination. However, none helps coordinated actions during the corridor siting study process, before the application filing.

In Wisconsin, the environmental review is performed by the state Department of Natural Resources, and regulations are coordinated with the Wisconsin Environmental Protection Act.

In North and South Dakota, an Advisory Committee and Local Review Committee, respectively, are formed. The members are representatives of interested and affected state and local agencies. The role of the Committees is to aid the coordination of activities during the application review.

If the line crosses federal lands, the chairman of the Minnesota Environmental Quality Board contacts appropriate federal agencies, to coordinate environmental studies and avoid duplications of work between the required Environmental Impact Assessment and federal EIS. Moreover, Minnesota regulations coordinate with state and local legislation by demanding that conditions for state and local permits must be considered in the Environmental Impact Assessment prepared by the applicant.

None of the selected states coordinates its regulations with neighboring states, which is a serious shortcoming.

Selected West Continent States. Neither Oregon nor California regulations coordinate with bordering states or with federal regulations, during the siting study.

In Oregon, state and local agencies must submit a Report with comments on the application. In addition, the Project Order issued by the Siting Council decides which state and local regulations must be met during the corridor siting.

In California, the regulations are coordinated with the California Environmental Quality Act, and a list of all permits must be included in the Proponents' Environmental Assessment.

Public and Agency Participation in Siting

Public and agency participation in reviewed regulations is evaluated in terms of forms and the timing of participation. The review answers the following questions: What is the content of provisions that mandate public participation in corridor siting study ? What is the content of provisions that mandate agency participation and review of corridor siting study ?

The summary of reviewed regulatory requirements for public and agency participation in corridor siting and certification is displayed in Table 5.4.

Appalachian States. Only Ohio and New York mandate public participation in the form of Public Information Programs. The Programs are conducted by the applicant during the corridor siting study and application preparation. The purpose of the Programs is early involvement of the public in the corridor siting study, identification of public issues and concerns, and collection of data not available from other sources.

In Ohio, the Public Information Program is mandatory for all proposed transmission lines.

In New York the Program is not required if the line follows local regulations, avoids designated natural and recreational areas, scenic and wild rivers or wetlands, does not demand tree clearing or grading in designated scenic areas, and if there are fewer than 10 residential buildings within 300 feet per mile of the line. The Program is carried out through at least one public information meeting 30 to 60 days before filing an application. The Program implementation involves all potentially interested persons, agencies, and organizations. The Program is beneficial for early public involvement in the project, for identifying issues and concerns to be considered in the siting, and for collection of data from the local public. However, the conditions that preclude the Program are not justified, because the public involvement in the siting is critical for all cases of a transmission line project.

None of the states regulations, except Maryland, mandate agencies participation in the corridor siting and the review of intermediate and final outcomes of the corridor siting study. The Project Coordinating Committee, formed by the

Table 5.4. Regulated Public and Agency Participation in Corridor Siting

STATE	FORM OF REGULATED PUBLIC PARTICIPATION IN SITING	TIME OF REGULATED PUBLIC PARTICIPATION IN SITING	FORM OF REGULATED AGENCY PARTICIPATION IN SITING	TIME OF REGULATED AGENCY PARTICIPATION IN SITING
OH	- Public Information Programs.	- During the corridor siting study, not specified.	- Preapplication conference with the applicant, the Board clarify filing requirements.	- Before filing, not specified.
NY	- Public Information Program.	- Before filing, not specified.	- Potentially affected agencies receive a copy of the application.	- Late, after filing.
PA	- None.	- None.	- Potentially affected agencies receive a copy of the application.	- Late, after filing.
MD	- None.	- None.	- Federal, state, local agencies represented in the Project Coordinated Committee.	- During the corridor siting study and regulatory review.
KY	- None.	- None.	- Potentially affected agencies receive a copy of the application.	- Late, after filing.
NC	- None.	- None.	- Potentially affected agencies receive a copy of the application.	- Late, after filing.
SC	- None.	- None.	- State agencies may participate in regulatory review without filing a special request.	- Late, after filing.

Table 5.4. Regulated Public and Agency Participation in Corridor Siting, continued

STATE	FORM OF REGULATED PUBLIC PARTICIPATION IN SITING	TIME OF REGULATED PUBLIC PARTICIPATION IN SITING	FORM OF REGULATED AGENCY PARTICIPATION IN SITING	TIME OF REGULATED AGENCY PARTICIPATION IN SITING
WI	- None.	- None.	- Dept of Natural Resources participates in the environmental review. - Agencies are contacted for comments on environmental issues. - Agencies review Preliminary Environmental Report prepared by the Board.	- Before application filing and during the environmental review.
MN	- In Certification of Need stage regulatory review, participant in hearings; - In Route Designation and Construction Permit phase in regulatory review, participant in hearings.	- During the review; Note: no special request needed for participation in hearings.	- Hearings only.	- During environmental review.
ND	- Through Citizen Coordination Committee.	- During the review.	- Through Advisory Committee, members representatives of Dept. of Agriculture and affected local agencies.	- During environmental review.
SD	- Through Local Review Committee.	- During the review.	-Through Local Review Committee.	- During public hearings.
OR	- None.	- Not applicable.	- Affected agencies served a copy of Notice of Intent and Application; must submit Report with comments on the corridors to Dept of Energy.	- After the Notice and Application filing.
CA	- None.	- Not applicable.	- Affected agencies get a copy of the Application.	- After the application filing.

Maryland commission, has the distinctive purpose to help agencies in the review of the corridor siting study outcomes.

However, all reviewed states have some way of involving agencies in the regulatory review of the application. Mostly federal, state, and local agencies are entitled to a copy of the application, which only initiates the participation without further structuring. In the regulatory proceedings and hearings the agencies are treated as any other party, with the exception of South Carolina where the agencies may participate without a written request.

Selected Mid-continent States. Public and agency participation in the corridor siting study is not regulated in any of the reviewed states.

Citizen and agency participation is limited to hearings in the regulatory review.

In terms of agency participation, Wisconsin regulations are an exception, because they mandate that the Department of Natural Resources oversee the corridor siting study, and assists in the implementation of siting standards and objectives.

Selected West Coast States. In California and Oregon regulations do not structure public and agency participation in the corridor siting study. Nonetheless, both states require that the affected agencies get a copy of the Application. This provision is not sufficient, as it only initiates participation and is realized after the proposed corridors are selected.

5.2. Highlights of State Regulations

This section presents regulatory provisions, identified as potentially advantageous for the corridor siting study. The provisions are grouped in six sets: (1) Provisions that deal with regulatory timeframe and speed up the corridor siting process, (2) Provisions that exemplify well specified, quantified, and ranked siting criteria and requirements, (3) Provisions that deal adequately with technical aspects of corridor siting, (4) Provisions that facilitate public participation in corridor siting, (5) Provisions that regulate agencies participation and coordination in corridor siting, (6) Provisions that coordinate with other relevant regulations.

Regulatory Timeframe. Most of the regulations do not set up any timeframe for actions and procedures in the corridor siting and regulatory review. However, the following provisions structure very well the timeframe for the regulatory review of applications:

- Maximum time for the entire review is clearly defined. In North Dakota it is 9 months, in California 1 year, in Minnesota 18 months from the time the application is accepted.

- Corridor siting and review process is divided into two stages: (1) Delineate, review, and approve the general location of the proposed line, (2) Delineate, review, and approve the right-of-way within previously approved corridors (see North Dakota, in Appendix C).

- The need for the line must be determined in separate proceedings, independently of the siting and environmental assessment. The siting study does not start until the need is determined by the Commission (see Maryland and Minnesota, Appendix C).

- Application completeness and compliance with the basic regulatory requirements must be determined shortly after it is submitted (e.g. within 21 days). Only after the Commission decides that the format and content of the application comply with the regulatory requirements, does the formal regulatory review start (see Ohio, New York, Kentucky, North Dakota, South Dakota, and Oregon, Appendix C).

Clarity of Regulations. Most of the reviewed regulations declare vague, qualitative, and unprioritized criteria, objectives, and standards for corridor siting. The following provisions are exceptions, which serve as examples of clear and well defined regulatory requirements:

- Commission develops and currently updates a list of exclusion and avoidance areas and features. The areas and features are ranked by relative importance, and by sensitivity to the electric corridor land use (see North Dakota, and Oregon, Appendix C).

- General siting criteria are interpreted for particular conditions in each particular case. In Maryland, the Project Coordinated Committee prepares a list of issues and studies to be performed in the siting study. In Minnesota, an Advisory Task Force is formed for each proposed project. The Force, in collaboration with the public, identifies specific criteria for the siting study and environmental assessment (see Appendix C for more details).

- The corridor siting study area or potentially affected area must be delineated by the Commission (see South Dakota Appendix C).

- A preapplication conference with the commission can be requested by the applicant to clarify vague and confusing regulatory requirements (see Ohio and South Dakota, Appendix C).

Technical Aspects of Siting Requirements. Most of the reviewed regulations lack technical provisions for corridor siting criteria, data collection, siting methods, and mapping. The following provisions, can improve technical siting aspects of the corridor siting study process:

- Mapping scale, coverage and update of the base map should be clearly specified by the regulations (see New York, Appendix C).

- Spatial coverage for analysis and assessment must be defined by the resources category, and quantified by the distance from both sides of the centerline of the proposed corridor (see New York, Ohio, Oregon, Appendix C).

- Probability, spatial extent, and duration of potential impacts must be addressed in the siting study (see New York, Appendix C).

- Direct (primary), indirect (secondary), cumulative, and unavoidable impacts should be identified, predicted and assessed in the corridor siting study (see Wisconsin, North Dakota, South Dakota, Oregon, California, Appendix C).

- Mitigation measures must be considered and defined in the corridor siting study process (see New York, North Carolina, Oregon, California, Appendix C).

- Implementation of corridor siting requirements should be ensured by the regulations. This can be achieved by mandating preparation and overseeing realization of:
(1) The Environmental Management and Construction Plan and,
(2) The Mitigation and Monitoring Plan, after the certificate for the line is granted (see New York, Oregon, and California, Appendix C).

<u>Regulated Public Participation in Siting Study.</u> Only a few of the reviewed state regulations mandate public participation in the corridor siting. Public participation in the siting study can be more effectively structured by incorporating the following provisions in the regulations:

- Mandated public information program shall be carried out, by the applicant, during the siting study. The function of the program is to engage the public in early stages of corridor siting, so that issues can be identified, and relevant data collected (see New York and Ohio, Appendix C).

- Formation of the Citizen Coordination and the Local Review Committee by the Commission. The purpose of the committee is to coordinate citizen participation in the regulatory review, assist the commission in the assessment of the application, and resolve controversial interests. Members of the committee are representatives of local communities potentially affected by the proposed project (see North Dakota and South Dakota, Appendix C).

Agencies Participation and Coordination. Early, continuous, and coordinated participation of federal, state, and local agencies potentially affected by the project is missing from most of the reviewed regulations. However, the following provisions for more efficient participation of agencies in the siting process are identified:

- The Project Coordinating Committee shall be formed to facilitate participation and to coordinate activities in the corridor siting study and application preparation. Interested and affected agencies are members of the Committee (see Maryland, Appendix C).

- Review and evaluation of intermediate and final results of the corridor siting study by the interested and affected agencies is required (see Oregon, Appendix C).

- The state environmental resources management agency should be directly involved into the environmental review of intermediate and final results of the corridor siting study (see Pennsylvania and Wisconsin, Appendix C).

- The State Department of Natural Resources is authorized to oversee the corridor siting study. The role of the Department is to improve the implementation of the regulatory siting standards and objectives (see Wisconsin, Appendix C).

- State and local agencies are entitled to participate in the regulatory review, without filing a written petition with the Commission (see South Dakota, Appendix C).

Coordination with Other Relevant Regulations. Coordination with other regulations is missing in most of the reviewed regulations. However, the following provisions identified in the review deal with the coordination:

- A statement of compliance with pertinent regulations must be included in the application (see Maryland, Appendix C).

- A statement showing that corridor siting and review criteria coordinate with the state environmental protection act must be included in the application (see Wisconsin and California, Appendix C).

- The Commission or the applicant must contact appropriate federal agencies to coordinate environmental studies and avoid duplications of work between the corridor siting and assessment and the federal EIS studies (see Minnesota, Appendix C).

PART IV: CASE STUDY REPORT

CHAPTER 6: THE SITING STUDY BACKGROUND

This Chapter presents the results of the Wyoming-Cloverdale case study research. A brief background of the siting project given in the opening section of the Chapter, is followed by a description of the study process milestone events. The core of the Chapter consists of findings related to the following research objectives:

- Explore and describe corridor siting methodology considerations, in terms of general approach, impact assessment techniques, and data collection and mapping. Identify and describe effects of these methodological considerations on the process of the Wyoming-Cloverdale siting study.

- Explore and describe public, institutional, and political considerations in corridor siting. Determine effects of these considerations on the Wyoming-Cloverdale siting study.

- Evaluate Virginia and West Virginia state siting regulations as they are implemented during the Wyoming-Cloverdale siting study.

Appendix B, gives a thorough description of the siting project background, along with the Case Study Protocol[15].

[15] The content and function of the Case Study Protocol are described in detail in the Chapter 4, section 4.2. which explains the methodology of the research.

6.1. Project Background

The Need for the Network Expansion. In March 1990, Appalachian Power Company (APCO) and Virginia Power Company (VP) agreed to examine options for the APCO/VP system reinforcement. The existing generating facilities in the areas of increased demand are evaluated as insufficient. On the other hand, the generation surplus within the American Electric Power Company (AEP) system can be used more rationally by construction of the new line. The companies proposed construction of Wyoming-Cloverdale 765 kV line, as the best way to improve the system transmission capacity and reliability. Six alternatives were considered before the construction of the Wyoming-Cloverdale 765 kV line was proposed.[16]

The 110 miles, Wyoming-Cloverdale 765 kV transmission line is to be interconnected with neighboring VP system in northern Virginia, via 88 miles of 500 kV Joshua Falls-Elmont and 14 miles of Dooms-Ladysmith transmission lines[17].

Most of the electricity transmitted by the proposed line will be produced and used beyond the areas traversed by the line. However, the line will significantly increase the reliability of the entire system, including areas traversed by the proposed line. The electricity will be generated in Rockport, Indiana which belongs to the AEP system, and burns

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[16] (1) upgrade of 138 kV existing lines, (2) the rebuilding of existing transmission facilities, (3) the building of new 138 kV lines, (4) the construction of the new generating facilities, (5) the expansion of conservation efforts, (6) the alternative locations of a 765 kV line.

[17] The application for these lines was filed with the Virginia SCC on July 19, 1991. On January 24, 1994, the Virginia SCC hearing examiner recommended the approval of the lines by the commission. The decision has not been made as of today.

coal imported from the state of Wyoming. Most of the energy is to be used in central Virginia within the VP service area. The smaller portion of the transmission capacity would supply electricity to nearby consumers in Craig and Botetourt Counties in Virginia. A quarter of the transmission capacity will be wheeled by non-utility generators (NUG) in Virginia (central and eastern APCO, as required by the Code of Virginia section 56-46.1). The line will have approximately 464 towers (4 towers per mile), with tower height between 87 and 187 feet, and 200 feet wide right-of-way. The estimated life of the line is about 50 years.

Landscape Context, Policy Constraints. From the onset of the study it has been clear that the diversity of natural, cultural, and scenic resources between two remote substations will dictate a complex siting project. The entire study area lays within the ecologically and culturally diverse Appalachian region. The 3,200 square mile study area covers Raleigh, Wyoming, Mercer, Summers, Monroe, and Greenbriar counties in West Virginia, and Giles, Craig, Montgomery, Roanoke, Botetourt, and Allegheny counties in Virginia (see Figure 6.1).

Avoidance of densely populated areas, and lands under special designation was the main principle in delimiting and refining the study area.

The major valuable resource areas crossed by the 110 mile straight line between the two substations are: Twin Falls State Park (WV); Camp Creek State Forest and Camp Creek State Park (WV) Interstate 77, Pipestem State Park (WV) Bluestone State Park (WV), Bluestone Lake and the New River Gorge National River (WV), The Jefferson National Forest (Va and WV), Bluestone Wild and Scenic River (WV), the Appalachian Trail (Va), and Carvin's Cove reservoir (Va). Management regulations and jurisdictions over these resources are

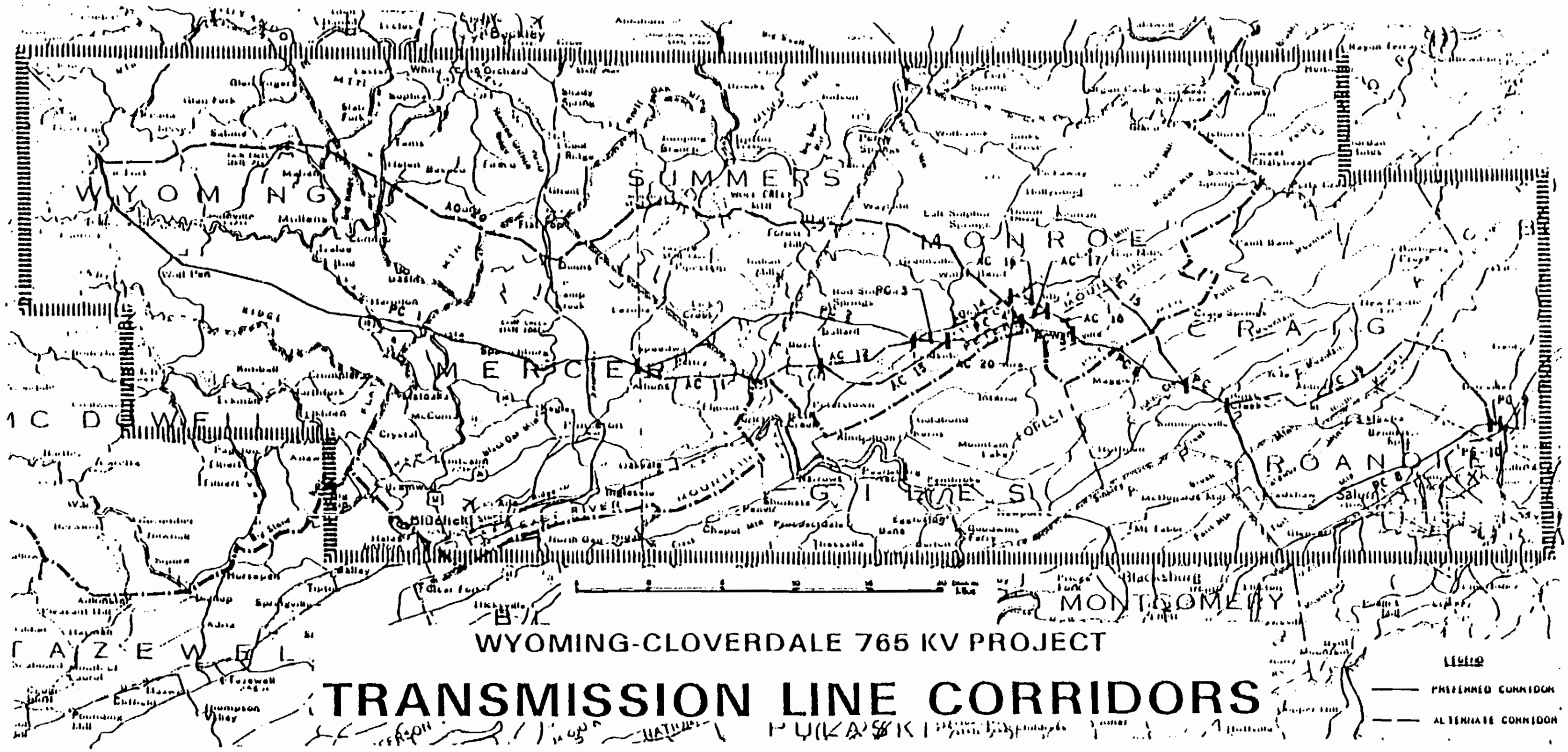

Figure 6.1: Study Area with Preferred and Alternative Corridors
(Source: Wyoming-Cloverdale Study Archives)

described in the Appendix B. The abundance of these resources, with related policy constraints, has conditioned a complex and potentially controversial corridor siting study.

Virginia State Corporation Commission Regulations. Virginia State Corporation Commission (SCC) has the authority to issue a Certificate of Convenience and Necessity for all transmission lines of 150 kV and above [18].

Before deciding on the application, the SCC evaluates the need for the transmission facility, potential adverse impacts on environment, historic and scenic resources, and potential health and safety hazards. A more detailed description of the regulations is given in the Appendix B.

West Virginia Public Service Commission Regulations. West Virginia Public Service Commission (PSC) has the authority to issue a Certificate of Convenience and Necessity for proposed transmission lines[19].

In the regulatory review, the PSC evaluates the need for the line, potential environmental impacts and potential health and safety hazards. A description of the regulations is given in the Appendix B.

Federal Regulations. Soon after the corridor siting study started it was determined that any corridor would have to cross portions of the federally owned and managed resources: Jefferson National Forest managed by the US Forest Service, The Appalachian National Scenic Trail, managed by US National

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[18] In accordance with Sections 56-265.2, and 56-46.1. of the Virginia Code.

[19] Requirements for the Certificate, content of application filing notice, timing of hearings, and review criteria are regulated by sections 24-2-11 and 24-2-11a of Public Service Commission Law of West Virginia. Information to be included in an application is stated in section 9.00 of Rules and Regulations for the Government of Electric Utilities prescribed by the PSC of West Virginia.

Park Service, the New River National River managed by the US National Park Service, the Bluestone Wild and Scenic River managed by the US National Park Service and R.D. Bailey Lake Flowage Easement Land managed by the US Army Corps of Engineers. Crossing these areas and rivers would require an Environmental Impact Statement (EIS) study as mandated by the 1969 National Environmental Policy Act (NEPA). As the requirements for the EIS study was recognized, the corridor siting team closely followed the Council of Environmental Quality Regulations for Implementing The Procedural Provisions of the NEPA (1986), to avoid future duplications of the work.

Besides the state Certificates of Convenience and Necessity, the following federal permits must be granted before the proposed line may be built: Special Use Authorization for crossing the Jefferson National Forest from the U.S. Forest Service, Right-of-Way Authorization for crossing the Appalachian Trail, from National Park Service, Section 10 Permit, Right-of-Way easement, and Consent of Easement from US Army Corps of Engineering for crossings the New River at Bluestone Lake, and R.D. Bailey Lake Flowage Easement Land at Gyandotte River.

The EIS procedure contributed to the exceptional complexity of the corridor siting study and the regulatory review.

6.2. Corridor Siting Study Process

According to the original project schedule, the corridor selection would last about a year, regulatory review between 1 and 2 years, survey, engineering design, right-of-way purchase and construction about 5 years. The planned in service date was May 1998. The estimated cost of the project was about $245 million.

Today, according to the original schedule, the survey of the right-of-way should have been well underway. However, as of this day, the federal EIS procedure, and the Virginia and West Virginia state review have not been completed. Both the siting study and the state regulatory review experienced a few major delays.

The sequence of the milestone events in the corridor siting study is presented in Figure 6.2.

1989. APCO and Virginia Power Company studied the adequacy of the existing transmission systems, and concluded that the transmission system reinforcement would be needed.

1990. On March 23, APCO and Virginia Power Company announced a $ 450 million joint reinforcement plan, which included about 212 miles of new transmission lines and substations in Virginia and West Virginia.

The Wyoming-Cloverdale 765 kV corridor siting study started in August 1990. The first steps in the study were to delimit the study area and refine the general methodology approach to the corridor siting. In October, the study area was defined and the data collection stage was underway. Federal, state, and local agencies potentially affected by the project were contacted and informed about the project. The introductory public meetings were held in November.

The study area was narrowed down by identification of critical and exclusion areas.

1991. The first five months of the year were devoted to the gathering data and specifying the criteria for the one mile study corridors selection. The one mile corridors were presented to the public in a second round of public meetings in May and early June 1991.

Alternative 1,000 foot corridors delineation within the one mile study corridors started with collecting more detailed data within the one mile corridors. By the end of June the data collection was finished. The next step was to find the least impact alignment of 1,000 foot corridors within one mile corridors. This was achieved by the beginning of July. The assessment of the 1,000 foot segments and selection of the preferred and alternative corridors proposed in the application was completed by the August 15.

The application was filed with the Virginia SCC on August 15, 1991. After that, the environmental assessment with mitigation was undertaken for the Virginia section of the study. The environmental assessment was completed by December 1991. The results were presented to the Virginia SCC as an appendix to the application.

On July 15, the Jefferson National Forest was chosen as a lead agency in the federal EIS process. This marked the official beginning of the EIS process. On July 19, the Virginia Power Company, filed the application with the Virginia SCC for approval of the 500 kV transmission line, which is an integral part of the system reinforcement.

During spring and summer, citizen opposition groups were formed in Virginia and West Virginia. The activities of the opposition were well organized and intensive, including the lobbying local and state politicians and a massive letter writing campaign to the team and local newspapers. United Mine Workers of American Political Action Committee joined the opposition in West Virginia.

In October the Virginia SCC announced its schedule for the public hearings on the application. In November, the corridor siting team started work on the hearing testimonies and rebuttal testimonies.

<u>1992.</u> In February the hearing examiner of the Virginia SCC extended the procedural schedule for the application public review, adding another hearing session to the schedule.

The Virginia SCC held three hearings in April, and one in July.

On April 22, the West Virginia Congressman Nick Rachall with a support of opposition groups and local politicians announced the intention to propose protection for 17 miles of the New River under the Wild and Scenic River Act. The House Subcommittee on National Parks and Public Lands passed Rachall's "New River Wild and Scenic Eligibility Study Act."

On June 22, APCO filed the application with the West Virginia PSC. On July 21, the PSC recommended the application withdrawal and refiling with a southerly alternative, which crosses the New River beyond the eligibility study designated segment. On August 7, the PSC issued the second memorandum again recommending withdrawal of the application and refiling later to correspond to the EIS report completion. On August 20, the PSC issued the third memorandum again suggesting the withdrawal of the application and refiling after January 1, 1993. In response to the PSC memorandums APCO withdrew the application on August 21.

1993. The studies of the alternative corridors crossing of the New River away from the sections designated for the eligibility for wild and scenic status study, started in August 1992 and were completed in February 1993. The application, including the new corridor, was refiled with the West Virginia PSC on February 11.

Only few weeks after the filing, on February 23, the leading West Virginia opposition group filed a Motion with the PSC to dismiss the application for failure to comply with the PSC regulations. On May 10, the PSC dismissed the application for noncompliance with mapping regulatory requirements.

Then the team started the preparation of the new maps for the third filing of the application with the PSC.

The final hearings on the application in Virginia were held in September. On December 2, the Virginia SCC hearing examiner recommended the approval of the application to the commissioners who will make the final decision on the application.

1994. By the end of June 1994, the team completed maps and updated the database for the third filing with West Virginia PSC.

The fate of the project is uncertain at this point. Three regulatory authorities have been involved: Virginia SCC, West Virginia PSC, and the Jefferson National Forest as the lead agency in the federal EIS. The federal EIS is in progress, though experiencing delays due to fierce citizen opposition. At this time, the tentative date for the Draft EIS Report is January 1995. The date of the third filing is going to be adjusted to match the completion of the Draft EIS. The outcome of this project is hard to predict. In the most expedient case scenario[20], the decision will be brought too late to meet the in service date deadline for the line.

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[20] If the application with West Virginia PSC is filed by December 1994, and the EIS proceeds as planned and approves the line, it could take (according to WV PSC regulations) up to 400 days for the WV PSC to make a decision. The decision, if the WV PSC approves the line, is very likely to be appealed by the opposition, which additionally prolongs the entire process.

FIGURE 6.2: WYOMING-CLOVERDALE STUDY: MILESTONE EVENTS

1990

August	Study formally started. Data collection and inventory started.
October	Boundaries of the study area defined.
November	Potentially affected federal, state, and local agencies introduced to the project.
November	Informational, introductory public meetings, ongoing communication with the public initiated. November 5, Hinton, Summers Co., WVA November 7, Union, Monroe Co., WVA November 8, Catawba, Roanoke Co., VA November 13, Pineville, Wyoming Co., WVA
December	The study area refined: exclusion zones and critical areas identified and mapped.

1991

January	Data collection for 1 mile study corridors identification in progress. Methodology development in progress. Siting and assessment criteria definition in progress.
May	1 mile wide study corridors identified. Open-house public meetings to introduce study corridors and provide public input: May 16, Hinton, Summers Co., WVA May 17, Pearisburg, Giles Co., VA May 20, Union, Monroe Co., WVA postponed May 21, New Castle, Craig Co., VA May 22, Catawba, Roanoke Co., VA May 23, Pineville, Wyoming Co., WVA June 3, Union, Monroe Co., WVA
June-July	Additional data collection within 1 mile study corridors. Review and data input by the agencies. Alternative corridor segments within study corridors delineated.
July 15	Jefferson National Forest a lead agency in the federal EIS process.
August	Data verification. Alternative corridor segments analyzed and assessed. Preferred and alternative corridors selected. Documentation for filing prepared. PARTIAL FILING WITH VIRGINIA SCC: need, engineering, corridor locations. Studies for environmental assessment with mitigation for Virginia segments of proposed corridors in progress.
October	Virginia SCC announces hearings schedules.
November	Virginia SCC orders local hearings, scheduled for April 2 and 6, 1992 Environmental assessment with mitigation measures for Virginia section completed. APPENDED FILING OF VIRGINIA APPLICATION including environmental assessment with mitigation studies. Request for Proposal by US Forest Service, Jefferson National Forest, for federal EIS study. Discovery phase: corridor siting study database available for public review, hearing testimonies preparation starts.

FIGURE 6.2: continued

1992	
January	Motion for additional hearings with Va SCC by Blue Ridge Soaring Society.
	Rebuttal hearing testimonies (Virginia) preparation by the team and APCO starts.
April	Virginia SCC hearings, New Castle.
	Virginia SCC hearings, Richmond.
	Federal EIS procedure starts. Woodward-Clyde Consultants hired to conduct the studies.
	New River Wild and Scenic River Eligibility Study Bill, introduced by Congressman Rahall, of West Virginia.
June	FIRST FILING WITH WEST VIRGINIA PSC.
	Federal New River Wild and Scenic River Eligibility Study Act, approved.
July	Virginia SCC holds additional hearings in Richmond.
	West Virginia PSC recommends the withdrawal of the application until new alternative with less impact on West Virginia is identified by the team and APCO (as a result of New River Wild and Scenic River Eligibility Study Act)
	Preparation of rebuttal testimonies by the team and APCO, for Virginia review completed.
August	APPLICATION WITH WEST VIRGINIA PSC WITHDRAWN.
	Siting and environmental assessment study for a new alternative corridor in West Virginia starts.
1993	
February	SECOND FILING WITH WEST VIRGINIA PSC, new corridor alternatively crossing New River included.
February-March	Common Ground inc. and Richard Ethelson, file Motions to dismiss and delay the application with WV Public Service Commission based on noncompliance with the regulations.
May	West Virginia PSC orders dismissal of the application, based on requests by the above Motions.
June	Preparation of new documentation and maps for the third filing with West Virginia PSC starts.
September	Last hearings in Virginia.
December	Virginia SCC "Hearing Examiner's Report", recommends the approval of the line.

FIGURE 6.2: continued

1994	
January-June	Materials for the third filing with the WV PSC prepared.
	Date of the THIRD FILING WITH WV PSC TO BE ADJUSTED TO MATCH THE EIS DRAFT COMPLETION.
July	Jefferson National Forest presents the alternative corridors in the series of public meetings.

EVENTS TO FOLLOW:

Draft EIS Report.

Final EIS Report.

U.S. Forest Service, Jefferson National Forest Record of Decision, approving or rejecting the project.

Filing of the Application with the WV PSC (third).

West Virginia public hearings, regulatory review.

West Virginia PSC recommended decision.

West Virginia decisions.

Virginia decisions.

Appeals of the Virginia SCC and West Virginia PSC decisions.

CHAPTER 7: SITING METHODOLOGY

7.1. Introduction

An overview of the siting methodology is followed by a summary of decision rules applied to delineate proposed corridors in the Wyoming-Cloverdale study.

The corridor siting study was organized as follows:

Stage I: Preanalysis. This stage consisted of the preliminary studies of literature, case studies of similar projects, identification of the substations location, and preliminary reconnaissance of the region. The preanalysis was conducted during the summer 1990, and resulted in the siting study proposal.

Stage II: Definition of the study area. Definition of the study area. Refinement of the study area by identification and mapping of exclusion zones and critical resources. Baseline data inventory commenced. This stage lasted from August 1990 to February 1991. The data collection continued with a higher degree of specificity throughout the study.

Stage III: Identification of study corridors. Identification of twenty-six, 1 mile wide, study corridors, lasted until May 1991. It was preceded by the analysis of specific resources of concern: Appalachian Trail, I-77, New River, and Jefferson National Forest.

Stage IV: Identification of corridor segments within study corridors. Delineation of sixty-nine, 1,000 foot wide, corridor segments within the study corridors, lasted until July 2, 1991.

Stage V: Assessment and selection of proposed corridors. Assessment of sixty-nine alternative corridor segments, and selection of the preferred corridor and alternative corridor segments proposed for approval by the state commissions. This stage of the corridor siting study was finished on August 15, 1991.

The Wyoming-Cloverdale siting study effectively started in late August 1990[21]. After the preferred and alternative corridors were selected, environmental assessment with mitigation was performed. Results of the siting and the assessment were the critical element in the application documentation[22].

7.2. An Overview

The following description of the siting study stages is based on participant observation, and the review of archival and internal documentation stored in the Wyoming-Cloverdale project database.

Stage I: Preanalysis. This stage included the research conducted during the summer of 1990, before the siting study officially started. The preanalysis stage attained the

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[21] The study was the united effort of West Virginia University (WVU), Geology and Geography Department, and Virginia Polytechnic Institute and State University (VPI & SU), Landscape Architecture Department. The main duty of the WVU was to build a digital database, and perform Geographic Information System (GIS) analyses for corridor delineation and assessment. The VPI & SU team was in charge of data collection, public participation, visual and cultural resources analysis and assessment. Development of the methodology and siting criteria was a joint responsibility.

[22] Upon recommendation of West Virginia PSC, a new corridor was delineated in the West Virginia portion of the study area, between August 1992 and February 1993. Siting methodology for this new corridor, labeled AC 20, (see Figure 6.1.) was the same as for the other corridors.

objectives to: (1) Identify the principal issues related to the siting, (2) Outline the siting process and the general methodology, (3) Determine the data requirements and availability, and (4) Prepare the siting study proposal.

Four general sets of issues were identified as critical for the corridor siting process: physiographic, ecological, cultural, and visual.

It should be noted that the siting team carried out the study independently, without any decision input from APCO.

Stage II: Definition and Refinement of the Study Area. During this stage efforts were directed to: delimit the study area, start baseline data collection on the regional level, and refine the study area by identification of exclusion zones, critical areas and crossings.

The 3,200 square mile study area included 54 USGS 7.5 minute quadrangles (1:24,000). The study area was refined by delineating exclusion and critical areas and features.

Exclusion zones encompassed concentration of natural, historic, recreational and scenic resources, and high population density. Exclusion zones in West Virginia were state parks and forests, preserves, designated and potential scenic rivers, and designated historic districts. In Virginia, exclusion zones were the state forest, designated and existing scenic byways, national preserves, wilderness and wilderness study areas.

Critical areas and features included resources with special federal and state special management status: Jefferson National Forest, the Appalachian Trail, proposed historic districts, scenic trails, proposed scenic parkways, hunting, fishing and other recreation areas, streams eligible for scenic status study, designated and proposed historic districts.

Stage III: Identifying One Mile Study Corridors. As a first step the analysis resources of special concern was conducted (e.g., Appalachian Trail, I-77, New River, and Jefferson National Forest). Checklist and matrix techniques were used to identify potential impacts in the study area. Review of environmental impact assessment literature resulted in an extensive and detailed checklist of possible impacts on natural, cultural and visual resources. Available mitigation techniques were assigned to identified impacts. The checklist, which also contained possible ways to quantify impacts, was used for potential impacts identification. The matrix contained information on physical actions during the construction and maintenance of the line (Participant observation notes in the meetings with APCO's real estate, engineering and construction, and forestry units, February 1991).

The incomplete status of the computerized database, in the first week of May, called for a shift in the methodological approach from computerized methodology to expert interpretation of source maps and computer plots. Two sets of computer maps were produced: (1) Composite color maps (1:24,000 and 1:100,000), and (2) Multi-impact maps, showing count of significant impacts by grid cell (1:24,000 and 1:100,000).

The following data was digitally encoded and plotted in the composite maps:

> landcover, roads, streams and springs, wetlands, future land use, biological resources in West Virginia, trout streams, registered historic sites and districts, transmission lines and substations, towers, Visual Quality Objective areas, semiprimitive Recreation Opportunity Spectrum areas, bear habitat, valued timber areas, special management areas, recreation and camping areas in the Jefferson National Forest, Appalachian Trail, scenic byways and trails, New River Parkway, hawk observation tower, wildlife management areas,

public input data from Giles County, Virginia, Interstate-77.

The potentially significant impacts, plotted in the multi-impact maps, included:

> urban and built up areas, deciduous, evergreen and mixed forest, streams, lakes and reservoirs, forested and riverine wetlands, airports, radio towers and navigational beacons, Forest Service VQO retention and protection categories, rare and endangered species, and valuable habitats in West Virginia, trout streams, historic sites and districts, semi-primitive motorized and non-motorized areas in Jefferson National Forest, Appalachian Trail, scenic byways and trails, New River parkway, VQO areas and habitats within the Jefferson National Forest, Hanging Rock observation tower, springs, Bluestone Wild and Scenic River proposed extension, wildlife management areas, cemeteries, churches and schools.

According to the total count of these significant impacts, the cells[23] were classified in color coded categories. The color multi-impact computer plots, displaying this classification were produced at scales of 1:100,000 and 1:24,000.

The following variables, not digitally plotted, were transferred onto the 7.5 minute topographic sheets at 1:24,000, using manual overlay technique: nucleated settlements, Virginia natural heritage resources, karst areas, depositional recharge areas, carbonate rock, AMTRACK railroad lines, vista points, retention and partial retention categories of Visual Quality Objectives on private lands. These overlays significantly helped the interpretation of the large number of coverages for the study corridor

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[23] The data was digitized into ARC/INFO vector based system, and converted into raster (cell) form by SPANS software. Each cell in a grid represented 100 by 100 meter, or 1 hectare area on the ground.

identification.

The study team defined the one mile study corridors during a three-day meeting (Observation notes, Blacksburg, May 13 and May 15). Twenty-six preliminary study corridor segments were mapped at the scale of 1:100,000, for presentation in the second set of public meetings. The preliminary study corridors were fixed following field verification and additional public input. A new one mile study corridor link was added, after the field survey of the area in Monroe County, West Virginia and Craig County Virginia.

Stage IV: Identification of Segments within Study Corridors. The objective of this stage was to align 1,000 foot corridor segments within the study corridors, for evaluation and selection of preferred and alternative corridors.

Between May 16 and June 3, all the time and energy were devoted to the public meetings. By the end of the month, collection of new data within one mile corridors was completed. The data was used to improve the detail and accuracy of the data base developed in the previous stage.

Additional data gathered within the one mile study corridor included:

> highly productive agricultural soils, highly productive forest soils, gas pipelines, generalized locations of habitats of five federal or state candidate or listed endangered animals in Virginia, public buildings and facilities, level two urban and built up land use categories, and level two agricultural land use categories.

The composite overlay computer maps, showing the one mile study corridors were plotted at the scales of 1:100,000 and 1:24,000.

New multi-impact color computer maps, displaying the information within the one mile study corridors, were plotted at 1:100,000 and 1:24,000. Variables assigned to "significant impact, mitigation not available" were counted within each 1 hectare cell, and cells were classified into categories, ranging from "1" with 1 non-mitigatable impact, to "9" with 9 or more potential non-mitigatable impacts. The study team agreed that full mitigation was not available for potential adverse impacts on the following resources:

> residential, commercial, industrial urban land uses, urban open spaces and urban development, forest cover, highly productive forest soils, wetlands, historic sites and districts, radio and TV towers and navigational beacons with 100 meter buffer, retention and protection Visual Quality Objective classes on private lands, airports and airfields, Appalachian Trail crossing indicated as critical, Interstate-77 crossings indicated as critical, New River Parkway crossings mapped as critical, Hanging Rock Observation tower, proposed extension of the Bluestone Wild and Scenic River, Havens Wildlife management area, vista points.

Moreover, full mitigation was not available for the following impacts within the Jefferson National Forest :

> semi-primitive motorized and non-motorized Recreation Opportunity Spectrum areas, Visual Quality Objective retention and protection areas, overlooks, camera points, shelters along Appalachian Trail, state fish hatchery, bear habitat, old growth timber, potential peregrine falcon recovery area, Peters Mountain bog special management area, recreation areas, developed campgrounds, areas with intensive recreation use.

In a two-day meeting, 1,000 foot corridor segments within the one mile study corridors were delineated by expert interpretation of source maps complemented by computer plots (Observation notes, Morgantown, July 1 and 2).

<u>Stage V: Assessment of Corridor Segments and Selection of Proposed Corridors.</u> The preferred and alternative corridors were selected in a two-day meeting (Observation notes, Morgantown, July 10, and 11). A ground field survey was conducted to update and verify the data within the 69 segments, delineated in the previous stage. The study team

analyzed sets of hand-drawn source maps, composite computer plots and multi-impact plots, which were still in the process of editing and verification. Again, the reliance on the computer plots was limited, because of their incompleteness. Nonetheless, the computer plots were useful to flag critical concentration of potential impacts, which were then verified by referring to the original source maps.

A list of the severe non-mitigatable impacts was prepared, and the impacts were ranked as either severe or high. The following impacts were ranked as severe:

> urban land uses, ecological resources, Visual Quality Objectives retention categories on private lands and in Jefferson National Forest, historic sites, all towers, airports, sensitive crossings of the Appalachian Trail, New River Parkway, and I-77, Recreation Opportunity Spectrum semi-primitive non-motorized areas within the Jefferson National Forest, overlooks, camera points, shelters along Appalachian Trail, fish hatchery, bear habitat, old growth timber, potential peregrine falcon recovery area, Peters Mountain bog special management area, recreation areas, developed campgrounds in the Jefferson National Forest, viewpoints, unique features.

The following non-mitigatable potential impacts were classified as high:

> highly productive soils, forest cover, retention categories of Visual Quality Objective areas within the Forest and on private lands, and Havens Wildlife Management Area.

This categorization served as a general guidance to select preferred and alternative corridors with the least total impacts per length. The corridors were drafted on the USGS 7.5 minute quadrangle maps (1:24,000) and reviewed by APCO to identify potential engineering and construction problems (e.g. angle of crossing the existing transmission lines, placing the towers in steep or unstable terrain) (Observation notes, Roanoke, August 5, 1991). The team made a few minor adjustments, which reduced the total number of potential impacts, while eliminating the construction problems.

7.3. Summary of Decision Rules

This section describes the decision rules for the proposed corridors' delineation. The primary siting objective in the Wyoming-Cloverdale study was to select the corridors which: (1) Meet regulatory, environmental, social, aesthetic, engineering criteria, and (2) Cause the least potential total impact on physiography, ecology, cultural and visual resources. Economic feasibility, the need, health and safety issues were not part of this study[24].

The method for the study area delineation involved interpretation of six 30 by 60 minutes USGS topographic maps, (1:100,000). The immediate goal was to limit the study area without loosing viable opportunities for corridors siting. The decision rule was to avoid: (1) Densely populated areas, and (2) Lands under special federal, state and local designation and management policies.

The initial study area was refined by distinguishing two categories of resources: (1) Exclusion zones where the transmission corridor siting would not be considered, and (2) Critical areas sensitive to corridor siting, where the transmission line land use is not preempted (see Appendix B for complete listings of exclusion and critical areas and features).

The settlement patterns were given the highest priority

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[24] Studies of economic need, impacts on karst topography, and Electromagnetic Field health impacts were done by experts in those areas.

in defining and refining the study area, because the potential health and visual impacts of the line were recognized as the major public issues and concerns. Federal and state historic, recreation and scenic areas and linear features were given the next highest priority for avoidance and protection.

The environmental impact assessment method[25] was used to select the one mile study corridors, evaluate the corridor segments, and select the preferred and alternative corridors. The expert consensus approach was applied to combine the estimated magnitude of potential impacts, with availability of mitigation measures, legal, policy, and management restrictions, and social importance of the potentially affected resources.

To identify the one mile wide study corridors, potential impacts were classified in the following categories by the expert consensus: (1) No significant impact discerned, (2) Potentially significant impact, fully mitigatable, and (3) Potentially significant impact, probably not fully mitigatable. The objective was to identify the one mile study corridor segments with the least number of potentially "significant impacts with no mitigation available". The significance of the impacts was assigned by combining the legal and policy considerations, predicted magnitude of negative change, and public input information. Four sets of 54 USGS 7.5 minutes quad maps (1:24,000) were interpreted: (1) Composite computer plots, (2) Multi-impact computer plots, (3) Hand-drawn land use and land cover maps, and (4) Hand-drawn ten variable overlay maps. Single coverage source maps were used to check accuracy and confirm the decisions.

To delineate 1,000 foot wide corridor segments, the principal investigators independently ranked the predicted

[25] As described in Chapter 2.

impacts within the study corridors by the significance and the availability of mitigation. Three significance categories were used: significant impact, low impact, and no impact. Each significance category was allocated to either a "mitigation available" or "mitigation not available" class. The selected segments sought the least total number of "significant impacts."

Once the 1,000 foot corridor segments were delineated, they were analyzed and evaluated to select the preferred and alternate corridors. The analysis and evaluation started at the western end of the study area, and was repeated from the opposite direction. In both runs, pairs of corridor segments were compared by total number of potential "significant non-mitigatable" and "significant mitigatable" impacts within the 1,000 foot corridor segments. It was a qualitative procedure, based on the elimination of combination of segments with more non-mitigatable potential impacts per length. Trade-offs were made on a case by case basis. Nevertheless, the critical priority was given to avoidance of homes, ecological resources, and recreational areas under special management regulations. Unacceptable corridor segments were eliminated from further consideration. In few instances, the 1,000 foot corridors were shifted beyond the study corridors. This decision was made after additional data was collected and verified by field survey initiated by concerned citizens.

In the Wyoming-Cloverdale study the decision rules were based on the potential impact classification by magnitude (e.g., high, low), significance (e.g., significant, not significant), and mitigation availability (e.g., full mitigation available, partially available, not available). The site specific decisions were made on a case by case basis. In many instances, (e.g., Monroe County, in West Virginia and most of the Virginia study area), the diffused spatial pattern of individual homes, called for site specific trade-offs and avoidance of impacts on those dwellings. The categories of physiographic, ecological, cultural, and visual resources were assigned equal importance. In addition, the team attempted to select the shortest segments, while encountering the fewest non-mitigatable adverse significant impacts. The siting decisions were made by expert interpretation of the original hand-drawn source maps. The computer generated maps were not used as a primary tool for the analysis and assessment.

CHAPTER 8: PUBLIC AND INSTITUTIONAL CONSIDERATIONS

This Chapter explores and describes public and institutional considerations in the Wyoming-Cloverdale siting study, and determines the effects of these considerations on the siting process. The following considerations are examined: (1) Public participation facilitated by the company, (2) Active opposition to the project, (3) Media coverage, (4) Attitudes of involved organizations towards the proposed transmission line, and (5) Communication between agencies and organizations during the corridor siting study.

8.1. Public Participation and Opposition

Public participation and the active opposition to the Wyoming-Cloverdale electric transmission line are the most prominent features of the corridor siting study, which significantly affected the entire process.

The first part of this section describes forms, timing, and scope of public participation initiated and facilitated by the corridor siting team and APCO. The second part illustrates and describes background, issues, and strategies of the active opposition groups.

Public Participation

Public participation was encouraged early in the study, as the university team felt a strong ethical obligation to work in the best public interest (Participant observation, 1990-1991, Interview with the team, 1994). The objective of the public participation was a two-way communication, benefiting various interest groups, in the study area. The team identified the main issues and concerns and received public information input, while the citizens become well informed and able to participate more effectively in the siting process.

Public meetings, written communication, disclosure of the database for public review, and the opinion survey were the forms of the public participation.

