DOE/EA-1221

Environmental Assessment

Ponnequin Wind Energy Project
Weld County, Colorado

U.S. Department of Energy
Denver Support Office
Commercialization Ventures Program
1617 Cole Boulevard
Golden, Colorado

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ACRONYMS AND ABBREVIATIONS

CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CDW	Colorado Division of Wildlife
dBA	decibel level averaged
Disgen	Distributed Generation Systems, Inc.
DOE	U.S. Department of Energy
EA	Environmental Assessment
FAA	Federal Aviation Administration
FR	Federal Register
kv	kilovolt (one kv = 1,000 volts)
kW	kilowatt
kWh	kilowatt-hour
MBTA	Migratory Bird Treaty Act
mph	miles per hour
MW	megawatt
MWH	megawatt-hour
NBS	National Biological Service
NEPA	National Environmental Policy Act
OAPH	Colorado Historical Society, Office of Archaeology and Historic Preservation
P.L	Public Law
PSCo	Public Service Company of Colorado
PUC	Public Utilities Commission (of Colorado)
rpm	revolutions per minute
SCADA	supervisory control and data acquisition (system)
SCS	Soil Conservation Service, now known as the Natural Resource Conservation Service
USFWS	U.S. Fish & Wildlife Service
WAPA	Western Area Power Administration
Z-46	Zond Z-46 wind turbine

EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) is considering a proposal from the State of Colorado, Office of Energy Conservation for funding the construction of the Ponnequin Wind Project in Weld County, Colorado by Public Service Company of Colorado (PSCo). PSCo along with its contractors and business partners would jointly develop the Ponnequin Wind Project. The first phase would involve the construction of seven wind turbines in 1997. Assuming public demand for the electricity produced, up to seven turbines are scheduled for construction in 1998. Depending upon consumer demand and the success of the first two phases of the project, an additional 13 turbines would be constructed for a total of 27 turbines within the 416-acre project area which is located on private land. The State of Colorado Office of Energy Conservation has requested funding from the DOE Commercialization Ventures Program to assist in the construction of the Ponnequin Wind Project and the marketing of its electricity through the development of a Green Pricing Program.

DOE, through its Commercialization Ventures Program, has solicited applications for financial assistance from state energy offices, in a teaming arrangement with private-sector organizations, for projects that will accelerate the commercialization of emerging renewable energy technologies. The Commercialization Ventures Program was established by the Renewable Energy and Energy Efficiency Technology Competitiveness Act of 1989 (P.L. 101-218) as amended by the Energy Policy Act of 1992 (P.L. 102-486). The Program seeks to assist entry into the marketplace of newly emerging renewable energy technologies, or of innovative applications of existing technologies. In short, an emerging renewable energy technology is one which has already proven viable but which has had little or no operational experience. The Program is managed by the Department of Energy, Office of Energy Efficiency and Renewable Energy. The Federal action triggering the preparation of this EA is the need for DOE to decide whether to release the requested funding to support the construction of the Ponnequin Wind Project.

The purpose of this environmental assessment (EA) is to provide DOE and the public with information on potential environmental impacts associated with the development of the Ponnequin Wind Energy Project. This EA and public comments received on it will be used in DOE's deliberations on whether to release funding for the project under the Commercialization Ventures Program. A public scoping statement was sent on May 5, 1997 to interested members of the public and affected local, state and Federal government agencies. Three comment letters were received and have been considered in the preparation of this EA. Two key issues raised in those letters were 1) impacts to streams and wetlands, and 2) the need for an impact monitoring and reporting program. A Pre-Decision Draft EA was released for public comment. Three comment letters were received on the Pre-Decision Draft EA. DOE sent individual letters in response to those letters. None of the comment letters required changes in the EA.

This document provides a detailed description of the proposed project along with an assessment of potential impacts associated with its construction and operations. Resources and conditions considered in this analysis include: streams, wetlands, floodplains, water quality, soils, vegetation,

air quality, socioeconomic conditions, energy resources, noise, transportation, cultural resources, visual and land use resources, public health and safety, wildlife (including birds), threatened, endangered and candidate species, and cumulative impacts. The analysis found that the project would have minimal impacts on these resources and conditions and would not create impacts that exceed the significance criteria defined in this document. In response to concerns about avian impacts, PSCo has agreed to implement the avian impact monitoring program found in Appendix B of this EA.

CHAPTER ONE
INTRODUCTION

1.1 Purpose of this EA and the NEPA Process

The purpose of this environmental assessment (EA) is to provide the U.S. Department of Energy (DOE) and the public with information on the potential environmental impacts associated with development of the Ponnequin Wind Energy Project in Weld County, Colorado. This information will be used by DOE in its deliberations on whether to fund a proposed renewable energy project under its Commercialization Ventures Program. This EA has been prepared in conformance with the following Federal regulations and guidelines:

- National Environmental Policy Act (NEPA), (Public Law 91-190);
- Council on Environmental Quality Regulations implementing NEPA (40 CFR 1500-1508);
- DOE regulations governing agency compliance with NEPA (10 CFR 1021); and,
- DOE Secretarial Policy on the National Environmental Policy Act (June 1994).

This document reflects DOE's independent evaluation of the impacts associated with the proposed project. DOE approves and takes full responsibility for the scope and content of this document.

An EA is not a decision document. DOE will issue a separate decision document following consideration of public comment on this EA and completion of the NEPA process. A public scoping statement was sent on May 5, 1997 to interested members of the public and affected local, state and Federal government agencies at the start of this process. Comments received during the scoping period have been addressed in the preparation of this EA. The scoping letter, mailing list and copies of the three written responses received during the scoping period are reprinted in Appendix A.

1.2 Project Background

DOE is considering a proposal from the State of Colorado Office of Energy Conservation which would involve the construction of the Ponnequin Wind Project in Weld County, Colorado by Public Service Company of Colorado (PSCo). The project has been named after the Ponnequin Camp--a feature shown on topographic maps of the area.

The State of Colorado Office of Energy Conservation has filed an application with DOE that requests funding for the development of a the Ponnequin Wind Project and a Green Pricing Program under the DOE Commercialization Ventures Program. Under the terms of the grant to be negotiated with the Colorado Office of Energy Conservation, DOE could provide funds that could be used to finance construction of the Ponnequin Wind Project and marketing of its

electricity under a Green Pricing Program. Under the program, PSCo would offer citizens and businesses the opportunity to purchase the electricity generated by the proposed wind project. The approval of the Colorado Public Utilities Commission was required before the project could proceed.

PSCo and its contractor, Distributed Generation Systems (Disgen), would jointly develop the first phase of the Ponnequin Wind Project. The first phase would involve the construction of up to seven wind turbines. Disgen has been hired by PSCo to provide technical expertise on the planning, design and construction of the wind turbine facility. For purposes of this EA, reference to "PSCo" includes PSCo and Disgen, and any other project-related contractors, subcontractors and business partners involved in the development or operation of the Ponnequin Wind Project.

On February 7, 1997, the Colorado Public Utility Commission approved the settlement of a case involving PSCo, the Colorado Office of Energy Conservation, the State Office of Consumer Counsel, the Land and Water Fund of the Rockies, the Colorado Renewable Energy Society, City of Boulder, the Boulder Energy Conservation Center and the Sierra Club. The settlement allowed PSCo to charge a premium for electricity generated by a wind generation facility. Several citizen groups and consumer-owned utilities involved in the case have agreed to help PSCo market this renewable energy source to consumers. The settlement specified that PSCo will develop up to 20 megawatts (MW) of wind generation capacity if consumer demand warrants it. A potential grant for the project under the DOE Commercialization Ventures Program is referenced in the settlement. Assuming Colorado and PSCo eventually receive the referenced $3 million grant from DOE (which is dependent, in part, upon the results of this NEPA process), consumers would pay no more than an additional $2.50 for each 100 kWh block of wind-generated electricity they purchase.

1.3 Purpose and Need for the Federal Action

The demand for electricity in Colorado is growing. PSCo anticipates a load growth of about 2 percent annually for the next five years. Firm, peak summer demand, for example, is expected to grow from 4,300 MW in 1996 to more than 4,700 MW in 2001. Electricity sales for PSCo are also predicted to increase from 23,600 million kWh in 1995 to 27,500 million kWh in 2001. Assuming current generating capacity and fuel-mix, increasing the output of electricity requires increased burning of coal and/or natural gas.

The proposed project offers the potential to diversify energy sources and improve the prospects for commercializing wind energy technologies. The proposed project would be the first commercial-scale, wind energy facility in a Rocky Mountain state. If successful, the proposed facility could serve as a model for using wind power to meet growing demand for electricity without the need to expand conventional generating stations. Commercialization of wind energy could help meet the demand for electricity in rural parts of the U.S. and other countries.

DOE, through its Commercialization Ventures Program, has solicited applications for financial assistance from state energy offices, in a teaming arrangement with private-sector organizations, for projects that will accelerate the commercialization of emerging renewable energy technologies. The Commercialization Ventures Program was established by the Renewable Energy and Energy Efficiency Technology Competitiveness Act of 1989 (P.L. 101-218) as amended by the Energy Policy Act of 1992 (P.L. 102-486). The Program is intended to assist entry into the marketplace of newly emerging renewable energy technologies, or the innovative applications of existing technologies. Generally, an emerging technology means one that a) has already been proven to be technically viable (i.e., it works) but which has had little or no operational experience, b) an innovative application of such technology has not been generally utilized, or c) a technology where experience has been limited to sub-commercial size or quantities, or to restricted or controlled operations or applications. In short, an emerging renewable energy technology is one which has already been proven to be viable but which has had little or no operational experience. The Program is managed by the Department of Energy, Office of Energy Efficiency and Renewable Energy. This proposed project was selected for potential funding by DOE for fiscal year 1997.

The Federal action triggering the preparation of this EA is the need for DOE to decide whether to release the requested funding to support construction of the Ponnequin Wind Project. By helping to reduce the premium consumers would pay for wind-generated electricity to $2.50/100 kWh, DOE funding could be critical to the successful introduction of wind power as a "green" energy alternative. Successful introduction of wind energy could lead to similar projects elsewhere in the region. Small wind power facilities could offer a more environmentally benign means of generating electricity which could reduce the reliance on fossil-fuel-fired facilities. The proposed facility could also test the commercial feasibility of using wind turbines to serve load growth in rural areas. In considering whether to fund this project through its Commercialization Ventures Program, DOE will assess its environmental impacts and benefits.

1.4 Regulatory Actions and Requirements

The DOE does not have regulatory authority over this project and as such would issue no permits for the project. Its primary involvement would be confined to financing in a portion of construction and assisting in the commercialization of the technology. However, in considering a decision to release funding for the project, the DOE has a responsibility under NEPA to assess the project's potential impacts.

Analysis of the Proposed Action assumes that PSCo would conform with all applicable Federal, state and local regulations. Regulations applicable to the project include those protecting cultural resources, Federally-listed threatened or endangered species and migratory birds, storm water quality, aircraft safety, egress from state and county roads, zoning and land use. Conformance with regulatory and permit requirements would reduce the potential adverse impacts associated with the project. Regulatory requirements and their effect on reducing adverse impacts are discussed in this EA. For example, before construction of the turbines can begin, a Special

Review Permit must be received from Weld County. This permit process includes a public hearing before the County Planning Commission. The process also requires the notification of adjacent landowners by letter and notification of the public through notices in local newspapers. The intent of the permit process is to ensure the proposed changes in land use occur in an orderly manner and do not create adverse impacts on local residents and lands. The County must also issue a building permit for the project and the states of Colorado and Wyoming must allow equipment and vehicles to travel across state lands.

1.5 Public Involvement

DOE issued a Notice of Public Scoping on May 5, 1997 to request public comment on issues and concerns that should be addressed in this EA. Notices were sent to intervenors in the Colorado Public Utility Commission case, affected and adjacent landowners, citizen groups, and officials of affected Federal, state and local government agencies. Appendix A provides a list of parties contacted. Three letters and one telephone call were received in response to the scoping letter. The letters are reprinted in Appendix A. None of the letters requested a public meeting or hearing on the project. The telephone call from the Bureau of Land Management, Rawlins Wyoming District Office, was to request a copy of the EA when available. Apart from issues mentioned in the scoping letter, two key issues raised in those letters were 1) potential impacts to streams and wetlands from excavation or filling activities, and 2) the need for an impact monitoring and reporting program.

As part of its own site selection, planning and environmental permitting efforts, PSCo also contacted the following parties: the Western Area Power Administration, Weld County Planning Department, Weld County Tax Assessment Department, Weld County Attorney's Office, Lazy D Grazing Association, the Terry Grazing Association, the U.S. Fish & Wildlife Service, Colorado Division of Wildlife, the Wyoming State Land Office, the Wyoming Governor's Office and the Colorado State Land Office. PSCo has received letters from utilities in Colorado and Nebraska expressing an interest in the project.

The project has been the subject of many articles in local papers. Opportunities for public comment on the project were available through the hearings of the Colorado Public Utilities Commission Meetings. Citizens were also given the chance to comment on the project as part of Weld County's Land Use Permit process.

CHAPTER TWO
PROJECT DESCRIPTION

2.1 Proposed Location

PSCo identified the site for the proposed wind project following a wind monitoring study and consultation with landowners, officials of Weld County, the Colorado State Office of Energy Conservation and the Colorado Division of Wildlife (CDW) and the U.S. Fish & Wildlife Service (USFWS). The CDW and USFWS were consulted about potential impacts on raptors, migratory birds, threatened, endangered and candidate species.

The wind project would be located approximately four miles east of Interstate 25 and 1.5 miles west of U.S. Highway 85 (Figure 2-1). The nearest large town is Cheyenne, Wyoming located approximately 10 miles to the north-northeast on Interstate 25. Various roads from Interstate 25, State Highway 223 and U.S. Highway 85 can be used to reach the project area; however, the preferred route was to access the project area from Highway 85. However, a private landowner's refusal to provide access has meant that the preferred route cannot be used. Instead, access would be from State Highway 223. The need for minor road improvements (e.g., gravel, some blading) would be coordinated with affected landowners. Figure 2-1 shows the proposed wind project site and vicinity.

The wind project would be located on private land in Weld County, Colorado within Section 19 of Township 12 North, Range 66 West. Adjacent lands are owned by the Terry Grazing Association, the Lazy D Grazing Association, the State of Colorado and the State of Wyoming. No Federal land is involved or would be affected. The project area within which the wind turbines, two meteorological towers and an electrical substation would be installed encompasses 416 acres. The project area is on a mesa of high plains rangeland currently used for cattle grazing and feeding. The mesa is approximately 6,300 feet above mean sea level. For reference, lands along U.S. Highway 85 are about 6,000 feet above mean sea level. Figure 2-2 provides a schematic view of the project area and shows the proposed location of the turbine string, two meteorological towers, (an existing meteorological tower that would be removed) and the substation. Two existing high voltage transmission lines are found along the eastern boundary of the project area are also shown. Outbuildings and a small windmill for a cattle feeding operation were the only structures found on the site until a meteorological monitoring tower was installed in September 1996.

A 30-year easement for the wind project area has been obtained from the property owner. The project area and possible access roads have been reviewed by a construction company. No unusual characteristics which would complicate access or construction activities were identified.

Vicinity Map
NORTH
US Hwy 85
OVERHEAD ELECTRIC TRANSMISSION LINES (2)
PROPOSED PONNEQUIN WIND FACILITY
SITE
SUBSTATION
PREFERRED
SITE CAPACITY = 27
WIND TURBINES
(Project Area Boundary)
State Highway 223
Proposed Access Road
(follows existing roads
not all roads shown)
OVERHEAD ELECTRIC
TERRY BISON RANCH
CHEYENNE
(4 MILES)
I-25