Introductory Public Meetings. In November 1990, the team and APCO held the first set of four public meetings (see Table 8.1). About hundred people attended each meeting. The purpose of the meetings was to introduce the project, present corridor selection criteria, describe technical attributes of the line, release the project schedule, describe the regulatory setting, introduce the team to the public, and most importantly, establish communication channels.

Public Opinion Survey. In April 1991, APCO hired Martin Research Inc, to conduct a public opinion survey, to examine opinion and concerns within the study area. According to the survey results, the most acceptable location for new transmission line would be on forest land, parallel to existing transmission lines, and near cemeteries. Clearly unacceptable location would be near homes, schools, airports, churches and habitats of rare and endangered species (Appendix B, Project internal documentation, 1991). The siting team incorporated this data directly into the corridor siting criteria.

Second Set of Public Meetings. The second set of meetings was held in May and early June of 1991. The open-house meetings were organized jointly by the universities and APCO.

Table 8.1 : Public Participation in the Corridor Siting Study - Meetings

TIME AND PLACE	FORMS	DESCRIPTION
FIRST SET OF MEETINGS Introductory Meetings 1990: -Nov 5, Hinton, Summers County, WVA 1-3pm -Nov 7, Union, Monroe County, WVA 7-9pm -Nov 8, Catawba, Roanoke County, VA 4-8pm -Nov 13, Pinneville, Wyoming County, WVA	Meetings opened with presentation/lecture by the APCO the study team. Questions/answers session. At the end, APCO and team representatives available for small group discussions on: environmental issues, land use issues, visual aesthetics, social/cultural issues, health effects, project need, ROW, engineering and construction.	- All meetings announced in 18 newspapers covering the study area. - Meetings introduced project goals, corridor selection criteria, contact personnel, project schedule, regulatory commissions, technical attributes of the line, study area. - Research team and APCO representatives present. - 3 meetings in WVA, 1 in V
SECOND SET OF MEETINGS. Corridor review meetings, 1991: -May 16, Hinton, Summers Co, WVA, 4-8pm -May 17, Pearisburg, Giles Co., VA, 4:30-8:30pm -May 21, New Castle, Craig Co., VA 4:30-8:30pm -May 22, Catawba, Roanoke Co., VA,4- 8pm -May 23, Pinneville, Wyoming Co., WVA 5-9pm -May 29, Union, Monroe Co., WVA 3-6 pm (rescheduled, originally scheduled for May 20).	Open-house meetings. A large map of 1 mile corridors displayed. Corridor selection methods, criteria presented. Distributed facts on: typical power lines impacts on property values; benefit of 765 kV over lower voltage lines; APCO's environmental record; ROW herbicides; EMF; Need issues ROW: Property values; overview and project description; engineering and construction. Exit surveys distributed to be filled in by the citizens and returned by mail to the team.	All meetings announced in 22 newspapers covering the Study Area HINTON, WVA, hundreds of opponents from Summers and Monroe Counties. At all times the room was packed with 50-60 people, opponents outside held their own meeting, passing pamphlets on EMF health hazard. A group of opponents had to be escorted from the building by Hinton police chief, they were using "unkind" words, shouting. Few individuals behaved inappropriately, rude, screamed obscenities at APCO's officials...disrupted the meeting. PEARISBURG, VA, about 50 people attended, many from Common Ground, Inc. NEW CASTLE, VA, few hundred people attended, opponents mostly, members of CPCC and Common Ground Inc., or Monroe County, WVA. Peaceful, but collected money to support opposition, distributed pamphlets. CATAWBA, VA, about 140 people attended, many from CPCC, Craig County, VA opposition group. PINEVILLE, WVA, only about 20 people attended, the lowest response. UNION, WVA, about 300 opponents, only 3 study team representatives.

Table 8.1, describes the schedule, format, and content of the meetings. Information material was set-up in a large room, and people were encouraged to freely move around, and ask about various aspects of the study.

The scope of information provided to the public was very comprehensive. The organizational chart of the siting team, the project schedule, list of data by sources, methods of data collection, analysis, and assessment were displayed. APCO's prepared handouts and boards with "facts" about the need for the proposed line, the project description, APCO environmental record, herbicides usage for vegetation management within right-of-way, electric and magnetic fields, an overview of engineering and construction of the line, and typical power line impacts on property values.

The first meeting was held in Hinton, Summers County, West Virginia. This was the most fierce meeting of all. When the team and APCO's representatives arrived, a few hundred opponents were already there. Many people came from neighboring Monroe County, where the strongest opposition group was formed. The opposition distributed materials on EMF health hazards, depreciation of property values next to the corridors, lack of economic benefits for West Virginia coal industry . About an hour after the meeting started an incident occurred. Residents of the Monroe County yelled at APCO representatives, questioned their accountability, and threatened the principal investigators. They claimed that the study corridors intentionally avoided homes of the principal investigators, that the universities were "bought" by APCO, and that the selection of corridor location was entirely controlled by APCO. The violators were escorted from the building by the Hinton city police (Participant observations, 1991). The incident was the reason that the team and APCO postponed the May 20, Union, Monroe County meeting. Although the members of the Monroe County opposition group apologized publicly to the team and APCO, pleading : " Don't Gauge the Whole by Actions of Only a Few" (Newspaper coverage review, May 1991), they maintained that the cancellation of the meeting in Union was merely an excuse to deprive Monroe County residents of an equal chance to participate. After the incident, the relationship between the opposition and the team and APCO would never improve.

The remaining five meetings were of low attendance except the meeting, held on May 21, in New Castle, Craig County, the center of Virginia opposition. This meeting attracted a few hundred people, from all over the study area. The Craig county opposition group, raised funds, distributed printed materials, organized voting against the line. The meeting was intense but without any incidents.

Public Correspondence. The first set of introductory public meetings caused a flow of letters from concerned citizens. During 1991, over two thousand letters were received by the VPI & SU team. Most of the letters were sent in May 1991, after the second set of public meetings, and in June and July 1991, just before and after the alternative corridor locations were proposed. The letters contained a variety of mostly negative attitudes, and many concerns about adverse impacts.

Many letters expressed the opposition, writing about this "shocking situation we never dreamed of..."(February 1991, Craig County), and "...what a horrible thought of the possibility that cancer causing terribly unsightly power lines would go through our farmland" (December 1990, March 1991 Craig County), and "...we do not want a power line, period" (February 1991, Monroe County). Others voiced the dissatisfaction with the current political system claiming that "this just goes to prove that individual rights of citizens in this country can be trampled by power brokers in search for more income and profits..." (February 1991, Craig County).

Most of the letters came from Craig and Monroe Counties, which were the centers of organized opposition to the line.

About 1,500 letters were accompanied by the "Opposition Pledge" protest forms designed by the Monroe County opposition group. The forms were used by other opposition groups throughout the study area. Besides other information, the forms contained a signed statement that all legal means to prevent APCO from constructing the proposed line will be used. Many forms were just saying that they were "against the line, because no benefit would be gained." People were concerned about the study corridors in their county, near their properties or homes, which was the typical local "Not In My Backyard" reaction.

The team reviewed and recorded all the correspondence. Information that could be located accurately was hand mapped and digitized. The letter writing campaign helped the study team to fully understand the community values within the study area, and provided useful local data.

There was a balance between the information requested by the public and the information supplied to the public by the team (see Table 8.2). The Craig County opposition group, Citizens for Preservation of Craig County provided very meaningful information mapped on original USGS 7.5 minute topographic maps. The map contained locations of historic structures, cemeteries and churches, archeological sites, recreation areas and camps, springs, trout streams, caves, observation areas and views, sightings of mountain lion, airfields, fire towers and other relevant information. Historic Society of Craig County sent a map of local historic and archeological resources not on federal and state

Table 8.2 : Content of Information Exchange: Public - Team

Variables	Source of Evidence
	PROJECT INTERNAL DOCUMENTATION
PARTIC-INFO-ASKED-BY-PUBLIC-FROM-TEAM	-Engineering, technical characteristics of the line -The need, generating facilities -The corridor siting method -Data sources used in the corridor siting study -The project schedule -The intermediate and final outcomes of the project -The construction activities -The EMF impacts -The real estate land value impacts of the line -The ROW vegetation management techniques -Herbicide applications
PARTIC-INFO-GIVEN-BY-TEAM-TO-PUBLIC	-All requested data released to the public.
PARTIC-INFO-ASKED-BY-TEAM-FROM-PUBLIC	-The site specific concerns, issues, locations, not available from official published sources. -Any Concerns related spatially to the alternative corridors locations.
PARTIC-INFO-GIVEN-BY-PUBLIC-TO-TEAM	- Information on all categories of requested data is provided.
PARTIC-INFO-USED-BY-TEAM	-In Craig county, VA and Monroe Co. WVA, most of the concerns were mapped on highway maps or USGS 1:24,000 Topo Maps. A majority of the information was not usable directly, except for detailed Craig county maps. -Most of the other information served as indication of public concerns (categories of information that cannot be mapped: vague comments, non-site specific, or large areas with no boundaries given, descriptions of their business, photos of scenic vistas, newspaper clippings on EMF effects, listings of sensitive plants, sightings of mountain lion etc.).

registers.

However, most of the other information received from public was either too vague or too detailed to be mapped accurately. Nevertheless, it served as an excellent indication of public concerns and issues.

Active Opposition Against the Line - Virginia

In Virginia, three opposition groups were formed with the mission to fight against the proposed Wyoming-Cloverdale transmission line: (1) Citizens for Preservation of Craig County, (CPCC) in Craig County, and (2) Citizens Organized for Protection of Environment (COPE) in Giles County, (3) Roanoke County Preservation League. Although all three groups contributed to building the opposition in Virginia, the Craig County opposition group was the leader. A wide range of issues was raised by the Virginia opposition (see Table 8.3)

The COPE of Giles County was founded in the late summer 1991. The members were long-time residents of the county, environmental activists, and students. Although the proposed corridor only touches the county, the COPE members were very active coordinating their actions and supporting other opposition groups in both states. In the Virginia hearings the COPE members testified individually against the line, Also, the group as an entity filed a protest with the Virginia SCC.

The Roanoke County Preservation League was formed in November 1991. It was not nearly as active as CPCC or COPE. Nonetheless, it testified against the line in Virginia regulatory hearings on the application. Table 8.4. displays the strategies and actions of the Virginia opposition groups.

Citizens for Preservation of Craig County. The CPCC was formed in the winter of 1991. By the end of the summer, the

Table 8.3 : Active Opposition Groups, Virginia: Issues

COUNTY:	Source of Evidence
	PUBLIC CORRESPONDENCE
CRAIG	-The need for the line -Scenic values -Mineral Springs -Wells -Organic (certified) farm -Christmas tree farm -Karst topography -Cemeteries, Historic -Churches -Hunting camps -EMF effect on health (people and livestock) -Rare plants -Property values -Airports -Groundwater quality -Historic buildings -Jefferson National Forest -"Not in my Backyard" -Tourism devaluation potential
GILES	-Scenic values -Virginia State Forest -University Research Center -Civil War grounds -Family reunion sites
ROANOKE	-Vistas -Pastures -Ponds -Springs -Rural Historic Designated District -"Not in my Backyard"

Table 8.4 : Active Opposition Groups, Virginia: Strategies and Actions

COUNTY:	Source of Evidence	Source of Evidence	Source of Evidence
	PUBLIC CORRESPONDENCE	NEWSPAPER COVERAGE REVIEW	PROJECTS INTERNAL DOCUMENTATION
CRAIG	-Letter writing campaign, massive -Coordinate with Common Ground of WVA -Hire a lawyer, environmental specialist -Organize networking -Collect money -Prepare and distribute "Opposition Pledge" forms to be sent to the team -Plea with the team to be on their side -Lobby in Richmond	-Rally APCO's headquarters (25 people) -Regularly meet to organize -A mass meeting with Floyd Co., VA opposition leaders -Organize a music festival	- Mailed around 300 "Opposition Pledge" forms to the team. - A 1:24,000 4.5 min. Topo Map with detailed site specific concerns regarding the County. -Protestants in Virginia SCC regulatory review.
GILES	-Letter writing, not massive	-Lobby politicians -Actively organize opposition outside the County -Coordinate with other opposition groups	-Only few "Opposition Pledge" and letters mailed to the team. -Protestants in Virginia SCC regulatory review.

SAY NO TO APCO

At its May 23 meeting the Citizens for the Preservation of Craig County made plans to employ the attorney and expert witnesses who will in July begin the fight against Appalachian Power Company before the State Corporation Commission. We must defeat Apco's attempt to build a monster 765,000-volt power line across 25 miles of unspoiled Craig County farms and forests. This battle will cost money—maybe fifty or sixty thousand dollars. A fund-raising committee therefore organized and named as its first priority a personal-visit solicitation campaign of every household in the county. We feel they can both raise money and also raise the level of public awareness about the threat.

The fund-raising committee present members are Linda Bell, Wes and Pat Carper, Dake Cassem, Jerry Crawford, Nan Gray, Judith Green, Jeanne Guthrie, Claude and Caroline Hildreth, Roy Keiter, Rache Mattox, Hoyt McCartney, Dee Mitchell, Grover Mitchell, Suzy Peverall, Rita Ratliff, Elizabeth Rich, Richard Smith, Charles Soraker, Eileen Setsar, Kent and Peggy Stewart, Jim Via. Others will be announced.

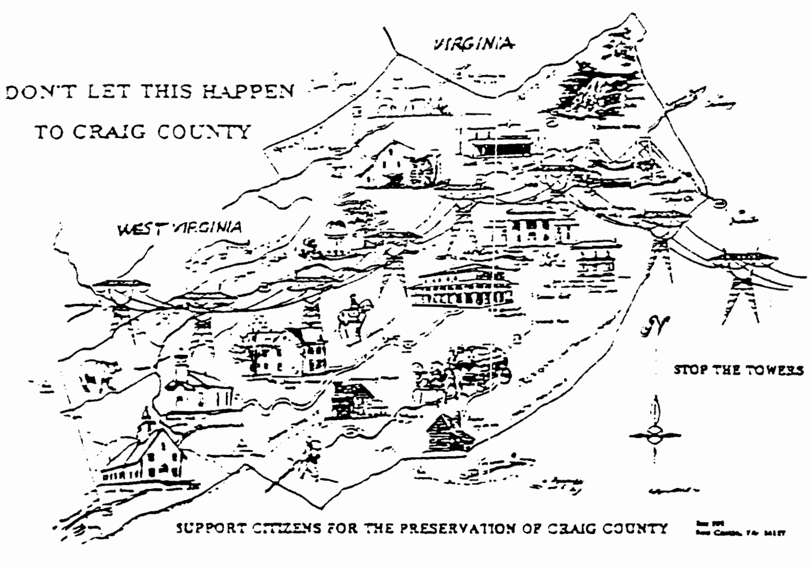
During the next three weeks these committee members will call upon their neighbors. You. Ask them questions about this fight. Tell them how you think CPCC can be more effective. They will ask you to become members at two dollars a person. Please sign up every member of your family. We very much need to say before the SCC that CPCC is all the people of Craig County.

They will urge you to contribute additionally according to your ability.

We are not in this fight alone. CPCC already has promise of sizeable contributions from charitable and environmental groups over the state and nation. These groups will measure their help to us by how we help ourselves.

If you want further information, call Grover Mitchell, 544-7208

Citizens for the Preservation
of Craig County



Karen Lynn Mitchell of Monroe County, West Virginia, drew this representation of Craig County and many of its landmarks. Lynn is the daughter of Craig Countian Grover Mitchell. They are both involved in the fight to prevent the power line from crossing Craig or Monroe Counties. This drawing has been made into placemats and signs and posted around Craig County. p. 5

Figure 8.1: Examples of Craig County Opposition Group Campaign (Source: Wyoming-Cloverdale Study Archives)

membership was about 1,000, which is a large number considering that the county has just over 4,000 residents. The group raised about $ 10,000 by the end of the summer. The members were newcomers, and landowners, people who love isolation and wilderness, and people who "are the eighth generation to live on this land" (Public correspondence, April 1991).

As the Virginia SCC hearing examiner stated, the people of Craig County saw themselves as "victims of a corporate project which will not benefit them..." while APCO was perceived as "a powerful corporate giant interested solely in company profits at the expense of the weak and helpless" ("Cloverdale-Wyoming 765 kV Project SCC Hearing Examiner's Report," December 2, 1993, p. 6).

The strategy of the CPCC was efficient and diverse, including a range of activities. Illustration of the CPCC anti-line campaign is given in Figure 8.1.

CPCC Testimony against the Line. The peak of the CPCC strategy was the protest filed with the Virginia SCC during the regulatory review of APCO's application. In addition, members of the CPCC submitted to the SCC two petitions with 1,400 and 2,000 signatures respectively, opposing the line. The main argument in the protest was that the need for the line was not balanced with adverse environmental impacts of the proposed line.

The CPCC did not see any direct economic benefit from the line passing through the county, while the environmental impacts were perceived as serious. The adverse impacts on exceptional scenic values of the county were also stated as a reason for rejection of the project. Although the Virginia SCC recognized potential environmental and scenic impacts on Craig County, the conclusion was that the greater public need on the state level outweighs the adverse impacts on the county level.

Active Opposition Against the Line - West Virginia

In West Virginia, the opposition was better organized and more efficient. Three opposition groups were formed: (1) Common Ground Inc, Monroe County, (2) Coordinated Voice for Summers County, Summers County, and (3) Citizens Against the High Voltage Line, Mercer County. The leader of the opposition in West Virginia, and the core of the opposition in the entire study area was Common Ground Inc. The issues raised by the West Virginia opposition were broad (see Table 8.5). The strategies and activities of the opposition groups are summarized in Table 8.6.

The activities of Coordinated Voice for Summers County closely followed Common Ground Inc., strategies. The group participated in rallies and lobbied West Virginia state and local politicians. The group organized a letter writing campaign to the team, APCO, and local newspapers. One of the letters said " ... by now you know that the people here are personally involved, and that we have too much at stake to sit idly and let our children's future be sacrificed on the altar of APCO's greed..." (Public correspondence, May 1991). The effectiveness of their opposition was primarily expressed through the support of the successful strategies of Common Ground Inc.

Citizens Against the High Voltage Line of Mercer County, was the last grass-root opposition group to be formed. The group employed strategies designed by Common Ground, and its main role was to contribute to the effectiveness of Common Ground's activities.

The following text describes background and strategies of Common Ground Inc. during the corridor siting process.

Background. Common Ground Inc. was founded in the winter of 1991. The members were farmers, long-time county

Table 8.5: Active Opposition Groups, West Virginia: Issues

COUNTY:	Sources of Evidence PUBLIC CORRESPONDENCE and NEWSPAPER COVERAGE
MONROE	-EMF health effects -Historic buildings, landmarks -Raptor collision with transmission line -Decreased property values -Commercial springs -Cemeteries and churches -Migratory Flyways -View form lookout tower -Tourism -Designated Historic District -Groundwater quality -Scenic highways -Use of herbicides -Endangered breed of horse -Crossing of Peter's Mountain -Noise -Scenic vistas, rest areas -Trout streams -Low level Navy training routes -Sweet Springs Valley, Potts Creek Valley -Communication (radio) towers -"Not in my Backyard"
SUMMERS	-Cemeteries, battlefields -Unregistered historic structures -Local parks -Vistas -Private airfields -RET species -Tourism -Scenic roads and trails -Bluestone Lake and Dam -Commercial Springs -WV coal industry, market, and loss of jobs -Decreased property values -Farming -"Not in my Backyard"
MERCER	-WV Coal industry, market -EMF impact on health -Visual degradation -Reduced property values

Table 8.5: Active Opposition Groups, West Virginia: Issues

COUNTY:	Sources of Evidence PUBLIC CORRESPONDENCE and NEWSPAPER COVERAGE
MONROE	-EMF health effects -Historic buildings, landmarks -Raptor collision with transmission line -Decreased property values -Commercial springs -Cemeteries and churches -Migratory Flyways -View form lookout tower -Tourism -Designated Historic District -Groundwater quality -Scenic highways -Use of herbicides -Endangered breed of horse -Crossing of Peter's Mountain -Noise -Scenic vistas, rest areas -Trout streams -Low level Navy training routes -Sweet Springs Valley, Potts Creek Valley -Communication (radio) towers -"Not in my Backyard"
SUMMERS	-Cemeteries, battlefields -Unregistered historic structures -Local parks -Vistas -Private airfields -RET species -Tourism -Scenic roads and trails -Bluestone Lake and Dam -Commercial Springs -WV coal industry, market, and loss of jobs -Decreased property values -Farming -"Not in my Backyard"
MERCER	-WV Coal industry, market -EMF impact on health -Visual degradation -Reduced property values

Table 8.6 : Active Opposition Groups, West Virginia: Strategies, Actions

COUNTY:	Source of Evidence PUBLIC CORRESPONDENCE	Source of Evidence NEWSPAPER COVERAGE REVIEW	Source of Evidence PROJECTS INTERNAL DOCUMENTATION
MONROE	-Created "Opposition Pledge" forms distributed to other WVA counties -Networked intensively -Contacted senators, congressmen, Governor, Director of PSC -Directed children to write opposition letters -Contacted county officials -Massive letter writing campaign -Few activists (leaders) wrote persistently and frequently to the team -Organized opposition meetings -Contacted town/city mayors in the study area -Accused the team of being biased -Organized Common Ground Health Effects Research Committee -Wrote petitions "Save the Monroe County"	-Open letters to U.S. Representatives, Governor -Rally at APCO's headquarters (25 people) -Write series of letters to the editor in the entire study area -Call for civilized behavior after incident in Hinton workshop -Lobby politicians (state and local) -Gain support from politicians -April 1991 meet with APCO in Union -Rally at WVA PSC headquarters Charlestown (60 people) -A festival and a rally at Pipestem State Park, WVA -Meet with APCO lawyer in Charlestown	-Mailed about 1300 "Opposition Pledge" forms received. Monroe county highway map excerpts with marked site specific concerns (1 inch = 1 mile) -Came to VA Tech campus to meet with principal investigators -Lobbied successfully for "The New River Wild and Scenic River Study Act 1992" U.S. Senate -Lobbied successfully for "Recognizing Monroe's Zenith- Sweet Spring Valley as a Special Natural Resource..." WVA Legislature -Filed successful motion with WVA PSC to dismiss APCO application
SUMMERS	-Organize "Opposition Pledge" forms massive mailings to the Team -Plead with the Team to stop the line -Contact the Governor -Contact Senators -Organize opposition protest letter writing campaign	Regularly meet -A festival and a rally at Pipestem State Park -Meet with APCO lawyer in Charlestown	-Mailed over 100 "Opposition Pledge" forms to the team
MERCER	-Petition to the team, requiring more information and opposing the line	-Rally at AEP headquarters Columbus, OH -A festival and a rally at Pipestem State Park, WVA	-Very few exit surveys sent to the team

WE HAVE THE POWER TO STOP THE TOWER!

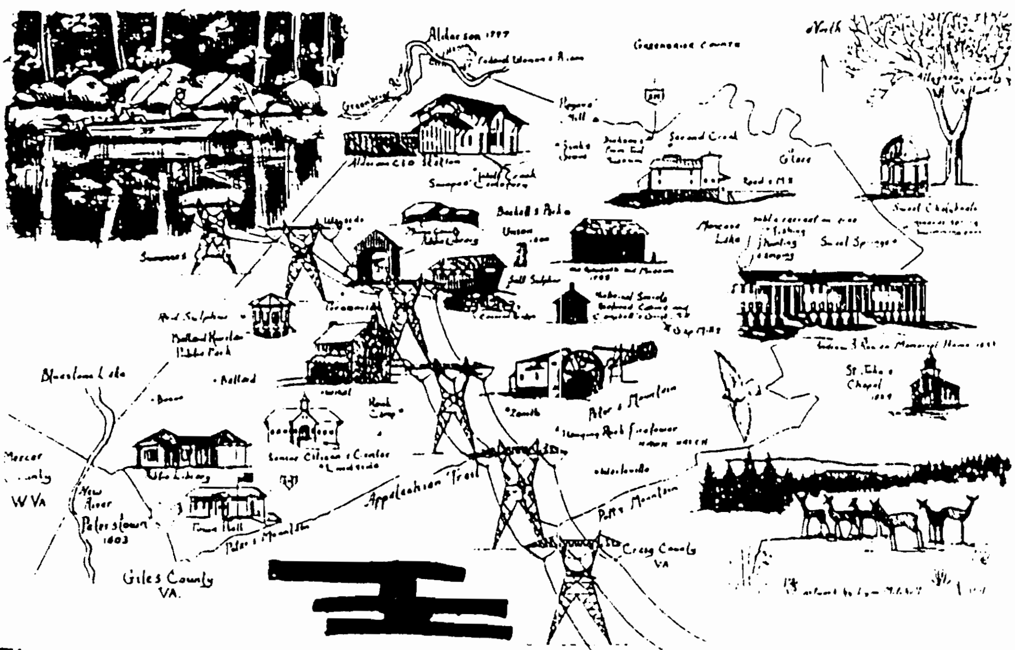
CRITICAL MEETING
Monroe County Courthouse, Union
Tuesday., Sept. 17th, 7:30 - 9:00 P.M.

The current APCO Corridor Maps are not final!

Bring your neighbors and find out what you can do to support the fight!
Speakers will be: Local, State and Federal Representatives, National Forest Service Personnel, and local experts.

Come and sing out your support for "Common Ground"
For further information call: 772-3087
Paid for by "Common Ground"

NO POWER TOWER



This University is helping to Ruin Monroe County, W.V.

Figure 8.2: Examples of Monroe County Opposition Group Campaign

(Source: Wyoming-Cloverdale Study Archives)

residents, real-estate businessmen, people who retired to the peaceful and rural county, well educated people who returned to farming, members of the Bluegrass Ruritan Club, members of "Progressive Animal Welfare Society," Seven Springs Veterinary Clinic, Brooks Bird Club, Zenith Mountain Designs art community. As a resident of the County put in the letter to the team "...Now I see everyone unified to stop this eyesore: locals and outoftowners, young and old, rich and poor, all are helping..." (Public correspondence, March 1991).

Letter Writing Campaign. The activities started with a letter writing campaign in the late fall 1990. The Common Ground letter writing campaign was the most intensive. About 1,300 "protest forms" arrived at VPI & SU. The ardent letter writing campaign to newspapers in the entire study area was going on from the onset of the corridor siting study. The group used the newspapers as a conduit to publicize its ideas and organize activities. Examples of Common Ground strategies may be seen in Figure 8.2.

Rallies. Common Ground Inc. organized the rally at APCO headquarters in Roanoke (April 1991). In July 1991 before the application was filed with Virginia SCC the group rallied West Virginia PSC headquarters in Charlestone, West Virginia, AEP headquarters in Columbus, Ohio, and organized a festival and rally in Pipestem State Park, Summers County, West Virginia. Their messages in the rallies were "Only God has the Eminent Domain Over West Virginia: and "We Have the Power to Stop the Tower." Evidently, the group was determined to fight for its cause.

Issue of Need. The most effective arguments that Common Ground Inc. fostered were : The issue of the need, and the fact that West Virginia coal was not burned in this project. The grounds for negative public sentiment were fertile in West Virginia coal country. It did not help much that APCO has been the largest user of West Virginia coal. The United Mine Workers joined the opposition, as they felt that APCO should use local coal to produce energy transmitted by the proposed line.

Pressure on Elected Politicians. Besides influencing the negative public opinion towards the line, a very efficient strategy was to put a direct pressure on local and state politicians. As a result, Common Ground gained the support of state, and local politicians, U.S. representatives and congressmen. In September 1991, state delegate Mary Pearl Compton, democrat from Monroe County said in a Common Ground Inc public meeting, referring to Peters Mountain: " As I came off that mountain last Sunday afternoon I said to myself, "God, don't let them put that line on this mountain'" (The Register Herald, September 18, 1991).

New River Wild and Scenic River Eligibility Study Act. During the Earth Day manifestation on April 22, 1992 West Virginia Congressman Nick Rachall declared his opposition and determination to place 17 miles of the New River, crossed by the preferred corridor, under federal wild and scenic river eligibility study status. The initiative was strongly supported by Common Ground Inc., Citizens Against a High Voltage Power Line, local and regional environmental groups, Bluestone Project Committee, and state delegate from Monroe County, Mary Pearl Compton. On June 30, the House of Representatives Subcommittee on National Parks and Public Lands held hearings on Rachall's bill. Representatives of Common Ground testified against the line and for protection of the river.

Reacting to the new policy developments, the West Virginia PSC recommended that APCO develop a new alternative corridor avoiding the section of the New River, which would probably be designated for a wild and scenic river eligibility study. In addition, the memorandum also indicated the deficiency of APCO's economic cost-benefit studies for the line in West Virginia. On July 23, the U.S. House of Representatives approved a Rachall's Bill. On August 7, the West Virginia PSC issued another memorandum suggesting that APCO withdraw the application because of the time lag between the completion of the federal EIS and state regulatory review. On August 20, the PSC issued the third memorandum recommending that APCO withdraw the application and refile after January 1, 1993. On August 21, the application was withdrawn, and the siting studies to delineate the new corridor started.

Motions Filed with West Virginia PSC. After the second filing of the application with the West Virginia PSC, at the end of February and beginning of March 1993, Common Ground Inc., and a leader of the group individually, filed motions with PSC to dismiss the application. The motions claimed application non-compliance with the PSC regulations. Specifically, they claimed that the map with proposed corridors was inadequate, as it did not include areas and features 5 miles of each side of the centerline. Furthermore, the motions stated that the information justifying the selection of preferred corridors over the alternatives was insufficient, and the methodology was not clearly described. Also, they maintained that impacts on wildlife, and impacts of the EMF on human health were not adequately analyzed and assessed. In addition, they criticized the economic justification of the line location through West Virginia. And finally, the motion requested postponement of the decision on the application by the PSC until the federal EIS is completed.

On May 10, 1993, the PSC issued an order dismissing the application on the grounds of inadequate presentation of the corridors and required resources on the submitted maps. It should be noted that map plates (1:24,000, 7.5 Minutes USGS

Topographic base maps) submitted with the first and second application, and previously assessed as acceptable, were deemed inadequate. Then the team and APCO decided to refile the application including West Virginia Department of Transportation County Highway Maps (1 mile = 1 inch), and mapping additional features within 5 miles each side of the centerline of the proposed corridors.

Generally, actions and strategies of Common Ground Inc. resulted in extensive delays in the corridor siting study.

8.2. Media Coverage

From the time the project was publicly announced, the media closely followed its evolution. Most of the leading regional and local newspapers, radio and TV stations in the study area reported on all stages of the study.

Commentaries on the project's milestone events were published regularly. The local and regional newspapers were an excellent outlet for the opposition to voice their opinions and campaign against the line. They wrote: " Time to Protest APCO Power Line is Now !" , "Get Active in Politics Now!", "Will You Take a Stand ?", "We Must All Unite," "West Virginia Loser in Most Power Company Scenarios," "Power Lines Would Mar Beauty of Bluestone," "APCO's Profits Shouldn't Put People at Risk," "Keep Lines Out of the Rural Areas," "Power Line will Reduce Property Values," and "Do not Let This Happen to Craig County."

All these titles illustrate very well the prevailing negative sentiments towards the line, suggest the lack of trust, and show the range of public concerns about the line.

During 1991, over two hundred letters were published in "New Castle Record," "Roanoke Times and World News" and

"Virginia Leader" in Virginia, and "Mountain Messenger," "Register Herald," and "Hinton News" in West Virginia (Appendix B, Newspaper coverage, 1991). Tables 8.7. and 8.8, illustrate the intensity and direction the newspaper coverage in Virginia and West Virginia during the year 1991. The number of letters to the editors was much greater than editorials and articles published in all the newspapers. The majority of letters were mailed by leaders and active members of the two most prominent opposition groups: Common Ground Inc. (Monroe County, WVa) and Citizens for Preservation of Craig County (Craig County, Va). Although the flow of letters was continuous, the frequency considerably raised after the second set of public meetings, and immediately before and after the Applications were filed. The letters expressed firm opposition to the project. Only a few supporting letters claimed that "Power Lines Really Aren't a Bother" and that "Life hasn't Changed by 765 kV Line ." However, these were the exception to the many adverse letters.

APCO and the opposition groups debated frequently through the newspapers. APCO responded to the issue of need for the proposed line, which was raised by many citizens in both states. APCO unsuccessfully confronted the West Virginia opposition groups which alleged that the transmission line will hurt the West Virginia coal industry, since the electricity to be transferred by the proposed line would originate from coal from the state of Wyoming, burned in the Indiana generating plant. Responding to these claims APCO published the letters entitled " APCO is the Greatest Consumer of West Virginia Coal" and "No Wyoming Coal Burned in West Virginia." Often, the debate was fierce and far from amicable. Citizens wrote: "Power-line Claims Filed with Errors," "Questionnaires is Biased for Power Line." APCO reacted by writing: "Power Line Opponents Use Deceptive Tactics," and

Table 8.7 : Newspaper Coverage of the Wyoming-Cloverdale Siting Project: VIRGINIA, 1991

NEWSPAPER COVERAGE	NUMBER OF ARTICLES	MAIN THEMES
NEUTRAL-INFORMATIVE-ARTICLES	-Series of articles in "New Castle Record" -Series of articles in "Roanoke Times and World News" -Both series follow the progress and events of the project (around 30 total)	"Corridor Selection Process Discussed by Research Team" "Power Line Findings To Be Given" "Appalachian President Discusses Power Lines" "Power Line Corridor is Scrutinized" "Workshop on APCO Power Line Conducted at Giles High" "Power Line Corridors Displayed, Opposition Group Will Take Meetings on the Road" "County (Craig) Still Opposes Power Line" "CPCC Begins Mail Campaign" "CPCC Will Hold Meeting to Discuss Power Line With Floyd Residents" "Power Line Opponents Hire Lawyer" "APCO Announces Delay In Filing" "SCC Gets Application For Rest of Power Line" "National Forest Studying Power Line" "Power Line Opposition Says 'Nothing Has Changed'" "Role of Research is Often Misunderstood" "Officials Tackle Power Line Fears"
OPPOSING ARTICLES	-Implicit opposition, only few articles -Series of articles in "New River Free Press", follows the progress of the study	"Virginia Residents Not Convinced That APCO Project is Necessary" "Appalachians Fight APCO Again" "Mercer County Way Joins APCO Fight"

Table 8.7: continued

OPPOSING LETTERS TO EDITOR	-About hundred letters published in 1991 -The most of the letters published after 2nd set of public meetings (May) and after 1st filing of the application with the Virginia SCC (July).	"Questionnaire is Biased For Power Line" "All Aspects of Life in Craig Not Accounted For by APCO" "Reader Casts Doubts on APCO Spokesman Logic" "765 kV Lines Harmful to Rural Landowner" "Power Line Could Affect Economy" "Let's Establish the Facts About the Power Line" "Reader Says: Line Is Not Progress" "Keep Lines out of Rural Areas" "Is a Power Line Really Worth It" "Line Will Affect Tourism" "CPCC Announces Members Who Have Recently Joined the Cause" "Do Not Let This Happen to Craig County"
SUPPORTING LETTERS TO EDITOR	About 20 letters: -April-May: To all local newspapers from APCO's public educator (public relations manager) -May: To all local newspapers from APCO engineers on issues of: WVA coal market, stray voltage impacts -May: To most of the newspapers a letter from Va citizen -July: From APCO, Vice President justifies the need -September: To all local newspapers from APCO public educator (public relations manager), alleges opposition strategy	-From APCO: "Power Lines Are a Necessary Evil of Modern Life" -From VA Resident: "Power Lines Really Arent a Bother" -From APCO: "Clarifying Stray Voltage" -From APCO: "Power Line Opponents Use "Deceptive Tactics" "Not Playing Straight With the Facts" -From APCO: "No Wyoming Coal Burned in WVA"

Table 8.8 : Newspaper Coverage of the Project: WEST VIRGINIA, 1991

NEWSPAPER COVERAGE	NUMBER OF ARTICLES BY MONTH	MAIN THEMES
NEUTRAL-INFORMATIVE ARTICLES	-Around 30 articles	"Discussion Becomes Heated Over Power Line Controversy" "Power Play: Protestors Walk, APCO Talks" "Power Source: A Key Question In Line Issue" "Possible Line Paths to be Discussed" "Caperton Favors APCO Project" "Workshop Set on APCO Plan" "Proposed Power Line Opponents Fight APCO" "Group Meets Without APCO (Union Workshop Canceled)" "Turnout Low At Meeting to Discuss Power Line" "Power Line Gets No Support From County (Summers) Officials" "Opponents of Power Line Confer With APCO Attorney" "Power Line Opponents Protest in Columbus, Continue Fight" "APCO Filing Delay Doesnt Surprise Foes" "Power Line Reports" "Common Ground Gains Support From Staggers, Compion, Anderson" "Parkway Authority Opposes Power Line"
OPPOSING ARTICLES	-Only few	None Explicitly Opposing, Tone is Not Supporting "What Did You (APCO) Expect, A Kiss on the Cheek?"

Table 8.8: continued

OPPOSING LETTERS TO EDITOR	-Over 100 letters during 1991, some sent to Virginia newspapers also -The most of the letters were published just after the 2nd set of public meetings and after 1st Filing in VA	"Time to Protest APCO Power Line is Now" "Become Involved With Common Ground" "Controversy Continues" "Power Lines Would Mar the Beauty of Bluestone" "APCO's Profits Shouldn't Put People at Risk" "Let's Establish the Facts About the Power Line" "Will APCO Stand Behind Statements It's Making?" "Power Line Will Hurt Property Values" "Imminent Domain? WVA Public Use? Out of State Public Use?" "Let's Show Outsiders We Are Proud People" -Open Letter to Governor: "APCO's 765 Kv Line Not Going to Help WVA" "Virginians Letting West Virginians Do the Work to Stop the Line" "Conserve Energy Before Building Lines" "Power Line Effects: Children and Progress" "How Does APCO Dictionary Define Progress" "Congressional Delegation Could Halt Power Line" "Line Will Affect Tourism"
SUPPORTING LETTERS TO EDITOR	-About 20 Letters -April-May: To all local newspapers from APCO public educator (public relations manager) -May: To all local newspapers from APCO engineers on issues of: West Virginia coal market, stray voltage impacts -A letter from Va citizen -July: From APCO Vice President; justifies the need -September: From APCO public educator (public relations manager): alleges opposition of unfair strategy	-From APCO: "Power Lines Are a Necessary Evil of Modern Life" -From VA Resident: "Power Lines Really Aren't a Bother" -From APCO: "Clarifying Stray Voltage" -From APCO: "Power Line Opponents Use "Deceptive Tactics" "Not Playing Straight With the Facts" -From APCO: "APCO: Growing Power Needs Necessitate 765,000 kV Lines" -From APCO: "No Wyoming Coal Burned in WVA"

"Common Ground's Letter Misleading." Trying to alleviate adverse public sentiment APCO published many letters with a theme "Power Lines are a Necessary Evil of Modern Life." The letters did not seem to influence at all the negative public opinion towards the project. Generally, APCO did not seem to use the media to its full advantage.

The newspapers also published neutral articles reporting on main events in the corridor siting process: "Process Discussed by the Research Team," "Power Line Findings To Be Given," "Research Team Releases One Mile Wide Corridors," "Discussion Becomes Heated Over Power Line Controversy," "Monroe Residents Plan to Rally APCO Headquarters", "Turnout Low at A Meeting to Discuss Power Line", "City Goes on Record Against Line Project", and "Line Leaps Hurdle".

Contrary to the large number of opposing letters to editors there were only few clearly opposing editorials and articles such as: "Virginia Residents Not Convinced That APCO Project is Necessary," "Appalachian Fight APCO Again," and "Mercer County Joins APCO Fight."

8.3. Attitudes of Affected Agencies

Federal Agencies. Attitudes of the federal agencies towards the project were mainly neutral and cooperative (see Table 8.9.). The cooperative attitudes were reflected in the readiness to communicate with the siting team throughout the study.

The Jefferson National Forest, National Forest Service, was mostly neutral towards the project. Although it was originally signed as a protestant in the Virginia regulatory review, the agency withdrew during the hearings, claiming that the it "neither supports nor opposes the project" (VA SCC

Table 8.9 : Attitudes of Federal Agencies towards the Wyoming-Cloverdale Project

AGENCY	Source of Evidence AGENCY CORRESPONDENCE	Source of Evidence MINUTES OF MEETINGS
NATIONAL PARK SERVICE New River Gorge National River	-Neutral -Indicated concerns about critical crossings	-Neutral -Cooperative, provided information
NATIONAL PARK SERVICE Appalachian Trail Project Office	-"Does not endorse any of the alternatives... It would be our preference to not have this line cross the AT at all, anywhere"	-Explicitly opposes
US ARMY CORPS OF ENGINEERS	-Neutral	-Neutral -Cooperative, provided data and information on critical crossings
US FOREST SERVICE Jefferson National Forest	-Cooperative, provided information -No explicit support -Implicit opposition	-Neutral
US DEPARTMENT OF INTERIOR Fish and Wildlife Service	-Neutral	-Neutral

Hearing Examiners Report,December 2, 1993). U.S. Army Corps of Engineers was neutral and cooperative, showing the most acceptable New River crossings, and suggesting mitigation measures to abate potential impacts of the corridors on their resources (Minutes of Meetings, July 12, 1991). The Fish and Wildlife Service, US Department of Interior, did not express explicit support or opposition to the project, keeping a neutral position throughout the siting process. New River Gorge National River, National Park Service, was also neutral. The agency regularly sent the most current information to the team.

However, the Appalachian Trail Project Office, National Park Service, explicitly and strongly opposed the transmission line. In the letter to the siting team, after the preferred and alternative corridors were selected, the Appalachian Trail Project Office plainly stated that "... we do not endorse any of the alternatives...it would be our preference to not have this line cross the AT at all, anywhere." (Agency correspondence, August 2, 1991).

Virginia State Agencies. The Virginia Department of Conservation, Division of Natural Heritage, the Department of Game and Inland Fisheries, the Department of Transportation, and the Department of Historic Resources did not formally support nor oppose the line (see Table 8.10.). Their attitudes were determined by the mission to protect the resources sensitive to the transmission line impacts. The agencies provided timely and updated information (Appendix B, Minutes of meetings, Agency correspondence).

The Department of Forestry was the only Virginia agency that moderately opposed the line. It persistently voiced concern about potential visual impacts of the line on the Niday Place State Forest, which is the first and only Virginia designated State Forest (Agency correspondence, December

Table 8.10: Attitudes of Virginia State Agencies towards the Wyoming-Cloverdale Project

AGENCY	Source of Evidence AGENCY CORRESPONDENCE	Source of Evidence MINUTES OF MEETINGS
Commonwealth of Virginia DEPARTMENT OF CONSERVATION DIVISION OF NATURAL HERITAGE	-Neutral. Sent information about critical sensitive areas, reviewed corridors. No explicit opposition or support.	------------------
Commonwealth of Virginia DEPARTMENT OF FORESTRY	-Concerned about potential visual impacts on Niday Place Forest, the first and only Virginia State Forest	------------------
Commonwealth of Virginia DEPARTMENT OF GAME & INLAND FISHERIES	-No explicit opposition or support, cooperative, data provided	------------------
Commonwealth of Virginia DEPARTMENT OF HISTORIC RESOURCES	-No explicit opposition or support, cooperative, data provided	-No explicit opposition or support, cooperative, data provided
VIRGINIA DEPARTMENT OF TRANSPORTATION Christiansburg Residency	-No explicit opposition or support, cooperative, data provided	-No explicit opposition or support, cooperative, data provided

11,1990; April 24, 1991).

West Virginia State Agencies. The West Virginia Division of Natural Resources, the Division of Tourism and Parks, the West Virginia Parkways, and the Department of Transportation held a neutral stand on the project, providing available information throughout the corridor siting study (see Table 8.11.).

However, West Virginia Division of Culture and History strongly opposed the line, unequivocally supporting the concerns of Common Ground Inc., Monroe County opposition group, about the potential impacts of the line on the Zenith Mountain Designs community (Agency correspondence, April 11, 1991).

The New River Parkway Authority held a neutral and cooperative position from the beginning of the corridor siting study. Nevertheless, it later took a clear opposition attitude (Newspaper coverage review, January 1992).

The West Virginia state legislature strongly confronted the project, passing three opposing resolutions, and taking the initiative for the approval of the "New River Wild and Scenic River Eligibility Study Act" (Internal documentation, 1992). In February 1992, the West Virginia House of Delegates passed a resolution ordering an independent study of the line (Internal documentation, 1992). This resolution was replaced by a new one, passed on March 8, which opposed the line because of no perceived economic benefits for West Virginia. It also required that the EIS consider the entire length of the corridor, not only the segments passing through the Jefferson National Forest, and other federal resources. In addition, the resolution recognized "Monroe's County Zenith-Sweet Springs Valley as a special natural resource for residents of the State and visitors alike" (Project internal documentation, 1992). The resolution gave a special status to

Table 8.11: Attitudes of West Virginia State Agencies towards the Wyoming-Cloverdale Project

AGENCY	Source of Evidence AGENCY CORRESPONDENCE	Source of Evidence MINUTES OF MEETINGS
State of West Virginia Department of Labor, Commerce and Environmental Resources DIVISION OF NATURAL RESOURCES	-No explicit opposition -Cooperative, data provided	-Neutral -Cooperative, provided data
State of West Virginia, Department of Labor, Commerce and Environmental Resources DIVISION OF TOURISM & PARKS	-No explicit opposition -Cooperative, data provided	-"Will strongly resist possible crossing of the Pipestem State Park"
NEW RIVER PARKWAY AUTHORITY	-No explicit opposition -Cooperative, data provided	-No explicit opposition in the beginning, later on opposition expressed -Cooperative, data provided -Other sources: "Parkway Authority Opposes Power Line"(Article, January, 1992)
State of West Virginia Department of Education and Arts DIVISION OF CULTURE & HISTORY	-Opposition	---------------------
West Virginia Economic Development and Tourism Authority WEST VIRGINIA PARKWAYS	---------------------	-Neutral, no explicit support or opposition -Cooperative, provided data
State of West Virginia DEPARTMENT OF TRANSPORTATION	-Neutral -Cooperative, data provided	-Neutral -Cooperative, provided data

Table 8.12: Attitudes of Virginia Local Agencies towards the Wyoming-Cloverdale Project

AGENCY	Source of Evidence MINUTES OF MEETINGS	Source of Evidence NEWSPAPER COVERAGE REVIEW	Source of Evidence PROJECT INTERNAL DOCS
BOTETOURT COUNTY BOARD OF SUPERVISORS, PLANNING DEPARTMENT	-No explicit support or opposition -Cooperative, provided information	-Botetourt officials oppose the line	-----------
COUNTY OF GILES BOARD OF SUPERVISORS	---------------	-July 1991, passed resolution asking SCC to hold hearings in Giles county to conduct EIS for Jefferson National Forest, to postpone decision until New River Valley Planning District Commission assesses the potential conflicts with the Giles County Comprehensive Plan	----- ------
CRAIG COUNTY ADMINISTRATION	-No explicit support or opposition -Cooperative, provided information	-County Board of Supervisors passed resolutions opposing the line; February, April, July 1991	-Opposition protestants in the Virginia SCC hearings on the application
MONTGOMERY COUNTY PLANNING DEPARTMENT	-No explicit support or opposition -Cooperative, provided information	---------------	-----------
NEW RIVER VALLEY PLANNING COMMISSION	-No explicit support or opposition -Cooperative, provided information	-Opposed the project, supported Giles County Board of Supervisors and citizen opposition group COPE	-----------
ROANOKE COUNTY PLANNING DEPARTMENT	-No explicit opposition or support -Concerns about particular routes and impacts -Cooperative	---------------	-----------

the area crossed by the proposed corridors. Another resolution initiated a proposal that a 17-mile section of the New River should be placed under Wild and Scenic River Eligibility Study Status. In June 1992, the New River Wild and Scenic Study Bill, proposed by the West Virginia Congressman Nick Rachall was enacted. Consequently, the originally proposed crossing of the New River by the preferred corridor lost its priority, and the West Virginia PSC demanded the study of a new alternative corridor crossing the New River elsewhere. (Project internal documentation, Minutes of meetings, December 30, 1992).

Virginia Local Agencies. Virginia local authorities in Craig, Roanoke, and Giles Counties strongly opposed the project. On the other hand, Botetourt and Montgomery Counties not directly affected by the proposed transmission line held a neutral position towards the line (see Table 8.12.).

The Craig County Administration formally expressed its opposition in three resolutions against the corridors crossing the county. The Board of Supervisors testified against the line during the application review by the Virginia SCC (Newspaper coverage review, February, April, July 1991).

The Giles County Board of Supervisors enacted a resolution requesting the hearings on the Transmission Line Application in Giles County, and the federal EIS, delay their final decision until the New River Valley Planning Commission assesses land use conflicts with Giles County Comprehensive Plan. The New River Planning Commission strongly opposed the line. It demanded the compliance with the Giles County Comprehensive Plan and openly supported the citizen opposition group of Giles County.

However, the clearly negative institutional attitudes on a local level in Virginia did not exert any considerable effect on the corridor siting process.

Table 8.13: Attitudes of West Virginia Local Agencies towards the Wyoming-Cloverdale Project

AGENCY	Source of Evidence	Source of Evidence	Sources of Evidence
	AGENCY CORRESPONDENCE	MINUTES OF MEETINGS	PROJECT INTERNAL DOCUMENTS/ NEWSPAPER COVERAGE REVIEW
West Virginia Region 1 Planning and Development Council (McDowell, Mercer, Monroe, Raleigh, Wyoming, Summers counties)	-No explicit opposition	-Cooperative, provided information -No explicit support or opposition of this entity but the counties took the opposing stand	------------
Monroe County Commission	-------------	--------------	Opposition, passed the resolutions requesting that upgrading of the Matt Funk Line be considered, and public hearings by PSC in the County
Mercer County Commission	-------------	-------------	- Opposition, July 8, 1991, passed resolution opposing the approval of the line
Summers County Commission	-------------	-------------	- Opposition, June 1991, passed resolution opposing the line.
Hinton City Council, Summers County	-------------	-------------	- Opposition, May 1991, passed resolution opposing the line
Athens Town Council, Mercer County	-------------	-------------	- Opposition, Fall 1991, passed resolution opposing the line

West Virginia Local Agencies. The West Virginia Region 1 Planning and Development Council was neutral towards the project. Nonetheless, strong opposition was encountered from Monroe, Mercer, Summers Counties, town of Hinton and Athens administrations (see Table 8.13.).

All these localities passed resolutions against the line, and continuously cooperated with the opposition groups. Besides a resolution opposing the line, the Monroe County Commission passed the resolution requesting that upgrading of the existing Matt Funk line be considered as an alternative (Newspaper coverage review, 1991). Interestingly, although the proposed corridors passed through Wyoming County, no opposition on the local governmental level was expressed.

Indirectly, by supporting the public opposition whose activities were effective, the adversare attitudes of the local West Virginia agencies caused two withdrawals of the application with the PSC .

8.4. Communication Among Organizations

Communication between APCO and the Corridor Siting Team. From the onset of the siting study the communication between the team and APCO was continuous, encompassing a variety of direct and indirect written and oral communication forms.

The APCO project coordinator and an independent study liaison attended project meetings, and followed the development of the project. APCO supplied data on the engineering attributes of the line, construction activities, ROW vegetation clearance and management, and ROW acquisition procedures. The team kept APCO up to date with steps in the siting project. The team and APCO shared tasks of preparing the public information material, and implementing public meetings.

The team was fully independent in developing the siting methodology, criteria, and in selection of locations of the proposed corridors. APCO's input was limited to the facts on engineering and construction feasibility of potential corridor locations. Indirect communication was by frequent phone calls, phone conference calls, exchange of minutes of meetings, faxes, and regular progress reports. The exchange of information included reporting on contacts with agencies and regulatory commissions, public correspondence, comments on media coverage, activities of the opposition groups, developments of the regulatory review process, clarification of regulatory requirements and technical issues. Both APCO and the team felt that their communication was effective (Interviews with APCO, and the Team, May 1994).

It should be noted that APCO did not exert any pressure on the team in terms of siting criteria or economic cost of mitigation recommended (Participant observations, 1991-1994, Interview with the team, May 1994). In spite of this, the opposition accused the team of being APCO's collaborator, who only executes APCO's wishes (Public correspondence, February 6, 1991, Participant observations 1991, Public meeting, Hinton, May 16, 1991).

Such public perception might be explained by the general public mistrust of the corporate power of the company, which was then conveyed to the team. The misconception was reinforced by the fact that the team and APCO appeared together in public meetings and press conferences, which lead the public to erroneously believe that the team was greatly influenced by APCO.

Communication between the Team and Governmental Agencies. Communication with the governmental agencies started early in the corridor siting study. It was continuous, taking direct and indirect communication forms. The purpose of the communication between the siting team and governmental agencies was to: (1) Introduce the project and present the corridor siting study schedule, methodology, criteria, and results, (2) Solicit data on the baseline conditions of resources managed by the agencies, and to get information about policy and management constraints potentially encountered, and (3) Receive comments on alternative corridors location and mitigation before the proposed corridors were selected (Appendix B, Minutes of Meetings). The chronology of meetings is presented in Table 8.14.

The team met with agencies most often during 1991, when the corridor analysis, assessment and selection were in progress. The meetings resumed in December 1992, and June 1993 to receive data and comments on the northern alternative corridor location for the second filing of the application with West Virginia PSC.

Between December 1990 and June 1991, a series of meetings with federal, state, and local agencies was held, to start up communication, inform the agencies on the study progress and to get necessary data. The corridor review and mitigation meetings were held in July and August 1991, before the preferred and alternative corridors were selected. These meetings primarily resulted in federal agencies comments on the alternative corridors.

At the end of 1992, and the beginning of 1993, before the second filing with the West Virginia PSC, the team met with the West Virginia State Parks, the US Army Corps of Engineers, and the National Park Service, New River Gorge National River National Park, to receive comments on the new alternative corridor, crossing the New River in West Virginia.

Introductory informative meetings with state and local agencies were not held, except the meeting with the West

Table 8.14: Chronology of Meetings between the Team and Governmental Agencies

(Source: Appendix B, Minutes of Meetings)

AGENCIES	Introductory Meetings	Data Collection Meetings	Review & Mitigation Meetings
FEDERAL:			
USFS, Jefferson National Forest	11.2.90	12.3.90; 1.25.91	7.19.91; 9.24.91
National Park Service New River Gorge NP	10.23.90	12.3.90; 1.25.91	1.6.93
National Park Service AT Conference	11.2.90	1.25.91	7.17.91; 12.17.91
US Army Corps of Engineers	none	none	7.12.91; 12.30.92
State Agencies, West Virginia	10.23.90	11.7.90; 12.10.90; 3.7.91; 6.27.91;	12.30.92
State Agencies, Virginia	none	12.10.90; 3.6.91; 3.8.91.	none
Local Agencies, West Virginia	none1	6.14.93; 6.14.93.	8.20.91.
Local Agencies, Virginia	none [1]	3.4.91; 3.4.91; 3.5.91; 3.5.91; 3.11.91; 6.24.91; 6.24.91; 6.27.91; 6.27.91; 6.27.91.	none

[1] The team did not meet with local officials at the onset of the project. Instead, APCO held two rounds of introductory meetings with local authorities within the study area: in October 1990, and in April through May 1991, and representatives of local governments participated in public meetings organized by the team and APCO.

Virginia Department of Natural Resources. Data collection meetings were the most frequent (24 meetings) compared to introductory meetings (4 meetings) and review and mitigation meetings (9 meetings). Comparing the three governmental levels, the team met most often with the state agencies (4 times with the West Virginia agencies and 10 times with the Virginia state agencies). Direct communication through the meetings with West Virginia local agencies was only for data collection (2 meetings).

The indirect communication (written correspondence and phone interviews) was going on throughout the study. After the preferred and alternative corridors were selected, the meetings were replaced by correspondence and phone calls. Chronology of indirect communication is given in Table 8.15.

The indirect communication with agencies was more frequent in the 1990 (17 phone interviews and 14 letters received from agencies) and 1991 (28 phone interviews and 22 letters received from the agencies), when the corridors were analyzed, assessed and selected, then in 1992 (only 9 phone interviews and no letters). In 1993 the indirect communication with the West Virginia state and local agencies through phone calls intensified, to collect data and coordinate with agencies for the West Virginia new alternative corridor selection (11 phone interviews with state agencies and 14 with local agencies).

The scope of the indirect communication included data requests, verification, and updates, as well as setting up meeting schedules and agendas.

Correspondence with both Virginia and West Virginia state agencies was frequent. The most regular was the correspondence with Virginia Department of Natural Heritage and West Virginia Division of Natural Resources. Both agencies were very

Table 8.15: Chronology and Frequency of Correspondence, and Key Phone Interviews between the Team and Governmental Agencies

AGENCIES	CORRESPONDENCE	KEY PHONE INTERVIEWS
FEDERAL:		
USFS, Jefferson National Forest	1990: 1	1990: 3 1991: 7 1992: none 1993: 3 1994: 1
National Park Service New River Gorge NP	1990: 1	1990: 2 1991: 2 1992: none 1993: 3 1994: 1
National Park Service AT Conference	1990: 1 1991: 1	1990: 4 1991:1 1992: none 1993: 1
US Army Corps of Engineers	none	1992: 4 1993: none 1994: 2
Federal Aviation Administration	1991: 2	1990: 2 1991: 4
USDI, Fish & Wildlife Service	1991: 1	none
State Agencies, West Virginia	1990:4 1991: 7 1992:none 1993:none 1994: 4	1990: 2 1991: 1 1992: 2 1993: 11 1994: 2
State Agencies, Virginia	1990: 4 1991: 10	1990: 1 1991: 6 1992: 1
Local Agencies, West Virginia	1990: 1	1990: 1 1991: none 1992: 1 1993: 14 1994: 1
Local Agencies, Virginia	1990: 2 1991: 2	1990: 2 1991: 6 1992: 1

(Source: Appendix B, Agency Correspondence and List of Key Phone Interviews) cooperative[26], providing available data on ecological resources, and reviewing the proposed corridors.

Problems in communication were experienced with the Appalachian Trail Conference Office, which held an opposing attitude towards the project. As issues and concerns were not resolved or negotiated through communication during the corridor siting they had to be settled through the regulatory hearings with the Virginia SCC[27].

The communication with West Virginia local agencies was limited before 1993. The reasons why the team or the agencies did not seek to communicate, might be due to the adversararial attitudes of the localities, so that communication was avoided by both sides.

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[26] A few brief delays were experienced in the exchange of information with the West Virginia Division of Natural Resources. Nevertheless, the agency supplied the available data.

[27] See the section on attitudes of affected agencies for more details.

CHAPTER 9: STATE SITING REGULATIONS

This Chapter reviews and evaluates the Virginia and West Virginia state regulations, and determines the effects of regulations on the Wyoming-Cloverdale corridor siting study. Detailed description of the regulations is given in Appendix B. The regulations are reviewed in terms of: (1) Clarity of requirements, (2) Technical aspects, (3) Regulated coordination of actions and coordination with other relevant legislation, and (4) Regulated public and agency participation in corridor siting study.

A brief overview of the Virginia and West Virginia regulations and a discussion of their effects on the Wyoming-Cloverdale siting study process is given.

9.1. Virginia Siting Regulations

The summary of the Virginia regulations review is displayed in Tables 9.1. to 9.4.

The Virginia state regulations for the electric transmission line siting define qualitative requirements dealing with topography, soils, hydrology, vegetation, and wildlife. The regulations do not demand quantification of the potential impact of transmission lines on these resources. Requirements are very general (e.g. "identify any national natural Landmark within or next to the proposed right-of-way" or "avoid steep and unstable slopes"). Moreover, the requirements do not explicitly rank any of the resources according to their significance or sensitivity (e.g. federal,

Table 9.1 : VIRGINIA State Regulations for Electric Transmission Corridors Siting - CLARITY

VARIABLES	DATA SOURCES: LEGAL DOCUMENTATION, PERSONAL COMMUNICATION
REGS-NATRES-CLARITY-PRECISION - specificity - quantification	-Qualitative regulatory requirements for all natural factors except geology, which is not included.
REGS-NATRES-CLARITY-PRIORITY	-The priority ranking is lacking. Implicit priorities are resources and areas designated for special management (e.g. federal, state, local parks and forests, scenic rivers and byways)

Table 9.2: VIRGINIA State Regulations for Electric Transmission Corridors Siting - TECHNICAL ASPECTS

VARIABLES	DATA SOURCES: LEGAL DOCUMENTATION, PERSONAL COMMUNICATION
REGS-NATRES-TECH- -SCOPE	-Geology, Mineral Resources : None. -Topography: Avoid steep and unstable slopes. -Soils: Erosion control during construction not quantified. Avoid impacts on farmlands designated by county, city, town; avoid prime and scenic timbered areas. -Hydrology: Scenic rivers only. -Vegetation: Right-of-way clearing, maintenance. -Wildlife: General (e.g. wildlife game preserves).
REGS-NATRES-TECH -DATA	-"The specific data ... may not be available prior to actual survey and design of the project. The company is expected to provide all information available at the time of the filing." -Field survey not required, update (most recent) required.
REGS-NATRES-TECH- METHOD	-"Describe ... route selection procedures. Detail alternative routes considered ... Detail why the proposed route was selected and other alternatives were rejected." -Very general mitigation requirements (only for soil erosion, vegetation clearing and maintenance, and scenic byways crossings).
REGS-TECH-PRESENT -map	-"A map of suitable scale, showing the route ... and its relation to the facilities of other public utilities ... highways, streets, parks and recreational areas, schools, convalescent centers, hospitals, airports, scenic and historic areas ... Indicate existing facilities which the line is proposed to follow..." -"Provide Virginia Department of Transportation of each county and municipality ... show the proposed line..." -Format requirements, general.

Table 9.3 : VIRGINIA State Regulations for Electric Transmission Corridors Siting - COORDINATION OF ACTIONS IN CORRIDOR SITING

VARIABLES	DATA SOURCES: LEGAL DOCUMENTATION, PERSONAL COMMUNICATION
REG-COORD-AGENCY	-VA Guidelines require that: Federal, state, and local agencies potentially affected by a proposed project must be mentioned in the companies notice of application filing. No other requirements. -Federal guidelines (adopted by the Va SCC) require that governmental agencies be contacted early in the planning process to coordinate actions.
REG-COORD-STATES	-No provisions for coordination with siting regulatory procedures of bordering states.
REG-COORD-PERMITS-FED	-No explicit provisions for coordination with relevant federal regulations. However, the following resources within and near the proposed right-of-way must be identified: resources on historic register, national natural landmarks, federal national parks, forests, game and wildlife preserves, and recreational areas.
REG-COORD-PERMITS-STATE	-No explicit provision for coordination with relevant state regulations. However, the following resources within and near the proposed right-of-way must be identified: archeological site or zone, and underwater historic property designated by Virginia Department of Historic Resources, Historic Landmarks, site, building, structure, district, or object on VA landmarks register, maintained by VA board of Historic Resources, areas in VA Natural Area Preserves system, managed by Department of Conservation and Recreation, scenic rivers, scenic byways, state forests, parks, recreation areas.
REG-COORD-PERMITS-LOCAL	-"Approval of a transmission line... shall be deemed to satisfy...local zoning ordinances with respect to such transmission line." -No other explicit provisions for coordination with relevant local regulations. However, archeological resources designated on local level, historic district designated by city or county, local parks, forests, game or wildlife preserve, recreational area within or adjacent to the proposed right-of-way must be identified.

Table 9.4 : VIRGINIA State Regulations for Electric Transmission Corridors Siting - PUBLIC & AGENCY PARTICIPATION

VARIABLES	DATA SOURCES: LEGAL DOCUMENTATION, PERSONAL COMMUNICATION
REG-PARTIC-PUBLIC-FORM	-No public participation in corridor siting study required by regulations. -The applicant should state in the application "any public meetings...with neighborhood associations and officials of local, state or federal governments who would have interest..."
REG-PARTIC-PUBLIC-TIME	-No public participation in corridor siting study is required by regulations.
REG-PARTIC-AGENCY-FORM	-No agency participation in corridor siting study required. -"The SCC shall receive and consider all reports that relate to the proposed facility by state agencies concerned with environmental protection, and if requested by any county or municipality in which the facility if proposed to be built, to local comprehensive plans..." -Upon request, agency participate in public hearings on the application. -Agencies are treated as any "interested party." -"The SCC has the duty only to "receive" information from other agencies, not to seek it out." -The applicant should state in the application "any public hearings...with neighborhood associations and officials of local, state or federal governments who would have an interest..." -In the notice of application filing the applicant shall "list all local, state, federal agencies...have an interest in the proposed construction and to whom the company has or will furnish a copy of the application.
REG-PARTIC-AGENCY-TIME	- No timeframe for agency participation in corridor siting study process specified by regulations.

state, local parks, nature preserves, wildlife protection areas, important farmlands). However, it is implied that designated federal, state, or local resources have a higher priority for protection.

The scope of the natural resources environmental considerations covers topography, soils, hydrology, vegetation, and wildlife. Geological factors (e.g. geologic hazards, extractable mineral resources) are not included. Although potential geologic hazards, such as landslide or subsidence exist in the state, the geology has not been included in the regulated siting requirements.

The data requirements are addressed by requesting that all the available information at the time of filing must be collected. The regulations dictate that corridor assessment and selection methodology must be described, justifying the selection of the proposed corridors.

Mitigation measures specifications are given for soil erosion and sedimentation control, and for vegetation clearing and maintenance in the right-of-way.

Mapping requirements prescribe only that "map of suitable scale is submitted showing the route...and its relation to the facilities of other public utilities ...highways, streets, parks and recreational areas, schools, convalescent centers, hospitals, airports, scenic and historic areas...." besides a map showing listed resources, a Virginia Department of Transportation Highway map of each county and municipality must be submitted showing the location of the proposed line.

Coordination of actions between the applicant and the governmental agencies is only mentioned in one paragraph. It requires that governmental agencies must be contacted early in the planning process. Virginia SCC regulations do not contain any provisions for coordination of procedures with bordering states. The provisions for coordination with federal and state permitting and other regulations are also lacking.

The regulations demand the compliance of the proposed transmission line with local comprehensive plans, and zoning ordinances, but only upon the request of the local government affected.

Although Virginia SCC regulations do not mandate public participation in the corridor siting the "applicant should state in the application any public meetings...with neighborhood associations and officials of local, state, or federal governments who would have an interest..." This paragraph implies that though not mandated the participation of citizens and agencies in the corridor siting study is expected and desirable.

In the notice of the application filing the applicant must list all federal, state, and local agencies that have interest in the proposed line, and to whom the company will furnish the application. It is important to note, that although the SCC is not obliged to seek information from governmental agencies, it must accept and consider all reports and information submitted by the agencies.

9.2. West Virginia Siting Regulations

The West Virginia regulations review is summarized in Tables 9.5. to 9.8.

The West Virgina siting requirements generally refer to topography, soils, hydrology, vegetation and wildlife. Consideration of geological impacts is not demanded. Specificity and quantification of the requirements vary. For instance, avoidance of a steep slope is specified quantitatively for slopes over 20 degrees. For all other

Table 9.5 : WEST VIRGINIA State Regulations for Electric Transmission Corridors Siting - CLARITY

VARIABLES	DATA SOURCES: LEGAL DOCUMENTATION, PERSONAL COMMUNICATION
REGS-NATRES-CLARITY-PRECISION -specificity -quantification	- Geology : None. - Topography: Slope in excess of 20 degrees. - Soils: Erosion, sedimentation. - Hydrology: Rivers, lakes, streams, reservoirs within 5 miles of either side of center line of the proposed right-of-way. - Vegetation: Emphasis on ROW maintenance of vegetation. - Wildlife: Habitat, type of wildlife, terrestrial and aquatic, feeding and breeding habitats. - Cultural resources: Recreational areas, parks, forests, hunting and fishing areas, historic, scenic areas or places within 5 miles on either side of the centerline of the proposed right-of-way.
REGS-NATRES-CLARITY-PRIORITY	- No priority explicit. Wildlife resources considerations implied as priority.

Table 9.6 : WEST VIRGINIA State Regulations for Electric Transmission Corridors Siting - TECHNICAL ASPECTS

VARIABLES	DATA SOURCES: LEGAL DOCUMENTATION, PERSONAL COMMUNICATION
REGS-NATRES-TECH--SCOPE	- Scope covers all natural factors, except geology.
REGS-NATRES-TECH-DATA	- No explicit data requirements.
REGS-NATRES-TECH--METHOD	- Methodology requirements missing. Mitigation, except erosion and sediment control, not required explicitly.
REGS-TECH-PRESENT-map	- Scale of the map not specified - Coverage of the map specified.

Table 9.7 : WEST VIRGINIA State Regulations for Electric Transmission Corridors Siting - COORDINATION OF ACTIONS IN CORRIDOR SITING

VARIABLES	DATA SOURCES: LEGAL DOCUMENTATION, PERSONAL COMMUNICATION
REG-COORD-AGENCY	- No provisions for coordination of actions of agencies, in corridor siting study process.
REG-COORD-STATES	- No provisions for coordination with siting regulatory procedures with bordering states.
REG-COORD-PERMITS-FED	- No provisions for coordination with relevant federal regulations.
REG-COORD-PERMITS-STATE	- No provisions for coordination with relevant state regulations.
REG-COORD-PERMITS-LOCAL	- No provisions for coordination with relevant local regulations.

Table 9.8 : WEST VIRGINIA State Regulations for Electric Transmission Corridors Siting - PUBLIC & AGENCY PARTICIPATION IN SITING STUDY

VARIABLES	DATA SOURCES: LEGAL DOCUMENTATION, PERSONAL COMMUNICATION
REG-PARTIC-PUBLIC-FORM	- No public (citizen) participation in corridor siting study required by regulations during the corridor siting study.
REG-PARTIC-PUBLIC-TIME	- No public (citizen) participation in corridor siting study is required by regulations during the corridor siting.
REG-PARTIC-AGENCY-FORM	- No agency participation required or facilitated by the regulations during the corridor siting study.
REG-PARTIC-AGENCY-TIME	- No agency participation required or facilitated by the regulations during the corridor siting study.

natural resources, a single quantitative requirement is given, specifying the features to be mapped within 5 miles of either side of the centerline of the proposed corridor. The natural resources to be presented in the map are qualified by general categories: rivers, lakes, streams, reservoirs and similar bodies of water, parks, and forests. In addition, the following cultural and scenic areas and features should be presented in the map: incorporated communities, public and private recreational areas.

The wildlife considerations are the most specific, demanding that: aquatic and terrestrial habitats, type of wildlife, feeding and breeding habitats must be identified within and next to the right of way. However, the term "adjacent" has not been quantitatively designated.

The priority for protection of particular resources is not explicit. Nevertheless, the higher level of specificity given to wildlife implies the higher priority.

Scope of the natural resources siting requirements includes all natural factors except geology and extractable mineral resources. This omission is inadequate, considering the abundance of the coal reserves in the state and potential geologic hazards related to mining areas and karst topography.

Data requirements for the corridor siting study are not stated in the regulations. The regulations do not specify the level of detail, update, accuracy standards, or coverage of the data.

Moreover, there is no word on the methodology for corridor selection and assessment. Rules for alternative corridors identification, and assessment of alternatives, and selection of preferred corridors are not defined. The specific impact mitigation description is required only for soil erosion and sedimentation control.

The mapping requirements are very vague, stating only the coverage of the map to be submitted with the application.

The regulations do not facilitate coordination of actions, or participation of citizens and agencies in the corridor siting.

CHAPTER 10: CASE STUDY FINDINGS

10.1. Findings: Technical and Methodological Aspects of Siting

General Approach to Corridor Siting

Table 10.1 on the following page displays the data on the adequacy of the study organization, considerations of scale and hierarchy, comprehensiveness of the siting and evaluation criteria, and the decision rules for corridor delineation.

The general approach to the corridor siting applied in the Wyoming-Cloverdale study adequately followed the standard study structure (White 1981, Juves et al. 1982, EDAW 1992).

Scale hierarchy is very important technical consideration in corridor siting (Meentemeyer and Box 1987, Meentemeyer 1989). Accordingly, the Wyoming-Cloverdale methodology employed three hierarchically smaller scales for the analysis and assessment (1:100,000, 1:24,000, and the scale of 1,000 foot wide corridors).

Evaluation criteria for corridor siting were comprehensive, covered a wide range of constraints and impacts on physiography, ecology, cultural and visual resources.

The original siting methodology, presented in the study proposal, fully relied on the computerized GIS analysis and assessment. The GIS technology was envisioned as the main tool for the corridor identification and assessment. The study proposal stated that the corridors would be identified by minimum path algorithms, applied to a set of quantitative computer models, together with the qualitative expert assessment. Moreover, digital terrain modeling was proposed to: identify exclusion zones and critical areas and crossings,

Table 10.1: GENERAL APPROACH TO CORRIDOR SITING IN THE WYOMING - CLOVERDALE STUDY

STUDY ORGANIZATION	SCALE & HIERARCHY IN STUDY STRUCTURE	COMPREHENSIVENESS OF SITING & EVALUATION CRITERIA	DECISION RULES
The study was organized in 5 stages: I. Preanalysis: Identification of the major issues, data requirements determination, definition of the general methods, preparation of the study proposal. II. Definition and refinement of the study area. Initial data collection at the regional scale. III. Identification of the preliminary study corridors (1 mile wide study corridors). Inventory of the baseline conditions at the local scale. IV. Delineation of the alternative corridor segments within the study corridors. Refinement and the verification of the data within the study corridors. V. Analysis and assessment of alternatives, and selection of preferred corridors. Field verification of the data within 1,000 foot corridors.	The study followed the principles of spatial hierarchy. The siting team recognized the importance of hierarchical landscape structure. The data was collected and analyzed at 3 hierarchically smaller scales: (1) Regional scale (1:100,000) in the stages I and II, and (2) Local scale (1:24,000), in the stages III and IV, and (3) Spatially most detailed analysis, in the stage V, when the 1,000 foot wide corridors were assessed and selected. Data was on the site specific scale obtained by the field inventory.	Siting and evaluation criteria were comprehensive including attributes of the following interactive factors: physiography, ecology, cultural resources, visual resources.	General decision rules: 1. Avoid residences. 2. Avoid designated federal, state, local resources incompatible with the transmission corridors. 3. Give equal importance to physiography, ecology, cultural, and visual resources. 4. Consider availability of mitigation measures. 5. Select corridors with the least total number of impacts on physiography, ecology, cultural, and visual resources. Consensus expert judgment procedure applied, on the case by case basis.

aid visual analysis, and generate habitat models. In the course of the study, the originally designed methodology went through a series of transformations. The departures were primarily due to time constraints caused by: (1) Large amount of data to be entered into the GIS, (2) Unanticipated amount of public input, and strong public opposition, (3) The need to spend time collecting new data as some data available from official sources proved to be of low level of accuracy, update, and reliability. Only the scope of data collection and visual resources studies, supported by the computerized simulation were conducted as planned.

The most important siting decisions were reached by the expert consensus among the multidisciplinary study team members. The expert interpretation of the source data maps, computer plots, and impact summary matrices built the basis for the decision.

The decision rules in the Wyoming-Cloverdale study allowed for flexible siting decision within the diverse and large study area. However, the following principles were followed throughout the study:

(1) General categories of physiographic, ecological, visual, and cultural resources were given equal importance.

(2) The avoidance of designated federal, state, and local resources which are incompatible with the transmission line land use was given high priority.

(4) Mitigation opportunity for the potential impacts was incorporated into the decision rules.

(5) The potential to reduce the visual impacts was a priority in key areas (e.g., Appalachian Trail crossings).

The overall objective was to select corridors with the least total number of impacts that cannot be mitigated.

The decisions were reached by the consensus of the expert judgment. This method is acceptable and valid as long as it is thoroughly and accurately recorded (Westman 1985, Conn 1986). In the Wyoming-Cloverdale study, the decision making process is presented in the application document as required by Virginia and West Virginia regulations. Variations between the states were noted and resolved. Specific rules and techniques may be found in the siting study internal documentation.

Environmental Impact Assessment Considerations

Figure 10.2. displays considerations of the environmental impact assessment in terms of: adequacy of impact prediction, level of impact measurements, and method of significance assignment.

A matrix and checklist were used to record and predict multiple impacts in the Wyoming-Cloverdale study area. These techniques were adequate for the following reasons:

(1) Possible impacts were identified from the focused interviews with knowledgeable individuals, and from systematic study of the state-of-the art literature.

(2) Data on the baseline conditions was collected from the most recent available sources, and where possible field verified.

(3) The logic of impact prediction (linking the physical activities of corridor siting with the baseline conditions) was in accordance with landscape ecology and land evaluation premises.

Measurements of impacts in stages I and II, primarily served for comparison of the preliminary study corridors. This general level of measurement, adequately corresponded to the scale and purpose of the stage of the study. More detailed and precise measurements at this scale, would be too extensive and expensive. However, in stages III to V, the field survey and

Table 10.2: ENVIRONMENTAL IMPACT ASSESSMENT CONSIDERATIONS IN THE WYOMING - CLOVERDALE STUDY

IMPACT PREDICTION TECHNIQUES	LEVEL OF IMPACT MEASUREMENT	METHOD OF IMPACT SIGNIFICANCE ASSIGNMENT
Prediction of potential impacts was by matrix and checklist techniques. The matrix indicated relations between the physical actions during the corridor construction, operation, and maintenance and alterations of the resources, caused by these actions. Checklist contained a wide range of potential impacts with specific mitigation measures. The general information from the matrix and checklist was linked to the mapped baseline conditions to predict potential impacts.	Impacts were measured by: (1) Determining the areal extent of resources traversed (e.g. acreage of land cover within the corridors), and (2) Count of resource categories crossed (e.g. number of streams crossings, number of wetland crossings). The measurements in the stages I and II were taken indirectly from the maps and aerial photographs. In the stages III to V, the field survey provided for more detailed, direct, on-site measurements of the impacts.	Significance of impacts was assigned by the expert consensus, using the following information: (1) Results of the public opinion survey conducted at the beginning of the study, (2) Public input through meetings and correspondence, (3) Legal, policy, and management considerations for federal, state, and local special status resources, (4) Input from governmental agencies through the meetings and correspondence, (5) Predicted extent of potential impacts. All these elements were cumulatively considered in the process of significance assignment by the principal investigators, to reach the consensus.

more precise and accurate measurements of impacts were performed.

Impact significance was assigned by the consensus of expert judgment, based on:

(1) Results of the public opinion survey.

(2) Concerns and issues of the public.

(3) Policy and management considerations.

(4) Concerns of potentially affected governmental agencies.

(5) Measurements of predicted impacts.

Data Collection and Mapping Considerations

A great diversity of physiography, ecology, cultural, and scenic resources in the study area required extensive data collection.

Eight and a half months were devoted to the data collection and mapping. By the end of May 1991, most information for the analysis and corridors delineation was gathered for the refined study area and study corridors.

The data collection was continuous, throughout the study, with increasing detail as the spatial scale of the analysis decreased.

Table 10.3. summarizes range and adequacy of data sources, adequacy of data update and verification, and adequacy of map detail.

A wide range of data sources was used in the study. Generally, data sources were adequate considering the time and financial constraints.

Most of the secondary data was collected from public agencies. Other secondary data were obtained through a literature review, field survey, public input, and

Table 10.3: DATA COLLECTION AND MAPPING IN THE WYOMING - CLOVERDALE STUDY

DATA SOURCES	DATA UPDATE & VERIFICATION	MAPPING ACCURACY	MAP DETAIL
The following data sources were used: - Databases of federal, state, local agencies. - Published maps. - Literature review. - Data obtained by the outside consultants (e.g. ecological resources and karst topography). - Aerial photographs of the entire study area: black and white, 1:24,000, color high altitude. - Field reconnaissance by air. - Ground field survey for systematic verification of the data mapped from the secondary sources. - Public input, with field verification.	Update of data varied due to the variability of the data sources. The data verification was by the field spot survey within the 1,000 foot alternative corridors.	Mapping accuracy was considered and verified in land use mapping in terms of: taxonomic and spatial accuracy. Transfer of data from secondary sources (e.g. maps received from the agencies) resulted in reduced accuracy due to referencing problems (e.g. copying and printing distortions, differences in scale between the base map and the source map).	Mapping detail corresponded adequately to the scale and the purpose of a particular stage.

consultants (e.g., biology, karst topography). Original inventory and mapping were performed for: land use and land cover, visual resources, and terrain classification. A ground survey was utilized for land use mapping and verification, visual resources inventory, and spot verification of the public input data (e.g., recreation areas). Aerial reconnaissance was conducted several times during the study (through the interpretation of aerial photographs and through a helicopter traverse).

As the data came from various sources, the update varied considerably. However, the update generally matched the rate of change of the resources mapped. Land use and land cover, and visual resources being the fastest changing land attribute, were of the most recent date, verified by ground and aerial survey to record changes within the alternative corridors.

Problems with mapping accuracy were encountered during transfer of data from source maps. Difficulties originated from inconsistencies in scale and accuracy between maps from various sources. Jefferson National Forest maps, and FEMA floodplain maps, were particularly difficult to reference accurately, requiring extensive corrections of planimetric errors. Detail of the maps (e.g. minimum mapping unit) was adequate considering the scale of the maps (e.g. for 1:24,000 the minimum mapping unit was 200 feet at any dimension on the ground).

10.2 Findings: Public and Institutional Considerations

This section presents findings on the effects of the public and institutional considerations in the Wyoming-Cloverdale siting process.

Figure 10.1. describes the effects of the public, institutional, and political considerations on the Wyoming-Cloverdale siting study.

Public Participation and Opposition

Today, the electric transmission corridor siting process is constrained by local and regional political and social factors, such as public participation, opposition, and the reaction of political representatives. The Wyoming-Cloverdale study is an example of political process influenced, largely, by public participation and the opposition to the project.

Public Participation. Public participation was initiated and facilitated by APCO and the siting team from the very beginning of the siting study. The objectives were to introduce the project, identify issues and concerns, solicit data, and receive public comments on the one mile study corridors.

The massive attendance of the meetings, and letter writing campaign proved the public need for the participation. The meetings provided a stage for citizens to show their strong opposition to the line. It seemed that many people believed that the meetings were just a formality, and that they did not have the power to influence the corridor location. They perceived the university team as APCO's ally.

The flood of invited public correspondence confirmed that the opposition was well organized, and determined to use all legal means to fight the line. Besides, it was obvious that West Virginians distrusted APCO and that cooperation would be difficult to establish.

Despite the predominantly opposing nature of public participation, the information exchange between the public and

FIGURE 10.1 : EFFECTS OF PUBLIC AND INSTITUTIONAL CONSIDERATIONS ON THE SITING STUDY

PUBLIC PARTICIPATION INITIATED AND FACILITATED BY THE SITING TEAM AND APCO	EFFECTS ON THE SITING STUDY
November 1990, Introductory Public Meetings.	Communication with the public was initiated. The public was given opportunity to get acquainted with the project. Opposition started to consolidate early in the project.
November 1990 - December 1991, Invited public correspondence/input.	Issues and concerns identified by the team. Locally available data collected. Most of the data not mappable. Opposition to the project more than clear.
April, 1991, Public Opinion Survey within the study area.	Issues and concerns identified, data used to develop siting criteria.
May - June 1991, Open House Public Meetings.	Opposition to the project strongly demonstrated. Distrust of the public towards APCO and the siting team strong. Public meetings failed to mediate conflicts of interests.

ACTIVE OPPOSITION IN VIRGINIA	EFFECTS ON THE SITING STUDY
In winter 1991, opposition formed. Very strong. Variety of actions. Cooperate with West Virginia opposition leaders. Testify against the project in the Virginia SCC hearings.	No significant effects on the corridor siting study process. Indirect effects were through support for West Virginia opposition.

ACTIVE OPPOSITION IN WEST VIRGINIA	EFFECTS ON THE SITING PROCESS
In winter 1991, leading opposition group formed. Activities diverse and well targeted.	Corridor siting process seriously interrupted several times. Delays and additional studies directly caused by the West Virginia opposition actions.
Letter writing campaign.	Issues and concerns recorded. Indications about new critical resources of local or wider importance, and indications of some inaccuracies in the study data responded to by additional and verification studies. The team and APCO cautioned about extreme opposition against the line, early in the study. However, efforts to negotiate with the opposition not successful.
Lobbying local and state politicians.	The study process gained political overtones. Opposition gained support from the politicians. The transmission line project officially unwanted in the state of West Virginia.

FIGURE 10.1: EFFECTS OF PUBLIC AND INSTITUTIONAL CONSIDERATIONS ON THE SITING STUDY continued

ACTIVE OPPOSITION IN WEST VIRGINIA (continued)	EFFECTS ON THE SITING STUDY
Maintaining the issue of need: The line will not economically benefit the state of West Virginia. West Virginia coal is not going to generate energy transferred by the line.	The general adversary opinion was reinforced. The issue was accepted as a valid argument against the line by the public, West Virginia local and state politicians, West Virginia miners. As a consequence, the opposition was strengthened by the political support.
Initiative and passage of New River Wild and Scenic river Eligibility Study Act, of 1992. Cooperation with local and regional environmental groups.	Withdrawal of the application from West Virginia PSC, on the recommendation of the PSC. New studies resulting in new corridor crossing the New River beyond designated eligibility study section to be undertaken, August, 1992.
Motions to dismiss the application filed with West Virginia PSC, March 1993.	The application dismissed for non-compliance with the West Virginia siting regulations, May 10, 1993.

MEDIA COVERAGE ATTRIBUTES	EFFECTS ON THE SITING STUDY
Continuous coverage from the onset of the study.	Provided an open stage for the team, APCO, and the public to voice their opinions and to promote their cause. However, the team and APCO did not use the opportunity as effectively as the public opposition did.
Media reflected negative public attitude towards the line, especially in West Virginia.	Indirectly, media coverage delayed the siting study, by being an excellent tool for the opposition to organize and publicize its causes. This contributed to more effective strategies of the opposition particularly in West Virginia.
Dynamics of the media coverage corresponded to critical stages of the study (e.g. intensified after public meetings, before filing, after filing). Also, media coverage was more intensive in West Virginia than in Virginia, which corresponded to the public opinion and level of organization of the opposition.	The media gave the clear indication of intensity, and dynamics of adversary attitudes against the line, particularly in West Virginia. However, neither the team nor APCO responded adequately. The intensive usage of the media by the opposition was not matched by the team or APCO. This may be considered a missed opportunity, which had negative effects on the siting study.

FIGURE 10.1: EFFECTS OF PUBLIC AND INSTITUTIONAL CONSIDERATIONS ON THE SITING STUDY continued

ATTITUDES OF AGENCIES TOWARDS THE PROJECT	EFFECTS ON THE SITING STUDY
Federal agencies potentially affected by the project, held neutral attitude. The exception was Appalachian Trail Project Office, National Park Service, which was openly against the project.	Neutral attitudes of federal agencies towards the project facilitated exchange of information between the team and the agencies. Negative attitude of the Appalachian Trail materialized in the testimony against the line in the Virginia SCC hearings. As a result minor adjustments of the trail crossing are recommended by the hearing examiner.
Virginia state agencies held neutral attitudes.	Consequences of the neutral attitudes of the Virginia state agencies was the effective communication and timely and adequate exchange of data and comments.
West Virginia state agencies held mainly neutral attitudes. West Virginia Division of Culture and History and Division of Tourism and Parks explicitly opposed the project. West Virginia state legislature strongly opposed the project. The opposition of the state legislature was based on the lack of larger public economic benefits for the state, and on potential environmental impacts on important scenic and ecological resources.The opposition was formalized in the resolutions against the line, and in the support of the New River Wild and Scenic River Eligibility Study Act, of 1992.	Application with West Virginia PSC withdrawn in August 1992, upon recommendation of the PSC. It was a direct consequence of the enactment of the New River Wild and Scenic River Eligibility Study Bill. Consequently, additional studies of alternative crossings of New River beyond designated segments were undertaken.
Virginia local agencies opposed the project. County administrations ratified resolutions formally opposing the line passing through their jurisdictions.	The opposing attitudes of the Virginia local agencies did not exert negative effects on the siting study. The agencies were cooperative and provided all requested data to the team.
West Virginia local agencies strongly opposed the project. Opposition was expressed through resolution against the line. Cooperation with citizen opposition groups was continuous.	The opposing attitudes of local agencies in West Virginia , coupled with their support for citizens opposition, contributed to the first (August 1992), and second (May,1993) withdrawal of the application with the West Virginia PSC.

FIGURE 10.1: EFFECTS OF PUBLIC AND INSTITUTIONAL CONSIDERATIONS ON THE SITING STUDY continued

COMMUNICATION ATTRIBUTES	EFFECTS ON THE SITING STUDY
Direct, continuous communication between the siting team and APCO. Effective information exchange.	Management of the project without major problems.
Communication between the team and APCO did not deal adequately with public participation and public relations.	The public image of both APCO and the team lacked accountability and trust. It was alleged that the corridor locations were influenced by APCO. This aggravated the effects of the opposition on the siting process.
Communication between the team and the federal, state, and local agencies was early, direct, and continuous with balanced information exchange.	The most of potential conflicts about transmission line crossings federal resources were resolved as the team responded to the critical areas and features indicated by the agencies.
Communication between the team, and Appalachian Trail Project Office (AT), National Park Service failed to abate the opposition of the AT.	Effect on the corridor siting study was indirect and minor. The AT Project Office testified against the line in the Virginia SCC hearings. The hearing officer recommended minor adjustments relative to the Trail upon the line approval.
State and local agencies were not involved directly in the review of the corridor siting study. Most of the meetings with state and local agencies were for the purpose of data collection.	Communication for the purpose of data collection function was successfully achieved. However, the opportunity to alleviate negative attitudes towards the projects (especially of local agencies) through direct communication was missed. In Virginia the team's poor communication with local and state agencies had little effect on the siting study. However, as the opposition to the line on state and local level in West Virginia was very strong and effective, the lack of communication with state and local agencies had indirect negative effects.

the team was balanced. The public input indicated a broad range of issues and concerns. The timing of public participation was adequate. The participation took place in the first and second year of the study, when the project was presented to the public, data was collected, and concerns about impacts within the mile study corridors were received. However, as the negative public opinion steadily grew, the resolution of issues and conflicts through direct communication was becoming more difficult. The team was perceived as APCO's confidant, and was attacked for accepting environmentally unethical work. In such a strongly biased atmosphere it was very difficult to maintain and build trust and accountability.

The positive effects of the public participation in the Wyoming-Cloverdale siting study are the early recognition of issues and concerns, and collection of local data not available from other sources.

<u>Active Opposition.</u> A most distinctive characteristic of the Wyoming-Cloverdale study was the overwhelming and influential public opposition to the proposed line. Although the team and APCO were aware that the project was potentially controversial the intensity of the opposition was far greater than anticipated. The opposition groups in both states targeted their actions similarly. However, the opposition in Virginia was not nearly as effective as in West Virginia.

In Virginia, the opposition was led by the Citizens for Preservation of Craig County (CPCC). The group had a large membership and was well organized, with good financial funding. It must be noted, that the group contributed to the quality of the corridor siting study by providing very meaningful and usable environmental and cultural data on local resources. The CPCC hired eminent legal and environmental consultants, and gained strong support from the local government. In October 1993, the CPCC filed a motion with the Virginia SCC to dismiss the application. Contrary to the West Virginia commission, the SCC did not respond favorably and did not find "compelling reasons to either delay or dismiss" the application. The CPCC filed protest testimony during the regulatory hearings. Although the hearing examiner recognized the validity of the CPCC concerns, he ruled that the broader public interest on the state level, outweighs environmental and scenic impacts on the county. In spite of good strategies and tactics, the group did not achieve its mission, and did not exert any significant effect on the corridor siting process.

On the contrary, the active opposition in West Virginia significantly affected and prolonged the corridor siting study process. Today, the third application filing with West Virginia PSC is planned for the end of 1994. The application was filed for the first time in June 1992. Since then, the process of the corridor siting for West Virginia has experienced two major delays.

The first unanticipated event was the passage of the "New River Wild and Scenic River Eligibility Study Act", passed by the House of representatives[28]. Responding to the Act, the West Virginia PSC recommended that APCO develop a new alternative corridor avoiding the section of the New River, designated for the wild and scenic river eligibility study. In addition, the PSC also indicated the deficiency of APCO's economic cost-benefit studies for the line in West Virginia. This was a direct result of Common Ground pressures on state and local politicians and the constituency. The West Virginia PSC issued another memorandum suggesting the withdrawal of the application because the federal EIS would not be ready at the

[28] It is still pending in the U.S. Senate.

time of state regulatory review. Consequently, the application was withdrawn and the corridor siting studies resumed. This shift in the corridor siting study was the direct consequence of the strategies of the West Virginia opposition groups, and chronologically uncoordinated federal EIS procedures[29].

The second filing of the application with the West Virginia PSC was on February 11, 1993. However, this was not to be the final filing with the West Virginia PSC, as the activities of the opposition, particularly of Common Ground did not subside. In March 1993, promptly after the application was filed for the second time, Common Ground filed a motion with the PSC for the application dismissal for incompliance with the regulations. As a result, the application was dismissed, and new studies to satisfy the regulatory requirements were undertaken. To this day the application has not been refiled.

The strategies and actions of the West Virginia opposition imposed the major obstacles to the study process, causing major delays and departures from the original study plan. The effects of the West Virginia active opposition on the corridor siting study process were considerable. Two major delays extending the study for almost two years were the direct consequence of the opposition strategies. All political structures in West Virginia were activated to oppose the line. The opposition combined the issue of need with the environmental issues, and regulatory issues, to strengthen the case against the line. No mixed emotions were present in West Virginia. The general sentiment was negative, various groups

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[29] The effect of the lack of coordination between the EIS process and the state regulatory procedures will be revisited in more detail in the section dealing with lack of regulated coordination between state and federal legislation relevant to the proposed line.

having various motives and interests.

The effectiveness of the opposition in attaining its mission correlates strongly with the perceived equity between the economic, social, and environmental benefits and costs of the project on the local and state levels. The lack of direct perceived economic benefit for the state of West Virginia was the principal reason the opposition had much more effect, as it was strongly supported by all political structures in the state. On the other hand, although the economic benefits for the Virginia counties crossed by the proposed line were minimal, the Virginia SCC hearing examiner recommended the approval of the line based on the justified need on the state level.

Although the formation of negative public opinion was evident from the onset of the study, the company and the team were not able to resolve the conflicts to the opposition satisfaction. The aggressiveness of local grass-root organizations was underestimated by the team and APCO.

Generally, social acceptability of the Wyoming-Cloverdale study was low throughout the study area. Public opposition was formed early in the study, and its activities were very effectove. The opposition got strong support from the politicians in West Virginia, which magnified the lack of political viability of the project. Besides, the team and the company did not use adequate strategies to enhance the public image, regain accountability, and alleviate the opposing public sentiments.

Media Coverage of the Project

Media coverage of the project vividly mirrored the current public opinion, and sustained the local and regional public attitude towards the project. Overall, the media accurately conveyed the negative sentiments of the public towards the project. The editors were flooded with opposing letters from individual citizens and the representatives of the active opposition groups in Virginia and West Virginia.

The coverage frequency was approximately the same in both states. However, in Virginia the newspaper coverage was more neutral and informative, while the West Virginia newspapers carried a more adversarial tone (Newspaper coverage review, 1991, Interview with the team, 1994; Interview with APCO, 1994). A year after the corridor siting study started, the adversarial opinion was deeply entrenched and "Power Line Opposition says: Nothing Has Changed."

The dynamics of the coverage matched the dynamics of the project. For instance, after the conflicting public meetings, immediately before and after the applications were filed, the coverage was more comprehensive and frequent.

From the opposition groups perspective, the media was an excellent instrument to organize the activities, to campaign against the project, and to influence public opinion. On the other hand, the company did not use the potential power of the media to build credibility and trust and modify highly adverse feelings about the project. Instead of taking the initiative in public debates, the company responded to challenges of the opposition, mostly too late to turn the debate to its own benefit. A lesson companies may learn from the Wyoming-Cloverdale project is that the media should be used more aggressively, particularly if the project is potentially controversial, and likely to cause negative public opinions. The potential of media to stir public opinion, and be an avenue to build positive public image and increase accountability should be maximally used by companies. Active publicizing of the project, instead of a passive or defensive attitude, can contribute to positive public opinion about the company and the project.