Figure 2-1

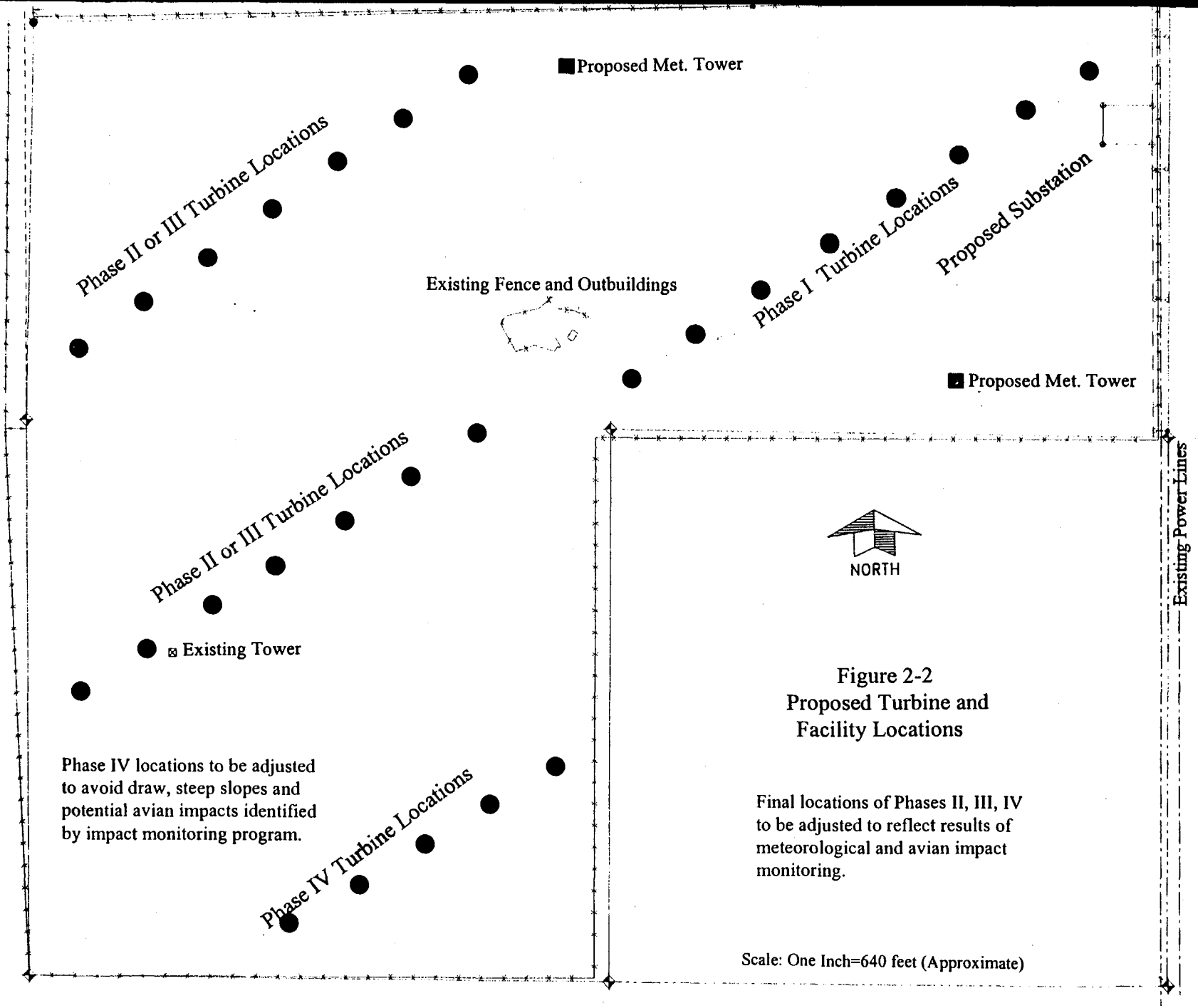


Figure 2-2
Proposed Turbine and
Facility Locations

2.2 Existing Activities and Development

Two transmission lines operated by the Western Area Power Administration (WAPA) form the eastern boundary of the project area. WAPA has indicated its willingness to allow interconnection to one of the lines. Various roads from Interstate 25, State Highway 223 and Highway 85 approach or enter the project area. No power lines, substations, oil and gas wells or other energy facilities are found within the project area. A 140-foot meteorological tower for sampling wind conditions at the project area was installed in September 1996. The only other structures found in the project area are a windmill and storage and outbuildings associated with the current landowner's cattle feeding operation (see Figure 2-2). The closest occupied residence is found approximately 1.5 miles southeast of the project area. The nearest commercial establishment is located approximately two miles east on U.S. Highway 85.

2.3 Proposed Action

The Proposed Action represents a reasonably foreseeable development scenario based on a recent agreement reached among PSCo, citizen groups and the Colorado Public Utilities Commission. Federal regulations (e.g., 40 CFR 1500.2) stress avoidance or minimization of possible adverse effects on the quality of the environment. While the Proposed Action is intended to avoid and reduce impacts otherwise associated with conventional forms of energy production, it also incorporates measures intended to reduce potential, adverse impacts resulting from this project.

Actual size of the project will depend upon the actual price premium and customer sign-ups. Based on market surveys conducted by PSCo, it is estimated that consumer demand ultimately could justify building up to 22 MW of wind turbine capacity in the project area--assuming the price premium was reduced to $0.025/kWh or less. The Colorado Public Utilities Commission has approved the operation of a 20-MW facility. To date, sign-ups for the program would justify construction of at least seven turbines.

2.3.1 Wind Turbines

PSCo anticipates using the Zond Z-46 or a similar turbine. The Z-46 is a 750-kW wind turbine whose blades turn at a relatively low number of revolutions per minute (rpm)--approximately 32 rpm. The reduced rpm increases the visibility of the blades. The Z-46 is a relatively new turbine design that has undergone 500 operating hours of testing.

A four-leg lattice tower would be used to support the turbine and rotor (Figure 2-3). The tower itself would be 164 feet tall. To discourage birds from nesting or perching in the tower, its cross-members would be sharply angled and no horizontal cross-members would be used. The tower itself is sharply tapered as shown in Figure 2-3. This design is different from the Kenetech 60-foot lattice tower used in the Altamont Pass wind project in California which

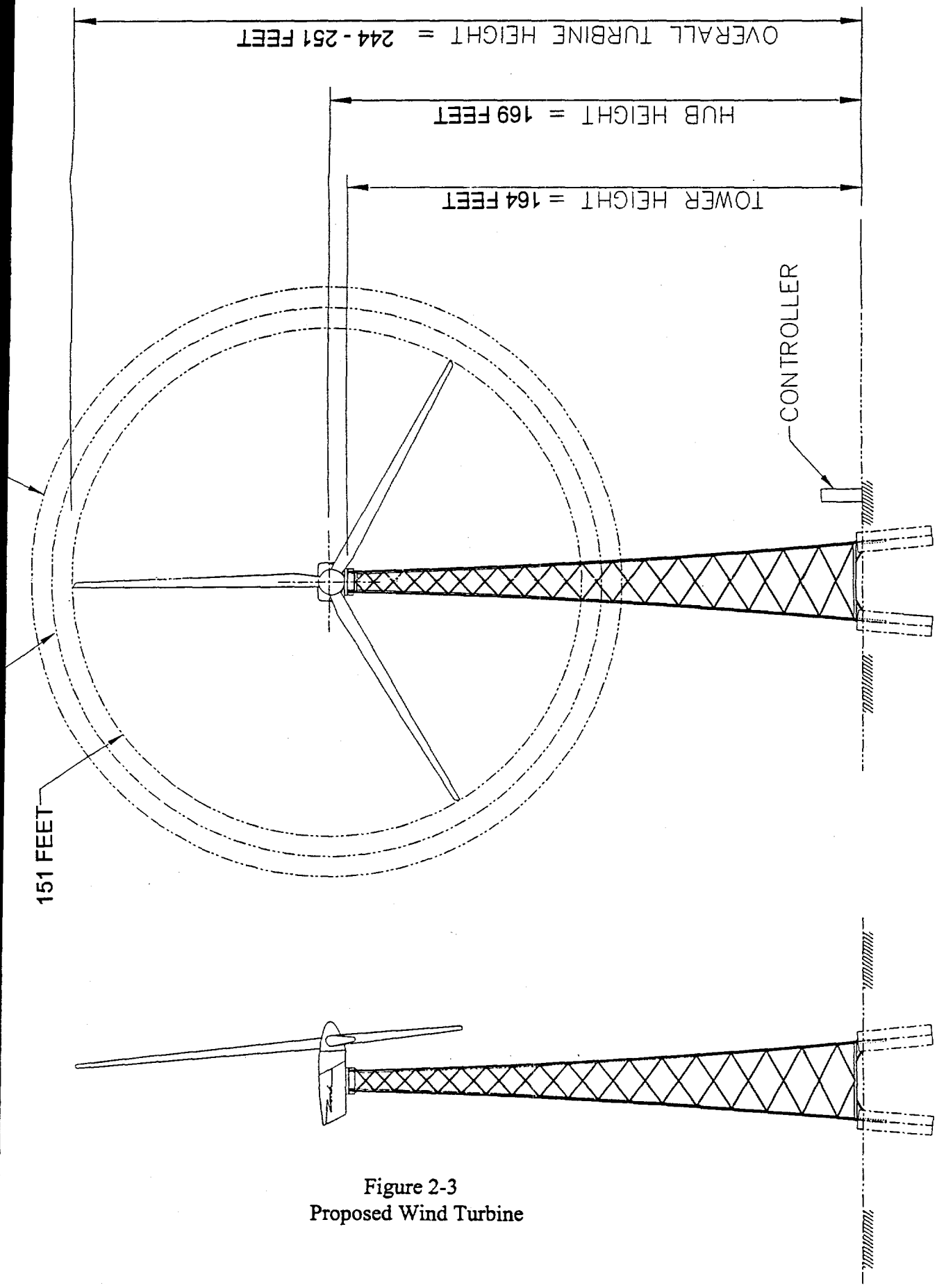


Figure 2-3
Proposed Wind Turbine

incorporated horizontal cross members and is a tower frequently referenced in the literature on avian impacts. The diameter of the rotor blade assembly, which would be mounted on top of the lattice tower, would be 151 to 164 feet depending upon the actual blade configuration used. Thus, the total height of the turbine structure with blades would be 244 to 251 feet. Turbines would be spaced (as shown in Figure 2-2) so that the turbulence created any given unit does not affect the operations of a nearby unit. The wind turbine system would be delivered to the site in major subassemblies consisting of the tower, turbine, blades and electronics cabinet. The tower itself would be hauled to the site as partially-assembled kits on semi-trailer trucks. Use of these kits would reduce on-site construction time and cost.

At each tower site a truck-mounted drilling rig would be used to drill four holes which would be filled with reinforced concrete. The four legs of the lattice tower would then be bolted to these concrete piers. The location for these foundations would be graded as necessary to create a level working surface. An area approximately 20 feet by 20 feet could be graded at each tower location. Grading of lay-down and staging areas would not be necessary due to the generally flat nature of the terrain. No areas would be graded or graveled for parking areas at turbine sites. PSCo intends to minimize surface disturbance associated with the project, in part, to reduce scars and the need for extensive reclamation and to reduce the attractiveness of disturbed areas to burrowing rodents. No fencing would be installed around the tower.

Once the tower has been built, specially trained rigging crews would install the turbine and blades. Electronics would be installed and interconnected to underground cables that would gather output from individual turbine sites. Once a turbine has been constructed, it would undergo a variety of tests to ensure its mechanical and electrical systems are operating correctly.

Based on estimated wind availability, typical wind speed frequency distributions, a typical power curve, and the characteristics of the turbine, PSCo has estimated that over the course of a year one turbine could generate the electricity equivalent to the average annual electricity consumption of 244 Front Range households. As proposed, the project calls for the construction of up to 27 turbines within the 416-acre project area with an estimated capacity of about 22 MW.

2.3.2 Roads

Access Road. The proposed route into the project area uses existing ranch roads which connect to State Highway 223, the Terry Ranch Road, and Interstate 25. (See Figure 2-1 but note that all roads are not shown on the topographic base map). Ranch roads would require minor improvements such as gravel, leveling of a high center, or installation of a culvert to make them temporarily suitable for construction trucks and traffic. Access roads would be improved to only the minimum condition necessary to allow passage of vehicles and equipment required for facility construction. No crown-and-ditch roads (engineered roads with side-ditches, shoulders, etc.) are proposed.

While not the shortest route into the project area, this route is proposed because, unlike other shorter routes (e.g., see the "preferred route" shown in Figure 2-1), landowners along this route have expressed a willingness to grant the necessary access. The junction with State Highway 223 would be upgraded as necessary to meet conditions set by the Wyoming Department of Transportation. The proposed access road would require approximately 0.2 miles of new road corridor--primarily to connect the project area with existing ranch roads. PSCo proposes to keep the access road width to about 12 feet and to the minimum condition necessary that allows for passage of construction vehicles.

Light truck traffic (e.g., pickup trucks) on the access road is expected to peak at 60 vehicle-trips per day during construction and decline to about 1-2 vehicle trips per day once the facility is operational. Heavy truck traffic, which would include flatbed trailers and cement trucks, would peak at 20 vehicle-trips per day during construction. No heavy truck traffic would be associated with day-to-day operation of the project.

Service Roads to Turbine Sites. No new improved (e.g., crown-and-ditch) roads would be constructed to reach individual turbine locations. Roads used to reach turbines would remain as two-tracks suitable for travel by a pickup truck or four-wheel drive maintenance vehicle. The flat terrain of the project site and its well-drained soils permit this type of use by the current landowners year-round.

2.3.3 Feeder Lines and Communication Cables

Buried, insulated feeder lines (25 kilovolts (kv)) would connect the turbines to step-up transformers and the substation on the 115 kv WAPA transmission line (see Figure 2-2). These trenches would also contain communication lines. Surface disturbance from construction of the four-foot deep trenches would be about four feet wide. The trench-line would not require grading. Once the cables are installed, the trench would be backfilled and the surface reclaimed and revegetated. No overhead lines or poles for feeder lines or new high-voltage transmission lines would be required.

2.3.4 Auxiliary Equipment and Buildings

Currently there is a 140-foot meteorological tower within the project area. As proposed, this tower would be dismantled and two new meteorological towers installed. The new towers would be approximately the same height as the turbine towers and would be installed at locations (see Figure 2-2) more suitable for monitoring wind conditions driving the turbines. An automated supervisory control and data acquisition (SCADA) system would be installed to collect and transmit performance data on the facility. Data would be made available to DOE. No maintenance buildings or offices are proposed for construction within the project area. Spare parts and maintenance supplies for the turbines would be stored at a facility in Cheyenne, Wyoming.

2.3.5 Interconnect Substation

PSCo would construct a substation where the feeder lines would interconnect with the existing 115 kv line owned by WAPA. The approximate location of the proposed station is shown in Figure 2-2. The site would be located slightly south and uphill from a small depression found at the northeast corner of the project area. The layout of the substation site is shown in Figure 2-4. A single-story, 20-feet by 28-feet control building would be located within fenced area of the substation. It would contain various equipment related to operation, monitoring and control of the wind facility and substation.

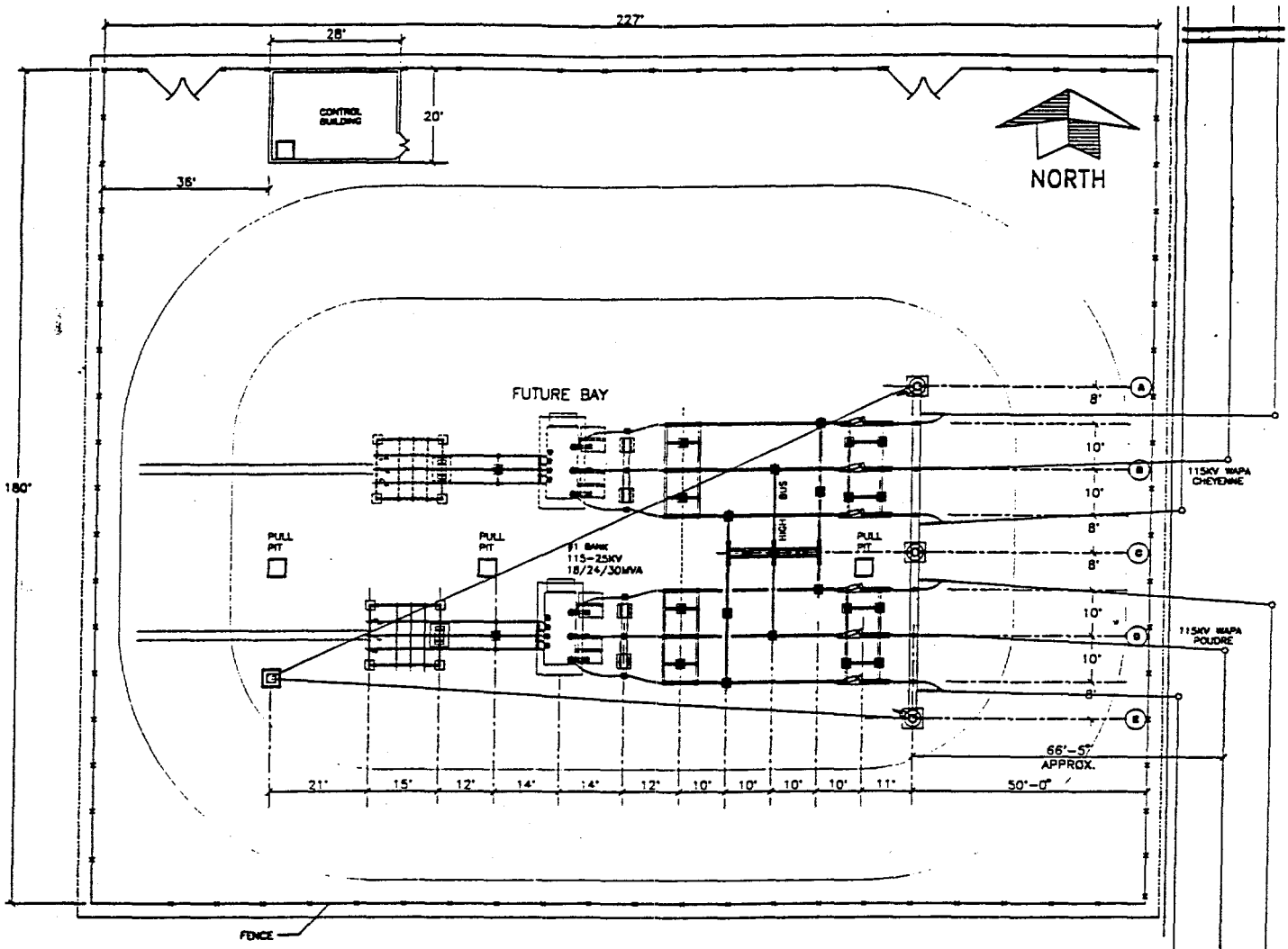
The substation would require line breakers, meters and various other pieces of equipment typical for such a station. The station would be locked and surrounded with a chain link fence and topped with barb wire to discourage entry. A sign on the fence would provide safety warnings and an emergency contact telephone number. The substation connection must be completed in 1997 before the turbines can come on line. The project would not require any upgrades to any existing transmission or distribution lines.

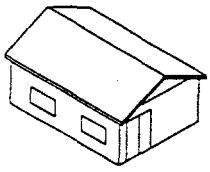
2.3.6 Project Stages and Timing

Construction of the first turbines is scheduled to commence in September 1997 and to be completed by the end of the year. Construction of the interconnect substation could begin in August or September 1997 prior to construction of the turbines. Access road improvements and service road construction would proceed prior to installation of the turbines. Installation, testing and final adjustment of new turbines would take approximately 90 days for each phase but could take longer, depending upon weather and test results. As proposed, up to seven turbines would be installed in the first phase to be completed by the end of 1997. Another 6-7 turbines would be installed in 1998 depending upon consumer demand. Installation of additional turbines at this site beyond the first seven would depend upon a variety of factors, including: customer demand for the "green energy" product, actual performance of the turbines at this specific site, construction and operations costs, and the results of avian impact monitoring (see Appendix B).