Attitudes of Affected Agencies

Federal agencies involved in the Wyoming-Cloverdale siting study held mainly neutral and cooperative stands towards the proposed line. Attitudes of federal agencies were determined primarily by their concerns for land use conflicts with the transmission corridors placed on their land.

Attitudes of Virginia and West Virginia state and local authorities towards the project depended on: (1) Whether the land within their jurisdiction was potentially affected, (2) Direction and intensity of public opinion and media coverage, (3) Intensity and strategies of the active opposition groups, (4) Perceived balance between environmental, social and economic costs and benefits on the local and state levels. The strongest opposition was in states, counties and municipalities potentially affected by the proposed line. Furthermore, strong opposition on the local level was directly correlated with adverse public opinion, the tone of media coverage, and intensive activities of the grass-roots opposition groups in the area. In addition, the attitudes of agencies on state and local levels seemed directly dependent on the perceived balance between the environmental, social, and economic cost and benefits related to the project.

Among potentially affected federal agencies, only the negative attitude of the Appalachian Trail Conference caused minor complications in the Virginia regulatory review. The opposition of the Appalachian Trail managing agencies [30] was formalized through protest testimonies submitted to the Virginia SCC during the Virginia regulatory review. The protest testimonies recommended relocation of the existing APCO Matt Funk line, which crosses the Trail 9 times, exerting a significant impact on the trail, as a condition for the Wyoming-Cloverdale line approval. This demand was rejected by the SCC. However, the request for modification of the proposed line crossing of the Trail was accepted by the SCC. If the line is approved, the certificate will be conditioned on additional analyses and assessment, to adjust the location of the preferred corridor in Virginia at the Appalachian Trail crossing.

Comparing federal, state, and local levels, the strongest institutional opposition was encountered on the local level. All potentially affected localities definitely opposed the line, except Wyoming County, West Virginia. The opposition of the local governmental entities was a direct consequence of political pressures and the activities of the local citizen opposition groups.

Virginia state agencies were mainly neutral. The agencies were cooperative providing timely and updated information during all stages of the siting study. This was partly related to the clear economic benefits to the state Virginia.

However, potentially affected local entities in Virginia opposed the line. Opposing county administrations were influenced by the active opposition in these counties. This was particularly so in Craig and Giles Counties, where the opposition was well organized and powerful. Despite this, the

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[30] As it has been noted, management of the Appalachian Trail is shared responsibility of the Appalachian Trail Project Office, Appalachian Trail Conference, National Forest Service and Roanoke Appalachian Trail Club.

attitudes of Virginia governmental agencies did not have significant effect on the study process. The situation was quite the contrary in West Virginia where the attitudes and accompanying activities caused a new filing and additional corridor siting studies.

The opposing attitudes of affected agencies in West Virginia were equally strong on both state and local levels. The attitudes were materialized thorough legislative actions, in concert with the strategies of the active opposition groups.

The attitudes and actions of the West Virginia state legislature were directly influenced by the pressures of the Common Ground Inc, and other grass roots opposition groups, and supported by local governmental entities. The negative attitudes of the West Virginia state legislature greatly affected the process of the study. It was the passage of the "New River Wild and Scenic River Eligibility Study Act," along with the state legislature resolutions, that caused the withdrawals of the application, and additional studies. The studies of the new alternative corridor, crossing the New River beyond the designated segments added about 8 months to the length of the project.

The effects of the negative attitudes of West Virginia state and local agencies on the siting process illustrate the very political nature of today's corridor siting studies. The lack of institutional support for the project on the state and local level can significantly reduce political viability, and consequently, the probability of the project approval.

Communication between Organizations

The communication between the team and APCO was early, continuous, and took a range of direct and indirect forms. No problems in communication were experienced by either the team or the company. However, in their communication, the team and APCO did not find the way to build an independent public image and maintain the public trust. Although the team was fully independent in the decisions on location of proposed corridors, the opposition alleged that the team was influenced by APCO. The lack of public credibility indicated the importance of building an autonomous public image.

Communication between the corridor siting team and affected governmental agencies had the purpose to: (1) Collect data, (2) Obtain comments on alternative corridors during the siting process, and (3) Identify and resolve existing and potential land use and policy conflicts. However, not all functions of the communication were attained effectively.

Federal agencies were involved early in the process, and participated in all stages of the study, by direct and indirect communication. On the other hand, the communication with state and local agencies was mainly through data collection meetings. The missed opportunity to effectively communicate during the corridor siting study caused indirect negative effects, especially with West Virginia local agencies, which passed the opposing resolutions, and testified against the line.

In a situation when a conflict of interest exists, both sides should try to resolve the problem, before the siting studies are completed, and the application is filed.

Communication with federal agencies was effective, except with the Appalachian Trail Conference, National Park Service. The agency was given the equal opportunity to review the intermediate phases and results of siting. The agency clearly expressed its opposition to the corridor crossing the Trail. Nevertheless, the communication failed to resolve the concerns and issues. This was a serious shortcoming, especially regarding the fact that the conflicts of land use interests were early and clearly stated by the AT Conference representatives.

The federal, state, and local agencies were important sources of information. Communication to gather data started early in the process. The sequence, and the frequency of communication corresponded to the necessity to obtain data for corridors analysis, selection, and assessment. The data gathering function of the communication was fully accomplished.

10.3. Findings: State Regulations and the Siting Process

This section presents the findings on the siting regulations and effects of the regulations on the Wyoming-Cloverdale siting study process. It answers questions about difficulties in implementation of the regulations during the corridor siting. The section is organized into four parts: (1) Clarity of regulations, (2) Technical aspects of siting requirements, (3) Regulated coordination of actions, and (4) Regulated public and agency participation in the corridor siting.

The summary of the effects of the Virginia and West Virginia siting regulations on the siting study process is displayed in Figure 10.2.

Clarity of Regulatory Requirements

The clarity of regulations is defined as a combination of specificity, level of quantification and explicit priority of

FIGURE 10.2: EFFECTS OF VA AND WVA SITING REGULATIONS ON WYOMING-CLOVERDALE SITING STUDY

CLARITY OF REGULATORY REQUIREMENTS	EFFECTS ON THE SITING PROCESS
<u>VIRGINIA</u>	
Vague, qualitative siting regulatory requirements and standards, lacking priority in terms of importance.	No significant direct effects on the siting process.
Scope of the requirements and criteria limited. Geology requirements missing.	Citizen opposition group requested detailed study of potential impacts on karst topography. In effect, expert consultant hired to perform the study.
<u>WEST VIRGINIA</u>	
Vague, qualitative siting regulatory requirements and standards, lacking priority in terms of importance. Scope of siting criteria limited.	Effects on the siting process significant. Unwanted delays in the siting process. Discrepancy in interpretation between the team and public opposition. Misinterpretation of mapping requirements by the team caused the dismissal of the application by the West Virginia PSC.

TECHNICAL ASPECTS OF SITING REQUIREMENTS	EFFECTS ON THE SITING PROCESS
<u>VIRGINIA</u>	
Vague data requirements. Only demand that the applicant provide the most recent application available.	No significant direct effects on the siting process.
Regulations vaguely state that corridor analysis, assessment, and selection methodology must be described.	No significant direct effects on the siting process.
Mitigation specification absent, except for detailed guidelines for erosion and sedimentation control, and general requirements that mitigation of visual impacts on scenic byways must be described.	No significant direct effects on the siting process.
Indefinite mapping standards.	No significant direct effects on the siting process.

FIGURE 10.2: continued

TECHNICAL ASPECTS OF SITING REQUIREMENTS	EFFECTS ON THE SITING PROCESS
WEST VIRGINIA	
Unspecified data requirements.	The West Virginia opposition questioned the accuracy and the update of data in the Motions filed with the PSC to dismiss the application, and in letters to the team and to the PSC. The opposition requested more detailed information, which was actually inadequate for the spatial level of the study. In effect, some additional data was gathered and verification was done by the team.
No methodological requirements for corridor analysis, assessment, and selection. Mitigation explicitly required only for erosion and sedimentation control.	The West Virginia opposition requested more specific description of siting methodology in the Motions filed with the PSC to dismiss the application. In effect, the application was dismissed (nor solely for that reason, but it contributed).
Unspecified mapping scale. Specified mapping coverage (5 miles on either side of the centerline of the proposed corridor).	The mapping requirements for the map coverage not followed by the siting team. In effect, the application was dismissed, upon the Motion of the opposition, on the grounds of noncompliance.

REGULATED COORDINATION OF ACTIONS AND WITH OTHER REGULATIONS	EFFECTS ON THE SITING PROCESS
VIRGINIA	
Vague requirement demanding that the applicant contact governmental agencies early in the corridor siting process. No specific provisions which structure and coordinate actions of potentially affected and/or interested agencies.	No significant direct effects on the siting process.
Lack of regulated coordination with regulatory siting procedures of bordering states.	Significant time lag between the siting study and the regulatory review in Virginia and West Virginia. West Virginia application has not been filed yet, as of today (August 1994), while the regulatory review with Virginia SCC has been completed in December 1993.
Lack of regulated coordination with federal regulations.	Unnecessary and costly duplication of work in the Wyoming-Cloverdale siting and environmental assessment study and in the federal EIS study.

FIGURE 10.2: continued

REGULATED COORDINATION OF ACTIONS AND WITH OTHER REGULATIONS	EFFECTS ON THE CORRIDOR SITING PROCESS
VIRGINIA	
Lack of regulated coordination with other relevant Virginia state regulations.	No significant direct effects on the siting study.
Vague requirements for coordination of siting process with local zoning and comprehensive planning regulations.	No significant direct effects on the siting study. However, local administrations requested compliance with the comprehensive county plans.

REGULATED COORDINATION OF ACTIONS AND WITH OTHER REGULATIONS	EFFECTS ON THE SITING PROCESS
WEST VIRGINIA	
Lack of requirements for coordination of actions of interested and/or affected agencies in corridor siting.	No significant direct effects on the siting process.
Lack of regulated coordination with regulatory siting procedures of bordering states.	Significant time lag between regulatory review in Virginia and West Virginia. West Virginia application has not been filed yet, as of today (August 1994), while the regulatory review with Virginia SCC has been completed in December 1993.
Lack of regulated coordination with federal regulations.	Unnecessary and costly duplication of work in the Wyoming-Cloverdale siting and environmental assessment study and in the federal EIS study. Delays (dismissal of the application) caused by the attempt to coordinate West Virginia regulatory review to coincide with the EIS Report. The opposition also required that the coordination with the EIS procedures be facilitated by the West Virginia PSC.
Lack of regulated coordination with other relevant West Virginia state regulations.	No significant direct effects on the siting process.
Lack of requirements for coordination of siting process with local zoning and comprehensive planning regulations.	No significant direct effects on the siting process.

FIGURE 10.2: continued

REGULATED PUBLIC PARTICIPATION IN SITING	EFFECTS ON THE SITING PROCESS
VIRGINIA No provisions for public participation in siting study.	No significant direct effects on the siting process.
WEST VIRGINIA No provisions for public participation in siting study.	No significant direct effects on the siting process.

REGULATED AGENCY PARTICIPATION IN SITING	EFFECTS ON THE SITING PROCESS
VIRGINIA Participation and review of intermediate siting study results by governmental agencies is not mandated. Implicated that the applicant should contact potentially affected agencies in a timely manner.	No significant direct effects on the siting process.
WEST VIRGINIA No provisions for participation in siting or for review of intermediate results of the study by governmental agencies.	No significant direct effects on the siting process.

corridor siting requirements. The clarity of both Virginia and West Virginia regulations is evaluated as low, and inadequate. The regulations mandate vague mainly qualitative siting standards and requirements. In addition, the priority of siting criteria is not explicit. Consequently, the team and APCO felt that the regulations could be more clearly defined (Interview with the team, 1994, Interview with APCO, 1994).

The lack of clarity caused misinterpretation of regulatory requirements by the corridor siting team. Moreover, there was a discrepancy in interpretation between the team and the opposition. The lack of clarity exerted negative effects in the West Virginia portion of the study. No significant negative effect occurred due to unclear Virginia regulations.

As a direct effect of incorrectly comprehended mapping requirements by the team, and the discrepancy in interpretation between the team and the opposition, the West Virginia PSC dismissed the second filing of the application. The reason for the application dismissal was that the submitted maps did not comply with the mapping requirements, because the team did not map the features within 5 miles of the centerline of the proposed corridors. The originally submitted map plates were the sections of the USGS 1:24,000 topographic base maps, with all the required features shown, but not within 5 miles of each side of the corridor. The map plates submitted with the first and second application, were initially accepted by the Commission. Only after Common Ground Inc. filed the Motion, did the PSC dismissed the application. The dismissal of the second application added about a year to the study.

Vague regulations give greater discretionary power to the commission to interpret the regulations on a case by case basis. It is an advantage if the Commission maintains consistency in translating general standards into specific requirements. Unfortunately, in the Wyoming-Cloverdale project the noncompliance with the regulatory mapping requirements was not determined until the public complaint was filed.

Consequently, vague regulations place the applicant in a vulnerable position, as it is not possible to know how the regulatory authority will interpret the regulations in a particular case. Furthermore, vague regulations increase the probability of noncompliance with the regulatory objectives. The lack of regulatory clarity may be compensated for by improved communication between the commission and the siting team during the corridor siting study, before the application is filed (Interview with APCO, 1994). The communication has the purpose to clarify vagueness, and eliminate possible misinterpretation of the siting standards and objectives.

Technical Aspects of Siting Requirements

Technical aspects of the siting requirements are evaluated by the following criteria: scope of siting criteria, data requirements, methodology requirements (siting, analysis, assessment criteria, mitigation specifications), and corridor mapping requirements.

The absence of geology criteria in both Virginia and West Virginia regulations is a serious shortcoming, considering the physiography of both states. The importance of geology as a corridor siting criteria has been proved clearly in the Wyoming-Cloverdale project. The karst topography, with its subsidence sensitivity, and potential indirect impact of construction activities on ground water quality, and cave habitats, is present in the study area. The karst topography issue was raised, as a major issue, by citizen opposition groups in both states (Participant observations, 1991, Internal documentation, 1992). Although the geology and karst topography were criteria in the corridor siting study, the concerned public demanded an even more detailed study. Consequently, an independent study, supported by APCO, was conducted and filed with the Virginia SCC (Internal documentation, July 1993).

The data requirements in Virginia and West Virginia regulations are vague and implicit. Despite the vagueness of the regulatory requirements, the corridor siting team used a full range of available sources and the most recent data to describe baseline conditions and assess and select the alternative corridors. Nevertheless, the West Virginia opposition questioned the accuracy and update of data, requesting an inadequately high level of spatial detail, for the spatial scale of the study (Internal documentation, 1994).

Methodological regulatory requirements, including criteria and techniques for corridor analysis, assessment, selection, and the impact mitigation are very ambiguous in both regulations. Taking advantage of the vague regulations, Common Ground Inc. filed the motion to dismiss the application with the West Virginia PSC. The motion claimed that insufficient information was filed, and that the methodology for selection of the proposed corridor was poorly documented and unjustified (Internal documentation, 1993).

West Virginia and Virginia mapping requirements are indefinite, requesting only a map of suitable scale, showing listed resources.

In a word, the absence of technical regulatory guidance leads to conflicting interpretation of the data requirements, methodology and mapping techniques in the corridor siting study. Although, the regulations cannot define detailed technical requirements, they should provide at least some principal technical standards, as a norm to judge the quality of technical aspects of the corridor siting study.

Regulated Coordination of Actions

The Wyoming - Cloverdale study exemplifies the effects of the uncoordinated siting and certification procedures of two bordering states. In addition, it illustrates the consequences caused by the lack of regulated coordination of state regulatory siting and certification procedures with the federal EIS process.

The lack of coordination of actions of the participatory agencies and the lack of coordination with relevant state and local legislation did not have any serious effects on the Wyoming-Cloverdale siting process.

First, West Virginia and Virginia corridor siting criteria and standards are different. What is most important, is that the procedures and the timeframe do not address interstate lines. The West Virginia regulations define a 400-day review period from the day of the application filing, while the Virginia regulations do not define the review timeframe. Nevertheless, the Virginia SCC reviewed the application, and recommended the favorable decision within two and a half year of filing. On the other hand, as of today, the application with the West Virginia PSC has not even entered a formal regulatory review process.

Another drawback of both regulations is the lack of coordination with the federal EIS process, which generated: (1) Unnecessary and costly duplication of work, (2) Delays caused by the attempts of the West Virginia PSC to adjust its review schedule with the timing of the EIS report completion.

The EIS study started with the same study area, which was only expanded by a few topographic quadrangles on the southern edge. Although the team provided most of the available data to the EIS team, the data collection, inventory, and mapping were essentially a duplication of extensive and expensive work. The methodology of the EIS study has been in many aspects very similar to the corridor siting study. As soon as the university team defined the study area, it was obvious that the proposed corridors would cross the federal resources and that the EIS would be required. However, the EIS procedures did not begin until early in 1992. The EIS schedule was modified several times. A Draft EIS was originally due mid 1993. The deadline has not been met. The new deadline is January 1995. The Virginia SCC did not adjust its review schedule with the EIS schedule, while the West Virginia PSC recommended the withdrawal of the application and the refiling until the time when the EIS report would be available.

The uncoordinated EIS and state review procedures increased the length and cost of the study.

At this point, it is very likely that the Virginia SCC will approve the application, and that the West Virginia PSC will reject it. The West Virginia PSC, under the strong pressure of public opposition and state and local politicians, is procrastinating on the regulatory review, to allow it to coincide with the completion of the Draft EIS. This regulatory disorder places the company in an uncertain position, and prolongs the entire project beyond acceptable limits for the consumers in need of electric energy.

As the corridor siting becomes highly political process, subject to many uncoordinated regulations, the need for provisions that coordinate relevant regulations becomes more evident.

Public and Agency Participation

Regulated public and agency participation in the corridor siting is another important element missing from both Virginia and West Virginia regulations. Only after the proposed alternative corridors are submitted for regulatory review and approval, are interested and affected public and agencies given the opportunity to express their concerns. After the application is filed, agencies are treated as any other "interested party" including private citizens and organizations.

Despite the lack of mandated participation, the company and the corridor siting team facilitated continuous public participation early in the Wyoming-Cloverdale study.

The overwhelming public interest in the Wyoming-Cloverdale study is a clear indication of the need for public participation during the corridor alternatives analysis and selection. By regulated structuring of the public and agency review, many conflicts can be resolved and negotiated before the study is completed and the corridors are proposed. The Wyoming-Cloverdale case poses a question: Why was it not possible for APCO and the team to attain better cooperation with the public during the public participation process? The absence of a neutral mediator is a reason for unsuccessful conflict resolution. If the participation in siting is overseen by the authoritative mediator, such as the state utility commission, the conflicts may be resolved earlier.

In the Wyoming-Cloverdale study, access and independent evaluation of the results of the corridor siting study was offered to all interested governmental agencies. The great interest, and mainly cooperative attitudes, proved that agency involvement is desirable.

Participation in the regulatory review through the hearings comes too late in the planning process, and should be complemented by regulated public and agency participation from the onset of corridor siting study.

10.4. Summary: the Wyoming-Cloverdale Study

The Wyoming-Cloverdale study is a model of the contemporary siting process in terms of technical siting considerations, public, institutional, and political factors, and state regulatory setting. The main lesson derived from the study is that technical, public, institutional, and regulatory factors interactively affect the siting study process. For instance, the improved technical and methodological aspects of siting in isolation cannot guarantee smooth and speedy siting study. The same can be claimed for public, institutional, and regulatory considerations. In the Wyoming-Cloverdale siting study, vague and inadequate Virginia state regulations did not negatively affect the siting study, because other factors (e.g., not so strong and efficient opposition) neutralized its potential negative effects. In West Virginia the situation was just the opposite: all three sets of factors reinforced each other and considerably hindered the siting study process. This following text summarizes lessons deduced from the Wyoming-Cloverdale case study research.

I. Technical and Methodological Aspects in Siting:

- The general study organization involves: (1) Preanalysis to define general issues, siting approach, and data requirements and availability, (2) Study area delineation

and refinement, (3) Identification of the network of preliminary study corridors, (4) Delineation of alternative corridor segments within the study corridors, and
(5) Analysis and assessment of the network of corridor segments, and selection of the proposed corridors.

- The siting study needs to apply hierarchically finer spatial scale of data collection, analysis, and assessment, as it moves towards the selection of preferred corridors. Furthermore, the detail of the mapped information should match the purpose and the scale of the study stage.

- Siting and evaluation criteria should encompass a broad array of constraints and impacts on physiography, ecology, cultural and visual resources.

- The decision rules need to be clearly defined and flexible, allowing for considerations of a variety of site specific conditions within the large and diverse study area.

- The study should develop complete, and well organized records and documentation of the siting process, including data sources, listings of siting criteria, and decision rules.

- Impact identification and prediction is more reliable if the initial list of possible impact is derived from a comprehensive literature review, interviews with electric transmission line siting experts, and case studies of similar projects. Moreover, data on baseline conditions should be as accurate and timely as feasible. And finally, the likelihood of prediction is higher, if physical actions in the line siting, construction, maintenance, and operation are linked to changes in baseline conditions using ecological and land evaluation principles.

- Measurement of impacts should be as quantitative, accurate, and precise as the data warrants. Indirect measurements (e.g. from secondary sources, such as maps or remotely sensed images) are acceptable in the siting study, but spot verification is critical. Direct, more expensive, accurate and precise field measurements should be conducted, especially in the later stages, when alternative corridors are analyzed.

- Impact significance should be assigned combining impact magnitude (extent of adverse change), social importance (public concerns), policy concerns (current management practices, restrictions), legal restrictions (management, planning, zoning, siting regulations) and the ability to mitigate the impacts. The combination of these factors yields a list of impacts, ranked by significance. To keep study techniques transparent and reliable, it is critical to document thoroughly the decision rules for each step in the process.

- Data collection requirements for the corridor siting are very extensive. The main data sources are governmental agencies databases, commercially available maps, and literature. The public input is a critical source of data. Field inventory conducted later in the study, is critical for data verification and update, and to collect data on visual resources. Original classification and interpretation of source maps to generate new mapping categories may be used for land use and terrain mapping and visual analysis. Aerial reconnaissance is applied to gain a sense of the landscape character and to verify alternative corridor locations, and implications in the areas of special concern.

- The consistency of coverage, update, scale and accuracy of data from a variety of secondary sources varies. Therefore, it is critical to record the level of data consistency, and to try to make data (and maps) as consistent as practical, within time and financial constraints.

II. Public and Institutional Considerations:

- Public participation, opposition, and attitudes of involved agencies have pronounced implications in corridor siting.

- Public participation initiated early in the study by the company and the siting team, and maintained continuously, should ensure that:

(1) Project is introduced to the public.

(2) Issues and concerns are identified and resolved.

(3) Locally known, unpublished information is gathered.

(4) Comments on the alternative corridors are received.

(5) Experience of the public participation raises the capability of the people to meaningfully participate in similar projects.

- It is important to establish channels for easy communication with the public early in the study.

- If there are indications of public distrust towards the company and/or the team, special efforts should be directed to increase the credibility and improve the communication.

- The siting team must act as a third part agent, staying away from issues between the company and the public.

- If the conflicts of interests are not resolved and negotiated early in the siting process through targeted public relations and communication with the public, it becomes more difficult to do so as the study advances.

- The public should be given simple and clear directions about the acceptable and usable format of solicited data. However, even if the data is not directly usable or mappable, it is an excellent indication of the public concerns, and should be incorporated into siting criteria (e.g. through impact significance assignment).

- If the line is long, crossing many jurisdictions, and if the potentially affected communities are not direct users or producers of transferred energy, the strong opposition should be expected.

- If the line crosses two states, the opposition is stronger and gains better political support in a state with no direct major economic benefit (e.g. West Virginia vs Virginia).

- The force of local grass-roots opposition groups should not be overlooked by the company and the team. The influence of the opposition on politicians can be considerable (e.g. under public pressure the politicians can initiate environmental regulations that interfere with the corridor siting study). The strategies of the local opposition groups can cause major delays in the siting and regulatory review (e.g. withdrawal of the application, dismissal of the application, new studies).

- The media coverage of the project simultaneously conveys and affects the public opinion. The opposition uses the media to campaign against the project. The company and the team should use the media to the build a positive public image and to promote the objectives of the proposed project.

- Attitudes of potentially affected federal agencies depend on the intensity of their concerns about land use conflicts with the transmission line. Attitudes of state and local agencies tend to be negative if:

(1) Land within the jurisdiction may be adversely impacted, while benefits to counterbalance the negative impacts do not prevail.

(2) Public opinion is mainly negative.

(3) Opposition to the proposed project is strong and active.

- If agencies express opposing attitudes towards the proposed project, the team and the company should initiate more frequent, direct communication to identify and resolve issues during the siting process.

- The opposing state and local agencies may closely cooperate with grass roots opposition groups to prevent the proposed project approval. As a result, the siting study can be significantly delayed.

- The team and the company should initiate and sustain early, continuous, and direct communication with potentially affected and interested governmental agencies. The communication should achieve the following objectives:

(1) Inform the agencies about the project.

(2) Collect data.

(3) Obtain comments on alternative corridors.

(4) Identify, resolve and negotiate conflicts.

III. State Regulations and Siting Process:

- Virginia and West Virginia state siting regulations are mainly vague, qualitative, and do not set priorities to be followed. The consequences of such unclear regulations are possible delays and dismissals of the application, because of misinterpretation and noncompliance with the regulations. If the regulations are vague, they are difficult to interpret, and the commission has a discretion to interpret regulations differently for each particular case. This may be unfavorable for the siting study process, especially if the communication with commission staff before the filing does not clarify the siting criteria.

- The scope of regulatory criteria for natural resources considerations should encompass geology, topography, soils, hydrology, vegetation, and wildlife. If a factor is not addressed (e.g. geology missing from Virginia and West

Virginia regulations), additional studies might be requested by the public and ordered by the commission. The additional studies prolong the siting study process, as the new data have call for the corridor adjustments.

- Regulatory requirements should be specify data categories, sources, gathering techniques, scale, update, and level of accuracy. Moreover, methodological regulatory requirements should specify criteria and techniques for corridor analysis, assessment, and impact mitigation. In addition, mapping regulatory standards should clearly specify the scale and coverage of the map, and mapping categories. If data collection, methodology, and mapping requirements are either vague or lacking (e.g. Virginia and West Virginia regulations), the siting techniques might be questioned by the opposition, and the reputation of the team and the company might be challenged. In the worst case, the application might be delayed by additional studies required by the commission, long after the corridors are selected. For these reasons, the regulations need to provide at least primary directives for data collection, siting methods, and mapping.

- The regulatory procedures of two bordering states, traversed by the proposed line (e.g. Virginia and West Virginia), need to be coordinated, to avoid delays due to discrepancies in siting criteria and timeframe for the review of the application. Also, the state regulations should contain provisions that coordinate procedures for state review and the federal EIS procedures. The lack of coordination with bordering states and federal EIS causes costly delays, and unnecessary duplication of work between the siting and the EIS study. The provisions that coordinate the bordering states and the EIS process will eliminate contradictions in the timing of the review, and will allow for a more realistic planning of the siting study schedule.

- The Virginia and West Virginia regulations do not mandate public and agency review of the alternative and final corridors during the siting study, before the application is filed. However, the great interest of the public and the agencies in the Wyoming-Cloverdale siting study demonstrates the need for structured participation. Although, companies initiate and facilitate public and agencies participation in siting, even if it is not mandated, the regulations should pose, at least general requirements for the participation in siting. The concerns and conflicts should be identified and settled before the siting study is completed, instead of having to collect additional data and repeat analyses, once corridors are selected.

PART V: RESEARCH OUTCOMES AND CONCLUSIONS

CHAPTER 11: GUIDELINES FOR IMPROVED CORRIDOR SITING STUDY

The trend in U.S. transmission network development is to build long, extra high voltage lines, which cross a large and heterogenous landscape, encountering diverse social and political settings. In addition, the regulatory framework for siting, dominated by often inadequate state commission regulations, is complicated by the relevance of various federal, state, and local legislation and policies. Under such circumstances, corridor siting studies become complex and prolonged. This research recommends the improvement of siting studies by defining the guidelines for dealing with deficiencies and obstacles in the siting process. The guidelines are the principal product of the research, intended to have direct application in the practice of corridor siting. The guidelines give the instructions for electric power companies, consulting firms, and the state commissions engaged in the siting process.

The Chapter presents directives for: (1) Technical and methodological aspects in corridor siting, (2) Public and institutional considerations, and (3) State corridor siting regulations.

The guidelines are derived from the synthesis of findings presented in the previous chapters.

11.1. Technical and Methodological Aspects of Siting

The following directives deal with the general siting approach, environmental impact assessment, and data collection and mapping considerations in corridor siting studies:

<u>General Approach to Siting</u>

1. The corridor siting study should contain the following principal stages (Case study 1994):

(1) Preanalysis stage, to identify general issues, siting approach, data requirements, availability, and adequacy for the study.

(2) Study area delineation and refinement.

(3) Delineation of a network of study corridors.

(4) Delineation of alternative corridor segments within study corridors.

(5) Analysis and assessment of these segments to select corridors to be proposed for approval.

The scale of data collection, analysis, and assessment should become finer as the initial study area is refined, and alternative corridors are narrowed down. The first three stages of the study, require large, regional scale data (e.g. 1:250,000 to 1:100,000), while the analysis and assessment of study corridors and alternative segments demand finer scale data (e.g. 1:24,000) (Case study 1994).

Study area delineation is at the regional level scale. It requires general locations of major constraints and opportunities for potential corridor locations. The study area is further refined by identifying exclusion zones (incompatible with electric transmission line land use), and critical areas (sensitive to potential impact of electric transmission line siting and construction). It is important to define flexible boundaries of the study area (margin beyond the study area) to keep the siting opportunities open, until the necessary data are collected. At this point, the data collection requirements must be determined, data sources and collection techniques defined, so that the inventory can start.

In the next stage, study corridors, 1 to 3 mile wide, are delineated. Within these corridors more detailed data at a finer spatial scale, should be collected. A network of alternative corridor segments is delineated within the study corridors based on models focusing on physiographic, ecological, and visual criteria.

In the final stage, data on potentially sensitive resources, and on resources of special public concern need to be field verified. The decision on the proposed corridor location is to be based on impact assessment techniques and field verification. This stage encompasses analysis and assessment of the alternative segments with a purpose to select corridors with the least total impacts on environmental, cultural, visual and resources along the entire length of the corridor.

2. Criteria for corridor siting and evaluation, should encompass:

(1) Principal factors of landscape systems (e.g. attributes of geology, topography, soils, hydrology, vegetation, and wildlife (Forman and Godron 1986, Zonneveld 1989, 1990, Case study 1994).

(2) Land use and land cover categories, cultural, and visual resources (Case study 1994).

Concerns of the potentially affected public and agencies should be incorporated into the criteria (Case study 1994).

3. The analytical and assessment techniques should be well documented, to enable independent verification of the siting method's reliability and validity (Bisenius and Marcotte, 1984, Case study 1994). The data used in the siting process should be stored in easily retrievable forms in the study archives (Case study 1994).

4. Decision rules applied to select proposed corridors

should be explicitly stated and documented, to facilitate independent evaluation of the siting procedure (Case study 1994).

<u>Environmental Impact Assessment Techniques</u>

5. Potential impact prediction techniques should be based on the following:

(1) The initial list of possible impacts should be derived from state-of-the-art literature, EIS reports, and electric transmission line siting studies and applications.

(2) Physical actions during construction, operations, and maintenance of the line, must be identified and described in detail. These actions are requirements that electric transmission line land use imposes on the land.

(3) Baseline land conditions should be inventoried and mapped, as accurately and timely as practical.

(4) Cause-effect relationships between baseline conditions and the physical actions should be identified. These relationships predict impacts of transmission line siting, construction, operation, and maintenance actions, on the land (including natural, cultural, visual factors). (FAO 1976, Westman 1985, Davidson 1986, Case study 1994)

6. Measurements of baseline conditions, siting criteria, and potential impacts should be accurate and precise. Greater precision is required for more detailed stages of study. Quantitative measurements should be given priority over qualitative. It is recommended that researchers quantify siting criteria by the minimum distance of the resource from the centerline (Fitipaldi et al. 1982, Westman 1985, Case study 1994).

7. Significance, defined as the importance of potential impacts relative to regulatory, policy management, social, and economic considerations, should be assigned by a transparent and well-documented procedure (Conn 1986, Davidson 1986, Case

study 1994).

8. It is critical to involve the public in impact prediction, measurement, and significance assignment (see section 11.2).

Data Collection and Mapping Considerations

9. Data should be gathered from a wide range of available sources. Data sources should be identified and located early in the study. The sources shall include (Simutis and Johnson 1974, Smart 1976, Giles et al. 1976, Duke Power Company and EDAW 1990, Case study 1994):

(1) Data bases of federal, state, and local agencies.

(2) Published maps.

(3) Literature.

(4) Public input.

(5) Aerial photography of the area (recently flown).

(6) Satellite images (e.g. for the first stages of the study).

(7) Reconnaissance by air (in all stages of the study).

(8) Ground survey (for within alternative corridors inventory, and for field verification of interpreted data).

10. The time of data collection and the last update of the secondary data should be recorded (Case study 1994).

11. The mapping should consider and verify the correct assignment of resources to predefined classes (taxonomic accuracy), and the correct planimetric presentation (spatial accuracy) (Case study 1994).

12. Mapping accuracy and update should be consistent throughout the single factor map (e.g. soil maps), and between different map coverages (e.g. soils, vegetation, wildlife). If this is not feasible (e.g. because of often inconsistent secondary sources) the inconsistencies should be recorded (Case study 1994).

11.2. Public and Institutional Considerations

This section is based on the synthesis of the case study findings with elements derived from the literature review. It presents guidelines for dealing with: (1) Public participation and opposition in the siting study, (2) Media coverage of the proposed project, (3) Attitudes of involved agencies towards the proposed project, and (4) Communication among organizations during the siting study.

Public Participation. Contemporary social context requires that even if it is not required by regulations, public participation should be facilitated in the corridor siting study. Public participation should be structured by the siting team and the utility company early, from the onset of the study. It should be continuous, throughout the project, and should involve people throughout the study area. The massive attendance at public meetings and huge written response to invited comments in the Wyoming-Cloverdale siting study prove the demand for public participation (Case study 1994).

Public participation should be organized and scheduled to attain the following objectives:

1. As soon as the siting study starts, the transmission line project should be introduced to the public, and the recording of issues and concerns should be start. This is best attained by introductory public meetings, throughout the study area. The public should be informed about: the general project background (e.g. need for the line, engineering design), potential local and regional adverse impacts and benefits from the transmission line, the methodology of siting, principal siting criteria, the project schedule, and the role, forms, and schedule for planned public participation during the siting study. The main function of the introductory meetings

is to establish open communication channels. (McConnon 1979, Bisenius and Marcotte 1982, Stern and Munson 1982, CECA/RF 1990, Case study 1994)

2. As the study progresses, the public should be given the opportunity to review and comment on alternative corridors. Participation limited to early involvement, which does not provide complete information on the siting process, mystifies the siting process. In such a situation, an environmentally and politically aware and educated public will demand the undisclosed information through other legal channels. (McConnon 1979, Bisenius and Marcotte 1982, Stern and Munson 1982, CECA/RF 1990, Case study 1994)

3. Public participation should facilitate the gathering of locally known data, which are not available from other sources. If meaningful and accurate data are to be collected, the public should be given some general instruction about: format of the data solicited, specificity (e.g. too detailed, or too vague), update (e.g. time of data gathering to be recorded), verification (e.g. time and mode of verification to be recorded), mapping directions (e.g. base map type and scale specified, legibility of the map). Otherwise, the public may swamp the team and the company with a mass of information incompatible with the siting study database. Nevertheless, any information received from the public, indicates public values, concerns, and issues, and should be incorporated into the siting criteria as appropriate (e.g. frequent concerns should be used, while sporadically raised issues are not to be considered). (McConnon 1979, Bisenius and Marcotte 1982, Stern and Munson 1982, CECA/RF 1990, Case study 1994)

4. Public participation should be used to examine public opinion from the onset of the project. Meetings, written correspondence, and opinion surveys can identify the spatial variation and direction of the public sentiment towards the

project. As soon as the opposition is detected, the company and the team should take actions to identify community leaders, establish communication channels, and organize more frequent participation meetings in localities where opposition is likely to be formed. These meetings should have a particular aim to moderate negative opinions (Case study 1994).

When a conflict of interests is recognized, the participation should negotiate the conflicts. This requires employing professionals with a knowledge of public relations, negotiation and moderation techniques. (Juves et al., 1982, CECA/RF 1990, Case study 1994)

5. It is critical that the company and the siting team project an image of trust and accountability in the first contacts with the public, as well as throughout the study. Once the people lose the trust in the company and the team, it is very difficult to regain it. Public participation should constantly contribute to a positive relationship between the public, the company and the team. (Juves et al., 1982. CECA/RF 1990, Case study 1994)

Active Opposition. The environmental and political awareness of the public in the U.S. has been growing, since the 1970's. Consequently, any large proposed project, including high voltage electric transmission lines, will face public opposition. In particular, organized and strong opposition to long extra high voltage transmission lines should be accounted for in the corridor siting stage of line planning. In today's milieu of pluralistic interests, it is unrealistic to expect that the siting process can run smoothly, without interference of opposing citizen groups (McConnon 1982, Schafer, Jacobson, Everett, 1982, Juves et al., 1982, CECA/RF 1990, Case study 1994). Opposition groups tend to be well organized, and able to gain strong financial and political support (Mazmanian and Sabatier 1989, Case study 1994). The power of local grass-roots organizations should not be underestimated, as their hindering influence on the siting study may be significant (McConnon 1982, Case study 1994). The knowledge of the following facts helps the company and the siting team deal with the active opposition to the project:

1. The background of the opposition may be very diverse, as various interest groups unite against the project. Therefore, the actions to counteract the opposition should target various interest groups, which are consolidated in their opposition to the line, although for different reasons (e.g. local land owners concerned about property value, and environmentalist concerned about the scenic beauty and the ecology of the area) (McConnon 1982, Case study 1994).

2. Communication with the opposition should be initiated and structured by the team and the company. Avoidance of open communication can worsen the opposition to the project (McConnon 1982, Case study 1994). As a result, strong opposition, coupled with poor public relations and communication can significantly complicate and delay the siting study process (Juves et al., 1982, Case study 1994).

3. It should be expected that active opposition raises a wide scope of issues, in an attempt to discredit and stop the proposed project. The issues include environmental, visual, economic, and regulatory factors. Issue of need may be a particularly effective argument against the line, both on a local and state level. This is likely to be the case with future transmission lines connecting remote generating plants with demand centers. These lines will traverse large areas, which are neither primary producers nor consumers of the transferred electricity, and thus do not perceive the line to be in the local or state public interest (Case study 1994). In such instances, the company and the team should concentrate

efforts on timely publicizing of project objectives and on educating the public about broader values of the proposed project (Case study 1994).

4. It should be expected that the strategies of the active opposition could be diverse and sophisticated, including: media and letter writing campaign, rallies, pressures on local and state politicians, cooperation with local and regional environmental groups. All these strategies can result in serious delaying events such as: enactment of legislation affecting the resources crossed by the proposed line, approved motions to dismiss application and demands for new corridor studies (Case study 1994).

5. The company and the team, should expect especially strong opposition in the following cases (McConnon 1982, Hartman and Simmons 1982, Case study 1994):

(1) Interstate transmission projects, if the need is directly justified in one state, but not in another.

(2) If people in the study area generally distrust government and corporate business.

(3) If there is a presence of skillful environmental activists in the study area.

(4) If there is a history of public opposition to similar projects in the study area.

(5) If state regulatory requirements do not mandate and/or structure meaningful public participation in the siting study process.

Media Coverage of the Project. Today's transmission line projects are closely followed by the media, from the moment they are announced (Case study 1994). Media coverage simultaneously reflects and forms public opinion (Juves et al., 1982, Mazmanian and Sabatier 1989, Case study 1994). Through its influence on the public opinion, the media may have a significant indirect impact on the siting study process

(Case study 1994). Well organized opposition is likely to promote its causes, steer public opinion, and organize its activities through the media (Case study 1994). In such circumstances the following directives should be followed by the company and the siting team:

1. The company and the team should be aware of the power of the media. Especially if the project is clearly controversial, facing a strong opposition, the media should be contacted and informed, long before the negative opinion is formed and the opposition is entrenched (Case study 1994).

2. Three major functions should be attained by active project publicizing (Case study 1994):

(1) Communicate project status and planning activities.

(2) Build and maintain public trust and environmental and social accountability.

(3) Abate negative public opinion and neutralize the opposition.

3. The media coverage should be carefully followed and analyzed during the siting study, as it is an excellent indicator of spatial and temporal variations of public opinion. The indications of public opinion should direct and structure public relations activities (e.g. more intense public relations in the areas where opposing attitudes prevail) (Mazmanian and Sabatier 1989, Case study 1994).

Attitudes and Communication with Governmental Agencies. Attitudes of governmental agencies, interested or involved in the electric transmission line project, are critical for the siting and approval process. Support by the agencies increases chances for project approval and implementation (Mazmanian and Sabatier 1989, Case study 1994). For instance, non supporting attitudes of state and local agencies can affect and delay the project through: resolutions against the project, passage of legislation directly interfering with project feasibility, protest testimonies against the project in the regulatory hearings (Case study 1994). Consequently, the company and the team should be aware of governmental agencies attitudes, and should ensure cooperative and supporting relationships with agencies on federal, state, and local levels (Case study 1994). Attitudes of federal agencies are determined primarily by the concerns for land use conflicts with an electric transmission line crossing their resources. Compared to state and local agencies, federal agencies are more likely to have neutral attitudes, as they are more resistant to pressures of local opposition groups and public opinion.

Communication and attitudes of agencies are directly interrelated. Negative attitudes often hinder the communication, while supporting attitudes tend to enhance communication (Juves et al., 1982, Case study 1994). Effective communication in the siting study is essential for project approval and implementation. The communication is considered effective if it helps the timely and open exchange of information (Case study 1994).

1. Communication with the siting team and the company with governmental agencies should attain the following objectives (Juves et al. 1982, EDAW 1992, Case study 1994):

(1) Collect information from agencies databases.

(2) Initiate and facilitate agency review of alternative corridors.

(3) Identify issues and concerns.

(4) Identify and resolve potential land use and policy conflicts.

2. The forms and timing of communication should facilitate early, continuous, and balanced information exchange (e.g. if information is required it should be supplied in a timely manner, in the best available form) (Nickerson et al. 1979, Juves et al. 1982, Case study 1994).

3. The company and the team should make a structured effort to inform all potentially affected agencies about the project objectives, schedule, methodology, and intermediate results. This is best achieved through regular meetings with the agencies from the onset of the project (Case study 1994). The goal is to maintain good professional relations with the agencies, and assure well informed comprehension of the project. Although thorough and up to date knowledge of the project does not guarantee supportive attitudes, eliminates misunderstanding as a basis for opposition (Juves et al. 1982, Case study 1994).

4. The direction of governmental agencies attitudes (e.g. opposition, support, neutral) should be detected early in the project, and monitored throughout the siting study. This should be achieved by continuous and direct communication with agencies, and by careful analysis of media coverage of the project (Case study 1994).

5. The team and the company should expect the opposing attitudes of state and local agencies if: (1) Land within their jurisdiction is traversed by the proposed line, particularly in areas which do not contain users of the transferred electricity, (2) Public opinion is negative and media coverage is intensive, (3) There is a lack of perceived balance of environmental, social, and economic cost and benefits, (4) Citizen opposition against the line is very active and intense. In such cases the communication efforts should be concentrated on the potentially opposing agencies.

6. In cases when agencies explicitly express opposition (e.g. in a meeting with a study team, or in a letter) or when the potential for opposition is eminent (see four indicators given above), communication should focus on immediate resolution of conflicts and concerns. Communication with opposing agencies should be more frequent and direct than with

others. A specialist for mediation and negotiation should be hired (or assigned to the project) to develop appropriate communication strategies for dealing with the opposing agencies (Case study 1994).

11.3. State Siting Regulations

The guidelines presented in this section recommend regulatory provisions with a potential to alleviate and eliminate siting study complications, and expedite the entire process.

Clarity of regulations. Most reviewed regulations declare vague, qualitative, and unprioritized criteria, objectives, and standards for corridor siting (Juves et al.1982, State regulations review 1994). Regulations are more effective in attaining the stated objectives if the requirements are clearly defined and prioritized (Mazmanian and Sabatier 1989). Too general siting regulations give greater discretionary power to the regulatory commission to interpret the regulations on a case by case basis. From the applicant's perspective, vague regulations are not desirable, as it is difficult, sometimes impossible, to infer the correct interpretation of the regulations. Consequently, vague regulations increase the probability of noncompliance with the regulatory objectives. Unclear regulatory standards might cause unplanned and unwanted delays in the electric corridor siting and review. Delays may be generated by the misinterpretation of regulations by the siting team, and consequent noncompliance with regulations, and return of the application for additional studies (Case study 1994).

The following elements of state regulations contribute to avoidance of such delays in the siting study:

1. Regulations should define clear and well prioritized siting criteria. It is beneficial if regulations demand that the Commission's staff develop and update a list of exclusion areas and features, in clear order of priority for protection, from the potential adverse impact of the electric transmission line. Such provisions are given in the regulations of North Dakota and Oregon.

North Dakota regulations exemplify specific, well ranked, and comprehensive corridor and route siting and assessment criteria: exclusion zones, avoidance zones. The exclusion and avoidance areas may be traversed by the corridor, but cannot take more than 50% of the corridor width. Also, the applicant must demonstrate that there is no other alternative. If these areas are crossed, all potential impacts must be mitigated. Exclusion areas include: designated federal and state parks, historic areas, archeological sites, nature preserves, wilderness areas, locally designated parks and recreational areas, critical habitats and unique biological resources. The avoidance areas are comprised of: national historic districts, national wildlife areas and refuges, national and state wild, scenic or recreational rivers; state game refuges and management areas, state forests, grasslands, and forest management areas, state management areas; areas of geological hazard, areas within 500 feet of a farm, residence or commercial land uses, municipal and rural district water supplies and reservoirs, irrigated lands, and recreational areas not classified as exclusion zones.

Oregon's regulatory body specifies protected areas and resources to be excluded from siting and which should not be significantly affected by the proposed corridors. The exclusion zones are resources within the following categories: national parks and monuments, national and state wildlife refuges, national coordination areas, national and state fish hatcheries, national recreational and scenic areas, state parks and waysides, state natural heritage areas, state estuarine sanctuaries, experimental areas and agricultural stations, research forests, and Bureau of Land Management critical areas.

North Dakota and Oregon regulatory provisions for exclusion and avoidance areas may serve only as a general model. However, the avoidance and exclusion areas should be defined for each state according to physiographic and landscape conditions in the region.

2. Regulations should mandate that the Commission appoint a task force, to help in the interpretation of general siting criteria in each particular case. Such a provision is contained in the Maryland and Minnesota regulations. According to Maryland regulations, the task force ensures coordination of actions in siting, and assists the company in application preparation by defining specific siting criteria and studies to be performed. The force consists of representatives of the Commission, company, and interested federal, state, and local agencies. It is recommended here that representatives of communities within the study area also participate in the work of the task force.

3. Regulations should mandate that the Commission staff or appointed task force delineate the corridor siting study area before the siting study commences. South Dakota regulations demand that the Commission delineates the study area within 30 days upon the receipt of Notification of Intent to Apply for the approval of electric transmission corridor location and construction. This eliminates possible conflicts of interest over the boundaries of the study area.

4. Regulations should enable communication between the company and the Commission's staff during the siting study, with the purpose to clarify the regulatory requirements, and

eliminate misunderstandings. Such a provision is incorporated in Ohio regulations, which facilitate the preapplication conference between the applicant and commission staff, upon the applicant's request.

Technical Aspects of Siting Requirements. The lack of adequate regulatory technical provisions for corridor siting criteria, data requirements, siting methods, and mapping may cause delays in the corridor siting study. Unspecified data requirements, missing or unclear methodological directions for corridor analysis, assessment, and selection, unspecified mitigation techniques, vague or lacking mapping standards could lead to complications in the siting study and regulatory review (Case study 1994). The delays might be due to the Commission's request for additional studies, long after the corridors are selected and proposed, and even to dismissal of the application for noncompliance with regulatory technical requirements (Case study 1994). If the compliance with regulatory objectives is to be attained, the regulations must be based on valid technical principles (van Horn and van Meter 1975, Mazmanian and Sabatier 1989).

The following elements in the state regulations streamline the corridor siting study process by improving the technical aspects of regulations:

1. Regulations should comprehensively cover the scope of requirements. Ohio, New York, Pennsylvania, Maryland, Wisconsin, Minnesota, North Dakota, South Dakota, Oregon, and California are states with a comprehensive range of regulatory siting environmental standards. All categories of resources should be included in siting considerations. Virginia and West Virginia regulations, for instance, do not include geology siting criteria, which is a serious shortcoming, considering the physiography of the region (Case study 1994).

2. Regulations should clearly specify: mapping scale,

mapping coverage, and type of base map to be used to represent corridors and potential impacts. Most of the regulations do not contain such provisions. However, the New York regulations give a good example of well specified mapping standards. The regulations state that information should be presented on 1:24,000 topographic maps, and on 1:250,000 topographic maps, if the corridor is longer than 10 miles. In addition, the location of the centerline and 1,200 feet of both sides of the corridors, should be drawn on aerial photographs taken less than 6 months from the date of application filing. Most other regulations specify the scale and coverage, but not the update of the map, which can become a serious issue during regulatory review (State regulations review 1994, Case study 1994).

3. Regulations should define quantitatively spatial coverage for analysis and assessment by resource categories and by distance from the centerline. This provision is well defined in New York, Ohio, and Oregon regulations.

For instance, Ohio regulations define the following classes of ecological impacts to be analyzed, assessed, and mapped within 1,000 feet of each side of the proposed corridors : streams and drainage channels; lakes, ponds, reservoirs, marshes, swamps, wetlands, woody and herbaceous vegetation, areas where herbicides may be applied; locations of the above resources, estimate of the occurrence of species of recreational value, federal and state endangered and threatened species. The listed resources must be mapped on the scale 1:24,000.

Oregon's regulations authorize the regulatory body to determine the size of the impact areas, depending on the category of resources considered. For instance, for surface and groundwater quality and availability, geology, cultural resources, and recreational opportunities, the study area equals the width of the right-of-way. For the noise level, the impact area is either the distance where the standards are exceeded by 10 Dba, or 0.5 mile from the right-of-way. The impact area for protected designated areas is 20 miles from the right-of-way. For scenic resources the impact area is determined by the maximum visibility of 30 miles. Wildlife habitats and rare and endangered species shall be studied within the area of 500 feet on either sides of the right-of-way.

The requirements on spatial extent of impact areas, as defined in Ohio and Oregon regulations are very specific and well quantified, and consequently easy to implement.

4. According to environmental impact assessment theory (Sondheim 1978, Fitipaldi et al. 1982, Shopley and Fuggle 1984, Westman 1985), regulations should require that the siting study address the following: probability of impact occurrence, spatial extent of predicted impact, duration of the impact, direct and indirect impacts, cumulative and unavoidable impacts. Regulations of New York, Wisconsin, North Dakota, South Dakota, Oregon, and California adequately formulate these requirements (see Appendix C).

5. To ensure the least environmental damage regulations should require that mitigation measures must be developed for identified impacts during the siting study (Sondheim 1978, Fitipaldi et al. 1982, Shopley and Fuggle 1984, Westman 1985). New York, North Carolina, Oregon, and California are a few states with clear requirements for mitigation considerations in the corridor siting study. California regulations are a good model, as they not only require specification of mitigation measures, but also demand that a Mitigation Monitoring Plan be implemented once the line is certified and built. Moreover, the company must periodically report to the Commission concerning implementation of mitigation measures.

6. The regulations are most effective if implementation

of regulatory requirements is structured by the regulations. This can be achieved by the mandate of an Environmental Management and Construction Plan (EM & CP) (see New York regulations review in the Appendix C). The EM & CP must be approved before the commencement of construction. It deals with site specific construction and operation impacts, restoration of disturbed areas, erosion control, vegetation management, and mitigation specifications.

Participation of Agencies and Coordination of Actions. Regulations that structure review of project intermediate and final outcomes by interested and affected agencies, ensure more effective project implementation (Mazmanian and Sabatier 1989). Early, continuous, and coordinated participation of federal, state, and local agencies in corridor siting study enables exchange of information, recognition of concerns that agencies might have, and resolution of controversial interests caused by potential land use and management conflicts (Case study 1994). It is extremely difficult to coordinate activities of many agencies affected by the proposed project. Therefore, siting regulations should incorporate provisions for early, continuous, and coordinated review and evaluation of alternative corridors by governmental agencies. The evaluation should facilitate inclusion of comments of the agencies into the siting study, before the study is completed. The following elements in siting regulations improve the review of the siting study by agencies:

1. Regulations should mandate the formation of a Project Coordinating Committee (e.g. Maryland). The representatives of interested and affected federal, state, and local agencies should be represented on the Committee. The function of the Committee is to coordinate participation of all these agencies in the siting process.

2. Regulations should mandate direct involvement of the

state environmental management agency in the siting project, to evaluate alternative and final corridors (e.g. Pennsylvania, Wisconsin). The agency should also help the applicant in interpretation and implementation of regulations.

Regulated Coordination with Other Relevant Regulations. Besides state public utility regulations, the regulatory setting for the corridor siting study encompasses local, state, and federal regulations (Juves et al. 1982, CECA/RF 1990). Lack of coordination among these regulations cause complications and delays in the siting study (Case study 1994). In cases of interstate projects, the siting study is further complicated by lack of coordination between siting regulations of bordering states traversed by the proposed line (CECA/RF 1990, Case study 1994). These difficulties can be abated if the regulations contain the following elements:

1. Regulations should require that the company coordinate the siting process with federal, state, and local land use and planning regulations. For instance, regulations of Maryland require that compliance with all other relevant legislation must be clearly shown in the application for electric transmission line approval.

2. Siting regulations should require that the siting process be coordinated with the State Environmental Protection Act (if there is one). Due to California regulations, environmental assessment of proposed corridors must follow procedures of the California Environmental Quality Act. The Commission is the lead agency in the environmental review of an application. However, the company must submit a "Proponent's Environmental Assessment" along with their application for line approval. This ensures a standardized and coordinated environmental assessment during the corridor siting study.

3. If proposed corridors traverse federal resources, and

a federal EIS report is applicable, regulations should facilitate coordination between siting and EIS studies. Minnesota regulations require that the applicant contact federal agencies participating in the EIS process, in order to coordinate activities, and avoid duplication of work.

4. Regulations should contain provisions that deal with cases of interstate lines. Minimum siting requirements, common to neighboring states, and coordinated siting and review schedules should be defined. Moreover, formation of a special Committee to coordinate the siting process and regulatory procedures for interstate lines, should be required.

Regulated Public Participation. Early and continuous public input in the siting study enables early recognition of public issues and concerns, and timely resolution of conflicts. Many conflicts can be resolved before the corridor siting study is completed (McConnon 1979,1982, Hartman and Simmons 1982, Bisenius and Marcotte 1982, Stern and Munson 19892, CECA/RF 1990, Case study 1994). However, most state siting regulations do not mandate public participation in corridor siting. Regulations require public input only after study is finished, and the application filed. (State regulations review 1994)

The following elements in siting regulations efficiently deal with public participation in the siting study process:

1. Regulations should mandate a public information program, which should be structured and carried out by the applicant during the corridor siting study. The program should achieve: early involvement of the public in the siting study, identification of issues and concerns, and resolution of conflicts (e.g. Ohio, New York).

2. Regulations should require the formation of a Citizen Review Committee, which shall closely follow the siting process, and communicate with the Commission's staff. Members

of the Committee are representatives of potentially affected communities in the study area. The committee shall also assist in negotiation of conflicts during the corridor siting process, before formal regulatory review starts (e.g. South Dakota).

Regulatory Timeframe. Most siting regulations do not clearly define the schedule for application review and decision making, causing uncertainties and delays in the intrinsic and expensive planning process (Juves et al. 1982, State regulations review 1994, Case study 1994). This serious regulatory deficiency, can be eliminated by the following elements in state regulations:

1. The timeframe for the entire regulatory review should be clearly defined. Regulations of North Dakota allow a maximum of 9 months for the regulatory review from the date the application is filed.

2. Regulations should require that the process of siting and review be simplified by narrowing of the spatial extent of data collection, analysis and assessment (e.g. North Dakota). The process of siting should have two major stages, sequentially dealing with smaller areas, and each resulting in a separate permit. First, wider corridors (e.g. 1 to 3 mile wide), indicating the general line location must be approved. In the second stage,the narrow corridors (e.g. 300 feet wide) within the previously approved corridors are delineated and submitted for a review by the Commission.

3. Regulations should facilitate successive and separate review of the need for the line and the environmental impacts of the line (e.g. Maryland and Minnesota). The need for the line must be determined in separate proceedings, before the siting and environmental studies are conducted. Nonetheless, the need should be balanced against environmental, and social costs in making the final decision. The value of this approach

is that expensive and lengthy siting and environmental studies do not commence until the need is approved.

4. Regulations should oblige the Commission to determine application completeness and compliance with basic regulatory requirements shortly after it is submitted (e.g. within 21 days). Only after the Commission decides that the format and content of the application comply with regulatory requirements, should the formal regulatory review start (e.g. Ohio, New York, Kentucky, North Dakota, South Dakota).

The summary of the guidelines is displayed in the Figure 11.1. on the following pages.

Figure 11.1: SUMMARY OF THE GUIDELINES FOR CORRIDOR SITING STUDIES

TECHNICAL AND METHODOLOGICAL ASPECTS OF SITING

GENERAL APPROACH TO SITING

The structure of the corridor siting study should encompass the following principal stages: (1) Delineation of the study area. Refinement of the study area by identifying and mapping exclusion and critical areas and resources, (2) Identification of preliminary study corridors (up to 1 mile wide), (3) Delineation of alternative corridor segments within study corridors, (4) Analysis and assessment of alternative corridor segments and selection of preferred and alternative corridors proposed for certification.

Subsequent stages of corridor siting study require hierarchically finer spatial scale of analysis and assessment, more certain impact prediction techniques, and more precise and accurate quantification.

Criteria for siting and assessment should be comprehensive covering principal interactive factors of landscape system: geology, topography, soils, hydrology, vegetation, and wildlife.

Documentation of the corridor siting study should be complete so that reliability of the siting methodology can be verified by an independent party.

ENVIRONMENTAL IMPACT ASSESSMENT TECHNIQUES

Impact prediction techniques identify impacts with higher probability if: (1) A wide range of sources is used to identify initial list of possible impacts, (2) Baseline conditions (land qualities) are inventoried comprehensively, and (3) A state-of-the art description of the physical land use requirements for electric transmission line corridors is compiled (e.g. data on construction, operation, maintenance, engineering design), (4) Functional, cause-effect relations between land qualities and land use requirements are established.

As the spatial extent of the study narrows down from the large study area to alternative corridors level of impact measurements should be more quantitative, direct, accurate, and precise.

Significance of impact should be assigned combining the magnitude of impacts, concerns of the public and affected agencies, regulatory, policy and management considerations. The expert consensus methodology is acceptable as long as the decision rules are thoroughly documented and explicit.

DATA COLLECTION AND MAPPING

Data for corridor siting should be gathered from the following sources: databases of federal, state, and local agencies, published amps, literature, public input, aerial photography, satellite images, air reconnaissance, ground survey for basic inventory and for data verification.

Update of data should be as recent as feasible. In any case the date of data collection should be recorded for all data collected and mapped.

Taxonomic accuracy (correct assignment of resources to predefined classes) and spatial accuracy (correct planimetric presentation) should be addressed in the corridor siting study mapping process.

Mapping accuracy and update should be consistent between and within mapping categories.

Map detail should correspond to mapping scale (e.g. minimum mapping unit should correspond to the scale of the map), so that map conveys accurate and legible information.

Figure 11.1: continued

PUBLIC AND INSTITUTIONAL CONSIDERATIONS IN SITING

PUBLIC PARTICIPATION

Public participation should attain objectives to:

(1) Introduce the project and scope the issues and concerns.

(2) Provide comments on preliminary alternative corridors.

(3) Invite and receive input of locally known and unpublished data.

(4) Examine the general public opinion towards the proposed project throughout the study area.

(5) Create consensus among conflicting interest groups.

(6) Build and maintain the credibility and trust between the public and a company.

Public participation should be initiated and structured by the siting team and the utility company early in the siting process. It should: (1) be continuous, (2) not be limited to initial scoping of issues and concerns, and (3) cover the entire study area.

While issues, concerns, and comments can take a wide range of detailed and generalized forms, data collected from the public should be in a usable and consistent form, when possible. For that purpose, it is useful to let the public know about type of data, and basic mapping requirements (e.g. level of detail, scale and type of base map should be uniform and adequate).

The siting team and the company should take a full advantage of the fact that the early and continuous public participation indicates the general public opinion about the project throughout the study area. Spatial variation of the public opinion (e.g. stronger opposition to the line in certain counties) should guide the public relation actions towards altering the negative public opinion.

ACTIVE OPPOSITION

Organized and strong opposition to large transmission projects should be accounted for in corridor siting study stage of line planning.

Opposition groups tend to be well organized and able to gain financial support.

Strong opposition, coupled with poor public relations and communication between the public and the company, can significantly complicate and delay corridor siting study process.

Active opposition groups exert pressure on politicians and often gain political support.

Active opposition raises a variety of issues: environmental, visual, economic, regulatory. Issue of need may be particularly effective argument against the line on a local and state level. Maintaining the issue of need can provide continuous support for the opposition.

Figure 11.1: continued

ACTIVE OPPOSITION continued

Active opposition groups strategies include cooperation with strong local and regional environmental groups. As a result new legislation that affect the proposed project may be enacted.

The power of local grass-root organizations should not be underestimated, as their influence on the proposed project and the siting study may be significant.

The membership structure and the background of the active opposition groups tend to be diverse, as various interest groups unite against the project.

In the case of interstate lines, it may be expected that the opposition groups from different states coordinate their strategies, and target their actions similarly.

General public suspicion towards government and business contributes to a stronger opposition to the proposed project.

Presence of skilful and educated leaders contributes to a stronger and more efficient public opposition.

Lack of regulatory provisions for meaningful public participation in corridor siting and regulatory review (or vague and unclear requirements) contributes to a stronger and more efficient opposition to the proposed project.

Already adversary public attitudes towards the company or previous projects, contribute to a stronger and more efficient opposition to the project.

Avoiding open communication with the public aggravates the opposition to the proposed project.

MEDIA COVERAGE

Media coverage simultaneously reflects and influences the general public opinion of the project. Media coverage may have a significant impact on all aspects of siting study process. Generally, media coverage conveys accurately public opinion about the project.

Public opinion and media coverage tend to change with spatial variations in socioeconomic conditions over the affected area, as well as over the course of the planning process. The dynamics of the media coverage follows the dynamics of the project. Media reports on milestone events in the project.

Media is an excellent instrument for the opposition groups to organize, promote their causes, and steer the general public opinion.

Media is a powerful tool to influence the public opinion. Thus, media should be used efficiently by the company, especially if the project is controversial, facing strong opposition. Utility companies should use media to: (1) Build and maintain credibility and accountability, and (2) Abate negative public opinion and neutralize the opposition.

Company should use media in a timely manner, before the potentially controversial project starts, to build a positive public image and communicate its objectives and practices.

Figure 11.1: continued

ATTITUDES OF AFFECTED AGENCIES

Attitudes of governmental agencies interested and affected by the proposed project are important factor in the siting and approval process. Generally, support of the proposed project by the governmental agencies increases the likelihood that the project is approved and implemented.

Supporting or neutral attitudes of governmental agencies contribute to more efficient data collection and to early identification and resolution of issues and conflicts of interests. Opposing attitudes of governmental agencies inhibit communication, and may lead to project delays.

Direction (e.g. opposition vs support), and intensity of attitudes (e.g. high vs low), and concerns of governmental agencies should be identified and dealt with, early in siting process.

Attitudes of federal agencies are determined by the concerns for land use conflicts with the transmission corridors crossing their resources. Federal agencies are more likely to hold a neutral attitudes, as they are less prone to political pressures by the local and state citizen opposition groups and politicians.

The strongest adversary attitudes are likely to arise on the local level. However, the institutional opposition may be expected on federal and state levels, as well.

Attitudes of agencies on state and local levels depend directly on the perceived equity between economic, social, and environmental benefits and costs related to the project on the state and local levels respectively.

The strongest institutional opposition on the state level (in the case of interstate lines) and on the local level, is likely to occur in states, counties, and municipalities potentially affected by the proposed line, but which are not direct producers or users of the majority of electricity transferred.

The negative attitudes of state agencies towards the line may be significantly affected by the pressures of grass-roots opposition groups. The negative attitudes of state agencies may have a distinctive delaying effect on the siting process (particularly, if the economic benefit to the state is not perceived as positive.

Even, if the citizen opposition in the state is active, presence of clear economic benefit on the state level, seems to neutralize citizen opposition effect, resulting in mainly neutral or supportive attitudes of state agencies.

Attitudes of local governmental agencies depend on the general public opinion in the area, tone of media coverage, and the strategies of the local opposition groups. Negative public opinion and media coverage, intense strategies of opposition groups contribute to opposing attitudes of local agencies.

In cases when agencies clearly express opposition to the project, communication should focus on resolution of conflicts and concerns. Communication with those agencies should be more frequent and direct than with neutral and supportive agencies.

Figure 11.1: continued

COMMUNICATION AMONG AGENCIES

Effective communication among agencies involved in policy implementation (e.g. siting project) is a prerequisite for successful project completion. Effective communication ensures that information is received and released in a comprehendible and timely manner.

Effectiveness of communication interacts strongly with the attitudes of agencies. Negative attitudes towards the project hinder the communication effectiveness. In addition, attitudes of agencies depend on the level of understanding of the project and its objectives. Although an open flow of information which enables better comprehension of the project, does not guarantee the project support, it at least eliminates attitudes based on misconception about the project.

The purpose of the communication between the siting team and governmental agencies is to:
(1) Collect data from agencies' databases, (2) Provide review and comments on the preliminary alternative corridors and final alternative corridors from the agencies, (3) Identify and resolve potential land use and policy conflicts.

Communication between the siting team and federal, state, and local agencies should be: (1) Early, (2) Continuous, (3) Direct, (4) Balanced in terms of information exchange.

STATE SITING REGULATIONS

REGULATORY TIMEFRAME

The timeframe for the regulatory review, from the day application is filed with the commission should be clearly defined. Reasonable timeframe for the entire regulatory review should be 6,9 or maximum 18 months.

Often the commission returns the application because of noncompliance with basic regulatory requirements, or simply because of incompleteness. This causes unnecessary delays. To avoid such delays regulations should provide that application completeness and compliance with basic requirements must be determined by the commission, shortly after it is filed. Only after the commission determines that the format and the content of the application comply with the regulatory standards, the formal regulatory review shall start.

Siting study and regulatory review are often prolonged by the public opposition claiming that the need for the project is not justified. The opposition often maintains that there is no basis to evaluate economic benefits against environmental costs, because the benefits are minimal or none. Consequently, none of the alternative corridors are acceptable. This issue can be resolved if regulations mandate that the need for the line must be determined by the Commission, in a separate proceedings, before the siting and environmental assessment shall start.

Corridor siting study is long multistage process, advancing from large spatial scale studies to detailed right-of-way or few hundred foot corridor studies. The siting process is very expensive, and it is more practical that regulatory review evaluates intermediate stages of the study instead of reviewing the final corridors.
To facilitate this the regulations should provide for two stage review: (1) Delineate, review, approve corridors indicating general location of proposed electric transmission line, (2) Delineate, review, approve right-of-way within previously approved corridors.

Figure 11.1: continued

CLARITY OF REGULATORY REQUIREMENTS

State regulations for electric transmission line siting are often vague, qualitative, unprioritized and difficult to interpret. The regulations are more effective if the requirements are precisely stated and clearly prioritized. Precise regulations enable corridor siting study participants to easily recognize and eliminate disparity between their actions and regulatory requirements. Regulatory siting standards and criteria should be clearly specified, quantified, and prioritized.

Regulations should provide that the commission develops and updates a list of exclusion areas and features, in order of priority for protection, or sensitivity to electric transmission line land use.

Regulations should mandate that the commission appoints a task force to translate general siting requirements into specific criteria on case by case basis.

Regulations should mandate that the commission delineates corridor siting study area.

Regulations should contain provisions that enable preapplication conference between applicant, interested parties, and the commission staff to clarify vague and confusing regulatory requirements, and eliminate misinterpretation.

TECHNICAL ASPECTS OF REGULATIONS

Often, state siting regulations suffer from lack of adequate technical provisions for corridor siting.
Regulations should be founded on valid technical principles if the compliance with regulatory objectives is to be achieved. Unspecified data requirements, missing or unclear methodological requirements for corridor analysis, assessment, and selection, unspecified mitigation standards, vague or lacking mapping requirements could cause delays in siting process, and even dismissal of the application for noncompliance with the requirements.

Regulations should cover comprehensive scope of requirements. (e.g. natural resources environmental requirements should cover geology, topography, hydrology, soils, vegetation, and wildlife).

Mapping scale, coverage, and update of the base map should be clearly specified.

Spatial coverage of analysis and assessment should be defined by resource categories and by distance from both sides of the centerline.

Probability, spatial extent, duration of potential impacts should be addressed in the siting study.

Direct (primary) and indirect (secondary), cumulative, and unavoidable impacts should be identified, predicted, and assessed in the corridor siting study.

Specific mitigation measures should be considered and defined in the corridor siting study process.

Implementation of regulatory corridor siting requirements should be ensured by the regulations. This can be achieved by mandating preparation and overseeing realization of : (1) Environmental Management and Construction Plan, (2) Mitigation and Monitoring Plan, after the certificate is issued.

Figure 11.1: continued

REGULATED COORDINATION WITH OTHER RELEVANT LEGISLATION

Corridor siting study regulatory framework is complex, involving state and local land use regulations, as well as federal legislation if the corridor traverses federal resources. These regulations are often uncoordinated, causing delays in the siting process.

Regulations for corridor siting do not facilitate coordination among legislation relevant to corridor siting study.

Uncoordinated siting procedures between two bordering states in cases of interstate project, cause significant delays and complications in siting study.

Lack of coordination between state siting procedures and federal EIS procedures causes significant delays and complications in siting study.

Regulations should require that the company and the team coordinate siting process with federal, state, and local, land use and planning regulations. The compliance should be stated in the application document.

If there is a state level environmental protection legislation, the siting regulations should require and facilitate coordination of the siting process with the environmental regulations.

If the federal EIS is applicable, the siting regulations must demand that the applicant contact appropriate federal agencies in charge of the EIS, in order to avoid duplication of work between the corridor siting assessment and federal EIS studies.

In cases of interstate lines, special provisions should define general siting criteria and time table. Committee in charge of coordination of procedures between bordering states should be formed.

REGULATED PUBLIC PARTICIPATION IN SITING STUDY

Public participation is important element in today's electric transmission line siting studies.

Most of the state siting regulations do not mandate public participation in siting study. The regulations start dealing with public input only after the siting study is completed, application is filed, and regulatory review starts.

In order to efficiently structure public participation in the siting study the regulations should mandate public information program. The program involves public early in the siting process, so that issues can be identified, conflicts resolved, and data collected.

Regulations should facilitate formation of Citizen Coordination or Local review Committee by the commission. The committee coordinates citizen participation, assists the commission staff in assessment of the application, and assist in resolution of conflicts.

CHAPTER 12: RESEARCH CONCLUSICNS AND FUTURE STUDIES

12.1. Conclusions

General Conclusions. EHV transmission corridor siting study is a complex process, often prolonged and impaired by technical and methodological, public and institutional, and regulatory considerations. Technical and methodological considerations in electric transmission siting studies are many and complex. This is especially the case with long electric transmission lines, which require a large study area, with a great diversity of natural, cultural, and visual factors to be inventoried, analyzed, and assessed (White 1981, Juves et al. 1982, Duke Power Co., and EDAW 1990, Burns and McDonell 1991, EDAW 1992).

Today, electric transmission corridor siting studies cannot be managed as purely technical endeavors. In contemporary political and social reality, the siting process has become influenced by local, regional, and state political factors. Many citizen interest groups, organizations, and governmental agencies are involved in the siting process. The multitude of interests leads to a potentially controversial process, especially if the proposed project is a long, interstate, and extra high voltage line. This is shown in the case study research of the Wyoming-Cloverdale study process.

The findings confirm and highlight the importance of public participation in siting. Furthermore, active opposition to a transmission line may be a central external constraint in the process. Strong and well organized citizen opposition can be the key obstacle for the streamlined and speedy corridor siting study. The power of the media and its influence on the public opinion, and consequently on the siting process may be significant. In addition, attitudes of involved agencies may affect the siting process. The findings also demonstrate the drawbacks and advantages of effective communication among agencies involved in the siting study.

A major shortcoming of most of the reviewed regulations is that they do not deal with the corridor siting stage of transmission line planning. The minimum siting criteria and application content directions are often the only requirements addressing directly the corridor siting study process and outcomes (State regulations review, 1994, Case study 1994). In most cases, the state regulations, are not adequate. However, the limited state regulations do not necessarily hinder the siting study, unless the following conditions are present: (1) Public opposition is strong; (2) State and local politicians and affected governmental agencies do not support the proposed project.

Technical, public institutional, and regulatory factors interactively influence the progression of the study. The deficiency in one factor reinforces the negative influence of the other factors. Therefore, it is difficult to isolate a single key factor that critically affects the EHV transmission corridor siting study process.

Technical and methodological aspects of siting are not the primary determinants in the decision on the proposed corridor location. The siting study process is greatly politicized by the involvement of conflicting private and public interests.

<u>Technical and Methodological Aspects of Siting.</u> The following conclusions relate specifically to technical and methodological aspects of siting:

- The corridor siting study organization should consist of the sequence of stages, each resulting in a more detailed spatial analysis and assessment. The preanalysis stage is very important, because it identifies the general issues, methodological approach, data requirements and availability. This stage should be carefully conducted, as it allocates resources and time to the remaining stages of the study. Extra resources and time should be allocated for unanticipated delaying events, such as intense opposition, or the possible receipt of large amounts of data through public participation. This can be in part accomplished in the preanalysis stage.

After the preanalysis stage, the standard siting study structure includes: study area delineation and refinement, identification of the network of study corridors, delineation of alternative corridor segments within the study corridors, analysis and assessment of the alternatives and selection of the proposed corridors.

- Siting criteria should include a full range of physiographic, ecological, cultural, and visual factors present within the study area.

- Data collection, mapping, analysis, and assessment should be performed at a hierarchically finer spatial scale, as the study progresses from the large study area to the few hundred feet wide alternative corridors. The scale of the study shall narrow down from regional scale (e.g. 1:250,000 to 1:100,000), subregional scale (e.g. 1:24,000), to the local scale (below 1:24,000).

- Data collection requirements for the siting study are very extensive. The possible sources of data include: governmental agencies databases (digital data, remotely sensed images, maps, studies), literature, public input, ground field survey, aerial reconnaissance. Due to the variety of the sources, the characteristics of the data vary significantly. The effort should be made to obtain information on the coverage, update, scale, and accuracy of the data from each source. The identified inconsistencies should be eliminated or acknowledged. The detail of the map should correspond to the mapping scale and purpose.

- Decision rules should be transparent, well documented, to ensure independent evaluation of the siting procedure.

- The identification and prediction of potential impacts should be based on the following: (1) Detailed description of the physical actions during construction and maintenance of the line (e.g. towers, conductors, right-of-way, substations, access roads, storage yards), (2) Characteristics of the existing baseline conditions (e.g. physiography, ecology, land use, cultural, and visual resources), (3) Knowledge about possible changes in the existing conditions (changes caused by the physical activities during the construction and maintenance of the line, and by the introduction of the corridor as a new structural element in the landscape).

- The magnitude of the predicted impact (spatial extent or degree of adverse or beneficial change in the existing conditions) is to be measured as directly, quantitatively and accurately as feasible. In the initial stages of the study predicted changes can be expressed more qualitatively and less accurately. However, as the study advances measures need to be more direct, quantitative, and accurate.

- The significance of the potential impacts is to be determined based on: (1) The magnitude of impact, (2) Social importance of impact, expressed by public concern, (3) Current and planned management and policy restrictions and conflicts with the electric transmission line land use, (4) Legal constraints, including the regulatory siting standards, permitting regulations, land use plans and zoning regulations. The method of combining and ranking the significance determinants should be transparent, and thoroughly documented.

Public and Institutional Considerations in the Siting

Study. The following conclusions deal with public participation, opposition, media coverage, communication and attitudes of agencies:

- Public participation in the corridor siting study should be initiated and structured by the siting team from the onset of the study. The forms and timing of the participation should provide the opportunities for the public to express concerns and issues, to learn about the project, and to make informed comments about the intermediate results of the siting study. The siting team benefits from early, continuous, and direct public participation by obtaining locally known data, and by recognizing the public concerns to be incorporated in the siting criteria. Public participation should aim to negotiate and moderate conflicts between the local public interests and the alternative locations of the corridors. This can be attained through direct and open communication with the public and community leaders.

- The active grass roots opposition to new electric transmission line projects should be considered in planning the siting study schedule and resources. Particularly strong opposition is likely to be formed in the following circumstances: (1) If the project crosses state borders, the opposition is likely to be stronger in the state where the eminent economic benefit is lacking. In that case the local opposition groups can get the political support from the state and local politicians, to delay the siting study process. (2) If the people in the study area traditionally distrust the government and corporate business. (3) If adversarial attitudes, and active environmental organizations with skilful leaders are present in the potentially affected area. (4) If there are no regulatory mandates for public participation in the siting study process, or if the company does not initiate and structure the participation.

- Strategies of the opposition include: (1) Media campaign, (2) Meetings, rallies, festivals, (3) Pressure on state and local politicians, (4) Legal means (testimonies, motions). The public will raise a broad array of issues, ranging from "Not In My Backyard" to the issue of need for the line.

- The media follows the proposed project from its onset. The media mirrors public attitudes towards the project, and also influences the public attitude. The opposition groups typically use the media to promote the cause, and organize the activities against the project. The company must actively publicize the project goals, inform the public regularly about the status and the progress of the study, and build and maintain its integrity. The dynamics of the coverage will match to the main stages and milestone events in the study.

- Federal, state, and local governmental agencies, potentially affected by the proposed corridors, are usually actively involved in the siting study. Supportive attitudes of these agencies contribute to a more efficient siting study, while negative attitudes may thwart and delay the study. Opposing attitudes are most likely to be formed on the local level. The attitudes of the federal agencies are mainly determined by the degree to which their resources are potentially impacted by the proposed line. The attitudes of state and local agencies are likely to be adversarial if: (1) The resources are potentially affected, (2) The area within their jurisdiction contains neither primary producer nor consumer of the transferred energy, (3) The agencies do not perceive equity between the environmental, economic, and social costs and benefits caused by the proposed line, (4) The public opinion and media coverage are negative, (5) The active opposition groups exert pressure on representatives of the agencies. The lack of the support by state and local agencies can complicate and delay the study and reduce the probability of project approval.

- The communication of the team with the governmental agencies should facilitate: (1) Continuous transfer of information from the siting team to the agencies, (2) Timely receipt of the available data by the team from the agencies, (3) Opportunities for the agencies to review the intermediate results of the study, and provide input into each major stage, (4) Identification of the conflicts between the potential corridor location and resource management policies and regulations, (5) Resolution of these conflicts during the siting study, before the application is filed. The communication should be early, continuous, and direct.

State Siting Regulations. The following conclusions address the siting regulations characteristics:

- Most of the state public utility regulations in the U.S. do not deal with the siting study stage of transmission line planning. Typically, the regulations define the minimum siting requirements, mapping standards, and application content. The regulations mainly deal with rules and procedures for the application review after the filing.

- The regulatory requirements are vague, causing possible misinterpretation and noncompliance, and leading to the delays in the siting process and the regulatory review. If the effective implementation of the regulatory objectives is to be achieved, the requirements should be more precise, explicitly prioritized, and quantitative.

- The provisions that define the techniques for achieving the siting objectives, are either too general or absent from the regulations. Ambiguous data and mapping requirements, unclear or missing criteria for corridor analysis, assessment, and selection, can delay the siting study process, due to the difficulties in implementation of the requirements.

The technical siting criteria need to be inclusive, covering a full range of physiographic, ecological, cultural, and visual factors present in the region. Data specifications shall contain the sources of data, data update, and the level of accuracy. Moreover, the mapping scale and the spatial coverage for the analysis and assessment need to be specified. Also, the mitigation measures definition, and the program to implement the mitigation and monitor the impacts should be mandated. The impact description requirements should cover: probability of impacts, magnitude of impacts, duration of impacts, classes of direct, indirect, unavoidable, and cumulative impacts.

- Representatives of the public and the governmental agencies potentially affected by the proposed project are typically involved in the siting study. However, in most states, this involvement is not regulated. The regulations should mandate early and continuous public involvement, to enable timely identification of issues and concerns, data input from public, and resolution of the conflicting interests during the siting process before the application is filed. The regulations should also direct the study review by the potentially affected and interested governmental agencies. The provisions dealing with the involvement of the agencies should facilitate coordinated actions, based on clear and continuous communication of the agencies with the siting team and the company.

- Besides the state Commission's regulations, the regulatory setting for the electric transmission siting studies includes federal, state, and local permitting, resource management, and planning legislation. If the proposed line traverses state borders, then two or more state public commission regulations are also applicable. Because these regulations are seldom coordinated, the siting study often experiences delays due to the difficulties of meeting all the requirements and procedures. This problem may be abated if the state regulations coordinate the requirements and procedures with neighboring states, and federal, state, and local regulations.

12.2. Future Research

The primary value of this research is that it identifies the variables affecting the process of the corridor siting study and indicates the effects of these variables on the siting study process. A frequent criticism of exploratory qualitative research (particularly of the single case study research), is the low external validity (generalizability) of the findings. However, in an area such as electric transmission corridor siting studies, which lacks the consolidated theory, the research of this nature is required to establish the basis for more descriptive and explanatory projects.

The results of this exploratory dissertation have generated the knowledge base for more descriptive and explanatory research. New research propositions have been opened. These propositions are more specific and predictive, probing the causal relations between the siting study process and technical considerations, public and institutional factors and state regulations. The following propositions may be tested in future research:

- Deficiencies in technical, institutional and public, and regulatory considerations in siting interactively affect the siting study process.

- The corridor siting study is likely to experience fewer delays if the technical considerations in siting meet the principles of the environmental impact assessment, land evaluation, and spatial data analysis.

- Vague state siting regulations are likely to magnify and strengthen strategies of the public opposition groups (and vice versa).

- There is a direct relation between the intensity of the opposition to the project and the media coverage.

- Intense public opposition coupled with vague state siting regulations decrease the probability of the project approval.

- The uncoordinated siting regulations of the bordering states delay the corridor siting study and the regulatory review, and decrease the probability of the project approval.

- If the federal EIS process is required, the proposed project is likely to experience major delays, and the probability of approval is significantly diminished.

The following projects are proposed for future research:

1. A project evaluating the implementation of the guidelines developed in this research. This project will test the applicability of the guidelines, and will modify the guidelines to more effectively accommodate demands of the corridor siting practice. In addition, a survey examining the opinions of the potential users of the guidelines (e.g. electric utility companies, siting study consultants, representatives of the commissions) can contribute to the refinement of the guidelines.

2. An exploratory case study project - a continuation Wyoming-Cloverdale case study). This project will explore and document the Virginia and West Virginia state regulatory review procedures and the federal EIS, as they affect the fate

of the proposed electric transmission line [31]. As a result, a detailed picture of an exceptionally complex electric transmission line siting and certification will be completed.

3. A multiple case study project, using the same conceptual framework, variables and measures. Cases will encompass two or more siting studies similar to the Wyoming-Cloverdale study (e.g. interstate, extra-high voltage, about 100 miles long line, involving federal EIS procedures). If the results across the multiple cases corroborate the findings of this research, its external validity will be increased. Such project can also test the reliability of the techniques and measures employed in this research[32].

4. A survey project, extending directly from the Wyoming-Cloverdale study. The survey will investigate the opinions of the experts on the electric corridor siting about relations of the siting study process and technical, public and institutional considerations, and the state siting regulations. The survey will provide the grounds for validation of the Wyoming-Cloverdale case study results.

5. A research project that evaluates the state siting regulations in selected states in the U.S. The project will take a multiple case study approach. Selection of the cases will include the states with potentially effective regulations, contrasted with the states with inadequate regulations. The results of the state regulations review

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[31] This project has not been undertaken because of the time constraint of the dissertation research. The entire regulatory procedure will probably be completed in two years.

[32] The documentation of the Wyoming-Cloverdale research process and the available database allow for the reliability test. If the results are similar to those of the Wyoming-Cloverdale study, the methodology can be deemed reliable.

presented in this research, can serve as a framework for the selection of states. Multiple case study results can increase the generalizability of the findings about state regulation effects on the siting study process.

APPENDIX A: SUMMARY OF THE SITING STUDIES REVIEW

Table A.1: Summary of Jackson's Ferry - Axton 765 kV Transmission Line Siting Study Method[1]

1.ALTERNATIVE CORRIDORS IDENTIFICATION

METHOD

Computer-aided, grid cell system. Initial suitability modelling and mapping. Visual interpretation and analysis of computer generated overlay maps by the research team and the company engineers. Eight alternatives were identified for further assessment.

CORRIDOR IDENTIFICATION CRITERIA

Twenty six variables, ranked at ten or nine levels of suitability (from 0 least suitable, to 10 most suitable). Selected variables were mathematically combined into 10 suitability models: overall constraints, economic, aesthetic, social,critical environmental areas, prime productive habitats, potential cliff habitats, sensitive, physiographic areas, cold-water and warm-water habitats.

DATA

Interpretation of USGS, 7 1/2 minute, 1:24,000 Topographic Maps, County Soil Survey Reports, State of Virginia Geology Map, communication with public agencies, and field observations.

2. ASSESSMENT OF ALTERNATIVES & PREFERRED CORRIDOR SELECTION

METHOD

Computer-aided suitability modelling and mapping.
Compared average suitability scores for all 10 models for all 8 alternatives. Corridor with the highest suitability score for the greatest number of models was selected as preferred.

ALTERNATIVE CORRIDOR ASSESSMENT CRITERIA

The same 26 criteria as in alternative corridors identification.

DATA

Data base was expanded and verified by field reconnaissance.

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[1] This study was prepared by Simutis and Johnson (1974) of Virginia Polytechnic Institute and State University, for Appalachian Power Company. The corridor is located in southwestern Virginia.

Table A.2: Summary of POWER Corridor Siting Method[2]

ALTERNATIVE CORRIDORS IDENTIFICATION AND ASSESSMENT, CHOICE OF PREFERRED CORRIDORS

METHOD

Computerized grid cell, minimum path algorithm system. Index of "probable impact resulting from power line construction" was calculated for each cell as follows: each variable value was multiplied by its relative importance or significance (weight); these results were then summed up for each cell. The study suggested that relative importance of variables could be assigned, by general public, by decision maker, or by experts. After the index was calculated computerized minimum path algorithm programs identified and assessed alternatives, and selected the preferred corridor.

CRITERIA

Natural resources related criteria included:
presence or absence of streams, lakes, ponds, wooded marshes, submerged marshes, forest, agricultural land cover, ridge tops, slope (5-15 degrees, > 15 degrees), topographic aspect (two classes).

DATA

Interpretation of USGS 7 1/2 minute, 1:24,000 Topographic Maps, and correspondence with state agencies.

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2 The POWER methodology was designed by Giles et al. (1976), of Virginia Polytechnic Institute and State University, for Virginia State Corporation Commission.

Table A.3: Summary of Jocassee Tie Fold - In, 525 kV Transmission Line Siting Study Method[3]

1.ALTERNATIVE CORRIDORS IDENTIFICATION

METHOD

Computer generated constraint/opportunity composite map with 11 color coded suitability categories. Five alternative corridors were identified for further assessment. The method of alternative identification was not explicitly described.

CRITERIA

Natural resource related criteria: land cover (deciduous, mixed and evergreen forest, cutover land, grassland), three soil erodibility classes, plant communities and wildlife habitats, water bodies.

DATA

Satellite image analysis, review and interpretation of published documentation and maps, correspondence with state natural resources agencies, field observations.

2. ASSESSMENT OF ALTERNATIVES & PREFERRED CORRIDOR SELECTION

METHOD

Eleven variables were quantified for each of five criteria. Values of each variable were grouped into three "relative impact levels": lowest, mid-range, highest. No relative importance or weight was given to variables, implying equal significance. The corridor with the lowest total count of lowest relative impacts was selected as preferred.

CRITERIA

Natural resources related criteria included: number of open water crossings, number of perennial streams crossings, acres of highly erosive soils (20% and greater slope), and acres of potentially disturbed land.

DATA

The same data set was used to identify alternatives, assess alternatives and select preferred corridor.

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[3] The source document was Environmental Impact Statement Report for 8.4 miles long line in South Carolina. The report was prepared by EDAW Inc. for Duke Power Company (1990).

Table A.4: Summary of Joshua Falls-Elmont and Dooms-Ladysmith 500 kV Line Siting Study Method[4]

1.ALTERNATIVE CORRIDORS IDENTIFICATION

METHOD

Constraint mapping.

CRITERIA

Natural resources criteria included avoidance of wetlands, parks, forests, and scenic rivers.

DATA

Interpretation of recent aerial photographs, review and interpretation of published maps and reports, correspondence with federal, state, and local agencies, public input, ground and aerial reconnaissance.

2. ASSESSMENT OF ALTERNATIVES & PREFERRED CORRIDOR SELECTION

METHOD

Impact indexes were calculated by corridor segments as follows: criteria measurements and weights were multiplied and summed up for each segment, and for each alternative corridor. Members of the study team assigned weights of relative significance to each assessment criteria (from 1 to 20, with 20 being the highest significance). Weights for some criteria were modified after public input was obtained. The corridor with the lowest total impact index was selected as preferred.

ALTERNATIVE CORRIDORS ASSESSMENT CRITERIA

Natural resources assessment criteria were: number of perennial and intermittent streams crossed, length of pastureland crossed, length of woodland crossed, length of wetland crossed.

DATA

Same data base was used as for alternative identification.

[4] The review was based on the Application for Approval of this line, submitted to Virginia Corporation Commission. The corridor siting study was performed by Burns and McDonell for VEPCO (1991).

APPENDIX B: CASE STUDY PROTOCOL

1. Variables

TECHNICAL CONSIDERATIONS IN SITING

Table B.1: Technical Considerations in Siting

Variables and Codes	Questions
Variable: General approach GEN-APPROACH	What are the characteristics of the general approach to siting ? In terms of:
GEN-APPROACH-ORGANIZAT	Structure and organization of the study ?
GEN-APPROACH-SCALE	Considerations of scale ?
GEN-APPROACH-COMPREHEN	Comprehensiveness of siting and assessment criteria ?
Variable: Environmental impacts assessment considerations ENVR-ASSMNT	What are the characteristics of environmental impact assessment considerations ? In terms of:
PREDICTION-TECHN	Impact prediction techniques ?
IMPACT-MEASURE	Level of impact measurements ?
IMPACT-SIGNIFICANCE	Approach to significance assignment ?
Variable: Data collection and mapping DATA-MAP	What are the characteristics of data collection and mapping considerations ? In terms of:
SOURCES	Data sources ?
UPDATE-VERIF	Data update and verification ?
ACCURACY-MAP	Considerations of mapping accuracy ?
DETAIL-MAP	Mapping detail ?

Table B.2: Public Participation and Opposition

Variables and Codes	Questions
Variable: Forms and timing of public participation PARTIC	What are the forms and timing of public participation initiated and facilitated by APCO ?
PARTIC-FORMS	Forms ?
PARTIC-TIME	Timing ?
Variable: Information exchange PARTIC-INFO	What is the content of information exchange ?
PARTIC-INFO-GIVEN-TO-PUBLIC	What information is supplied by APCO to the public ?
PARTIC-INFO-ASKED-FROM-APCO	What information is sought by the public ?
PARTIC-INFO-ASKED-FROM-PUBLIC	What information was sought from the public ?
PARTIC-INFO-GIVEN-BY-PUBLIC	What information is supplied by the public ?
PARTIC-INFO-USED	How is that information used in the study ?
Variable:background of active opposition groups OPPOS-GROUP-BACKGROUND	What is the background of active opposition groups ?
OPPOS-GROUP-BACKGROUND-VA	In Virginia ?
OPPOS-GROUP-BACKGROUND-WV	In West Virginia ?
Variable: Issues raised by the opposition OPPOS-ISSUES	What are the issues raised by the active opposition ?
OPPOS-ISSUES-VA	In Virginia ?
OPPOS-ISSUES-WV	In West Virginia ?
Variable: Strategies and timing of opposition groups actions OPPOS-ACT	What are the strategies and timing of actions of active opposition groups ?
OPPOS-ACT-VA	In Virginia ?
OPPOS-ACT-WV	In West Virginia ?

Table B.3: Media Coverage

Variables and Codes	Questions
Variable: Media coverage of the project MEDIA	What is the direction, intensity, and dynamics of media coverage ?
MEDIA-DIR-VA MEDIA-INT-VA	Direction and intensity of media coverage in Virginia ?
MEDIA-DIR-WV MEDIA-INT-WV	Direction and intensity of media coverage in West Virginia ?
MEDIA-DYNAM	Dynamics of media coverage over the life of the corridor siting study

Table B.4: Attitudes of Participating Organizations

Variables and Codes	Questions
Variable: Attitudes towards project ATTITUDE-PROJ	What are the attitudes towards the project of:
ATTITUDE-PROJ-FED	Federal agencies ?
ATTITUDE-PROJ-VA-STATE	Virginia state agencies ?
ATTITUDE-PROJ-WV-STATE	West Virginia state agencies ?
ATTITUDE-PROJ-VA-LOC	Virginia local agencies ?
ATTITUDE-PROJ-WV-LOC	West Virginia local agencies ?
Variable APCO attitudes towards Va regulations ATTITUDE-APCO-VA-REGS	What are the attitudes of APCO towards Virginia SCC regulations?
Variable: APCO attitudes towards WV regulations ATTITUDE-APCO-WV-REGS	What are the attitudes of APCO towards West Virginia PSC regulations ?

Table B.5: Communication among Organizations

Variables and Codes	Questions
Variable: Communication among organizations COMM-FORM, COMM-TIME, COMM-INFO	What are the forms, timing, and content of communication between:
COMM-FORM-VA-SCC-APCO COMM-TIME-VA-SCC-APCO COMM-INFO-VA-SCC-APCO	Virginia SCC & APCO ?
COMM-FORM-WV-PSC-APCO COMM-TIME-WV-PSC-APCO COMM-INFO-WV-PSC-APCO	West Virginia PSC & APCO ?
COMM-FORM-APCO-TEAM COMM-TIME-APCO-TEAM COMM-INFO-APCO-TEAM	APCO & corridor study team ?
COMM-FORM-FED-TEAM COMM-TIME-FED-TEAM COMM-INFO-FED-TEAM	Federal agencies & corridor study team ?
COMM-FORM-VASTATE-TEAM COMM-TIME-VASTATE-TEAM COMM-INFO-VASTATE-TEAM	Virginia state agencies and corridor study team ?
COMM-FORM-WVSTATE-TEAM COMM-TIME-WVSTATE-TEAM COMM-INFO-WVSTATE-TEAM	West Virginia state agencies & corridor study team ?
COMM-FORM-VALOC-TEAM COMM-TIME-VALOC-TEAM COMM-INFO-VALOC-TEAM	Virginia local agencies & corridor study team ?
COMM-FORM-WVLOC-TEAM COMM-TIME-WVLOC-TEAM COMM-INFO-WVLOC-TEAM	West Virginia local agencies & corridor study team ?

Table B.6: Clarity of Regulatory Siting Requirements

Clarity	REGS-CLAR
Variables:	Questions
Precision of stated regulatory requirements PRECISION	What are the siting objectives and requirements ? What is the level of quantification ?
Priority ranking of the objectives to be attained PRIORITY	Are the priorities set ? To what extent are requirements ranked in terms of priority for corridor siting?