Figure 2-2 shows approximate locations for the proposed turbines. Final locations could be adjusted to reflect the results of avian impact monitoring and additional wind monitoring data. No construction problems (for example, problem soils) which would require relocation of turbines or other facilities are likely to occur. Locations have been ranked according to project stages. Stage I locations include those which would be used in 1997 for the first seven turbines. Stage II-III locations include those most likely to be used for turbines which would be installed in 1998 and in later years. Stage IV locations would be the last locations used in a build-out of the project area. Stage IV locations would be adjusted as necessary to avoid a draw, steep slopes and potential impacts to raptors that might be identified by avian monitoring. It is possible that substitute Stage IV locations could be identified in other portions of the project area (e.g., SE 1/4, NE 1/4) once additional, site-specific data of factors affecting turbine spacing and location, such as turbulence from installed turbines, has been gathered.

Overhead View of Substation





PREFABRICATED CONTROL BUILDING

Side View of Substation

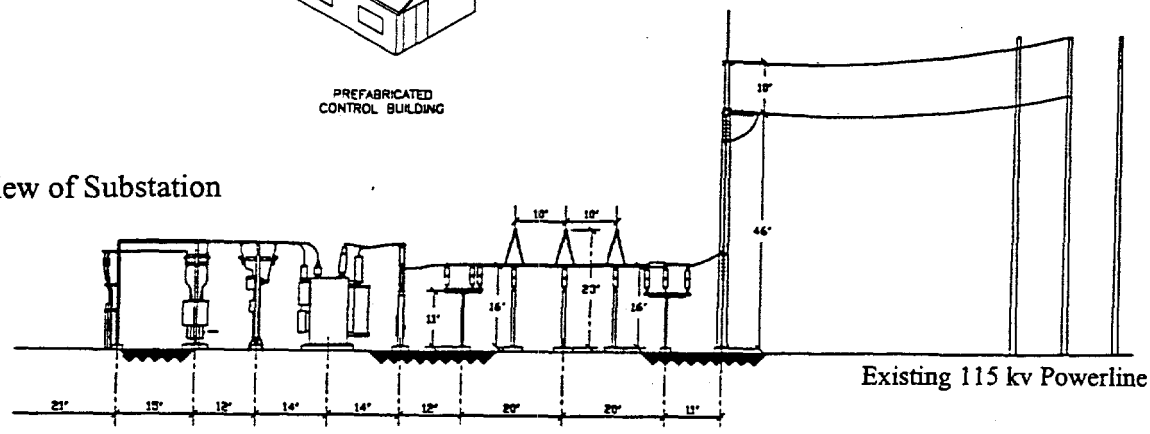


Figure 2-4
Proposed Substation Site

It is estimated that the initial seven turbines would generate approximately 5 MW of electricity. Depending upon actual operating conditions, about 27 turbines would be required to meet the 22 MW of demand. The turbines have been designed for a thirty-year life span and a thirty-year easement for the project has been obtained from the private landowner.

Construction activities would be scheduled each year to avoid nesting mountain plover and/or nesting raptors identified by field surveys (see Section 2.3.9). No nesting raptors or nest structures were found in the project area during a Spring 1997 raptor survey completed for this EA; nor were any nesting plover located during field studies conducted in Spring 1997 for this EA (Reeve, 1997). Additional discussion of these species may be found in chapters three and four.

2.3.7 Project Work Force

PSCo and its partners or contractors would be responsible for the completion of construction activities, including installation of the wind turbines. Disgen, in consultation with the turbine manufacturer, would have direct responsibility for overseeing construction of the wind turbines while PSCo itself would manage construction of the substation and interconnection. A maximum of about 60 workers would be on-site. Due to the short construction period (e.g., about 90 days), no personnel are expected to permanently relocate to Colorado as a result of this project.

The turbine manufacturer would provide operations and maintenance training to project personnel or would provide some or all of these services on a contract basis. It is anticipated that current employees of a PSCo subsidiary in Cheyenne, Wyoming would be used to operate and maintain the facility as appropriate. PSCo anticipates that the facility would create no new permanent positions.

2.3.8 Operations and Maintenance

The turbine manufacturer would provide 24 hour consultation services and dispatch a technician to the site within 48 hours once notified by PSCo. It is expected that turbine maintenance activities would consist of checking the lubricating oil on an annual basis. In general, it will not be necessary to change the lubricating oil more frequently than once every five years unless metal shavings are present. The turbine unit is equipped with oil filters and these would be changed during routine maintenance. All used oil would be placed in closed containers and taken to an oil recycling or permitted disposal facility.

Once commercial operations begin, the wind project would be unmanned but would be visited by a maintenance person on an as needed basis, probably not more than once a week. A supervisory control and data acquisition (SCADA) system would be installed to collect and relay data on turbine output and other performance parameters. Turbine operations and maintenance needs would be monitored by the manufacturer. Facility output, performance and operations would be monitored by PSCo at an off-site location. Given that it would be the first commercial wind turbine facility in Colorado, it is possible that the project would be monitored by several different

organizations from a variety of locations. However, control of project operations would be limited to PSCo and its partners and contractors. In the case of extremely high winds or reports of a tornado in the vicinity, PSCo could shut down the turbines. Operations and maintenance personnel would be informed of environmental protection measures discussed in Section 2.3.9 and elsewhere in this document. PSCo would be responsible for monitoring project operations and maintenance staff to ensure the successful implementation of all measures discussed in this EA.

2.3.9 Proposed Environmental Protection Measures

PSCo has proposed to implement environmental protection measures specifically designed to minimize or avoid environmental impacts associated with construction and operation of the wind project. A brief description of these measures is provided below.

Risk-Reducing Site Selection Criteria. Apart from its excellent wind characteristics, the project area was proposed because it incorporated features which would reduce environmental risks, especially risks to wildlife and avian species. A discussion of alternative sites and site selection criteria is found in Section 2.5.1 of this EA.

Land Use Compatibility. PSCo would comply with the conditions of approval attached to Weld County land use and building permits.

Low RPM Turbine. PSCo has chosen a turbine which would operate at a relatively low rpm. Because a lower rpm blade tends to be more visible, PSCo expects this could help to reduce the potential for avian strikes.

Visible Turbine Blades. The Kenetech Windpower Avian Research Program has established criteria for a special white paint ("raptor white") that would be used on turbine blades to provide the highest level of contrast across the complete spectrum of raptors' vision--including the ultra-violet end of the spectrum.

Lack of Horizontal Perches. The proposed lattice tower design incorporates sharply-angled cross-members which should provide a less suitable perch site for species of raptors found in the region (Hunt, 1995). The proposed lattice tower has no horizontal, widely-spaced crossbars unlike those found on older lattice tower designs commonly referenced in the avian impacts literature.

Protection of Nesting Birds. Due to the potential for mountain plover to nest in the project area, future surface-disturbing activities would not be conducted between April 15 and July 31 each year until after a field survey has been completed and the presence or absence of nesting plover verified. Similarly, the project area would be surveyed and the presence or absence of nesting raptors in the vicinity of proposed construction activities verified. PSCo would consult with the U.S. Fish & Wildlife Service and the Colorado Division of Wildlife regarding raptor and/or mountain plover nests located during such surveys and appropriate protective measures.

Construction activities would be scheduled each year as necessary to avoid impacts to nesting raptors and mountain plover identified in field searches.

Removal of Carrion. PSCo would work with local landowners to ensure the prompt removal and disposal of carcasses and carrion that could attract raptors to the project area or access road where the risk of a fatality would be greater.

Protection of Existing Land Uses. PSCo fully intends to cooperate with local landowners to allow continued use of the area for cattle feeding and ranching operations. This ongoing level of human activity would maintain a current environment that provides little wildlife habitat and is relatively inhospitable for avian species--especially those sensitive to human disturbance during the nesting period. Thus the lack of cover, trees, shrubs or natural roost and perch sites within or adjacent to the project area also would be maintained.

Hazardous Materials. No materials found on the *List of Extremely Hazardous Substances and Their Threshold Planning Quantities,* defined in 40 CFR 355 (as amended) would be used. No PCBs or substances regulated by the Toxic Substances Control Act would be used in the project. PSCo would review substances to be used during construction and operations in light of the Environmental Protection Agency's *Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986* (as amended) to determine whether materials proposed for use qualify as hazardous substances. Hazardous materials would be used, stored, and disposed of in an environmentally safe manner according to State and Federal regulations. Materials such as paints, lubricants, oils and vehicle fuels would be located, handled, stored in containers, and disposed in a manner that avoids contamination of soil or water. PSCo's spill response procedures would be initiated should an accident occur.

Noxious Weed Control. Noxious weed infestations on areas disturbed by proposed construction activities would be controlled by mechanical, chemical, biological or other methods. Weed control measures would be developed in consultation with the affected landowner and Weld County.

Reclamation of Soils and Vegetation. Areas disturbed during construction which are not needed for facility operations or maintenance would be reclaimed. Seeding would occur in either the early spring or fall to take advantage of available moisture. PSCo would consult with the landowner and the Natural Resource Conservation Service (formerly, the Soil Conservation Service) to select a seed mixture adapted to the area's climate and one that requires no supplemental watering.

Erosion Prevention. Runoff from the 0.9 acre substation site would be directed and controlled such that it would not promote sedimentation of natural channels or down-cutting of new channels. The project would comply with Colorado Department of Health regulations and permit requirements for control of sediment and storm water runoff from construction sites.

New surface disturbance, and thus erosion potential, would be minimized by using existing two-track roads for all but 0.2 miles. PSCo proposes to limit road improvements to these existing two tracks and the 0.2 miles of new access road. No wetlands are found in the project area nor would any wetlands be crossed by new access road. The access road would be graveled as necessary to stabilize its surface and minimize rutting. Culverts would be sized and placed as needed along the existing road to improve drainage and maintain natural patterns of runoff. If outfalls for new culverts are needed, they would be lined with rock or otherwise designed and located to minimize down-cutting and soil erosion.

Waste Management. The project would produce no liquid effluent. All sewage at construction sites would be contained in portable toilets and disposed at a permitted facility. No manned facility requiring sewage or water services has been proposed. Construction debris would be collected in closed containers and sent to a permitted disposal facility. Routine trash would be collected and disposed of at a permitted disposal facility.

Cultural Resources. A cultural resources survey was conducted to locate any cultural resources within the project area potentially eligible for listing on the National Register of Historic Places (Tate, 1997). None were found. Completion of the cultural resources survey was intended to ensure compliance with requirements of the National Historic Preservation Act (36 CFR 800). Results of the survey are discussed in chapters three and four. The proposed access road is an existing two-track which crosses an old railroad grade. If leveling or grading of the two-track is necessary in the vicinity of the old railroad grade, it would first be checked for cultural resources.

Socioeconomic Benefits. PSCo intends to use local contractors and personnel to the extent feasible. Disgen, assisting PSCo in project design and implementation, is a Colorado-based company. PSCo and its contractors would pay Colorado sales and use taxes as required.

Public Health and Safety. In accordance with Federal Aviation Regulations (14 CFR 77.13), an Application to Construct would be filed with the Federal Aviation Administration (FAA). The FAA has issued an advisory circular on marking and lighting of potential aircraft obstructions including wind turbines (FAA, 1996). FAA guidelines allow for flexibility in the type of lighting and marking that can be used. Final decisions on marking and/or lighting requirements for the turbine structures rests with the FAA. Compliance with FAA requirements would ensure that the project presents a minimal threat to aircraft.

Construction and Post-Development Impact Monitoring. PSCo has developed an avian impact monitoring program (see Appendix B). The plan incorporates ongoing consultation with Federal and state agencies regarding project development and impacts to identify any additional impact mitigation measures that could be needed. Sampling and observations would be conducted by qualified professionals (see Appendix B) in accordance with good scientific practice as recognized in the biological and impact assessment literature. Data would be recorded in accordance with protocols based on experience at other wind sites. Data would be shared with Federal and state agencies and the public. In brief, the objectives of the impact monitoring

program would be: 1) to monitor avian use of the project area; 2) to determine whether lattice towers are (not) being used for perching; 3) to continue the surveys of raptor nesting in the vicinity which were conducted Spring, 1997 (Reeve, 1997); 4) to monitor whether project activities may have increased the presence of raptor prey species such as rodents; 5) to monitor and report any avian deaths in the vicinity of installed turbines, and 6) to identify any additional impact mitigation measures that may be needed.

For example, it will be important to monitor whether the wind turbines are attracting raptors, other birds or raptor prey species to the site. If surveys indicate increased perching activity in the project area, the USFWS and CDW as well as experts on avian impacts, would be consulted regarding the development and installation of measures to discourage birds from perching and to avoid their becoming acclimated to the turbine towers. Because avian fatalities are statistically rare events at wind projects, and because knowledge of what conditions contribute to collisions is scarce, as much data as possible will be collected if a fatality occurs. All data regarding bird fatalities would be provided to the CDW and USFWS. Discovery of the death to a raptor or a threatened or endangered species (regardless of the cause) would be reported to the USFWS and CDW within 24 hours. PSCo would review the case with the CDW and the USFWS to identify the cause of mortality (if possible) and to identify ways to reduce the risk of future impacts.

Phased Development. Data from the avian impact monitoring program would be evaluated in coordination with Federal and state wildlife agencies prior to expansion of the facility once the initial set of turbines has been installed. Unlike large-scale wind development projects constructed elsewhere in the U.S. (Altamont Pass) that incorporate thousands of wind turbines and where avian mortality has been reported, the proposed project would involve a maximum of 27 turbines. Expansion of this project would occur in relatively small stages. This phased approach to development would allow the opportunity to monitor avian impacts and incrementally increase the size of facility if such impacts are found to be minimal. Similarly, data collected as part of the avian monitoring program would suggest the need to maintain or change tower or turbine designs, change turbine locations (e.g., Stage IV locations), implement new impact mitigation measures, or to cap the project size within the project area.

2.4 No Action Alternative

CEQ regulations implementing NEPA require DOE to consider the No Action Alternative in all NEPA documents. Under the No Action Alternative, DOE would take no action to release funding for the proposed project. DOE adoption of the No Action Alternative could cause construction to be delayed unless the project proponents could quickly develop alternative plans for financing the Ponnequin Wind Project. The No Action Alternative would not meet the purpose and needs described in Section 1.3 of this EA. Under this alternative, even higher premiums for wind-generated electricity could be required which could lead to reduced consumer demand for this electricity. Attempts to develop alternative means for financing the project may not be successful. For these reasons, this analysis of the No Action Alternative assesses the impacts that would result if failure to fund the project resulted in its abandonment. DOE could

choose the No Action Alternative if it offered clear environmental advantages over the Proposed Action or if significant impacts would be created by the Proposed Action which, in turn, would require preparation of an Environmental Impact Statement.

2.5 Alternatives Considered But Not Receiving In-Depth Analysis in this EA

2.5.1 Alternative Locations

Numerous locations have been considered in the past for wind energy sites in Northeast Colorado. PSCo conducted a preliminary review of Northeast Colorado in terms of local wind characteristics, availability of transmission lines, the cost of interconnection, county land use constraints, permitting requirements, potential impacts on birds, the presence of sensitive flora and fauna, and local landowners' willingness to grant long-term easements (Thompson, 1997). Various locations were examined by the CDW for raptor nest structures (see Appendix D). The project area proposed in response to the DOE solicitation and analyzed in this EA incorporates the following features, or a lack of features, which would reduce the risk of environmental impacts.

- The project area and land in the vicinity of the proposed towers are treeless and devoid of shrub cover.
- The only structures taller than the fence posts are the WAPA transmission lines and poles that form the eastern edge of the project area. No raptor nests have been found in these poles.
- The area and adjacent sections are devoid of water features such as ponds, streams, lakes or impoundments which would be attractive to migratory birds or wildlife.
- The project area is devoid of riparian areas and jurisdictional wetlands.
- No streams cross the project area.
- The project area is virtually flat and access roads cross no difficult terrain, water bodies or wetlands.
- The project area is accessible from paved roads using existing ranch roads.
- Vegetation diversity and wildlife habitat suitability in the project area and vicinity are very low.
- The project area and vicinity have been intensively grazed.
- No residences are found in the project area or in close proximity to the project area.
- A survey by the Colorado Division of Wildlife found no raptor nest structures in the project area.
- The project is directly adjacent to power lines that could receive electricity produced by the facility. No new overhead power lines would be needed.
- Based on existing records, the potential for cultural sites appeared to be low.
- The towers would not be located within a restricted airspace or in close proximity to an airport.

Given the estimated, low environmental risks associated with the proposed project area, alternative locations for the proposed facility have not been proposed or analyzed in this

document. The Federal action under consideration is whether to fund or not to fund construction at the proposed location.

2.5.2 Alternative Tower Designs

In general, three options exist for a wind turbine tower: an open lattice tower with horizontal cross-braces, an open lattice tower without horizontal cross-braces but with sharply-angled cross-braces, and a closed tubular tower. The proposed tapered, lattice tower design uses sharply-angled cross-braces (see Figure 2-3). It is a departure from the horizontal cross-braced lattice tower commonly found at the Altamont Pass Wind Resource Area in California. A comparison of alternative tower designs follows.

First, avian mortality at any wind project appears to be caused by collisions with power lines and turbine blades. Visibility of blades would not differ between a lattice and tubular tower configuration. In addition, the potential for mortality would be reduced because all proposed power lines would be buried and the proposed turbine uses a low rpm rotor. Therefore, the only potential advantage of using a tubular, rather than a lattice tower, is that it may offer fewer opportunities for perch sites for raptors and other birds.

Second, the attractiveness of the proposed "no-horizontals" lattice design to birds inhabiting the project area and vicinity is unknown. The project area already offers few attractive environmental features for wildlife and avian species. Under these circumstances, while the proposed lattice design may be a more attractive perch site compared to a tubular tower, the actual impact of this "attractiveness" on avian mortality is unknown and cannot be predicted at this time. This is something that would be monitored during project operations (see Appendix B).

Third, the project area is characterized by environmental conditions which indicate that it is only marginally attractive to raptors. However, bird use of the project area and changes in the raptor prey base are conditions which would be monitored during project development. The avian impact monitoring program described in Appendix B would collect data on actual, project-related impacts and the risk of avian fatalities. The issue of tubular versus lattice towers and avian impacts would be revisited once monitoring data on the initial phase of the project has been collected.