Table B.7: Technical Aspects of Siting Requirements

Technical aspects of siting requirements	REGS-TECHN
Variables:	Questions
Comprehensiveness of regulatory requirements SCOPE	Which factors and attributes are covered ?
Data requirements DATA	What are the data requirements ?
Corridor assessment & selection requirements METHOD	What are the corridors assessment and selection requirements ? What are the impact mitigation, monitoring requirements ?
Corridor study results presentation requirements MAPPING	What are the mapping requirements ?

Table B.8: Regulated Coordination of Actions in Corridor Siting

Regulated Coordination of Actions	REG-COORD
Variables:	Questions:
Regulated coordination of agencies'actions in the corridor siting study process -AGENCY	Which agencies are mandated to attain specified objectives and requirements ? Is the authority for attainment of regulatory requirements assigned to competent agencies and organizations? Do the regulations define procedures for attainment of objectives? Which procedures are mandated ? Do regulations define the timeframe for the procedures ? What is the timeframe for actions ?
Regulated coordination with bordering states BORDER-STATES	Are the regulations coordinated with regulations of bordering states? Which are the provisions that coordinate regulations with bordering states ?
Regulated coordination with federal permitting regulations -PERMITS-FED	Are the regulations coordinated with federal permitting regulations? What are the provisions that coordinate procedures with federal permitting regulations ?
Regulated coordination with state permitting regulations -PERMITS-STATE	Are the regulations coordinated with state permitting regulations? What are the provisions that coordinate procedures with other state permitting regulations ?
Regulated coordination with local permitting regulations -PERMITS-LOCAL	Are the regulations coordinated with local permitting regulations?What are the provisions that coordinate procedures with local permitting regulations ?

Table B.9: Regulated Participation and Evaluation in Siting Study

Regulated participation in the corridor siting study	REG-PARTIC
Variables:	Questions:
Forms and timing of regulated public participation in corridor siting -PUBLIC	What are the forms of regulated public participation ? What is the timing of regulated public participation ?
Form and timing of regulated access and evaluation by agencies in the corridor siting study -AGENCY	Do the regulations mandate participation and evaluation during the corridor siting study by agencies ? What are the forms of regulated independent evaluation ? What is the timing of participation and evaluation by organizations and agencies?

2. Data Sources

Agency Correspondence

The correspondence with the federal, state, and local agencies is stored in archives at Virginia Tech, Landscape Architecture Department. The letters listed here include letters from the agencies to the Virginia Tech corridor siting team.

CORRESPONDENCE WITH FEDERAL AGENCIES

National Park Service -- Appalachian Trail Project Office

- November 14, 1990
- February 20, August 2, 1991

U.S. Department of the Interior -- Fish and Wildlife Service
Endangered Species Program

- January 3, 1991

U.S. Department of Agriculture, Forest Service -- Jefferson National Forest (Virginia)

- December 3, 1990

National Park Service --New River Gorge National River
Gauley River National Recreation Area, Bluestone National Scenic River

- October 24, 1990

National Radio Astronomy Observatory, Green Bank, West Virginia

- May 24, 1991

U.S. Department of the Navy -- Office of the Navy Representative Federal Aviation Administration

- May 31, July 3, 1991

U.S. Department of the Army -- United States Army Research, Development, and Acquisition Information Systems Agency (Radford Virginia)

- January 7, 1991

U.S. Department of the Army, Radford Army Ammunition Plant

- February 13, 1991

CORRESPONDENCE WITH WEST VIRGINIA STATE AGENCIES

State of West Virginia -- Department of Commerce, Labor and Environmental Resources, Division of Natural Resources

- November 8, November 20, 1990
- January 11, January 26, February 28, March 8, June 27, 1991.
- February 1, March 28, April 8, 1994.

State of West Virginia -- Department of Commerce, Labor and Environmental Resources, Division of Tourism and Parks

-December 4, 1990.

The New River Parkway Authority, Hinton, West Virginia

January 25, 1991.

State of West Virginia -- Department of Education and the Arts Division of Culture and History

- April 11, June 23, 1991.

State of West Virginia -- Department of Transportation

- January 25,1994.

State of West Virginia -- Public Service Commission

- February 16, 1990.

CORRESPONDENCE WITH WEST VIRGINIA LOCAL AGENCIES

Region I Planning and Development Council, Princeton, West Virginia (McDowell, Mercer, Monroe, Raleigh, Summers, Wyoming Counties)

November 12, 1990.

CORRESPONDENCE WITH VIRGINIA STATE AGENCIES

Commonwealth of Virginia -- Department of Conservation and Recreation, Division of Natural Heritage

- November 1, 1990, November 14, 1990.
- March 5, April 22, June 21, September 30, 1991.

Commonwealth of Virginia -- Department of Forestry

- December 11, 1990.
- April 24, September 20, 1991.

Commonwealth of Virginia -- Department of Game and Inland Fisheries

- February 19, April 12, 1991.

Commonwealth of Virginia -- Department of Historic Resources

- November 8, 1990.

Commonwealth of Virginia -- Office of the Governor, Secretary of Natural Resources

- January 8, 1991.

Commonwealth of Virginia -- Council of Environment
- September 26, 1991.

CORRESPONDENCE WITH VIRGINIA LOCAL AGENCIES

Botetourt County Board of Supervisors

- November 28, 1990.
- June 3, 1991.

Bland County Board of Supervisors

- November 1, 1990.

County of Giles Board of Supervisors

- August 21, 1991.

Public Correspondence

The public correspondence is kept on file at Virginia Tech, Landscape Architecture Department. It contains letters from the concerned citizens and private organizations , and "Protest Forms" accompanied by letters. The listed correspondence is addressed to the Virginia Tech corridor siting team.

PRIVATE ORGANIZATIONS

- Roanoke Appalachian Trail Club, Member of the Appalachian Trail Conference, Roanoke, Va.

    - February 13, March 9, March 27, April 15, 1992.

- Southwest Virginia Hang Gliding Society.

    - March 13, 1991, Blacksburg, Va

- Blue Ridge Soaring Society.

    - Spring 1991, over 20 letters from members of Soaring Society.

- The Brooks Bird Club, Inc., Fairfax, Va

    - April 8, 1991.

- Sweet Springs Valley Water Company, Monroe County, WV.

    - May 6, 1991.

- Monroe County Historical Society, Union West Virginia.

    - June 1991.

- Roanoke Regional Preservation Department of Historic Resources, Roanoke, Va.

    - March 6, 1991.

GILES COUNTY VIRGINIA

- Fifteen "Protest Forms" and 1 letter, 1991.

ROANOKE COUNTY, VIRGINIA

- Ten "Protest Forms" and 2 letters, 1991.

MONTGOMERY COUNTY VIRGINIA

- Six "Protest Forms" and 4 letters, 1991.

CRAIG COUNTY, VIRGINIA

- Three hundred "Protest Forms" and 51 letters, 1990 and 1991.

SUMMERS COUNTY, WEST VIRGINIA

- Hundred "Protest Forms" and 14 letters, 1991.

MERCER COUNTY, WEST VIRGINIA

- Three letters, 1991.

WYOMING COUNTY WEST VIRGINIA

- Six "Protest Forms", and 3 letters, 1991.

MONROE COUNTY, WEST VIRGINIA

- About 1,300 "Protest Forms", and 123 letters, 1990, 1991.

<u>Minutes of Meetings with Agencies</u>

Start-up Meetings 1990

10.23.90	National Park Service, New River Gorge National River West Virginia Department of Natural Resources
10.25.90	US Forest Service, Jefferson National Forest, Roanoke Office
11.2.90	Appalachian Trail Conference US Forest Service, Jefferson National Forest, Roanoke Office National Park Service, Appalachian Trail Project Office
11.7.90	New River Parkway Authority

Information / Presentation Meetings, 1990-91

12.3.90	USFS, Jefferson National Forest, Roanoke Office, Landscape Architecture
12.4.90	West Virginia Parkways, Economic Development and Tourism Authority
12.10.90	Virginia Department of Historic Resources, Roanoke Office
1.25.91	USFS, Jefferson National Forest, National Park Service, New River Gorge National River National Park Service, Appalachian Trail Project Office
2.6.91.	National Park Service, New River Gorge National River

3.4.91	Roanoke County Planning Department
3.5.91	Botetourt County Planning Department
3.5.91	Craig County Administration
3.6.91	Virginia Department of Transportation, Christiansburg Residency
3.7.91	West Virginia Region 1 Planning and Development Council
3.8.91	Virginia Department of Transportation, Salem Residency
3.11.91	New River Valley Planning Commission
3.4.91	Montgomery County Planning Department
6.24.91	Roanoke County Planning Department
6.24.91	Botetourt County Planning Department Botetourt County Administration
6.24.91	Craig County Administration
6.27.91	Montgomery County Planning Department
6.27.91	New River Valley Planning Commission
6.27.91	West Virginia Region 1 Planning and Development Council

Corridors Review Evaluation Meetings 1991

7.12.91	US Army Corps of Engineers
7.17.91	Appalachian Trail Conference National Park Service, Appalachian Trail Project Office
7.19.91	US Forest Service, Jefferson National Forest, Roanoke Office
7.29.91	Appalachian Power Company, Roanoke Office
8.5.91	Appalachian Power Company, Roanoke Office
8.20.91	Roanoke County Administration Roanoke County Planning Office
12.17.91	Roanoke Appalachian Trail Club

Information/Review Meetings for the New
Northern Corridor Study, West Virginia

12.30.92	WV State Parks , Bluestone State Park. US Army Corps of Engineers
1.6.93	National Park Service, New River Gorge National River National Park

Key Telephone Interviews

DATE	AGENCY

1990

10.14.90	Appalachian Trail Conference, Harpers Ferry, West Virginia
10.14.90	National Park Service, New River Gorge National River
10.31.90	New River Parkway Authority
11.9.90	National Park Service, New River Gorge National River
11.13.90	Appalachian Trail Conference, Harpers Ferry, West Virginia
11.14.90	U. S. Forest Service, Jefferson National Forest
11.14.90	West Virginia Parkways, Tourism, and Economic Development Authority
11.15.90	U. S. Forest Service, Jefferson National Forest
11.20.90	The Nature Conservancy, Virginia Office
11.20.90	Appalachian Trail Conference, Martinsburg
11.21.90	The Nature Conservancy, Virginia Office
11.30.90	West Virginia Parkways, Tourism, and Economic Development Authority
11.30.90	U. S. Forest Service, Jefferson National Forest
12.10.90	Appalachian Trail Conference, Harpers Ferry, West Virginia
12.11.90	Appalachian Trail Conference, Harpers Ferry, West Virginia
12.13.90	National Park Service, New River Gorge National River
12.18.90	Appalachian Trail Conference, Newport, Virginia
12.21.90	Federal Aviation Administration
12.31.90	Federal Aviation Administration

1991

1.2.91	U. S. Forest Service, George Washington National Forest
1.3.91	Federal Aviation Administration
1.10.91	Virginia Department of Historic Resources, Roanoke Office
1.10.91	Federal Aviation Administration
1.14.91	National Park Service, New River Gorge National River
1.14.91	Federal Aviation Administration
1.22.91	Appalachian Trail Conference, Harpers Ferry, West Virginia
1.28.91	National Park Service, New River Gorge National River
2.4.91	Virginia Department of Historic Resources, Roanoke Office
2.15.91	Federal Aviation Administration

2.15.91	Virginia Department of Historic Resources, Roanoke Office
3.2.91	West Virginia Department of Education and the Arts, Division of Culture and History
3.11.91	U. S. Forest Service, Jefferson National Forest
3.13.91	U. S. Forest Service, Jefferson National Forest
4.5.91	U. S. Forest Service, Jefferson National Forest, Blacksburg
4.10.91	Virginia State Forest, Salem Office
4.26.91	Virginia Department of Historic Resources, Roanoke Office
5.1.91	U. S. Forest Service, Jefferson National Forest
7.26.91	Craig County Administrator
7.30.91	U. S. Forest Service, Jefferson National Forest
7.31.91	Roanoke County Department of Planning and Zoning
8.2.91	U. S. Forest Service, Jefferson National Forest
10.21.91	City of Roanoke, Office of Engineering
10.21.91	VPI Airport
10.25.91	Botetourt County Planning Department
10.30.91	Fifth Planning District Commission
11.6.91	Virginia Department of Transportation
11.7.91	Botetourt County Planning Department

1992

1.22.92	West Virginia Region I Planning and Development Council
1.24.92	U. S. Army Corps of Engineers
1.24.92	West Virginia Department of Natural Resources
1.27.92	U. S. Army Corps of Engineers
1.27.92	West Virginia Department of Natural Resources
5.29.92	Roanoke County Department of Planning and Zoning
5.29.92	Virginia Department of Historic Resources
12.31.92	U. S. Army Corps of Engineers
12.31.92	Bluestone Wildlife Management Area

1993

1.4.93	West Virginia Region I Planning and Development Council
1.4.93	National Park Service, New River Gorge National River
1.8.93	West Virginia Department of Education and the Arts, Division of Culture and History
3.31.93	National Park Service, New River Gorge National River
5.25.93	West Virginia Department of Education and the Arts, Division of Culture and History
5.27.93	West Virginia Department of Natural Resources
5.27.93	West Virginia Department of Recreation
5.28.93	Appalachian Trail Conference
5.28.93	The Nature Conservancy, West Virginia Office
5.28.93	New River Parkway Authority
6.3.93	Princeton/Mercer County Chamber of Commerce
6.4.93	Bluestone Visitors Bureau
6.4.93	Bluestone State Park

6.7.93	West Virginia Department of Transportation, Environmental Division
6.7.93	Monroe County Historical Society
6.8.93	West Virginia Department of Education and the Arts, Division of Culture and History
6.15.93	West Virginia Department of Education and the Arts, Division of Culture and History
6.18.93	West Virginia Department of Education and the Arts, Division of Culture and History
6.24.93	U. S. Forest Service, Jefferson National Forest
7.27.93	Wyoming County Schools
7.28.93	Raleigh County Board of Education
8.3.93	West Virginia Department of Education and the Arts, Division of Culture and History
8.5.93	West Virginia Department of Transportation
8.5.93	Raleigh County Board of Education
8.10.93	Wyoming County Schools
8.20.93	Monroe County School District
8.22.93	Summers County School District
8.26.93	U. S. Forest Service, Jefferson National Forest
8.30.93	Mercer County Schools
9.2.93	Mercer County Schools
9.10.93	Virginia Department of Conservation and Recreation, Division of Planning and Recreation Resources
10.1.93	U. S. Forest Service, Jefferson National Forest

1994

1.24.94	West Virginia Department of Natural Resources
1.31.94	U. S. Army Corps of Engineers
1.31.94	West Virginia Department of Education and the Arts, Division of Culture and History
3.15.94	U. S. Forest Service, Jefferson National Forest
3.31.94	West Virginia Rivers Coalition
4.4.94	National Park Service, New River National Gorge National River
4.4.94	U. S. Army Corps of Engineers

Siting Study Internal Documentation

- Mailing list including all persons, governmental agencies, organizations contacted.

- Progress reports, prepared by APCO's corridor siting study project manager.

- Progress reports, prepared by the Virginia Tech and WVU team.

- Minutes of the corridor siting team internal meetings.

- Notes on the Construction, Operation, and Maintenance Practices for 765 Kv Transmission Facilities, compiled from interviews with APCO Divisions, by Dr. William Shepherd and Zora Crnojacki, March 1991.

- High Voltage Transmission Line Public Survey, Martin Research Inc., Richmond, Roanoke, Norflok, April 1991.

- Printed materials about the project distributed by APCO in the public meetings, November 1990, and May 1991,

- Request for Proposals Preparation of an Environmental Impact Statement for A Proposal to Construct a 765kV Transmission Line across Portions of the Jefferson national Forest, Appalachian National Scenic Trail, the New River, and R. D. Bailey Lake Flowage Easement Land, USDA Forest Service Jefferson National Forest, November 22, 1991, Roanoke, Virginia.

- Application for Approval and Certification of Electric Transmission Lines Wyoming-Cloverdale 765 kV Line and Cloverdale 500 kV Bus Extension, Appalachian Power Company Before the Virginia State Corporation Commission, July 1991 and November 1991.

- Environmental Assessment with Mitigation for Wyoming-Cloverdale 765 kV Transmission Line Proposal, West Virginia Section, Appendix to Application filed with West Virginia Public Service Commission, June 1992.

- Environmental Assessment with Mitigation for Wyoming-Cloverdale 765 kV Transmission Line Proposal, West Virginia Section, Appendix to Application filed with West Virginia Public Service Commission, January 1993.

VIRGINIA SCC REGULATORY REVIEW DOCUMENTATION

- Cloverdale-Wyoming 765 Kv Project, Master List for Rebuttal Testimony.

- Transcripts from the SCC Hearings held on April 2,3 and 6 1992.

- Memos concerning the rebuttal testimony May 1992 (APCO, Team, Woods, Rogers & Hazelgrove)

- Testimony and Exhibits, Protest of Appalachian Trail Club, Inc, Gentry Locke Rakes & Moore, Attorneys at Law, May 15, 1992.

- Testimony Filed with Virginia SCC, on Behalf of Citizens for the Preservation of Craig County, Stephen A. Isaac Attorney and Counselor at Law, May 18, 1992.

- Supplemental Rebuttal Testimony,filed with Virginia SCC by APCO, September 1, 1993.

- Transcripts of testimonies from the Hearings, Virginia SCC, September 14, 1993

- "Cloverdale-Wyoming 765 Kv Project SCC Hearing Examiner's Report", Virginia SCC, December 2, 1993.

- Press release, December 2, 1993, "Appalachian Power Expresses Satisfaction with SCC Hearing Examiner's Recommendation", APCO.

WEST VIRGINIA LEGAL DOCUMENTATION

- Petition of Common Ground, Inc., for Leave to Intervene, filed with WV PSC, February 23, 1993.

- Motion to Dismiss the Application with two supporting memoranda, February 23, 1993:

1. Memorandum in Support of Motion to Dismiss the Application for failure to Comply with CSR 150-3-9.02(1)(a)

2. Memorandum in Support of Motion to Dismiss the Application for failure to Comply with CSR 150-3-9.02(1)(g).

- R Ethelson Petition to Intervene and Request for Dismissal of Appalachian Power Company's Application for a Certificate of Public Convenience and Necessity, filed with WV PSC, March 3, 1993.

- Response of Appalachian Power Company to Common Ground Inc.'s Motion to Dismiss and Supporting memoranda, filed with WV PSC, March 23, 1993.

- Response of Appalachian Power Company to Richard Ethelson's request for Dismissal of the Company's Application, submitted to WV PSC, April 22, 1993.

- Amended Motion for Dismissal of Appalachian Power Company's Application, May 10, 1993.

- Public Service Commission of West Virginia, Commissions Order to Dismiss the Pending Application, May 10, 1993.

RESOLUTIONS, TESTIMONIES, LEGISLATION IN REACTION TO THE PROJECT

- West Virginia House resolution No. 22 proposed by delegate Mary Compton, Seventieth Legislature of West Virginia, First Regular Session, March 8, 1991, Charleston WV, "Recognizing Monroe's County Zenith-Sweet Spring Valley as a special natural resources for residents of the State and visitors alike.

- Final version of West Virginia HCR 41, New River Wild and Scenic River Eligibility Study Act proposed, March 8, 1992.

- Testimony of James W McNeely, before the Subcommittee on National Parks and Public Lands in Support of HR 5021 The New River Wild and Scenic Study Act of 1992, June 30, 1992.

- Testimony of Robert W Zacher , Executive Director of Common Ground Inc., before the Subcommittee on National Parks and Public Lands in Support of HR 5021 The New River Wild and Scenic Study Act of 1992, June 3, 1992.

- Testimony of Hon Mary Pearl Compton of Monroe County, West Virginia before the Subcommittee on National Parks and Public Lands in Support of HR 5021 The New River Wild and Scenic Study Act of 1992, June 3, 1992.

- H.R. 5021 introduced by Representative Rahall, New River Wild and Scenic River Eligibility Study Bill.

Newspaper Coverage, 1991.

The clippings of the articles from the following papers are on file at Virginia Tech, Landscape Architecture Department:

VIRGINIA:

- New Castle Record, 38 clippings.
- Roanoke Times & World News, 24 clippings.
- The Virginia Leader, 27 clippings
- Virginian Review, 5 clippings.
- New River Free Press, 2 clippings.
- Salem Times Register, 3 clippings.
- The News Messenger, 2 clippings.
- Richmond Times Dispatch, 1 clipping.

WEST VIRGINIA

- Mountain Messenger, 43 clippings.
- Register Herald, 59 clippings.
- Hinton News, 23 clippings.
- The Independent- Herald, 8 clippings.

- The Monroe Watchman, 4 clippings.

- Logan, WV Banner, 1 clipping.

- Daily Telegraph, 1 clipping.

- Lewisburg News, WV, i clipping.

- The Welch Daily News, 3 clippings.

The chronological list of the articles, by newspaper, and title is also kept on file at Virginia Tech, Landscape Architecture Department. The existing record covers completely year of 1991.

Questionnaires

Originally four questionnaires were designed. The objective of questionnaires was to solicit data from:

- the corridor siting team
- APCO
- Virginia State Corporation Commission
- West Virginia Public Service Commission.

The West Virginia Commission did not cocperate, so that the data could not be obtained. The questionnaires were self-administered (the corridor siting team, and Virginia Commission) and responded to through an interview (APCO) during May and early June of 1994.

Questionnaire - Virginia SCC

I. BACKGROUND INFORMATION

- What is the organizational structure of Va SCC ?

- When was the SCC established ? By which legislation ?

- What is the common sequence of events in the electric transmission line application review and certification ?

- What is the average length of the electric transmission line application regulatory review and certification ?

- How many and which applications have been received recently (e.g last 5 or 10 years) ?

- How many and which applications have been returned for additional information or studies before the review started ?

- What were the reasons for the applications return ?

- How long did it usually take for an incomplete application to be filed again ?

- How many and which applications have been approved recently (e.g. last 5 or 10 years) ?

- How many and which applications have been denied recently (e.g last 5 or 10 years) ?

- What were the reasons for the applications denial ?

- In which cases were the application decisions appealed ?

- What were the outcomes of the appeals ?

- What is the expertise of the SCC staff involved in transmission line application review ?

- What is the expertise of staff dealing with environmental issues in certification ?

- What is the background of experts consulted in the environmental review of the Wyoming-Cloverdale application?

- What activities describe the role of VA SCC in the Wyoming-Cloverdale corridor siting process ?

II. VA SCC COMMUNICATION WITH AGENCIES AND ORGANIZATIONS DURING THE WYOMING-CLOVERDALE CORRIDOR SITING STUDY PROCESS

COMMUNICATION WITH APCO

-How often the SCC and APCO communicated (formally and/or informally):

- after the Wyoming-Cloverdale project was introduced, just before the corridor siting study started ?

- during the corridor study ?

- after the application is filed ?

- What was the nature and format of formal and informal communication ?

- How effective was the communication with APCO, in terms of forms, timing, and information exchanged ?

COMMUNICATION WITH WV PSC

- How often the SCC communicated with the West Virginia PSC (formally and/or informally):

  - after the Wyoming-Cloverdale project was introduced, just before the corridor siting study started ?

  - during the corridor study ?

  - after the application is filed ?

-What was the nature and format of formal and informal communication ?

- How effective was the communication with WV PSC, in terms of forms, timing, and information exchanged ?

COMMUNICATION WITH FEDERAL AGENCIES

- How often the SCC communicated with federal agencies (formally and/or informally):

  - after the Wyoming-Cloverdale project was introduced, just before the corridor siting study started ?

  - during the corridor study ?

  - after the application is filed ?

- What was the nature and format of formal and informal communication ?

- How effective was the communication with federal agencies, in terms of forms, timing, and information exchanged ?

COMMUNICATION WITH VIRGINIA STATE AGENCIES

- How often the SCC communicated with Virginia state agencies (formally and/or informally):

  - after the Wyoming-Cloverdale project was introduced, just before the corridor siting study started ?

  - during the corridor study ?

  - after the application is filed ?

- What was the nature and format of formal and informal communication ?

- How effective was the communication with Virginia state agencies, in terms of forms, timing, and information exchange ?

COMMUNICATION WITH VIRGINIA LOCAL AGENCIES

- How often the SCC communicated with Virginia local agencies (formally and informally):

  - after the Wyoming-Cloverdale project was introduced, before the corridor siting study started ?

  - during the corridor study ?

  - after the application is filed ?

- What was the nature of formal and informal communication ?

- How effective was the communication with Virginia local agencies, in terms of forms, timing, and information exchanged ?

III. INSIGHTS INTO THE WYOMING-CLOVERDALE PROJECT

- What are in your opinion the elements that distinguish this project from others ?

- What are the milestone events in the corridor siting study ?

- Any other comments ?

Questionnaire: APCO

I. BACKGROUND INFORMATION

1. What is the organizational structure of APCO ? A chart ?

2. Which divisions are directly involved in the Wyoming-Cloverdale corridor siting study ?

3. New 345 kV and 765 kV lines the company proposed in the last 5 or 10 years ?

4. How many and which of these lines have been approved ?

5. How many and which of these lines have been denied ? For which reasons ?

6. What is the expertise of APCO's staff involved in the Wyoming-Cloverdale project ?

II. COMMUNICATION DURING THE WYOMING - CLOVERDALE PROJECT

1. What was the timing, form and content of communication between APCO and VIRGINIA SCC ?
   - during the corridor siting study ?
   - after the application was filed ?

2. In your opinion, how effective was the communication with the SCC ?

3. What was the timing, form and content of communication between APCO and WEST VIRGINIA PSC ?
   - during the corridor siting study ?
   - after the application was filed ?

4. In your opinion, how effective was the communication with the West Virginia PSC ?

III. MEDIA COVERAGE

1. What is your comment on media coverage of the project in Virginia ?

2. What is your comment on media coverage of the projects in West Virginia ?

IV. VIRGINIA AND WEST VIRGINIA REGULATIONS

1. Which state regulations are more specific and easier to interpret ? Comments ?

2. Which regulations are more comprehensive in terms of scope of natural resources environmental requirements ? Comments ?

3. Which regulations are more demanding in terms of data collection requirements ? Comments ?

4. Which regulations are more specific and inclusive in terms of impact mitigation techniques requirements ? Comments ?

5. Which regulations are more specific and adequate in terms of mapping requirements ? Comments ?

V. INSIGHTS INTO THE WYOMING-CLOVERDALE PROJECT

1. What elements distinguish this project from others ?

2. What are the milestone events in the corridor siting study process ?

3. Any other comments ?

Questionnaire - Corridor Siting Team

I. ROLES AND ACTIVITIES OF PARTICIPATING ORGANIZATIONS

- What activities describe the role of APCO:

    - in corridor siting ?
    - in certification ?

- What activities describe the role of the team ?

    - in corridor siting ?
    - in certification ?

- What activities describe the role of federal energy agencies:

    - in corridor siting ?
    - in certification ?

- What activities describe the role of federal natural resources management agencies:

    - in corridor siting ?
    - in certification ?

- What activities describe the role of Va state agencies:

    - in corridor siting ?
    - certification ?

- What activities describe the role of Virginia local agencies:

    - in corridor siting ?
    - in certification ?

- What activities describe the role of West Virginia state agencies:

    - in corridor siting ?
    - certification ?

- What activities describe the role of West Virginia local agencies:

    - in corridor siting ?
    - in certification ?

II. COMMUNICATION

- What are the forms, timing, and content of information exchange in communication with APCO :

    - before the corridor siting study started ?
    - in the course of the corridor study ?
    - after the application is submitted ?

- How effective was the communication with APCO, in terms of forms, timing and information exchange ?

- What are the forms, timing, and content of information exchange in communication with federal agencies:

  - before the corridor siting study started ?
  - in the course of the corridor study ?
  - after the application is submitted ?

- How effective was the communication with federal agencies, in terms of forms, timing and information exchange ?

- What are the forms, timing, and content of information exchange in communication with Virginia state agencies:

  - before the corridor siting study started ?
  - in the course of the corridor study ?
  - after the application is submitted ?

- How effective was the communication with Virginia state agencies,in terms of forms, timing and information exchange?

- What are the forms, timing, and content of information exchange in communication with Virginia local agencies:

  - before the corridor siting study started ?
  - in the course of the corridor study ?
  - after the application is submitted ?

- How effective was the communication with Virginia local agencies, in terms of forms, timing and information exchange ?

- What are the forms, timing, and content of information exchange in communication with West Virginia state agencies:

  - before the corridor siting study started ?
  - in the course of the corridor study ?
  - after the application is submitted ?

- How effective was the communication with West Virginia state agencies, in terms of forms, timing and information exchange ?

- What are the forms, timing, and content of information exchange in communication with West Virginia local agencies:

  - before the corridor siting study started ?
  - in the course of the corridor study ?
  - after the application is submitted ?

- How effective was as the communication with West Virginia local agencies, in terms of forms timing and information exchange ?

IV. MEDIA COVERAGE

- What is your opinion of media coverage of the project in Virginia ?

- What is your opinion on media coverage of the projects in West Virginia ?

IV. PUBLIC PARTICIPATION

- What is your opinion on forms of public participation in the siting study?

-What is your opinion on the timetable of public participation in the siting study ?

- What do you think of issues raised by:

  - the Virginia opposition to the line ?
  - the West Virginia opposition to the line ?

- What do you think of activities and strategies of the:

  - the Virginia opposition groups ?
  - the West Virginia opposition groups ?

V. VIRGINIA AND WEST VIRGINIA REGULATIONS

CLARITY

What is your opinion on clarity of the natural resources regulatory requirements in Virginia terms of:

- specificity ?
- required level of quantification ?
- priority ranking ?

What is your opinion on clarity of the natural resources regulatory requirements in West Virginia in terms of:

- specificity ?
- required level of quantification ?
- priority ranking ?

TECHNICAL ASPECTS

What is your opinion on technical aspects of the Virginia regulations in terms of:

- scope of corridor siting requirements ?
- data collection requirements ?
- corridor assessment and selection requirements ?
- impact mitigation requirements ?
- mapping requirements ?
- general application format requirements ?

What is your opinion on technical aspects of the West Virginia regulations in terms of:

- scope of corridor siting requirements ?
- data collection requirements ?
- corridor assessment and selection requirements ?
- impact mitigation requirements ?
- mapping requirements ?
- general application format requirements ?

REGULATED COORDINATION OF ACTIONS IN CORRIDOR SITING STUDY

What is your opinion on the Virginia regulatory requirements that:

- coordinate actions of agencies and organizations in the siting study ?
- define timetable for actions of participating agencies and organizations ?
- coordinate with West Virginia regulatory process ?
- coordinate with federal legislation ?
- coordinate with Virginia state legislation ?
- coordinate with Virginia local legislation ?

What is your opinion on the West Virginia regulatory requirements that:

- coordinate actions of agencies and organizations in the siting study ?
- define timetable for actions of participating agencies and organizations ?
- coordinate with Virginia regulatory process ?
- coordinate with federal legislation ?
- coordinate with West Virginia state legislation ?
- coordinate with West Virginia local legislation ?

REGULATED PARTICIPATION IN THE CORRIDOR SITING STUDY

What is your opinion on regulated participation in the corridor siting study in Virginia in terms of:

- forms and timing of regulated public participation ?
- forms and timing of regulated agency participation?
- regulatory provisions for independent evaluation of the corridor study intermediate and final results by agencies ?

What is your opinion on regulated participation in the corridor siting study in Virginia in terms of:

- forms and timing of regulated public participation ?
- forms and timing of regulated agency participation ?
- regulatory provisions for independent evaluation of the corridor study intermediate and final results by agencies ?

VI. INSIGHTS INTO THE WYOMING-CLOVERDALE PROJECT

- What are the elements that distinguish this project from others ?

- What are the milestone events in the corridor siting study process ?

- Any other comments on the project process ?

Table B.10: Source of Evidence: QUESTIONNAIRE, VIRGINIA SCC

Variables	
PUBLIC AND INSTITUTIONAL CONSIDERATIONS	CONTEXT
Characteristics of Participating Organizations:	Communication among Organizations:
EXP-VA-SCC ROLE-VA-SCC	COMM-FORM-VA-SCC-APCO COMM-TIME-VA-SCC-APCO COMM-INFO-VA-SCC-APCO COMM-FORM-VA-SCC-WV-PSC COMM-TIME-VA-SCC-WV-PSC COMM-INFO-VA-SCC-WV-PSC COMM-FORM-VA-SCC-FED COMM-TIME-VA-SCC-FED COMM-INFO-VA-SCC-FED COMM-TIME-VA-SCC-STATE COMM-FORM-VA-SCC-STATE COMM-INFO-VA-SCC-STATE COMM-TIME-VA-SCC-LOC COMM-FORM-VA-SCC-LOC COMM-INFO-VA-SCC-LOC
APPLICATIONS	REVIEW AND CERTIFICATION STATUS
VA-APPL-RECEIVED VA-APPL-RETURNED VA-APPL-RETURNED-REASONS	VA-APPL-APPROVED VA-APPL-DENIED VA-APPL-DENIED-GROUNDS VA-SCC-DECISION-APPEALED

Table B.11: Source of Evidence: INTERVIEW, APCO

Variables	
PUBLIC AND INSTITUTIONAL CONSIDERATIONS	CONTEXT
Characteristics of Participating Organizations:	Communication among Organizations:
EXP-APCO	COMM-FORM-VA-SCC-APCO COMM-TIME-VA-SCC-APCO COMM-INFO-VA-SCC-APCO COMM-FORM-WV-PSC-APCO COMM-TIME-WV-PSC-APCO COMM-INFO-WV-PSC-APCO
Attitudes towards Virginia & West Virginia Regulations	Media Coverage:
ATTITUDE-APCO-VA-REGS-CLARITY ATTITUDE-APCO-VA-REGS-TECHNICAL ATTITUDE-APCO-VA-REGS-COORD ATTITUDE-APCO-VA-REGS-PARTIC-PUBLIC ATTITUDE-APCO-VA-REGS-PARTIC-AGENCY ATTITUDE-APCO-WV-REGS-CLARITY ATTITUDE-APCO-WV-REGS-TECHNICAL ATTITUDE-APCO-WV-REGS-COORD ATTITUDE-APCO-WV-REGS-PARTIC-PUBLIC	MEDIA-DIR-VA MEDIA-DIR-WV MEDIA-DYNAM
Background Information : experience with previous projects, insights into the Wyoming-Cloverdale Project	

Table B.12: Source of Evidence: INTERVIEW, SITING TEAM

Variables	
PUBLIC AND INSTITUTIONAL CONSIDERATIONS	CONTEXT
Characteristics of Participating Organizations:	Communication among Organizations:
EXP-TEAM ROLE-APCO ROLE-TEAM ROLE-FED ROLE-VA-STATE ROLE-WV-STATE ROLE-VA-LOC ROLE-WV-LOC	COMM-FORM-APCO-TEAM COMM-TIME-APCO-TEAM COMM-INFO-APCO-TEAM COMM-FORM-FED-TEAM COMM-TIME-FED-TEAM COMM-INFO-FED-TEAM COMM-TIME-VA-STATE-TEAM COMM-FORM-VA-STATE-TEAM COMM-INFO-VA-STATE-TEAM COMM-TIME-VA-LOC-TEAM COMM-FORM-VA-LOC-TEAM COMM-INFO-VA-LOC-TEAM COMM-TIME-WV-STATE-TEAM COMM-FORM-WV-STATE-TEAM COMM-INFO-WV-STATE-TEAM COMM-TIME-WV-LOC-TEAM COMM-FORM-WV-LOC-TEAM COMM-INFO-WV-LOC-TEAM
Attitudes towards Virginia and West Virginia Regulations	Media Coverage:
ATTITUDE-TEAM-VA-REGS ATTITUDE-TEAM-WV-REGS	MEDIA-DIR-VA MEDIA-DIR-WV MEDIA-DYNAM
	Public Participation
	PARTIC-FORM **PARTIC-TIME** **PARTIC-INFO-GIVEN-BY-APCO** **PARTIC-INFO-ASKED-FROM-APCO** **PARTIC-INFO-ASKED-FROM-PUBLIC** **PARTIC-INFO-GIVEN-BY-PUBLIC** **PARTIC-INFO-USED-BY-APCO** **OPPOS-GROUP-BACKGROUND-VA** **OPPOS-GROUP-BACKGROUND-WV** **OPPOS-ISSUES-VA** **OPPOS-ISSUES-WV** **OPPOS-ACT-VA** **OPPOS-ACT-WV**

Table B.13: Source of Evidence: AGENCY CORRESPONDENCE

Variables
TECHNICAL CONSIDERATIONS IN SITING
Characteristics of Participating Organizations:
DATA-MAP-SOURCES DATA-MAP-UPDATE-VERIF DATA-MAP-ACCURACY DATA-MAP-DETAIL
Communication among Organizations:
COMM-FORM-FED-TEAM COMM-TIME-FED-TEAM COMM-INFO-FED-TEAM COMM-TIME-VA-STATE-TEAM COMM-FORM-VA-STATE-TEAM COMM-INFO-VA-STATE-TEAM COMM-TIME-VA-LOC-TEAM COMM-FORM-VA-LOC-TEAM COMM-INFO-VA-LOC-TEAM COMM-TIME-WV-STATE-TEAM COMM-FORM-WV-STATE-TEAM COMM-INFO-WV-STATE-TEAM COMM-TIME-WV-LOC-TEAM COMM-FORM-WV-LOC-TEAM COMM-INFO-WV-LOC-TEAM
Attitudes towards the Project:
ATTITUDE-PROJ-FED ATTITUDE-PROJ-VA-STATE ATTITUDE-PROJ-WV-STATE ATTITUDE-PROJ-VA-LOC ATTITUDE-PROJ-WV-LOC

Table B.14: Source of Evidence: PUBLIC CORRESPONDENCE

Variables
PUBLIC AND ISTITUTIONAL CONSIDERATIONS
Public Participation:
PARTIC-INFO-GIVEN-BY-APCO PARTIC-INFO-ASKED-FROM-APCO PARTIC-INFO-ASKED-FROM-PUBLIC PARTIC-INFO-GIVEN-BY-PUBLIC PARTIC-INFO-USED-BY-APCO OPPOS-GROUP-BACKGROUND-VA OPPOS-GROUP-BACKGROUND-WV OPPOS-ISSUES-VA OPPOS-ISSUES-WV OPPOS-ACT-VA OPPOS-ACT-WV

Table B.15: Source of Evidence: MINUTES OF MEETINGS, AGENCIES

Variables
PUBLIC AND INSTITUTIONAL CONSIDERATIONS
Communication among Organizations:
COMM-FORM-FED-TEAM COMM-TIME-FED-TEAM COMM-INFO-FED-TEAM COMM-TIME-VA-STATE-TEAM COMM-FORM-VA-STATE-TEAM COMM-INFO-VA-STATE-TEAM COMM-TIME-VA-LOC-TEAM COMM-FORM-VA-LOC-TEAM COMM-INFO-VA-LOC-TEAM COMM-TIME-WV-STATE-TEAM COMM-FORM-WV-STATE-TEAM COMM-INFO-WV-STATE-TEAM COMM-TIME-WV-LOC-TEAM COMM-FORM-WV-LOC-TEAM COMM-INFO-WV-LOC-TEAM
Attitudes towards the Project:
ATTITUDE-PROJ-FED ATTITUDE-PROJ-VA-STATE ATTITUDE-PROJ-WV-STATE ATTITUDE-PROJ-VA-LOC ATTITUDE-PROJ-WV-LOC

Table B.16: Sources of Evidence: SITING STUDY INTERNAL DOCUMENTS AND PARTICIPANT OBSERVATION NOTES

Variables	
Technical Considerations in Siting	**Communication among Organizations:**
GEN-APPROACH-ORGANIZAT GEN-APPROACH-SCALE GEN-APPROACH-COMPREHEN ENVR-ASSMNT-PREDICTION-TECHN ENVR-ASSMNT-IMPACT-MEASURE ENVR-ASSESSMNT-IMPACT-SIGNIF DATA-MAP-SOURCES DATA-MAP-UPDATE-VERIF DATA-MAP-ACCURACY DATA-MAP-DETAIL-MAP	COMM-FORM-APCO-TEAM COMM-TIME-APCO-TEAM COMM-INFO-APCO-TEAM COMM-FORM-FED-TEAM COMM-TIME-FED-TEAM COMM-INFO-FED-TEAM COMM-TIME-VA-STATE-TEAM COMM-FORM-VA-STATE-TEAM COMM-INFO-VA-STATE-TEAM COMM-TIME-VA-LOC-TEAM COMM-FORM-VA-LOC-TEAM COMM-INFO-VA-LOC-TEAM COMM-TIME-WV-STATE-TEAM COMM-FORM-WV-STATE-TEAM COMM-INFO-WV-STATE-TEAM COMM-TIME-WV-LOC-TEAM COMM-FORM-WV-LOC-TEAM COMM-INFO-WV-LOC-TEAM
Attitudes of Participating Organizations:	**Public Participation:**
ATTITUDE-TEAM-VA-REGS-CLARITY ATTITUDE-TEAM-VA-REGS-TECHNICAL ATTITUDE-TEAM-VA-REGS-COORD ATTITUDE-TEAM-VA-REGS-PARTIC-PUBLIC ATTITUDE-TEAM-VA-REGS-PARTIC-AGENCY ATTITUDE-TEAM-WV-REGS-CLARITY ATTITUDE-TEAM-WV-REGS-TECHNICAL ATTITUDE-TEAM-WV-REGS-COORD ATTITUDE-TEAM-WV-REGS-PARTIC-PUBLIC ATTITUDE-TEAM-WV-REGS-PARTIC-AGENCY	PARTIC-FORMS PARTIC-TIME PARTIC-INFO-GIVEN-BY-APCO PARTIC-INFO-ASKED-FROM-APCO PARTIC-INFO-ASKED-FROM-PUBLIC PARTIC-INFO-GIVEN-BY-PUBLIC PARTIC-INFO-USED-BY-APCO OPPOS-GROUP-BACKGROUND-VA OPPOS-GROUP-BACKGROUND-WV OPPOS-ISSUES-VA OPPOS-ISSUES-WV OPPOS-ACT-VA OPPOS-ACT-WV

Table B.17: Source of Evidence: NEWSPAPER COVERAGE

Variables
PUBLIC AND INSTITUTIONAL CONSIDERATIONS
Media Coverage:
MEDIA DIR-VA MEDIA-INT-VA MEDIA-DIR-WV MEDIA-INT-WV MEDIA-DYNAM
Public Participation:
OPPOS-GROUP-BACKGROUND-VA OPPOS-GROUP-BACKGROUND-WV OPPOS-ISSUES-VA OPPOS-ISSUES-WV OPPOS-ACT-VA OPPOS-ACT-WV
Attitudes Towards the Project:
ATTITUDE-PROJ-FED ATTITUDE-PROJ-VA-STATE ATTITUDE-PROJ-WV-STATE ATTITUDE-PROJ-VA-LOC ATTITUDE-PROJ-WV-LOC

Table B.18: Source of Evidence: LEGAL DOCUMENTS

Variables	
STATE	REGULATIONS
Clarity of regulations:	Technical Aspects of Regulations:
REGS-CLAR-PREC REGS-CLAR-PRIORITY	REGS-TECH-SCOPE REGS-TECH-DATA REGS-TECH-METHOD REGS-TECH-PRESENT
Regulated Coordination:	Regulated Participation:
REG-COORD-AGENCY REG-COORD-OTHER-STATES REG-COORD-PERMITS-FED REG-COORD-PERMITS-STATE REG-COORD-PERMITS-LOC	REG-PARTIC-PUBLIC REG-PARTIC-AGENCY REG-PARTIC-AGENCY-TIME

4. Wyoming-Cloverdale Project Background

The Appalachian Power Company (APCO) with headquarters in Roanoke, Virginia, is one of eight American Electric Power (AEP) Company's subsidiaries. The AEP system serves over seven million people in Michigan, Indiana, Ohio, Kentucky, West Virginia and Virginia (see Figure 1). The APCO transmission system is an integral part of the large AEP network. It is organized into northern, central, and eastern service areas (see Figure 2). The APCO system is interconnected with systems of Virginia Power Company (VP), Tennessee Valley Authority (TVA), Carolina Power and Light Company, Duke Power Company, and with Kentucky Power Company.

The following factors have influenced the decision to propose the new line between Wyoming substation (Wyoming County, West Virginia) and Cloverdale substation (Botetour County, Virginia): (1) the projected increase of the electricity demand in northern Virginia outside APCO service area, (2) the projected increase in electricity demand in portions of central and eastern APCO service areas, (3) the insufficient generating capacities in both APCO and VP service areas, (4) the surplus of generating capacities within the AEP system, (5) insufficient transmission capacities to transfer the surplus of electricity to the areas of increased demand, (6) decline in the reliability of the existing transmission lines within the APCO service areas.

The Wyoming-Cloverdale 765 kV transmission line will be interconnected with neighboring VP system in northern Virginia, via 88 miles of 500 kV Joshua Falls-Elmont and 14 miles of Dooms-Ladysmith transmission lines (see Figure 3). The Wyoming-Cloverdale proposed preferred and alternative corridors cross the central service area (Wyoming, Summers, Mercer, Monroe Counties, West Virginia) and the eastern service area (Craig, Giles, Botetour Counties, Virginia).

The line would have approximately 464 towers (4 towers per mile), with tower height between 87 and 187 feet, and 200 feet wide right-of-way. The minimum clearance between ground and conductors will be 44 feet. Gyed-V and self-supporting towers will be used (see Figure 4). The estimated life of the line is about 50 years. In addition, 3,100 feet long 500 kV bus extension is proposed as a part of the transmission extension.

The entire study area lays within the Appalachian region. The West Virginia study area may be subdivided, according to its physiography, into four distinctive areas going from west to east: coalfields/deeply dissected plateau , upland plateau, Greenbriar drainage basin, and a small area in Mercer County with characteristics of mountain and valley. The coalfields/deeply dissected plateau, in the western part of the area, imposed the least potential constraints for transmission corridor siting. Landscape of this province is disturbed and scarred by numerous active and abandoned coal strip mines. Many small coal mining settlements are situated in hollows and along the roads. The upland Appalachian plateau and Greenbriar basin physiographic provinces have a rural character and are rich in scenic and natural resources. Touristic and recreation potential of the areas are remarkable, while the population density is relatively low, and farming is main economic activity.

Most of the study area in Virginia belongs to the mountain and valley physiographic province, while smaller southeast portion of the Virginia study area lies within great valley province.

The mountain and valley province is a dissected plateau of rolling hills with well defined drainage pattern. The area has exceptional scenic qualities with rural pastoral character and a tourist and recreation potential.

Small southeastern portion of the Virginia study area whihc lies in great valley province, is an elevated plateau, located between the Blue Ridge and Allegheny mountain chains. Most of the great valley province in Virginia study area was excluded from further study because of dense settlement patterns.

The initial study area was refined by distinguishing two categories of resources: (1) Exclusion zones where the transmission corridor siting would not be further considered (see Figure 5), and (2) Critical areas sensitive to corridor siting, but where the transmission line land use is not preempted (see Figure 6).

Virginia State Corporation Commission Regulations

In order to acquire a certificate of Convenience and Necessity, the utility company (applicant) files an application for a transmission line construction. Thirty days after the filing the applicant should issue a public notice describing the proposed project.

On May 10, 1991, about eight months after the Wyoming-Cloverdale study started, Division of Energy Regulation of SCC, issued "Guidelines of Minimum Requirements for Transmission Line Applications Filed Under Virginia Code Section 56-46.1 and The Utility Facilities Act". The guidelines, were followed throughout the siting study. The nine page document defines the content of the applications for overhead and underground transmission lines, and switching stations and substations. It directs the applicant to document the need for the project, and to provide a map and description of alternative corridors, adjacent highways, streets, parks, recreational areas, schools, convalescent centers, hospitals, airports. The proposed corridors should be mapped on Virginia Highway Map sheets for each County traversed. The method of the corridor selection should be described.