Fourth, the proposed project is much smaller than wind generation projects elsewhere in the country where avian mortalities have been a concern. For example, the Altamont Pass Wind Resource Area in California contains 6,500 turbines of various designs. Some perching on tubular towers has been observed in that area.

Fifth, concerns about the potential advantage of tubular towers must be weighed against their disadvantages. Tubular towers require more extensive and costly concrete foundations. The energy and financial costs of manufacturing and installing a tubular tower are also higher than a lattice tower.

For the reasons discussed above, it appears that tubular towers offer no clear, demonstrated environmental advantages for the initial stage of this project. At the same time, the disadvantages of using tubular towers could compromise the feasibility of this first commercialization venture and the achievement of other environmental benefits. Therefore, this alternative has not been analyzed further in this document. Similarly, a lattice tower with horizontal cross-braces offers a higher potential for avian impacts; therefore, it has not be analyzed further in this EA.

2.5.3 Alternative Access Routes

The access route from Highway 85 (see Figure 2-1) would be the preferred route to access the project for several reasons. It is the shortest route to a paved road. This route would require the least amount of road upgrading or maintenance during facility construction and operations. The route crosses state land (Section 20, see Figure 2-1) and requires the use of only a short segment of existing road across private land (Section 21). However, the private landowners have denied PSCo access, effectively denying access to the State land and the adjacent project area. PSCo was required to pursue an alternative route and has proposed the access route from State Highway 223. For these reasons, the preferred route is not analyzed further in this document.

CHAPTER THREE
AFFECTED ENVIRONMENT

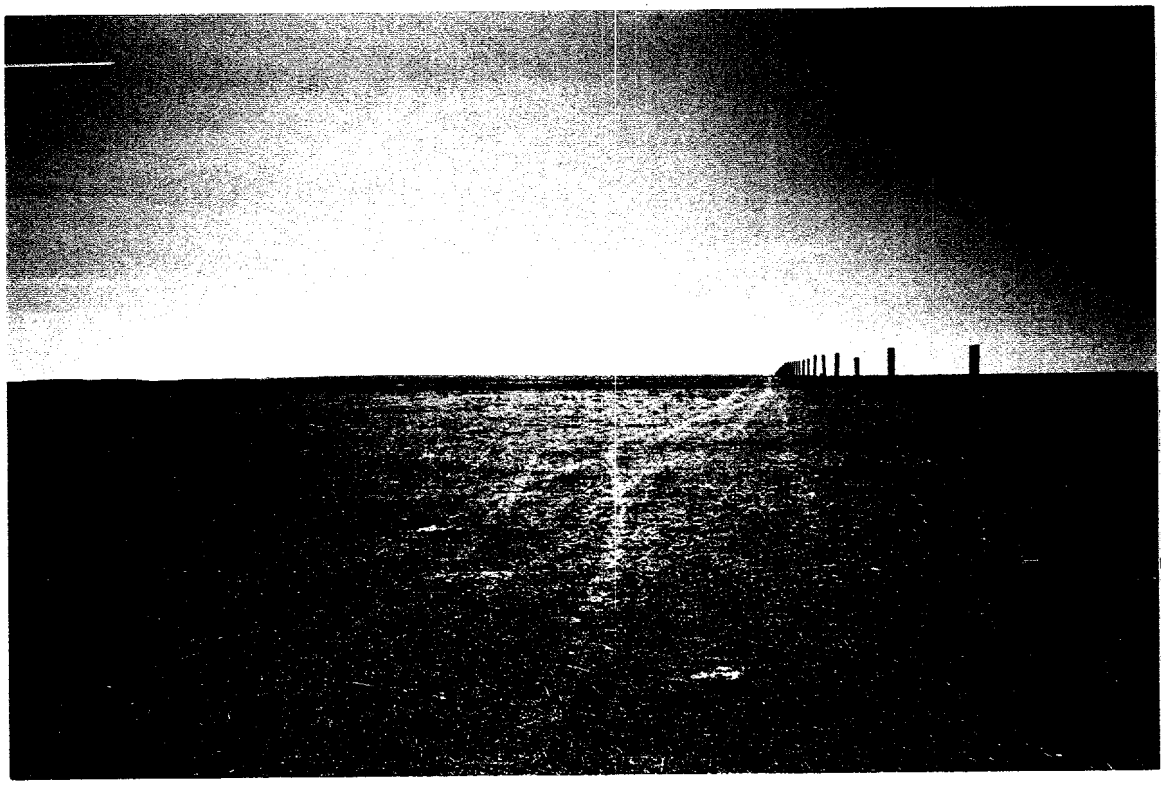
3.1 Resources Considered But Not Receiving Further Analysis

The potentially affected environment considered in this chapter includes the physical, biological, and human environment (40 CFR 1508.14). However, the purpose of this chapter is not to provide an encyclopedic description of the project area but rather to present a brief description of the proposed project area and the surrounding environment. Detailed information on environmental conditions is only presented where it would assist the understanding, interpretation, assessment and disclosure of potential impacts associated with the project. This information was derived from printed sources, technical reports, on-site inspections and conversations with experts on a variety of subjects. To help the reader visualize the project area and environs, photographs have been included as Figure 3-1.

Potentially affected resources requiring further analysis were identified during internal DOE scoping, public scoping and on-site inspection of the project area. The following resources are either not found in the project area or vicinity, or would not be affected, either directly or indirectly, by the proposed action or project alternatives; therefore, they are not analyzed further in this document:

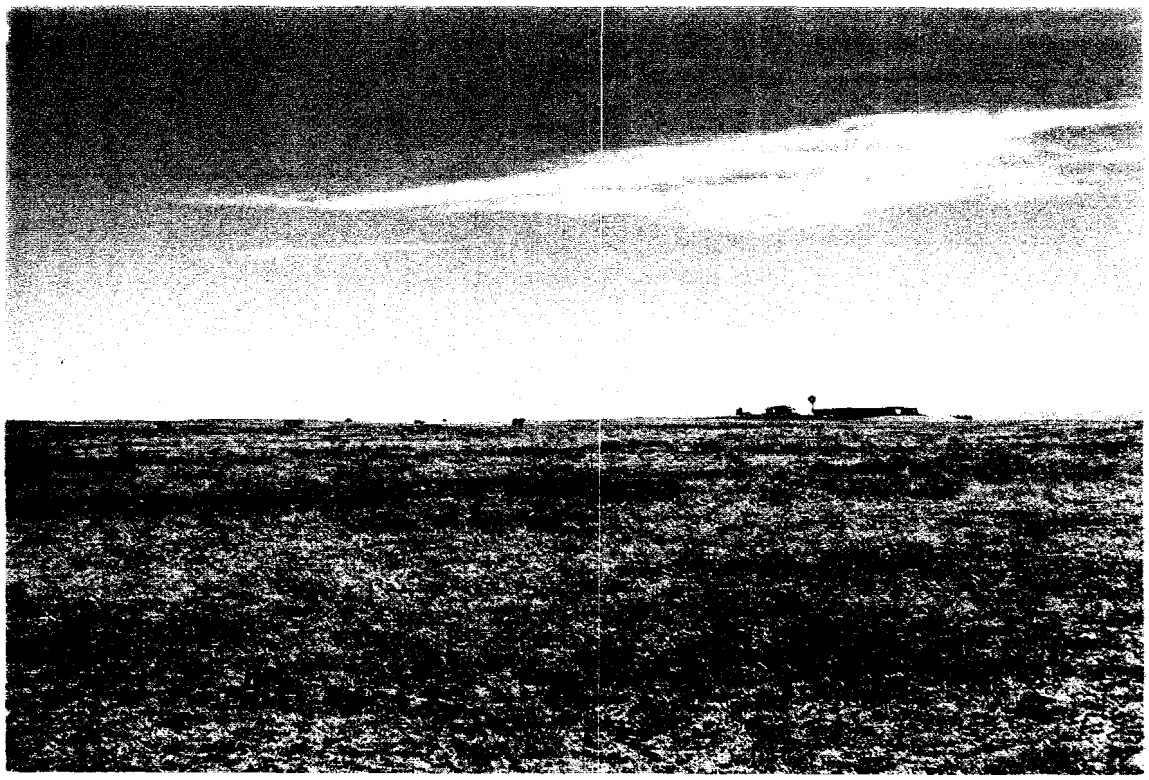
- National parks, recreation areas or monuments;
- Prime or unique farmlands;
- National historic sites;
- Wilderness or wilderness study areas;
- Areas of critical environmental concern;
- National historic, scenic or recreation trails;
- Wild, scenic and recreational rivers;
- Recreation sites, facilities, areas;
- Lands administered by agencies of the Federal government;
- National wildlife refuges;
- State parks or conservation lands or state-designated wildlife protection areas;
- Tribal lands;
- Fisheries;
- Timber, forest lands; and,
- Groundwater aquifers.

Proposed Site for an Electric Substation in Northeast Corner of Section 19.
(Fence line paralleling power lines is eastern boundary of Section 19.)