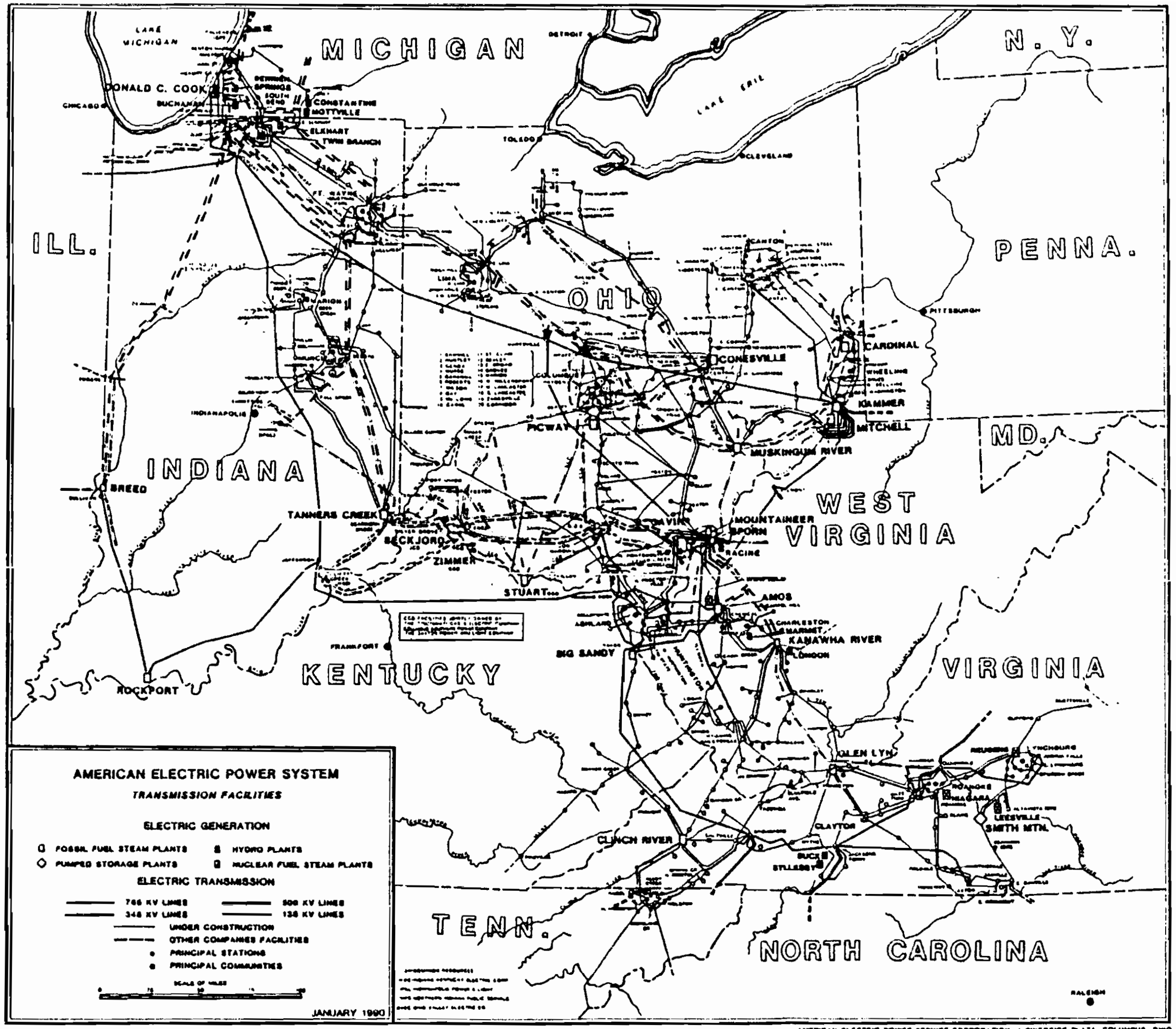

Figure 1: American Electric Power System (Source: Wyoming-Cloverdale Study Archives)

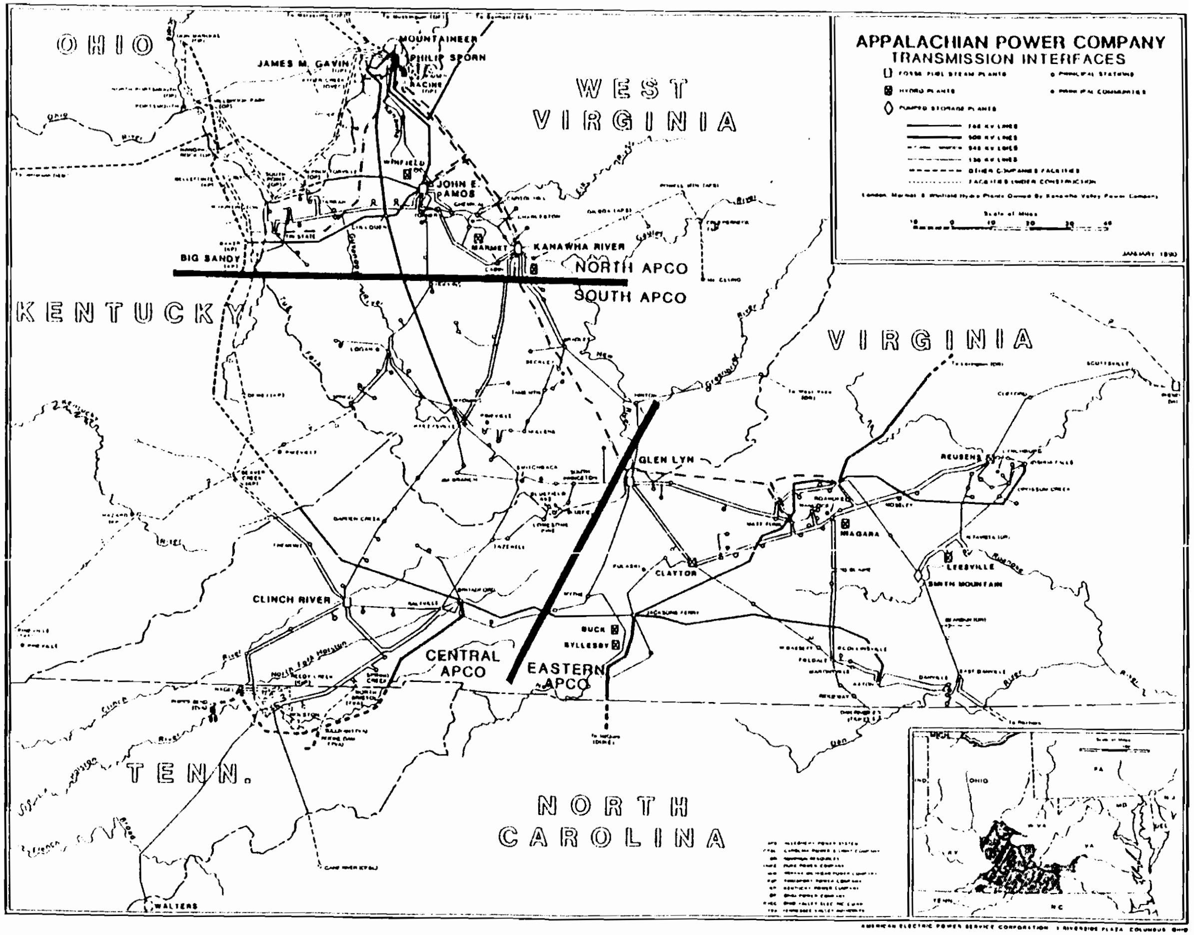

Figure 2: APCO Service Areas (Source: Wyoming-Cloverdale Study Archives)

AEP APPALACHIAN POWER

PROPOSED TRANSMISSION LINE PROJECT

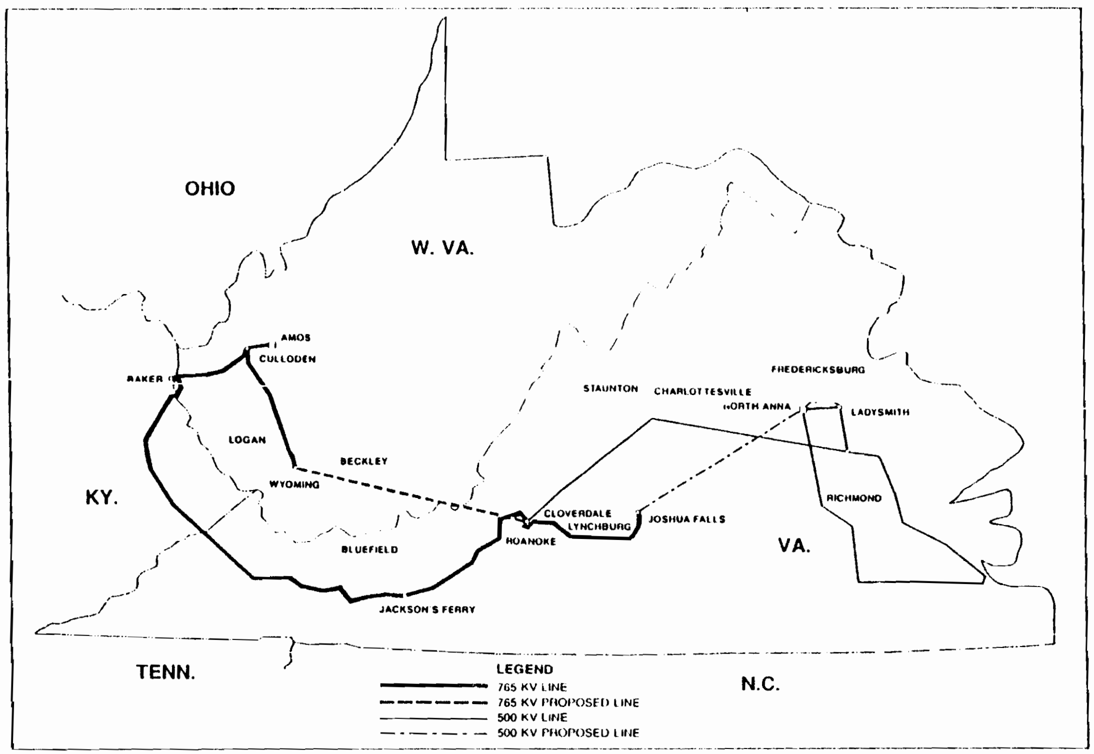

Figure 3: General Location of the Proposed Project (Source: Wyoming-Cloverdale Study Archives)

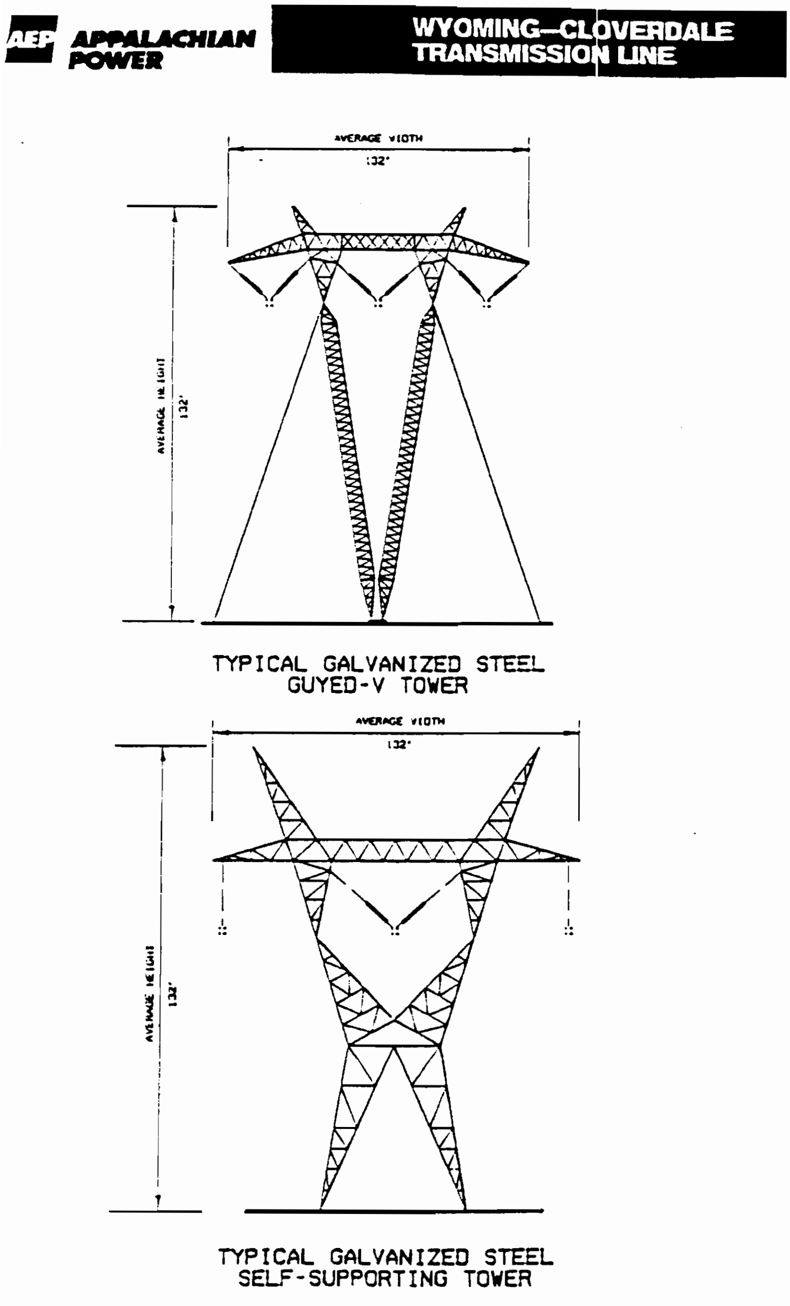

Figure 4: Tower Types for the Proposed Project

(Source: Wyoming-Cloverdale Study Archives)

In addition, full compliance with the FERC "Guidelines for the Protection of Natural, Historic, Scenic, and Recreational Values in the Design and Location of Rights-of-Way and Transmission Facilities" is to be demonstrated[5]. The guidelines, written more than twenty years ago, very generally deal with the route selection, choice of towers and overhead lines location, the maintenance and clearing of rights-of-way. The guidelines recommend: avoidance of designated historic, scenic, wildlife, recreational areas, avoidance of prime and scenic woodlands, steep slopes, highways, minimizing land use conflicts and vegetation clearing, mitigation of erosion and sedimentation, minimizing visual intrusion by corridor selection and vegetation clearing and maintenance within the rights-of-way. It also advises that if the line crosses federally, state and locally managed lands the appropriate agencies be contacted early in the planning process. A description of engineering design and operational features, as well as right-of-way profile should be submitted. The compliance with National Electrical Safety Code should be demonstrated. Potential adverse impacts on scenic, environmental and historic resources should include: paralleling to existing transmission lines, railroads, highways, and pipelines; dwellings within 500 feet of the line; location and ownership of buildings that will be demolished; locally designated important farmlands with measures to mitigate potential adverse impacts; historic resources on the National Register of Historic Places, on Virginia Landmarks Register, or on any local historic register; archeological sites designated by Virginia Department of Historic Resources or by local agencies; National Natural Landmarks; areas on the Virginia Registry of Natural Areas; areas in Virginia Natural Area Preserves System; state scenic rivers; scenic byways; airports; federal, state, or local parks, forests, game and wildlife preserves. Moreover, health risk related to electromagnetic field must be addressed. Also, the utility has to show why the existing right-of-ways cannot be utilized for the new line. And finally, the utility should provide a proposed route description and a map to be used for public notification.

Upon receiving the application, the SCC should schedule at least one public hearing upon a written request of at least twenty interested parties. Interested parties are defined as counties and municipal governments, residents and property owners in the area. If more hearings are held, copies of transcripts of testimonies from all previous hearings are to be available to the public.

If an agency or a citizen hires an attorney, they participate as "protestants" with the right to cross examine witnesses. The protestants ought to submit a notice of protest and copies of testimonies before public hearings. If interested parties do not hire an attorney their participation is limited to spoken comments in public hearings. The SCC has no obligation to solicit information from other governmental agencies, but must accept and consider any information provided by the agencies during the review and approval procedure.

After the hearings, a hearing officer reviews testimonies and records and recommends whether the line would be approved or not. This recommendation is subject to participants commentary. Upon the commentaries are reviewed the SCC makes a decision which may be appealed in the higher court.

If the SCC finds that the routes different from those proposed by the utility company are more acceptable, the procedure may start again. If an approval is not granted the utility could reapply with new alternative corridors[6].

West Virginia Public Service Commission Regulations

West Virginia Public Service Commission (PSC) may issue a Certificate of convenience and necessity for proposed transmission lines[7].

The PSC evaluates the need for the line, potential environmental impacts and potential health and safety hazards.

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5 The guidelines are imposed by Federal Energy Regulatory Commission, Federal Power Commission, Order No. 414, November 27, 1970.

6 In November 1990, APCO hired a legal firm of Woods, Rogers, and Hazelgrove, of Roanoke, Virginia to aid in the SCC legal requirements for siting and certification.

7 Requirements for the certificate, content of application filing notice, timing of hearings, and review criteria are regulated by sections 24-2-11 and 24-2-11a of Public Service Commission Law of West Virginia. Information to be included in an application is stated in section 9.00 of Rules and Regulations for the Government of Electric Utilities prescribed by the PSC of West Virginia.

Upon filing the application the applicant should give a legal notice describing the project. The application should contain: a map of the proposed locations of the line, and incorporated communities, private and public recreation areas, parks, forests, public and fishing areas, historic and scenic resources, streams, rivers, lakes within five miles of both sides of the right-of-way center line; engineering and technical characteristics of the line; description of the right-of-way; mitigation measures for potential impacts on soils and vegetation within the right-of-way; methodology of the vegetation maintenance within the right-of-way; potential impacts on wildlife habitats and domestic animals; clear explanation and justification of preferred corridor selection; and an environmental impact statement.

The public participation is through hearings on a written request. Within sixty days of the request the PSC will hold the hearings. The applicant is obliged to publish the notice about the hearing. The participants who want to file testimony and cross examine witnesses must be represented by an attorney. All other parties may make comments during a hearing session. If no protest is received within 30 days after the public notice is issued, the hearing may be waived. For all proposed projects that cost over fifty million dollars, the PSC shall make the decision within four hundred days after the filing, or within ninety days after hearing.

The PSC may demand that the applicant modify the proposed project, in which case the procedure starts again. Thirty days after the PSC decision, protestants may file a petition with the state supreme court[8].

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[8] In November 1990, Robinson and McElwee legal firm, of Charleston, West Virginia was hired to help APCO with interpretation and compliance with West Virginia PSC regulations.

Figure 5: Exclusion Zones

MAJOR CITIES AND TOWNS

WEST VIRGINIA STUDY AREA

- 10.5 mile section of Bluestone National Scenic River, Summers County
- 15 mile section of Bluestone river eligible for scenic status, Mercer County
- The New River Gorge National River, Summers County
- Twin Falls State Park, Wyoming County,
- Little Beaver State Park, Raileigh County,
- Pipestem State Park, Summers County,
- Bluestone State Park, Summers County,
- Pinnacle State Park, Mercer County,
- Camp Creek State Forest, Mercer County,
- Greenbriar State Forest, Greenbriar County,
- Brush Creek Nature Preserve, Mercer County
- Greenbrier River eligible for scenic river status, Summers County

VIRGINIA

- Niday State Forest, Craig County
- Scenic Byway Route 785 , Montgomery County
- Mountain Lake Wilderness Conservancy, National Preserve, Giles County
- University of Virginia Biological Research Station, Giles County
- Horton Research Center, Giles County

- The Nature Conservancy lands:
  - The Narrows, Giles County
  - Buhrman Tract, Botetour County
  - Falls Ridge, Montgomery County

- The North Fork Historic District, Montgomery County
- Proposed Scenic Byways:
  Routes:700,635,604,61,42 in Giles County

EXCLUSION AREAS IN JEFFERSON NATIONAL FOREST

- Special Management Areas in Jefferson National Forest:
  - Peters Mountain Bogs, Craig County
  - Mill Creek, Giles County
- Wilderness and Wilderness Study Areas in Jefferson National Forest:
  - Mountain Lake and Peters Mountain wilderness areas
  - Barbours Creek wilderness study area

Figure 6: Critical Areas and Linear Features

LANDS WITHIN JEFFERSON NATIONAL FOREST

- Visual Quality Objective: retention, and partial retention categories
- Recreation Opportunity Spectrum: semi-primitive non-motorized category
- Wildlife Feature Areas, bear habitat

APPALACHIAN TRAIL SENSITIVE AREAS

- Dragon's Tooth/Cove Mountain
- Angels Rest
- Little Wolf Creek proposed Special Management Area
- Hunting Camp proposed Special Management Area
- Shaver's Creek Wilderness Study Area
- all shelters along the trail

CRITICAL RESOURCES: VIRGINIA

- Proposed Catawba Rural Historic District, Roanoke County
- Havens State Wildlife Management Area, Roanoke County
- Proposed Scenic Byways: Route 311, Roanoke County; Routes 42, 311 Craig County
- Craig Creek trail, Craig County
- Streams eligible for state scenic river designation:
    - New River, from Whitethorne Landing to Bluff City, Montgomery County
    - Johns Creek from Craig Creek to New Castle, Craig County
- Streams with potential for the state scenic eligibility study:
    - Section of Walker Creek, Giles County
    - Section of Craig Creek, Craig County

CRITICAL RESOURCES: WEST VIRGINIA

- New River
- Bluestone river
- Brush Creek Nature Preserve, Summers County
- R.D. Bailey Reservation recreation area, Wyoming County
- The Bluestone Public Hunting and Fishing Area, Summers County
- Turnpike I-77
- Proposed New River Parkway, Summers County
- Allegheny Trail
- Hanging Rock Raptor Observation Tower, Peters Mountain, Monroe County
- Designated Historic District

APPENDIX C: STATE REGULATIONS REVIEW

Appalachian States

Ohio

Ohio Power Siting Board has the authority to issue a "Certificate of Environmental Compatibility and Public Need" for electric transmission lines of over 125 kV. A " Standard Form" application is to be filed with the Board for a proposed construction of lines over 300 kV capacity, which are more than 5 miles long, and for lines between 125 kV and 300 kV which are more than 10 miles long. For the lower voltage and shorter lines, including upgrading, an utility has to file a "Short-Form" application.

Annual Longterm Forecast. All electric utilities must file an annual longterm forecast report with the Ohio Public Utility Commission. The forecast report describes planned additions to the electric transmission network within the state.

Preapplication Conference. An applicant may request a preapplication conference with the Board. The purpose of the conference is to provide better understanding of the filing requirements and review procedure.

Corridor Siting Requirements. The "Standard Application" content is well defined. In addition to justification of need, technical data (mapped on 1:24,000 USGS and 1:100,000 quadrangles), and financial data, environmental, social and ecological data categories must be included into the application. Environmental data shall cover impacts of construction and operation activities on air quality, water resources (aquatic discharges from the route clearing and construction, including runoff and siltation, changes in flow patterns and erosion, impacts on public water supplies, operation plans to control the herbicide residues or herbicide introduction into surface, estimate impact on public water supplies), solid waste and debris generation, treatment, storage, transport disposal, and noise levels during construction and operation, as well as proposed mitigation techniques.

The corridor siting study should address ecological impacts within 1,000 feet of each side of the proposed corridors on: streams and drainage channels; lakes, ponds, reservoirs, marshes, swamps, wetlands, woody and herbaceous vegetation, areas where herbicides may be applied; locations of the above resources, estimate of the occurrence of species of recreational value, federal and state endangered and threatened species. The listed resources must be mapped on the scale 1:24,000. Estimation of probable impact of construction and operation on the above resources must be supplied, along with mitigation procedures.

The corridor siting study should assess the long term impact of the land use changes caused nu the transmission line siting. A map 1;24,000 presenting an area within 1 mile of each side of the proposed corridor shall depict: residential, urban, manufacturing and commercial, mining, transport, utilities, water and wetlands, forest and woodland, pasture and cropland, county and township boundaries.

The following cultural resources shall be mapped on the scale 1:24,000: landmarks designated or eligible for registration by The Ohio Historical Society and The Ohio Department of Natural Resources, historic, religious, archeological, scenic, natural features within 1 mile on either side of the corridor. The potential impacts on these resources must be estimated, and mitigation measures described.

The "Short-Form Application" requirements are less specific, but still include all information required for the "Standard Form". The general land use, noise sensitive areas, and agricultural districts within 1,000 feet of either sides of the line, shall be mapped at the scale of 1:24,000.

Methods and Data Requirements. Sources of data shall be stated, methodological assumptions, methods of corridor assessment and selection, direct and indirect impacts identification and evaluation must be included in the application. The results of comparative analysis and assessment of alternatives must be summarized in tables comparing technical, financial, environmental, and social impacts.

Mapping Requirements. The following classes of impacts shall be described in the section on social and ecological impacts : (1) Impacts on health and safety (2) Ecological impacts (mapped within 1,000 feet on either side of the proposed line, 1:24,000); (3) Impacts on land use and community development (mapped within 1 mile on either sides of the proposed line, 1:24,000); (4) Cultural impacts (mapped within 1 mile of either side of the proposed line, at the scale 1:24,000); (5) Impacts on "Agricultural Districts" (mapped within the proposed right-of-way, 1:24,000).

Public Involvement in Corridor Siting Study. The application shall describe a public information programs that the applicant shall conduct during corridor siting study, construction and operation of the proposed transmission line.

Completeness of Application Determined. After the application is filed the Chairman of the Board within 60 days of the receipt, certifies or rejects the application based on its completeness and compliance with all pertinent rules.

Public and Agency Participation in Certification. Within 7 days of filing a certified application, an applicant gives a public notice on the application.

A copy of a certified application has to be distributed to the chief executive officer of each county and municipality potentially affected by the proposed line, and to the head of each environmental and land use planning agency in the area where the line is proposed.

Although the municipalities and the agencies are served with the copies of application, their participation is not required, by the Board regulations.

Upon motion of any party, the Board shall hold prehearing conference to clarify various issues of the proceedings.

Participation in the proceedings may be as an intervenor or as a limited participant. All persons including the municipalities and public agencies shall file a petition to leave to intervene within 30 days of receipt of a copy of application or of publication of notice of filing the application. Any person may give written or oral testimony in hearings, however only parties (applicant, intervenors) and staff have the right to examine witnesses.

Decision. The presiding officer submits a written report to the Board. The report is distributed to all parties, which may file exceptions on it within 20 days upon the report is filed. Within unspecified time the Board shall release a final order, approving the line in its entirety, ordering modification of some segments, or rejecting the line. The modifications condition the certificate, meaning that the certificate shall not be valid unless the modifications are made. If a new information becomes available after the certificate is issued, a party may apply for rehearing.

The final order of the Board may be subject of judicial review with the higher court.

Conclusions. Comprehensive corridor siting criteria, and well defined mapping standards are the most prominent quality of Ohio siting and certification regulations. Another positive regulatory element is certification of the application based on its completeness before the formal review starts. The public participation in the corridor siting study is through required public information programs to be conducted by the applicant.

However, the time frame for the certification proceedings is not established, which may be viewed as a serious flaw. Another shortcoming is that criteria that the Board employs in its review and evaluation of environmental impacts of proposed transmission line are not set forth in the regulations.

The provisions for regulated agency participation and coordination of activities and other relevant legal requirements in the corridor siting and regulatory review are absent in Ohio regulations.

New York

State of New York Public Service Commission (PSC) has the authority to issue a "Certificate of Environmental Compatibility and Public Need" for proposed transmission lines of 125 kV and above, over 1 mile long, and for lines between 100 kV and 125 kV more than 10 miles long.

Completeness of Application Determined. The completeness and compliance of the application with the regulations is formally determined by the PUC shortly after the filing, before the formal review starts. If the application is accepted the applicant gives a notice of filing of an application to all potentially affected municipalities.

Corridor Siting Requirements. The content of environmental considerations in the application is defined in general terms, outlying general land use categories (residential, commercial, industrial, institutional, agricultural), ecosystem resources (highly erodible soils, wetlands, streams, springs, wells, unique old growth trees, habitats of rare, threatened, endangered species), designated scenic resources, and designated and eligible historic and archeological resources. Probability, extent, and duration of potential impacts on environmental resources must be addressed. A description of mitigation measures is required for each potential impact identified.

Mapping Requirements. Mapped information shall be presented on 1:24,000 USGS topographic base maps, and on 1:250,000 USGS topographic base maps if the line is longer than 10 miles. Location of the centerline and 1,200 feet on both sides, shall be drawn on aerial photographs taken less than six months before the filing.

Public Participation in the Corridor Siting. An outstanding requirement imposed on the utilities is "Public Information Program". The program shall be implemented before the application filing. The purpose of the Program is to engage the public in the early stages of a corridor siting study, so that issues and concerns may be identified, and relevant data collected. The Program is not mandatory if the proposed project: complies with local regulations, avoids designated natural and recreational areas, does not cross designated scenic and wild rivers or wetlands, does not demand tree clearing or grading in designated scenic areas, there will be less than 10 residential buildings within 300 feet per mile of the line. To implement the program , the applicant must organize at least one public information meeting 30 to 60 days before filing an application. Also the Program implementation shall include establishing contacts with all potentially interested persons, agencies, and organizations.

For all cases, the applicant must publish newspaper notice two weeks before filing, once a week, in all areas the line would traverse.

Public and Agency Participation in Certification. A copy of the application shall be served upon the chief executive officer of each municipality, the Commissioner of Environmental Conservation, the Commissioner of Economic Development, the Secretary of State, the Commissioner of Agriculture and Markets, the Commissioner of Parks, Recreation, and Historic Preservation, the had of each State Agency that have the jurisdiction to issue a permit.

All agencies and entities entitled to a copy of the application, and any other person shall file a notice of intent to participate in the proceedings, within 30 days of the date of the application filing. A pre-hearing conference with all parties may be scheduled by the PUC in order to discuss and clarify the proceedings, and schedule the hearings. The hearings shall be scheduled within 30 to 60 days after the application is accepted by the PUC. A public notice of the hearing shall be given. If a person, an agency, or a municipality wants to intervene it shall file a petition for intervention.

Decision. The administrative law judge recommends a decision to the PUC. The parties may file comments on the recommended decision. The final decision, made by the PUC, may be petitioned for a judicial review. Any party may also petition for rehearing if a new evidence appears after the decision is made.

Environmental Management and Construction Plan. If the Certificate for the construction of the proposed transmission line is granted the next step is that the utility files "Environmental Management and Construction Plan" (EM & CP), which must be approved before commencement of the construction. The EM & CP deals with site specific construction and operation activities, disturbed areas restoration, erosion control, vegetation management, and mitigation techniques.

Conclusions. Generally speaking, the state of New York certification procedure has distinctive advantages: (1) the requirement that the applicant implement the Public Information Program during the corridor siting study process, and (2) the requirement for the filing and approval of the EM & CP after the certificate is granted.

However, the exceptions from the Public Information Program are not fully justified, because the public involvement in the corridor siting study is important
for any new transmission line planning, even if it complies with local regulations, and avoids designated natural and scenic areas, and residential area.

The EM & CP is very important requirement because it deals in a concrete manner with environmental impacts of the construction, maintenance and operation of the line. This element is often missing form other reviewed state certification procedures. Although all state Commissions have some kind of construction and operation supervising authority after certificate granting, it is often not implemented in such a structured way.

New Jersey

According to the Chief of Bureau of Electric Service Evaluation of the New Jersey Board of Regulatory Commissioners, New Jersey does not have specific certification requirements. The utility files a petition with the Board only if the proposed transmission line violates current local municipal zoning laws, or a condemnation of land for the right-of-way occurs. In such circumstances the Board of Regulatory Commissioners evaluates the need and safety issues and holds public hearings, in order to bring a decision approving or disapproving a construction of the proposed line. According to the State Department of Environmental Protection and Energy, there are no regulations pertaining to environmental considerations in siting review and approval. However, there is a resolution, which does not have a legislative power, which prescribes that the intensity of Electro Magnetic Field at the edge of a transmission right-of-way does not exceed 3 kV per meter.

Pennsylvania

Pennsylvania Public Utility Commission (PUC) has the power to issue the "Authority to Locate and Construct a High Voltage Transmission Line", for lines with the capacity over 100 kV.

Corridor Siting Requirements. The minimum corridor siting requirements include general safety considerations, a description of environmental impact and mitigation studies (scenic, historic areas, land use, soils, sedimentation, habitats, terrain, hydrology), location of archeological, geologic, historic, scenic, wilderness areas, and airports within 2 miles of the either side of the proposed line. In addition to this general requirements, the application shall contain a list of all federal, local, and state agencies that may mandate additional permits or impose any conditions for the line construction and location. A list of documents that the applicant must file with each agency shall be submitted.

Public and Agencies Participation. The application filing shall by announced by a notice, and a copy of the application shall be available for the public examination and review in each affected county. Notice of filing shall be sent to: the Department of Transportation, the Historical and Museum Commission, and to all federal, state, and local agencies that require a permit or conditions for construction and location of the proposed line.

The applicant shall serve a copy of the application to the chief executive officers of each affected municipality, and to state and local land use planning agencies. Agencies have the same participation status as any other person or organization.

A prehearing conference may be held to discuss and clarify proceedings. Notice of hearing shall be given at least 45 days in advance. The need, safety, and environmental impacts will be considered in the hearings. The PUC may waive hearings if no protest or petitions for leave to intervene are received 7 days before scheduled hearing.

Review and Evaluation by Department of Environmental Resources. A copy of an application shall be sent to the State Department of Environmental Resources (DER), Office of Policy, and is subject to Project Review and Evaluation Program (PREP). Two offices within DER : Office of Environmental Protection and Office of Resources Management assess the application, and send the comments to the PUC. The PREP functions as a one stop environmental review process.

Decision. The hearings presiding officer recommends a decision to the PUC. Exceptions and comments on the recommended decision may be filed within 20 days after the recommended decision is made. After 10 or 15 days the PUC issues a final decision order, based on: the need for the line, health and safety considerations, compliance with relevant laws, and adverse environmental impacts. The order may approve, deny, or partially approve the application. If the approval is granted it authorizes the utility to build the transmission line within 500 feet of the proposed centerline. The final decision may be appealed to the Commonwealth Court.

Conclusion. Pennsylvania. The responsibility of DER for environmental review of the application is the distinctive element of Pennsylvania regulations. This is a good example of environmental review by an agency with appropriate expertise.

Delaware

The State of Delaware Public Service Commission (PSC) does not have a certification regulations for construction and operation of electric transmission lines. Municipal electric transmission system is in effect and the utilities do not need to apply for an approval for system additions. Moreover, the electric utilities do not have the privilege of "eminent domain", meaning that the land cannot be condemned for the transmission corridors. However, the utilities may purchase easements or land from private owners or may acquire right-of-way from State Highway Department. DELMARVA Power and Light Company has the authority to build transmission lines in Delaware and a special permission from the PSC is not needed. According to DELMARVA engineers most of recent transmission additions have voltage of 138 kV, and are built within existing right-of-ways. The company does lot of upgrading of the existing transmission lines in order to meet increased transmission needs. Internal standards relating to electromagnetic field have been developed and applied within the Company.

Maryland

Maryland Public Service Commission (PSC) has the authority to issue "Certificate of Public Convenience and Necessity" for transmission lines over 69 kV.

Corridor Siting Requirements. An application for the certificate shall contain a description of physical, biological, aesthetic and cultural resources in the vicinity of the proposed line, a summary of environmental and socioeconomic impacts with mitigation. Copies of all relevant environmental impact studies conducted by the utility must be submitted, along with a statement of compliance with all pertinent environmental standards and regulations, and a list of all federal, state, and local agencies with authority to issue permits and impose conditions on construction, location and operation of the line.

Mapping Requirements. All data need to be mapped at a minimum scale of 1:24,000. A 100-year floodplains within the propose right-of-way and public airports within 1 mile of the right-of way shall be identified on a map. Special emphasis is given to the visibility of the proposed line from historical, institutional, recreational, aesthetic, archeological, wildlife management areas, and from parks and forests.

Agencies Participation and Review. After the application is filed, copies shall be distributed to planning and zoning commissions, municipalities and counties, the Department of Health and Mental Hygiene, the department of State Planning, the Department of Natural Resources, the Department of Economic and Employment Development, the Department of Transportation, The State Aviation Commission, the State Highway Administration, the Regional Planning Council (if affected), the Maryland-National capital Park and Planning Commission (if affected), and the Office of People's Counsel. Except to these state agencies, a copy of the application shall be sent to federal agencies: the U.S. Department of Interior, the Federal Energy Regulatory Commission, and the Federal Aviation Administration. This exhaustive list of agencies that are directly involved in the proceeding is a good example of effective facilitation of the other agencies involvement in the proceedings.

Project Coordinating Committee. Project Coordinating Committee is formed by the PSC to coordinate the participation of all involved agencies, and to assist the applicant with preparation of the application. The Committee shall prepare a list of issues to be addressed in the application, as well as a list of studies to be included in the application. The Committee members include representatives of the utility and the PSC, representatives of state agencies with the authority to issue permits or have definite interest in the proposed project. Interested local and federal agencies may also be represented in the Committee.

Phased Review of Need, Cost, Environmental Impacts. In accordance with the regulations, the utility may request phased review of the need, the cost, and environmental impacts of the project.

Public Participation in Certification. Prehearing conference may be held with the interested parties. Affected property owners do not need a legal counselor in order to participate in hearings, while all other interested parties shall be represented by a counselor in order to intervene. Written request for a leave to intervene must be filed with the PSC.

Decision. After the hearings the hearing examiner brings about a proposed order which may be appealed by any party. The final decision is made by the PSC. The request for rehearing may be filed by any party, only if new evidence is presented. The final decision may be appealed with the higher court.

Various conditions may be attached to the Certificate, and the utility is obliged to report to the PSC, concerning the fulfillment of the imposed conditions.

Conclusions. The Project Coordinating Committee is the most prominent feature of the Maryland regulations. Activities of the Committee eliminate many potential delays that may be caused by misinterpretation of regulation and organizational and management problems potentially encountered in corridor siting and certification with many participants may be successfully avoided.

The phased review and filing eliminates expensive siting and environmental studies, which may be redundant if the PSC decides that the need for the project is not justified.

Kentucky

The Kentucky Public Service Commission has a discretion to grant a "Certificate of Public Convenience and Necessity", for new high voltage electric transmission lines. For lines of 400 kV and above the "Certificate of Environmental Compatibility" must be issued by the PSC.

Corridor Siting Requirements. A checklist of filing requirements for the applications for the Certificate of Public Convenience and Necessity" prepared by the PSC does not specify any environmental information for the application content. Only facts pertaining to the need, cost and engineering design of the line are demanded.

Before the application filing, if a proposed line is 400 kV or above, the applicant shall submit a statement of the environmental compatibility to the Natural Resources and Environmental Protection Cabinet. The Cabinet reviews and evaluates the statement which shall contain a description of the project, and description of impacts on air pollution, waters, noise levels, and other unavoidable environmental effects. Within 60 days the Cabinet shall submit to the PSC a report on the environmental compatibility statement.

Completeness of Application Determined. Upon the receipt of the report (if the line is 400 kV and above) and the application (for all high voltage lines) the PSC determines if the application is complete.

Public and Agency Participation in Certification. A public notice of the hearing shall be given 30 days in advance. An informal prehearing conference may be held upon request of any party. The application is available for the public review, but a distribution of copies of the application to municipalities or agencies is not required, except for lines of 400 kV and above, in which case it is served upon the state agencies in charge of environmental protection. A written request to participate in the proceedings as an intervenor (with the right to receive copies of all materials and the right to examine witnesses) and a limited intervenor (with no right to receive documents or to examine witnesses). All landowners and residents in the affected area may be heard in the hearings.

Decision. The "Certificate of Environmental Compatibility" shall be granted if the PSC determines that there is a balance between the need, engineering, technical and economic factors and environmental impacts of the proposed line of 400 kV and above. The decision on the "Certificate of Public Convenience and Necessity" is based solely on the need and engineering criteria.

Conclusion. In the last 15 years the PSC has not received any applications for the lines of 400 kV and above, so that the regulations on the Certificate of Environmental Compatibility have not been applied in practice.
The review procedure for the "Certificate of Public Convenience and Necessity" does not include environmental considerations. The omission of environmental considerations for lines bellow 400 kV cannot be justified. The potential adverse impacts of the location, construction, and operations of transmission lines on the environment do not vary considerably with voltage.

Tennessee

Tennessee Public Service Commission does not require approval for new transmission lines construction. Most lines are built by Tennessee Valley Authority (TVA) an independent federal agency, which complies with National Environmental Policy Act (NEPA) procedural requirements for environmental assessment of all transmission lines over 161 kV. However, in few instances when other utilities build transmission extensions in their service area the nonexistence of state regulatory procedures may be harmful, because there is no authority to regulate potential adverse impacts on the environment.

North Carolina

North Carolina Utilities Commission (UC) has the authority to grant a "Certificate of Environmental Compatibility and Public Convenience and Necessity" for transmission lines of 161 kV or higher capacity.

Corridor Siting Requirements. An application for the Certificate shall contain an environmental report describing identified environmental impacts with proposed mitigation techniques. The content of the environmental report is not specified beyond this general requirement.

Coordination of Actions. A public notice shall be given within 10 days of the application filing. In addition to the notice, the applicant shall serve a copy of the application on: the attorney general, the Department of Environment, Health and Natural Resources, the Department of Economic and Community Development, the Department of Agriculture, the Department of Cultural Resources, an on each affected county and municipality.

A list of all needed permits in order to start construction shall also be submitted. In order to facilitate better implementation of local ordinances and laws, municipalities and counties shall sent to the applicant their laws and ordinances within 30 days after a receipt of a copy of the application.

Public and Agency Participation. Within 100 days of the application filing any person or agency may file a petition to intervene in the proceedings. A hearing shall be scheduled no later than 120 days of the filing.

Decision. The UC brings a decision by considering the need for the line, the cost, and the environmental compatibility. A final order granting or denying the Certificate is given within 60 days after the hearings are closed.

Conclusions. The timeframe of the proceedings is clearly defined, which is a significant advantage of the North Carolina siting regulations comparing to the other states in the region. Unfortunately, the corridor siting requirements are too broadly stated, leaving a lot of flexibility for interpretations. Although the state agencies, counties, and municipalities receive copies of the application, they are not obliged to participate, which is a serious drawback, especially with regard to loose environmental considerations in UC regulations.

South Carolina

South Carolina Public Service Commission (PSC) has the authority to issue a "Certificate of Environmental Compatibility And Public Convenience and Necessity"
for proposed transmission lines of 125 kV and higher voltage.

Corridor Siting Requirements. Minimum environmental information requirements are limited to a summary of environmental impact studies. The scope and content of these studies are not defined by the PSC.

Public and Agencies Participation. A public notice on the application filing shall be given. Copies of the application have to be distributed to the chief executive officer of affected municipalities and to the head of all environmental and land planning state and local public agencies.

A public hearings shall be scheduled not earlier than 60 days and not later than 90 days after the application is filed.

The following state agencies are entitled as parties in the proceedings without petitioning to participate: the Department of Health and Environmental Control, the Wildlife and Marine Resources Department, the Department of Parks, Recreation and Tourism, and Water Resources Commission. All other interested agencies, persons, and organizations also need to file a notice of intervention or a notice on protest within 30 days upon the application filing date. The participation may be as: protestants, intervenors and by limited appearance.

Decision. After the hearings, the PSC makes a decision based on the need for the project, economy, reliability and environmental impacts. The parties may petition for rehearing if a new information appears. The final decision on the Certificate may be appealed with higher courts.

Conclusions. In South Carolina the provision which mandates the agencies involvement in the proceedings is very significant. Their participation is enabled by supplying copies of the application and by exempting them from a written request to take part in the regulatory review.

Georgia

The Georgia Public Service Commission does not regulate siting and construction of electric transmission lines. Moreover, the Georgia Environmental Policy Act of 1991, does not mandate an Environmental Impact Assessment for electric transmission line projects. The Georgia Power Company, which constructs and operates most of the electric transmission lines in the state, internally adopted National Environmental Policy Act (NEPA) provisions for all new transmission line projects.

Selected Mid-continent States

Wisconsin

The Wisconsin Public Service Commission (PSC) mandates a "Certificate of Public Convenience and Necessity" for siting and construction of proposed transmission lines with the capacity of 100 kV and higher. For lines of 345 kV and above, and for lines with capacity between 100 kV and 345 kV that are longer than 1 mile, a rigorous and well structured environmental review is to be performed by the PSC, in cooperation with the Department of Natural Resources (DNR), in accordance with the PSC Code and Wisconsin Environmental Protection Act.

Advance Plan for Transmission Additions. The PSC also requires that an advance plan for transmission additions of 100 kV and above, is filed with the PSC every second year. A list of environmental impacts with mitigation for transmission lines, planned for construction within 18 months, shall be submitted.

Coordination of Activities. Although the PSC is the lead agency in the environmental review, the Wisconsin Department of Natural Resources is directly and continuously involved in the proceedings for the Certificate. The Department of Natural Resources shall complete its review procedures within 150 days after the application is filed. A utility planning to apply shall contact the Department of Natural Resources and the PSC in order to clarify environmental information requirements.

Corridor Siting Requirements. The application for the Certificate for lines of 100 kV and above shall contain a map previously included in the most recent Advance Plan. In addition to information on the need and technical and design information, overlay maps at the scale of 1:250,000 shall be submitted. The following environmental information must be mapped: geology, topography, general soil associations, water resources and wetlands, general vegetation cover, productivity ratings for soil associations, general land use, planned land use, public land, and population density. If the proposed line requires an EIS than the following overlay maps at the scale of 1 inch to 2 miles shall be included in the application: alternative routes, glacial geology, topography, general soil association plus water resources and wetlands, vegetation and wildlife habitats, general existing land use, planned land use, public lands, residential areas, active mines and quarries, soil productivity, radio/TV towers, airports, wild rivers, scenic rivers, scenic roads, historical sites, valuable natural areas, existing corridors, and population density.

Environmental Review:A Separate Process. The environmental review of an application is defined by the Wisconsin Environmental Policy Act (WEPA) of 1973. The lead agency in the review is the PSC. The review starts with Environmental Screening Procedure, which determines if an EIS is required, based on identification and assessment of potential adverse impacts.

Criteria for Environmental Screening. The Environmental Screening Procedure employs a screening worksheet to determine if the EIS is needed for the particular project. The Worksheet contains a description and maps of the proposed project and alternatives, a list of agencies that have been contacted and their comments. A section of the Worksheet contains an evaluation of potential impacts on : long range development plans (regional and local), special areas (e.i. designated parks, recreational areas, historical and archeological resources, educational resources, unique landforms,habitats), hydrology (e.i. erosion, siltation, siltation of wetlands, and visual degradation of scenic water resources), and general vegetation disruption.

Preliminary Environmental Report. If the EIS is required, the next step is preparation of a Preliminary Environmental Report (PER) which describes the project and alternatives and evaluates potential impacts.

Review of Preliminary Environmental Report. Copies of PER are distributed to: Governor's office, Department of Natural Resources, Wisconsin State Historical Society, regional planning agencies within the study area, applicant, and local libraries. Responses on the PER may be received within at least 45 days after it is made available for a review. Maximum 90 days is allowed for the comments.

Preparation of EIS. Upon receipt of the comments, a preparation of the EIS document begins. It contains description of the transmission line and the alternatives, positive and negative effects including primary and secondary impacts, unavoidable impacts, mitigation measures of adverse impacts, and irreversible and irretrievable loss of resources. Economic assessment shall also be included. Copies of the EIS are distributed in the same manner as copies of the PER.

Public Participation in Certification. A public hearing is scheduled after at least 30 days upon the distribution of the EIS. A public notice on the hearing is given at least 15 days in advance. Participation in the hearings may be by full intervention, which requires a written request to be filed with the PSC. For a limited intervention participation a written request is not needed.

Decision. A hearing officer proposes a decision on the application. The proposed decision is subject to comments by any party. The PSC makes a final decision on the application within 180 days of the date of the application filing. Within 20 days after the order on final decision is given, any party may request a rehearing. In addition, the final decision may be appealed for a judicial review.

Conclusion. The requirement for Advance Plan for Transmission Additions is important as it mandates a list of potential impacts with mitigation. The Plan is available for public review, which gives plenty of time for the public to get acquainted with future transmission projects.

Corridor siting criteria and potential impacts are specific, and comprehensive including attributes of all natural factors qualitatively measured. Potential impacts to are ranked into categories: primary, secondary, and unavoidable. Also, the irretrievable losses of resources shall also be identified. The process of environmental review performed by the PSC and DER seems to be efficient. The overlay maps with well specified content that must be submitted with an application, indicate that there is an established methodology for the environmental review by the PSC and DER.

Although, not engaged in the corridor siting process, governmental agencies are involved in the regulatory review from the very beginning. The PSC is required to solicit and considers the input of all agencies with jurisdiction over the environmental resources.

Public participation in corridor siting study is not required.

The state of Wisconsin regulations on corridor siting and certification give an excellent example of efficient and comprehensive environmental review. Not only that the requirements are comprehensive and clearly stated, the 180 days maximum for time for a review is a very reasonable timeframe, comparing to either unspecified, or much longer time needed for a review in other states.

Minnesota

Applications for location and construction of transmission lines of 200 kV and above, with 50 miles in the state of Minnesota, and for lines of 300 kV and above, with more than 25 miles in the state of Minnesota, must pass a two step certification procedure. The first step is issuance of the "Certificate of Need" by the Public Utilities Commission (PUC). After the "Certificate of Need" is acquired, the utility files an application for the "Route Designation and Construction Permit" with the Environmental Quality Board (EQB).

Step I - Certificate of Need

Public and Agencies Participation. Upon receipt of the application for the "Certificate of Need" the PSC appoints an employee to facilitate effective citizen participation in the proceeding concerning the need for the proposed line.

State agencies in charge of other permits related to the proposed line location and construction are required to submit comments on the application. At least one public hearing shall be held by the PSC. The participation in the hearings does not require a written petition with the PUC. In the decision making process the PUC considers the need for the line, general environmental effects and relevant federal, state, and local policies and regulations.

Time Limit. The entire proceedings shall not last more than 6 months after the date of the application for the Certificate of Need is filed.

Step II - Route Designation and Construction Permit

If the "Certificate of Need" is issued, the utility files a separate application for "Route Designation and Construction Permit" with the EQB.

Completeness of the Application Determined. Within 21 days of the application receipt, the EQB determines if it is complete in terms of the information content and format required.

Project Leader, Advisory Route Task Force, Public Advisor. Once the application is accepted, the EQB appoints an independent project leader to coordinate environmental review and proceeding. The EQB may appoint an advisory route task force to assists with the environmental evaluation. A public advisor shall be designated by the EQB to assist in public participation.

Route Siting Criteria. The minimum criteria that the EQB shall use in evaluation of the application are defined as follows: displacement of homes, aesthetic impacts on settlements, impacts on recreation and cultural values, impacts on public services, noise, impacts on public health and safety, impacts on agriculture, forestry, tourism, and mining, impacts on archeological and historic resources, impacts on natural environment, adverse environmental impacts that cannot be avoided, use of paralleling to existing corridors, electric system reliability, and cost of construction, operation and maintenance. Special priority is given to the avoidance of federal, state and local designated resources.

Environmental Impact Assessment. In addition to the minimum environmental criteria to be followed, the applicant shall prepare an Environmental Impacts Assessment (EIA).

The EIA shall include analysis of all issues identified by the advisory route task force and by the public in the first information meeting. The EIA also shall include a summary of the "Certificate of Need" decision. Copies of the EIA are made available for public review and comments.

Public and Agency Participation. Hearings are scheduled and held by the EQB, and no special request is needed for participation. Information meetings with the interested public and agencies are conducted after the acceptance of the complete application and before hearings to explain and clarify the regulatory procedures.

Decision. A decision on the application shall be made within one year upon the application filing date. Conditions concerning location, construction, operation and maintenance may be attached to the certificate. The decision may be appealed with the higher court.

Preliminary Construction Plan. A compliance with the conditions in the Certificate is facilitated through the requirement that the utility file a Preliminary Construction Plan with the EQB , at least 60 days before construction commencement.

Conclusions. The Minnesota regulations structure very well corridor siting and review process. The two step process requiring that the need for the line must be determined before the environmental review is conducted simplifies the process. The applicant does not have to conduct elaborate and costly environmental studies if the need for the transmission network expansion is not approved. The agencies that issuing other permits are involved early in the process which facilitate coordination of actions in the corridor siting study. Once the need for the line is approved by the PUC, and the application for the Route Designation and Construction Permit is submitted its completeness is determined within 21 days. This eliminates potential obstacles in the review caused by the non-compliance with the application content requirements. The appointment of the project leader, advisory route task force, and public advisor facilitates the coordination of actions and meaningful public and agency participation in the review.

Corridor (route) identification criteria are stated in a general way. However, the advisory task force and public identifies specific criteria that must be incorporated into the Environmental Impact Assessment prepared by the applicant. This provision enables that the specific issues and concerns be identified on case by case basis.

The entire process for the Route Designation and Construction Permit may not last longer than a year. The mandate for Preliminary Construction Plan ensures that the conditions attached to the Permit are met by the applicant.

North Dakota

To get an approval for construction of new transmission line of 115 kV and higher, a company has to obtain two permits from the North Dakota Public Service Commission (PSC): (1) Certificate of Corridor Compatibility and (2) Route Permit. The Certificate of Corridor Compatibility determines a corridor within which a route may be approved by the Route Permit.

Letter of Intent. At least 1 year prior to filing an application for construction approval an utility shall file a "Letter of Intent" witn the PSC. The purpose of the letter is to acknowledge transmission additions and to determine if the addition is the subject to the certification regulations.

Siting Criteria. The PSC has defined criteria to be considered in assessment of applications for the certificates. The applicant shall include information needed for the PSC to employ these criteria in the applications for both the "Certificate of Corridor Compatibility " and for the "Route Permit. The environmental criteria include: effects of location, operation, and maintenance on public health, natural resources, and environment in general; mitigation measures available; adverse direct and indirect environmental impacts that cannot be avoided; irreversible and irretrievable losses of natural resources; land use plans; impacts on scenic, historic, paleonthological, and archeological resources; impacts on unique biological resources and habitats of rare and endangered species.

In addition the PSC maintains and updates a list of exclusion and avoidance areas, and specific selection criteria for corridor or route assessment, which shall serve as a guidance for the corridor and route siting studies.

The exclusion and avoidance areas may be traversed by the route or the corridor, but cannot take more than 50% of the corridor or route width. Also, the applicant must demonstrate that there is no other viable alternative. If these areas are crossed all potential impacts have to be mitigated.

Exclusion Areas Determined by the PSC. The exclusion areas categories are: designated federal and state parks, historic areas, archeological sites, nature preserves, wilderness areas, locally designated parks and recreational areas, critical habitats and unique biological resources.

Avoidance Areas Determined by the PSC. The avoidance areas are defined as sensitive to the transmission line siting. The categories of avoidance areas are: national historic districts, national wildlife areas and refuges, national and state wild, scenic or recreational rivers; state game refuges and management areas,state forests, grasslands, and forest management areas, state management areas; areas of geological hazard, areas within 500 feet of a farm, residence or commercial land uses, municipal and rural district water supplies and reservoirs, irrigated lands, and recreational areas not classified as exclusion zones.

Corridor Selection Criteria Determined by the PSC. The corridor selection criteria are defined as potential adverse impacts on the following: agricultural production, family farms, land suitable for irrigation, surface drainage patterns and groundwater flow, noise level, visual resources, extractive and storage resources, wetlands, woodlands, and wooded areas, radio and TV reception, human health and safety, animal health and safety, and plant life.

In making the decision the PSC also considers some policy criteria such as monitoring of impacts by the applicant once the project is in service, and applicant's work with citizen coordinating committees during the siting studies.

An application for the "Certificate of Corridor Compatibility" shall contain a summary of all relevant environmental studies and information needed for the PSC to implement its avoidance and exclusion areas criteria, the selection and policy criteria.

Step I: Certificate of Corridor Compatibility

Completeness of the Application Determined. Upon the receipt of the application the PSC determines if it compiles with all pertinent requirements, or the application is returned doe additional information and studies.

Decision on Certificate of Corridor Compatibility. Within 3 months of acceptance of complete application the PSC shall make a decision on Certificate of Corridor Compatibility. The corridor width has to be at least 10 % of its length, but not less than 1 mile and not more than 6 miles wide.

Step II: Route Permit

If the Certificate of the Corridor Compatibility is issued the utility may apply for "Route Permit". The route is defined by the PSC as a specific location of the proposed right-of-way within the corridor designated by the "Certificate of Corridor Compatibility". The minimum environmental requirements for the Route Permit application content are the same as for the Certificate of the Corridor Compatibility.

Advisory Committee. The PSC may appoint an Advisory Committee, to assist in a review and proceedings. The members of the Committees hall include representatives of State Department of Agriculture, and representatives of affected counties and municipalities.

Public and Agencies Participation. Hearings are held according to the same regulations in both stages of the proceedings. All hearings shall be announced publicly. Any person wishing to intervene shall file a petition for intervention at least 10 days before hearing. A prehearing conference may be held upon request. The participation of federal and state agencies in the proceedings is encouraged but not mandated. The agencies are directly notified on all phases of proceedings.

Decision. After the hearings the PSC makes a decision approving or rejecting a route within a designated corridor. The PSC shall made a final decision within 6 months of the application filing. The decision may be subject to rehearing an to judicial review with a higher court.

Time Limit. The maximum time of 9 months for both corridor designation (3 months) and route permit (6 months) is exceptionally reasonable.

Conclusions. The North Dakota regulations have few distinctive provisions: (1) two step process narrowing down the spatial extent of the analysis and assessment, (2) letter of intent filed a year before the application filing (3) specific and well prioritized, and comprehensive corridor and route siting and assessment criteria : exclusion zones, avoidance zones, selection criteria, (4) determination of completeness of the application before the formal review starts, (5) requirements that the applicant works with citizen coordination committee facilitating public participation in corridor siting, (6) direct notification of agencies about all important steps in the review, (7) appointment of advisory committee from the representatives of state agencies, counties and municipalities (8) short timeframe for the review process (9 months).

South Dakota

The South Dakota Public Utility Commission has the authority to grant a "Permit for Transmission Facility", for construction of transmission lines of 200 kV and above. The same Permit is needed for lines between 115 kV and 200 kV if more than 1 mile does not parallel to the existing corridors.

Notification of Intend to Apply. At least six months before application filing for the Permit, utility has to submit to the PSC a "Notification of Intend to Apply". The Notification shall contain brief description of the project, a list of persons for membership in the "Local review Committee", and a list of issues and questions to be discussed in a prefiling conference.

Local Review Committee. Within 30 days of the Notification filing, the PSC shall designate the "Local Review Committee", which shall assist to the PSC in the application assessment. The Committee is composed of the chairman of the tribal council of each affected indian tribe, the president of the Board of Education in each affected school districts, the chairman of county commissioners in affected counties, the mayor of affected municipalities, and representative of the utility applying for the Permit.

Corridor Siting Requirements. The Committee considers the following areas in its evaluation procedure: housing supplies, education, energy, waste management, legislative framework, transportation, fire protection, health, recreation. The Committee submits the Final Report on the application to the PUC no later than 7 months upon copies of the application is received.

Affected Area Designated. Within 30 days upon the Notification receipt, the PUC shall designate the affected area.

Completeness of Application Determined. Before the formal regulatory review begins the PUC determines if the application is complete or it is returned for extra studies. If the application is accepted, the notice on filing is published, and copies are served upon the Committee, and made available for the public review in the affected area.

Time Limit. The application for the Permit shall be filed not later than 6 months prior the planned date of construction commencement. The methodology of proposed corridors selection and assessment has to be described.

Corridor Siting Requirements. The environmental information included identification of irreversible and cumulative impacts, and all potential adverse impacts along with mitigation measures. Impacts on physical environment (landform, topography, geology, mineral resources, soils, erosion and sedimentation, hazardous areas), hydrology (drainage patterns, groundwater, public water supplies), terrestrial and aquatic habitats, land use and land use policies, water and air quality, and community development shall be addressed in the corridor siting study and presented in the application.

Public and Agencies Participation. A public hearing is scheduled and announced. All persons and agencies wishing to participate shall apply for the party status with the PUC. The PSC shall admit environmental, social, and economic information for state and local agencies, only if the agencies were given the party status upon written request. A prehearing conference may be held with the PUC upon request of any party.

Decision. The final decision of the PUC is based on the final report by the Local Review Committee, and on all additional information acquired in the proceedings. The decision may be petitioned for the judicial review with a higher court.

Conclusions. The South Dakota regulations define clear and comprehensive corridor siting requirements. The review is conducted by the Local Review Committee with representatives of all state agencies, counties, and municipalities. The Committee actually coordinates all activities and ensures direct participation of state and local agencies in the review and evaluation. The designation of the affected area by the PUC avoids possible conflicts of interests of affected parties. The determination of the completeness of the application immediately upon the receipt is also beneficial for the review, as it eliminates later delays on the grounds of incompleteness.

Selected West Coast States

Oregon

Prior a construction of a transmission line of 230 kV and higher capacity, and over 10 miles long, an utility shall obtain a "Site Permit" from the Energy Facility Siting Council of the State Department of Energy. The regulatory review and certification is a two step process: (1) the Notice of Intent is filed and approved and Project Order is Issued, (2) the application for Site Permit is filed and reviewed, and decided upon.

Notice of Intent

At least 180 days before intended date of applying for the Site Certificate, the utility shall submit a Notice of Intent with general information on the need, engineering and design, potential environmental impacts, schedule of filing the application, and a list of all permits needed. Within 45 days of the Notice receipt the Department of Energy determines its completeness.

Public Involvement. In order to acquaint the public with the planned transmission addition, the Department of Energy shall hold informational public hearings on the Notice.

Agencies Participation. The Notice is distributed to all state agencies which deal with environmental protection, natural resources planning, land use planning, economic planning and development, indian tribes, municipal and county governments. All agencies and governmental entities entitled to a copy of the Notice of Intent shall present their comments to the Department of Energy.

Project Order. After the review is completed the Department issues a Project Order, which actually authorizes the applicant to proceed with the application for the Site Permit. The Project Order determines the applicable state and local regulations to be implemented, information required in the application, the issues to be addressed, and the study area.

The Site Permit application shall be submitted to the Siting Council at least 180 days upon the Notice of Intent is filed, meaning that the maximum time for the Notice of Intent review is 180 days.

Site Permit

Study Area Defined by the Council. The size of the study area, delimited by the spatial extent of impacts to be identified and assessed, is defined by the Council. The size study area varies depending on the category of resources considered. For surface and groundwater quality and availability, geology, cultural resources, and recreational opportunities, the study area equals the width of the right-of-way. For the noise levels, the study area is either the distance where the standards are exceeded by 10 Dba, or 0.5 mile from the right-of-way. The study area for protected designated areas is 20 miles from the right-of-way. For the scenic resources the study area is determined by the maximum visibility of 30 miles. Wildlife habitats and rare and endangered species shall be studied within the area of 500 feet on either sides of the right-of-way.

Corridor Siting Requirements. The Council regulations prescribe general and specific siting standards which apply for electric transmission lines. The general environmental standards include protected areas, land use, fish and wildlife, threatened and endangered species, scenic and aesthetic resources, cultural and archeological resources, and recreation. All standards require identification of potential impacts and mitigation measures. The selected corridor shall comply with all applicable state and local regulations and shall have the less significant adverse impacts comparing to alternatives assessed.

Exclusion Areas Determined. Protected areas and resources must be excluded for siting considerations and shall not be significantly impacted by the proposed corridors. The protected areas (exclusion zones) are: national parks and monuments, national and state wildlife refuges, national coordination areas, national and state fish hatcheries, national recreational and scenic areas, state parks and waysides, state natural heritage areas, state estuarine sanctuaries, experimental areas and agricultural stations, research forests, and Bureau of Land Management critical areas.

The environmental information to be included in the application for the Site Permit cover: geological, soil and seismic hazards, comprehensive land use map, identification of protected areas, impacts on fish and wildlife habitats with mitigation, impacts on rare and endangered species. Besides, impacts on historic, cultural, and archeological resources, recreational areas and opportunities must be determined.

Mitigation plan, monitoring plan, identification of areas permanently or temporarily disturbed by construction activities, a list or environmental and land use regulations and permits required.

Completeness of the Application Determined. Within 60 days of filing the Council determines that the application is completed. If the application is accepted, the public notice on the filing is given.

Public Participation. Informational hearings are held upon the acceptance of the application. In the informational hearings the general information on the proposed project, impacts, and the proceedings is presented. A prehearing conference shall be scheduled before formal public hearings. Interested persons may participate in the proceedings as either a party with the right to cross examine witnesses or as a limited party entitled only to giving oral or written testimony.

Agencies Review Mandated. All state and local agencies that are entitled to a copy of the Notice of Intent also receive a copy of the application and shall submit a Report on their findings on the application before a prehearing conference.

Decision. The Department of Energy prepares a report on the compliance with the relevant rules, draft conditions to be attached to the Permit, and a draft monitoring plan. Upon the conclusion of the hearings hearing officer makes a proposed order to the Council denying or approving the Permit. After the comments of parties and reviewing agencies are considered, the council makes a final decision.

Conditions on Permit. The following conditions are always attached to the Site Permit: mitigation plan, impact monitoring plan, construction schedule, restoration of disturbed landscapes and vegetation, restoration of radio and TV reception if interference occurs.

Conclusions. The Oregon regulations mandate a two step review process. Approval of the Notice of Intent results in the Project Order. Environmental issues are not the priority in this first step. In depth environmental assessment is required for the review of the application for Site Permit. Coordination with governmental agencies and the permitting and other regulation (e.g. zoning) is facilitated throughout the process. The applicant must demonstrate compliance with all pertinent state and local legislation. The agencies review of the application is required, and all the agencies must submit an evaluation report to the Department of Energy.

The corridor siting standards are comprehensive, and well specified. The standards are quantified by defining the size of the impacts area depending on the resources category. General corridor siting requirements are specific but only qualitatively stated. The priority is given to the assigned exclusion zones including federal and state designated resources.

The conditions that imposed to a Site Permit ensure that the requirements stated in the regulations will be implemented.

California

No electric transmission lines of 200 kV and higher can be constructed unless the Public Utility Commission (PUC) grants a Certificate of Public Convenience and Necessity. An application for the Certificate has to be filed with the PUC at least 12 months before planned construction date.

Time Limit. Within 30 days after the application is filed, the PUC determines if the application is complete. If it complies with all regulations the application is accepted. The decision on the application shall be made by the PUC within 1 year off the application acceptance.

Environmental Review Mandated by California Environmental Quality Act. The PUC is a lead agency in the environmental review, responsible for preparation of environmental documentation relevant to the proposed transmission line: Negative Declaration, Draft Environmental Impact Report (EIR), and Final EIR. The Negative Declaration is announced if no significant impacts are identified and the EIR procedure is not necessary. The Declaration shall be made within 105 days after the application filing. If the PUC determines that the EIR procedure is required for the particular project, the Draft EIR, and the Final EIR are prepared.

Proponents Environmental Assessment. As a information base for the environmental review the application for the Certificate shall include a Proponent's Environmental Assessment (PEA), which generally describes predicted potential environmental impacts of the transmission line project. The PEA serves as a starting point for the PUC in its environmental review process. The applicant shall also include a list of all relevant agencies granting permits and imposing conditions on the proposed project.

The PEA shall include description of the existing environmental setting from regional and site specific aspects, environmental assessment summary, detailed description of all potential impacts and mitigation measures, and alternatives to the proposed action.

Environmental Considerations in PEA. The environmental impact assessment summary requires the following: land use impacts (conflicts with the existing and planned land use, conflicts with recreational, educational, religious, and scientific land uses, prime farmland impacts, impacts on national parks, monuments, seashore, recreation areas, wildlife refuges and wilderness, wild and scenic rivers, state parks, beach, recreation areas, historical resources eligible for designation), geology and soils (topography, relief, unique features, erosion rates, soil, geologic, seismic hazards, soil productivity), atmospheric impacts (air pollution), hydrology (water quality standards, water supplies, ground water quality and quantity, drainage patterns, flooding, water related recreation) biological impacts (rare and endangered species and their habitats, species diversity, migration patterns fish and bird, habitats of recreational values, unique vegetation communities, agricultural cropland) noise, visual impacts (parks, recreational areas, residential areas, architectural structures).

Socioeconomic impacts, public health and safety are also incorporated in the PEA.

Public and Agencies Participation. A notice of the application filing shall be given, and copies of the application shall be distributed to counties and municipalities, State Department of Transportation, and Energy Commission.

The application and appropriate environmental documents are available for the public and agencies review, and may be subject to public hearing if the request is filed with the PUC within 30 days of the completion of each document. If within 30 days the request for hearing is not received, a hearing may be waived. Hearings shall be held within 45 days after the Draft EIR and Final EIR are made available to the public review, and within 21 days after the distribution of the Negative Declaration.

Decision. After the hearings the administrative law judge makes a draft decision for the Commission to analyze. The final order by the Commission may be appealed in the State Supreme Court.

Mitigation Monitoring Plan. If the Certificate is granted the Mitigation Monitoring Plan shall be implemented by the utility, and the reported to the PUC.

Conclusions. The entire review by the PUC cannot last more than 1 year from the application filing date. The environmental review is well defined and structured process mandated by the California Environmental Quality Act.

Comprehensive, but qualitatively expressed and unclearly prioritized regulatory requirements for corridor siting are defined under the contents of Proponent Environmental Assessment which is included into the application. The requirements are generally stated but mandate detailed description of potential impacts and mitigation measures. Agencies are involved in all phases of the application review process.

Mitigation Monitoring Plan must be submitted and its implementation must be reported to the PUC periodically.

Table C.1: DATA SOURCES FOR STATE REGULATIONS REVIEW - APPALACHIAN STATES

STATE	REGULATIONS, RULES, STATUTES, DOCUMENTATION	PERSONAL COMMUNICATION
OHIO	• Ohio Administrative Code, Chapters 4096-1, 4906-5,4906-7,4906-15, Codes of Rules & Regulations of the Public Utilities Commission of Ohio, Volume 3, Ohio Power Siting Board, January 15, 1991.	• Ms. Edna Newkirk, Librarian, PUC of Ohio. • Mr. Ronald Urian. Ohio Power Siting Board.
NEW YORK	• Public Service Law, Subchapter E Certificates of Environmental Compatibility & Public Need for Major Utility Transmission Facilities, Parts: 70,72,73,74,75. • Questions & Answers Explaining the Transmission Line Certification Process in New York State, PSC, Department of Public Service, 10/82. • The State of New York Energy Law, Article 7, Energy Planning.	• Mr. Fred G. Haag, Nuclear Power Generation Planner, System Planning Section, Power Division, PSC, State of NY Dept of Public Service. • Mr. Frederick Carr, Principal System Planner, Power Division, PSC, State of NY Dept of Public Service. • Mr. John J. Suloway, Director of Environmental Licensing, New York Power Authority.
PENNSYLVANIA	• PUC, Subchapter G: Commission Review of Siting & Construction of Electric Transmission Lines, Sections 57.71 to 57.77. • Pennsylvania Code, Title 52, Public Utilities, Chapters 1,3,5, Rules of Administrative Practice & Procedure. • Project Review & Evaluation Program, Commonwealth of Pennsylvania, Department of Environmental Resources.	• Mr Frank Wilmarth, PUC, Law Bureau, Fixed Utility Service Division. • Ms. Patricia K. Burket, Assistant Counsel, PUC. • Ms. Kathy Seiber, PA Department of Environmental Resources, Office of Policy.

Table C.1: continued

STATE	REGULATIONS, RULES, STATUTES, DOCUMENTATION	PERSONAL COMMUNICATION
NEW JERSEY	———	• Mr. Richard Hartung, Chief of Bureau, Electric Service Evaluation, Board of Regulatory Commissioners • Ms. Deborah Wenke Department of Environmental Protection & Energy
MARYLAND	• Title 20 PSC, Subtitle 80, Applications Concerning the Construction of Generating Stations & Overhead Transmission Lines. • Title 20 PSC, Subtitle 07, Practice & Procedure.	• Mr. Joseph Walter, Engineer, Public Service Commission • Ms. Sandy Shaw, Biologist, MD Dept. of Natural Resources
DELAWARE	———	• Mr. Ken Wilson, Delaware Public Service Commission. • Mr. Frank Sobonya, DELMARVA Power & Light Company.
KENTUCKY	• 807 KAR 5:001 Rules of Procedure, Chapter 5, Utilities • Kentucky Public Service Commission Laws, Annotated, 1988 edition. • Filing Requirement Checklist, Certificate of Public Convenience & Necessity - Construction	Mr. Wayne Bates. Kentucky Public Utility Commission

Table C.1: continued

STATE	REGULATIONS, RULES, STATUTES, DOCUMENTATION	PERSONAL COMMUNICATION
VIRGINIA	• Code of Virginia Sections 56-46.1 & 56-46.2 • Guidelines of Minimum Requirements for Transmission Line Applications Filed Under Virginia Code Section 56-46.1 & The Utility Facilities Act. • Guidelines for the Protection of Natural, Historic, Scenic & Recreational Values in the Design & Location of Rights-of-Way and Transmission Facilities, Federal Power Commission, November 27, 1970. • Virginia SCC Rules of Practice & Procedures	• Ms. Deborah Ellenberg • Mr. Howard Anderson • Mr. Ken Shrad Virginia State Corporation Commission
WEST VIRGINIA	• Public Service Commission Law of West Virginia, Powers & Duties of PSC, Ch. 24, Articles 1,2,5. • Title 150, Procedural Rule PSC, Series 1, Rules of Practice & Procedure. • Title 150, Legislative Rule PSC Series 3, Rules & Regulations for the Government of Electric Utilities.	• Ms. Karen Short • Mr. Earl Melton Public Service Commission
TENNESSEE	———	• Mr. Hall Novak PSC, Electric Utility Division • Mr. Hugh Barger, Environmental Engineer,TVA

Table C.1: continued

STATE	REGULATIONS, RULES, STATUTES, DOCUMENTATION	PERSONAL COMMUNICATION
N. CAROLINA	• North Carolina Public Utilities, Article 5A. Siting of Transmission Lines.	• Mr. Benjamin R. Turner, Jr. Rate Engineer, Electric Division, Public Staff, N.C. Utilities Commission
S. CAROLINA	• Utility Siting & Environmental Protection Act, Chapter 33 • SC PSC Regulations Pertaining to Practice & Procedure, Chapter 103, Article 8. Practice & Procedure.	• Mr. A.R. (Randy) Watts, Chief Electric Department,Utilities Division, S.C. Public Service Commission
GEORGIA	• Georgia Environmental Policy Act, July 1, 1991. • The Georgia Environmental Policy Act Guidelines, Georgia Department of Natural Resources, Environmental Protection Division, July 1, 1991.	• Georgia Public Service Commission. • Mr. John Waldon, Georgia Environmnetal Protection Division. • Ms. Jolee Gardner, Land Department, Georgia Power Co.

Table C.2: DATA SOURCES FOR STATE REGULATIONS REVIEW - SELECTED MID-CONTINENT STATES

STATE	REGULATIONS, RULES, STATUTES, DOCUMENTATION	PERSONAL COMMUNICATION
N. DAKOTA	• ND PSC, Energy Conversion & Transmission Facility Siting, Part I: Siting Act, Part II: Rules & Regulations, January 1988. • ND PSC, Article 69-02 Practice & Procedure, September 1, 1992.	• Mr. Jerry Lein, Staff Engineer Public Service Commission, State of North Dakota.
S. DAKOTA	• South Dakota Energy Facility Permit Act • PUC Energy Facility Siting Rules, Chapter 20:10:22, Revised December 27, 1989. • Application of Black Hills Corporation for a Construction Permit for 18.8 miles of 230 kV Electric Transmission Line & Terminal Facilities in Lawrence County, South Dakota. • Technical & Biological Evaluation of the Spearfish to Kirk 230 kV Transmission Line, Black Hills Power & Light Co., prepared by Stone & Webster Engineering Corporation, March 1991	• Mr. Martin C. Bettmann, Staff Engineer,Public Utilities Commission • Mr. Robert Koenig, Black Hills Power & Light Company, Rapid City, SD

Table C.2: continued

STATE	REGULATIONS, RULES, STATUTES, DOCUMENTATION	PERSONAL COMMUNICATION
MINNESOTA	• Minnesota Statutes, Section 216B.243 Public Utilities: Certificate of Need. • Minnesota Rules Chapter 4400, Environmental Quality Board, High Voltage Lines, Power Plants.	• Mr. Scott Brackett, Minnesota Department of Public Service. • Mr. Alan Krug, Minnesota Dept. of Public Service. • Mr. George Durfee, Environmental Quality Board.
WISCONSIN	• Wisconsin Administrative Code Chapter PSC 111 Plans & Certificates for Major Electric Facilities, December 1982. • Wisconsin Administrative Code, Ch. PSC 2, Procedure & Practice. • Guidelines for the Implementation of the Wisconsin Environmental Policy Act, December 1973.	• Mr. Paul Rahn, Environmental Analyst, Wisconsin PSC. • Ms. Ann Pfeifer, Hearing Examiner, Wisconsin PSC. • Mr. David J. Barger, Staff Engineer, Electric Division, Wisconsin PSC.

Table C.3: DATA SOURCES FOR STATE REGULATIONS REVIEW - SELECTED WEST COAST STATES

STATE	REGULATIONS, RULES, STATUTES, DOCUMENTATION	PERSONAL COMMUNICATION
OREGON	• Proposed Revised Energy Facility Siting Council Rules, Oregon Administrative Rules Chapter 345, Divisions 1 through 25, August 1992.	• Mr.Charlie Grist, Policy & Planning Div, Dept of Energy. • Ms. Sandra Muckleston, Nuclear Safety & Energy Facility Div, Dept of Energy. • Ms. Marilyn Forsyth, Dept of Energy. • Mr. Phil Cerver, Dept of Energy.
CALIFORNIA	• Rules Relating to the Planning & Construction of Electric Generation & Transmission Facilities Located in California, Order No 131-C, PUC, September 18,1985. • Rules of Practice & Procedure,State of California PUC, Latest Revision Record January 20, 1992. • California Permit Handbook, Governor's Office of Planning & Research, April 1991 • The California Environmental Quality Act, Governor's Office of Planning & Research, Office of Permit Assistance, June 1986 edition. • State of California PUC Amended Rules of Practice & Procedure, Commissions Information & Criteria List Applicable to Transmission Line Projects.	• Mr. George Hersh, PhD, California Public Utility Commission

Table C.4: REGULATORY AUTHORITY, CERTIFICATE TITLE AND APPLICABILITY, APPALACHIAN STATES

STATE	AUTHORITY	CERTIFICATE TITLE	APPLICABILITY
OH	Ohio Power Siting Board	• Certificate of Environmental Compatibility & Public Need	> 300 kV; > 5 M 125-300 kV;2-10 M
NY	Public Service Commission	• Certificate of Environmental Compatibility & Public Need	> 125 kV; > 1 M 100-125 kV > 10 M
NJ	Public Utilities Board	• no state certification required (only if land condemnation problem or conflict with local zoning)	————
PA	Public Utility Commission	• Authorization to Locate & Construct High Voltage Transmission Line	100 kV & <
MD	Public Service Commission	• Certificate of Public Convenience & Necessity	69 kV & <
DE	————	• no state certification required	————
VA	State Corporation Commission	• Certificate of Public Convenience & Necessity	150 kV & <
WV	Public Service Commission	• Certificate of Public Convenience & Necessity	200 kV & <
TN	————	• no state certification required	————
KY	Public Service Commission	• Certificate of Public Convenience & Necessity • Certificate of Environmental Compatibility	69 kV & < 400 kV & <
NC	North Carolina Utilities Commission	• Certificate of Environmental Compatibility & Public Convenience & Necessity	161 kV & <
SC	Public Service Commission	• Certificate of Environmental Compatibility & Public Convenience & Necessity	125 kV & <
GA	————	• no state certification required	————

Table C.5: REGULATORY AUTHORITY, CERTIFICATE TITLE AND APPLICABILITY, SELECTED MID - CONTINENT STATES

STATE	AUTHORITY	CERTIFICATE TITLE	APPLICABILITY
WI	Public Service Commission	●Certificate of Public Convenience & Necessity ●Environmental Impact Statement (condition for the certificate)	100 kV & < 100-345 kV; > 1 M > 345 kV
MN	Public Utilities Commission Environmental Quality Board	● Two permits are required: 1. Certificate of Need 2. Route Designation & Construction Permit	> 200 kV; > 50 M in MN > 300 kV; > 25 M in MN
ND	Public Service Commission	● Two permits are required: 1. Certificate of Corridor Compatibility 2. Route Permit within Designated Corridor	115 kV & <
SD	Public Utility Commission	● Permit for Transmission Facility	200 kV & < 115-200 kV if > 1 M does not parallel

Table C.6: REGULATORY AUTHORITY, CERTIFICATE TITLE AND APPLICABILITY, SELECTED WEST COAST STATES

STATE	AUTHORITY	CERTIFICATE TITLE	APPLICABILITY
OR	State Dept of Energy Energy Facility Siting Council	● Project Order ● Site Certificate	> 230 kV; > 10 M
CA	Public Utilities Commission	●Certificate of Public Convenience & Necessity ●Environmental Impact Report (condition for the Certificate)	> 200 kV

Table C.7: PROCEDURES AND ACTIONS REQUIRED BY STATE REGULATIONS FOR TRANSMISSION LINE SITING AND CERTIFICATION

REQUIRED ACTIONS	STATES														
	OH	NY	PA	MD	VA	WV	KY	NC	SC	WI	MN	ND	SD	OR	CA
ADVANCE PLAN FOR TRANSMISSION SYSTEM ADDITION	+	+	-	+	+	+	-	+	+	+	-	+	+	+	+
LETTER OF INTENT TO APPLY FOR CERTIFICATES	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-
INFORMATIONAL HEARING ON LETTER OF INTENT	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
PREAPPLICATION CONFERENCE UTILITY - COMMISSION	+	+	-	+	+	-	+	-	-	+	-	-	+	-	-
PUBLIC INFORMATION PROGRAM BEFORE APPLYING	-	+	-	-	-	-	-	-	-	+	+	-	-	-	-
PUBLIC EDUCATION PROGRAM BY COMMISSION/BOARD	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
DESIGNATION OF AFFECTED AREA BY COMMISSION	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-
SEPARATE APPLICATION FOR CERTIFICATE OF NEED & CORRIDOR COMPATIBILITY	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-

Table C.7: continued

REQUIRED ACTIONS	STATES OH	NY	PA	MD	VA	WV	KY	NC	SC	WI	MN	ND	SD	OR	CA
SEPARATE APPLICATION FOR ROUTE PERMIT WITHIN DESIGNATED CORRIDOR	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-
APPLICATION FOR CERTIFICATE OF PUBLIC CONVENIENCE, NECESSITY, ENVIRONMENTAL COMPATIBILITY	+	+	+	+	+	+	+	+	+	+	-	-	+	+	+
DETERMINATION OF APPLICATION COMPLIANCE/COMPLETION	+	+	-	+	-	-	+	-	-	-	+	+	+	+	+
NOTICE OF APPLICATION FILING	+	+	+	-	+	+	-	+	+	-	+	+	+	+	+
DISTRIBUTION OF APPLICATION	+	+	+	+	+	-	-	+	+	+	+	-	+	+	+
PHASED PROCEEDINS OR CONSIDERATIONS OF ISSUES	-	+	-	+	-	-	-	-	-	-	-	-	-	+	+
LOCAL REVIEW COMMITTEE DESIGNATED	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-
PROJECT COORDINATING COMMITTEE FORMED	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
PROJECT LEADER DESIGNATED	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
ROUTE ADVISORY COMMITTTEE DESIGNATED	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-

Table C.7: continued

REQUIRED ACTIONS	STATES OH	NY	PA	MD	VA	WV	KY	NC	SC	WI	MN	ND	SD	OR	CA
COMMISSION'S PUBLIC ADVISER DESIGNATED	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
PUBLIC INFORMATION MEETINGS AFTER FILING	-	+	-	-	-	-	-	-	-	+	+	-	-	-	-
ALTERNATIVE ROUTING PROPOSAL BY ANY PARTY	-	+	-	+	+	+	-	-	+	-	+	+	+	-	+
PROPONENTS ENVIRONMENTAL ASSESSMENT (BY APPLICANT)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
NEGATIVE DECLARATION BY COMMISSION	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
DRAFT EIR BY COMMISSION	-	-	-	-	-	-	-	-	-		-	-		-	+
ENVIRONMENTAL SCREENING BY COMMISSION	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
PRELIMINARY ENVIRONMENTAL REPORT BY COMMISSION	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
ENVIRONMENTAL IMPACT STATEMENT/REPORT	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+
NOTICE OF FORMAL HEARING	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Table C.7: continued

REQUIRED ACTIONS	STATES														
	OH	NY	PA	MD	VA	WV	KY	NC	SC	WI	MN	ND	SD	OR	CA
REVIEWING/PARTICIPATING AGENCIES COMMENTS REQUIRED	-	-	+	+	-	-	+	-	+	+	+	+	-	+	+
PREHEARING CONFERENCE	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+
INFORMATIONAL HEARING ON APPLICATION/PLAN	-	+	-	-	-	-	-	-	-	+	+	-	-	+	-
REQUESTS FOR PARTICIPATION AND INTERVENTION	+	+	+	+	+	+	+	+	+	+	-	-	+	+	+
REQUEST FOR INFORMATION BY PARTIES (DISCOVERY)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
FORMAL HEARINGS	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
HEARING OFFICER/JUDGE REPORT AND RECOMMENDATION	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
FILING COMMENTS ON RECOMMENDATION	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+
FINAL DECISION/ORDER BY COMMISSION/BOARD	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
PETITION FOR REHEARING	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
PETITION FOR JUDICIAL REVIEW-APPEAL ON DECISION	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Table C.7: continued

REQUIRED ACTIONS	STATES														
	OH	NY	PA	MD	VA	WV	KY	NC	SC	WI	MN	ND	SD	OR	CA
CONDITIONS ON CERTIFICATE	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+
POST CERTIFICATION REQUIREMENTS:	+	+	-	+	+	-	-	-	-	-	+	+	-	-	+
- preliminary construction plan	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
- EM & CP	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
- mitigation monitoring plan	-	+	+	-	-	-	-	-	-	-	-	-	-	+	+
- public information program	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C.8 : STATE REQUIREMENTS FOR TRANSMISSION LINE SITING AND CERTIFICATE

MINIMUM REQUIREMENTS	STATES OH	NY	PA	MD	VA	WV	KY	NC	SC	WI	MN	ND	SD	OR	CA
MAPPING:															
- 1,000 ft on each side of the corridor, 1:24,000	+	+	+	-	-	+	-	-	-	-	-	-	-	-	-
- 1 mile on each side of the corridor, 1:24,000	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-
- 2 miles on each side of the corridor 1:24,000	-	+	+	-	-	+	-	-	-	-	-	-	-	-	-
- 5 miles on each side of the corridor, suitable scale	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
- study area, 1:24,000	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-
- impact area, suitable scale	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
- area & scale not specified	-	-	-	+	+		+	+	+	-	-	+	+	-	+
AERIAL PHOTOGRAPHS	-	+	+	-	-	-	-	-	-	-	-	-	+	-	-
DIGITAL DATA	-	-	-	-	-	-	-	-	-	-	-	-	+	+	
COMPLIANCE WITH FEDERAL, STATE, LOCAL REGULATIONS	+	+	+	+	+	-	-	+	+	+	+	+	+	+	+
ENVIRNMNTL IMPACTS, GENERAL	-	-	-	-	-	+	+	+	+	-	-	-	-	-	-
IDENTIFICATION OF IMPACTS	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Table C.8: continued

MINIMUM REQUIREMENTS	STATES OH	NY	PA	MD	VA	WV	KY	NC	SC	WI	MN	ND	SD	OR	CA
DIRECT & INDIRECT IMPACTS	+	+	-	-	-	-	-	-	-	-	+	+	+	+	+
PROBABILITY,EXTENT,DURATION OF IMPACT	-	+	-	-	-	-	-	-	-	-	+	-	+	+	+
IRREVERSIBLE CHANGES	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+
MITIGATION OF IMPACTS	+	+	+	+	+	+	-	+	-	+	+	+	+	+	+
MONITORING OF IMPACTS	-	-	-	-	-	-	-	-	-	+	+	+	-	+	+
NATURAL RESOURCES, GENERAL	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-
PARALLELING CORRIDORS	-	-	-	-	+	-	-	-	-	+	+	-	-	-	-
METHOD OF ROW CLEARING & MANAGEMENT	+	+	-	-	+	+	-	-	-	-	+	+	+	+	-
AREAS DISTURBED	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
SOLID WASTE & DEBRIS TREATMENT IMPACT	+	-	-	-	-	-	-	-	-	-	-	-	-	+	+
TERRAIN & TOPOGRAPHY	+	+	+	-	-	-	-	-	-	-	+	+	+	+	+
SLOPE OVER 20%	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
SOIL STABILITY	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+
GEOLOGY	+	-	+	-	-	-	-	-	-	+	+	+	+	+	+
GEOLOGIC HAZARD	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+

Table C.8 : continued

MINIMUM REQUIREMENTS	STATES OH	NY	PA	MD	VA	WV	KY	NC	SC	WI	MN	ND	SD	OR	CA
SEIZMIC HAZARD	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+
MINERAL RESOURCES	-	-	-	-	-	-	-	-	-	-	+	+	+	-	+
STREAMS	+	+	+	-	-	+	-	-	-	+	+	+	+	+	+
FLOODPLAINS	-	+	-	+	-	-	-	-	-	-	-	-	-	-	+
DRAINAGE PATTERNS	+	+	-	-	-	-	-	-	-	-	-	+	+	-	+
GROUNDWATER SUPPLIES	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+
SPRINGS	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
WELLS	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
LAKES,PONDS,RESERVOIRS	+	+	-	-	-	+	-	-	-	+	+	+	+	+	+
WETLANDS	+	+	+	-	-	+	-	-	-	+	+	+	+	+	+
RUNOFF & SILTATION CHANGES	+	-	+	-	+	+	-	-	-	-	-	-	+	+	+
EROSION CHANGES	+	-	-	-	+	+	-	-	-	-	-	-	+	+	+
WATER SUPPLIES CHANGES	+	-	-	-	-	-	-	-	-	-	-	+	+	+	+
HERBICIDE APPLICATION	-	-	-	-	-	+	-	-	-	-	-	-	+	+	-
AREAS TO BE TREATED WITH HERBICIDES	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C.8 : continued

MINIMUM REQUIREMENTS	OH	NY	PA	MD	VA	WV	KY	NC	SC	WI	MN	ND	SD	OR	CA
								STATES							
HERBICIDE IMPACT ON WATER SUPPLIES	+	-	-	-	-	-	-	-	-	-	-	-	-	+	+
SOILS GENERAL	+	+	+	-	+	-	-	-	-	+	+	-	+	+	+
SOIL PRODUCTIVITY	-	-	-	-	-	-	-	-	-	+	-	-	+	-	+
HIGHLY ERODIBLE SOILS	-	+	-	-	-	-	-	-	-	-	-	-	+	-	+
LAND USE, GENERAL	-	-	+	-	-	-	-	-	-	+	+	+	+	+	+
PLANNED LAND USE	-	-	-	-	-	-	-	-	-	+	-	-	-	+	+
POPULATION DENSITY	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+
PUBLIC LAND	+	+	+	-	+	+	-	-	-	+	-	-	-	+	+
RESIDENTIAL LAND USE	+	+	-	-	-	+	-	-	-	+	+	+	+	+	+
URBAN LAND USE	+	-	-	-	-	+	-	-	-	-	+	+	-	+	+
HOMES 500 FT OF THE LINE	-	-	-	-	+	-	-	-	-	-	-	+	-	-	-
INSTITUTIONAL LAND USES	-	+	-	+	+	+	-	-	-	+	+	-	+	-	+
SCHOOLS	-	-	-	-	+	-	-	-	-	-	-	-	+	-	+
CONVALESCENT CENTERS	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+
HOSPITALS	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+
LOCATION & OWNERSHIP STRUCTURES TO BE DEMOLISHED	-	-	-	-	+	-	-	-	-	-	+	-	+	-	-

Table C.8: continued

MINIMUM REQUIREMENTS	STATES OH	NY	PA	MD	VA	WV	KY	NC	SC	WI	MN	ND	SD	OR	CA
INDUSTRIAL & COMMERCIAL	+	+	-	-	-	-	-	-	-	-	+	+	+	-	+
AIRPORTS	-	-	+	+	+	-	-	-	-	+	-	-	-	+	-
TRANSPORTATION	+	+	-	-	+	-	-	-	-	+	+	+	+	+	+
MINING	+	-	-	-	-	-	-	-	-	+	+	-	+	-	-
UTILITIES	+	+	-	-	-	-	-	-	-	+	+	-	-	+	+
VEGETATION, GENERAL	+	-	-	-	-	-	-	-	-	+	-	+	+	-	+
FOREST	+	+	-	+	-	-	-	-	-	+	+	-	-	+	-
WOODLAND	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
UNIQUE/OLD GROWTH FOREST	-	+	-	-	-	-	-	-	-	-	+	-	-	+	-
PRODUCTIVE TIMBER STANDS	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-
AGRICULTURAL LAND	+	+	-	-	+	+	-	-	-	+	+	+	+	+	+
PASTURELAND	+	-	-	-	-	-	-	-	-	-	-	-	+	+	-
CROPLAND	+	-	-	-	-	-	-	-	-	-	-	-	+	-	+
AGRICULTURAL PRODUCTION	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+
PRIME FARMLAND/LOCALLY IMPORTANT FARMLAND	-	-	-	-	+	-	-	-	-	-	-	+	+	-	+

Table C.8: continued

MINIMUM REQUIREMENTS	STATES OH	NY	PA	MD	VA	WV	KY	NC	SC	WI	MN	ND	SD	OR	CA
AGRICULTURAL DISTRICTS	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
IRRIGATED LAND	+	-	-	-	-	-	-	-	-	-	-	+	+	-	-
OCCURRENCE OF FISH & GAME	+	+	-	-	-	-	-	-	-	-	-	+	+	+	+
WILDLIFE MANAGEMENT AREAS	-	-	-	+	+	-	-	-	-	-	-	+	-	+	+
GAME & WILDLIFE PRESERVES	-	-	-	+	+	-	-	-	-	-	+	-	-	+	+
RARE & ENDANGERED SP.	+	-	-	-	-	-	-	-	-	-	+	-	+	+	+
HABITATS PLANT & WILDLIFE	+	+	+	-	+	+	-	-	-	+	-	-	+	+	+
HABITATS RARE, THREATENED, ENDANGERED SP.	-	+	-	-	+	+	-	-	-	+	+	+	+	+	+
IMPACTS ON DOMESTIC ANIMALS	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-
CULTURAL RESOURCES, GENERAL	-	-	-	-	-	-	-	-	-	-	+	-	+	+	+
HISTORIC RESOURCES	+	+	+	+	+	+	-	-	-	+	+	+	+	+	+
RELIGIOUS SITES/STRUCTURES	+	-	-	-	-	-	-	-	-	-	-	-	+	-	+
ARCHEOLOGICAL RESOURCES	+	+	+	+	+	-	-	-	-	-	+	+	+	+	-
FEDERAL, STATE, LOCAL PARKS	+	-	-	+	+	+	-	-	-	+	+	+	+	+	+
FEDERAL, STATE, LOCAL FORESTS	+	+	-	-	+	+	-	-	-	+	+	+	+	+	+

Table C.8: continued

MINIMUM REQUIREMENTS	STATES OH	NY	PA	MD	VA	WV	KY	NC	SC	WI	MN	ND	SD	OR	CA
NATIONAL LANDMARKS	+	+	-	-	+	-	-	-	-	+	+	+	+	+	+
DESIGNATED NATURAL AREAS	+	-	-	-	+	-	-	-	-	+	+	+	+	+	+
WILDERNESS AREAS	-	-	+	-	+	-	-	-	-	+	+	+	-	+	+
RECREATIONAL AREAS	+	+	-	+	+	+	-	-	-	-	+	+	+	+	+
SCENIC RESOURCES	+	+	+	+	+	+	-	-	-	+	+	+	+	+	+
SCENIC RIVERS	+	-	-	-	+	-	-	-	-	+	-	+	-	+	+
SCENIC BYWAYS	+	-	-	-	+	-	-	-	-	+	-	+	-	+	-
HUMAN HEALTH & SAFETY	+	+	+	-	+	-	-	-	-	-	-	+	+	+	+
AIR POLLUTION	+	-	-	-	-	-	-	-	-	-	-	-	+	+	+
NOISE	+	+	-	-	-	-	-	-	-	-	+	+	+	+	+
EMF	+	+	-	-	+	-	-	-	-	-	+	-	-	-	-
RADIO/TV INTERFERENCE	+	-	-	-	-	-	-	-	-	+	-	+	-	+	-

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