Looking South Along Fence and Western Boundary of Section 19

Figure 3-1



Looking From Northeast Quarter, Section 19 Toward Meteorological Tower in Southwest Quarter, Section 19. Area For Wind Turbine String

Looking West from Northwest Corner, Section 19

Figure 3-1 (Continued)

3.2 Streams, Wetlands and Floodplains

Field reconnaissance found no perennial streams (i.e. streams that flow year-round) within the project area, on adjacent sections of land, or crossed by the proposed access road (Reeve, 1997; Jacob, 1997). Intermittent streams are found in draws on the south and southeast edge of the project area (see Figure 2-1). These streams are tributary to Owl Creek--itself an intermittent stream. Draws in the vicinity of the existing access road can also carry water during storm events and spring runoff. Localized flooding from these channels could occur during intense thunderstorms. Some water collects in draws at the south edge of the project area and in draws in the vicinity of the access road during the spring snow melt or storm events, but this water is consumed by grazing cattle and the remainder quickly evaporates.

A review of National Wetland Inventory maps found no wetlands within the project area and no wetlands crossed by the existing or proposed access roads. One small wetland (less than 0.5 acre) is found in the vicinity of a 0.1 mile section of proposed, new access road in the far northwest corner of Section 13 (see Figure 2-1). This wetland is classified as "palustrine, emergent, temporarily or seasonally flooded" on the National Wetland Inventory map. PSCo would avoid this wetland as part of its Proposed Action. No willows, cottonwoods or similar types of riparian vegetation are associated with this wetland.

Riparian vegetation (e.g., willows, cottonwood) is generally absent from draws along the existing access road. National Wetland Inventory maps do not show any wetland-riparian areas associated with these draws. No water was observed flowing in these draws during field reconnaissance conducted for this EA. Vegetation of the project area and vicinity is heavily grazed. No trees or wetland or riparian vegetation were observed during field reconnaissances of the project area (Jacob, 1997; Reeve, 1997). The one soil type found within the project area is classified as "non-hydric"; that is, it is not a soil associated with wetlands (SCS, 1993).

3.3 Surface Water Quality

No data on surface water quality exists for intermittent streams in sections adjacent to the project area. The closest water quality monitoring station is on Lone Creek at Carr, Colorado, approximately eight miles southwest of the project area. Average daily discharge at this location almost never exceeds one cubic foot per second whatever the season (USGS, 1995). No ponds or other surface water bodies are found in the project area. Some springs are found at the base of mesas or within draws outside the project area. No springs have been identified within the project area. A windmill that pumps water from a well more than 100 feet deep is used to supply water for stock tanks found near some outbuildings within the project area (see Figure 2-2).

3.4 Soils and Vegetation

The project area is unirrigated range land which is currently used for cattle grazing and as a winter feeding area from about November through May. Lands along access roads into the project area

are used for cattle grazing and a commercial buffalo raising operation. Vegetation of the project area is similar to that observed along access roads. Grazing pressure has resulted in a uniform, closely cropped pasture. The current owners have grazed the project area for 35 years. In that time it has not been plowed or seeded.

According to the soil survey, the project area is uniformly characterized by a soil known as Bresser sandy loam (SCS, 1982). This non-hydric, deep, well-drained soil is found on nearly level (0-3 percent slope) high plains and was formed of sandy alluvium. Typically, the topsoil is a coarse, sandy loam up to 15 inches thick; the subsoil is a sand-clay loam 22 inches thick; and the substratum is loamy coarse sand to a depth of 60 inches or more. In some areas, this loamy-coarse sand appears on the surface.

Permeability of this soil is moderate. Available water capacity is also moderate. Effective rooting depth is 60 inches or more. Runoff is slow to medium and the potential for soil erosion by water is slight. The hazard of blowing soils is moderate but is likely to increase if vegetation holding topsoil in place is disturbed. Precipitation is too low for planted grasses or grains to utilize fertilizers effectively. To help control erosion and conserve moisture, only minimum tillage is recommended. Where necessary, terraces can be used to intercept runoff and reduce soil erosion.

Precipitation in the project area averages about 13 inches a year and is likely to be greatest in the late spring and early summer. Accumulations of snow may occur during the winter months which melt to provide moisture for seed germination in the spring. Under these conditions, the plant community is a grassland comprised of blue grama, needle-and-thread, prairie sandreed, fringed sage, birdfoot sagewort, scarlet globemallow, prickly pear, buffalo grass, wheat grasses and yucca (SCS, 1982). However, this vegetation has been altered by intensive grazing which tends to increase the proportion of less desirable plant species (e.g., prickly pear). If the plant cover is disturbed, protection from erosion is needed. Loss of topsoil can result in a severe decrease in productivity and make subsequent stabilization difficult. The potential for noxious weed invasions exists, particularly where soils have been disturbed by construction activities. This soil is suited to planting of windbreaks but supplemental irrigation would be needed. No trees or shrubs are found in the project area. Affected soils are generally suited for a variety of grain crops such as winter wheat and barley but these crops are not grown in the project area.

None of the soils potentially crossed by access roads are listed as hydric (typically wetland-associated). Characteristics are generally similar to those of the project area. Soil limitations (e.g., susceptibility to wind erosion and noxious weed invasion, low precipitation) are also similar.

3.5 Meteorology and Air Quality

3.5.1 Meteorology

According to a wind atlas of the area (DeHapporte, 1984), the project area is characterized by Class 4 or 5 winds. Areas designated Class 4 or greater are considered suitable for wind energy

development using a variety of tower configurations. However, this general classification system does not address significant local variability in wind speeds. Because the project area is a relatively flat mesa approximately 6,300 feet in elevation, it is exposed to southerly, westerly and northerly winds.

A 140-foot meteorological tower was built within the project area in September 1996 to collect additional, site-specific data on wind conditions. Location of the tower is shown in Figure 2-2. Wind data is being collected at three levels: 32 feet, 82 feet and 140 feet. The average wind speed at the top of the tower has been estimated at 16.3 miles per hour. Preliminary data from the tower indicate that wind patterns are highly correlated with those reported at the Cheyenne, Wyoming airport approximately 10 miles north. Average annual wind speed in Cheyenne is 13 miles per hour near ground level and an estimated 16.6 miles per hour at 130 feet. Peak gusts recorded at the Cheyenne airport range from 58 to 77 miles per hour depending upon the time of year.

3.5.2 Air Quality

The project area is outside any non-attainment area for criteria air pollutants and any listed Class I Area (40 CFR 81.400). Class I refers to a set of the most stringent federal air quality standards which are intended to prevent the significant deterioration of air quality in national parks and wilderness areas. The closest Class I areas are Rocky Mountain National Park, approximately 50 air miles to the southwest, and the Rawah Wilderness Area, approximately 60 air miles to the west. However, it is expected that many consumers likely to purchase electricity from the project live in Front Range communities which include non-attainment areas for ozone, particulates and carbon monoxide.

3.6 Socioeconomic Conditions

The project area is located in Weld County, Colorado which has an estimated population of 143,800. Approximately 45 percent of its residents reside in the city of Greeley, 30 percent live in other towns and the remainder of its residents live in unincorporated areas. Cheyenne, Wyoming is the closest major city or town to the project area. The project area is outside of any incorporated city or town. The closest home is 1.5 miles from the project area.

An estimated 72 percent of County residents are white, 21 percent are Hispanic and 2 percent from other racial-ethnic groups. Unemployment rate in 1996 was 4.4 percent and in recent years has tended to be very close to the state average. Of persons 25 years or older, 75 percent have a high-school education and 18 percent have a bachelor's degree or higher. Average household income in Weld County in 1994 was $37,324. Weld County is one of the key growth areas of Northern Colorado. Since 1990, population has been increasing an average of 2-3 percent per year. While a large part of the County is agricultural, farming and agribusiness account for only 14 percent of the County labor force. Manufacturing, technology and the service sector have become very important employers in the County.

The project area is located in an agricultural area. No industrial or manufacturing facilities are found in the vicinity. No economically disadvantaged communities are found near the proposed project area. Because of the short construction time involved (90 days), the project is unlikely to cause the permanent relocation of out-of-state personnel to Colorado. In addition, PSCo intends to use local contractors and existing PSCo employees wherever feasible. No new permanent hires are expected. For these reasons, the project is not expected to affect local incomes, employment or population, or the demand for housing, government services, educational or health services. Therefore, these conditions are not examined further in this document.

The project area is currently used for grazing cattle. According to the Weld County Assessor's Office, property tax revenue from the project area is $113.46 per year. Property taxes would apply to proposed improvements made to the property and would increase revenues to Weld County. Colorado levies a five percent sales-use tax on applicable purchases which would result in increased state revenues. Increased tax revenue from property improvements is usually considered a positive socio-economic impact.

3.7 Energy Resources

Currently, there is no commercial-scale wind energy facility in Colorado. Electricity demand in the state is met by coal or natural gas-fired generating stations. Currently consumers are not offered the opportunity to purchase electricity generated by a renewable energy source. There are no oil or gas wells in the project area. No other energy facilities are found in the project area. Two sets of WAPA power lines (230-kv, 115-kv) follow the eastern boundary of the project area.

3.8 Noise

Baseline noise studies have not been conducted at the Weld County site. Based on studies conducted in rural situations in southern Wyoming (BLM, 1995) with similar wind, topography, vegetation and land use patterns, it is estimated that background noise levels in the project area vary between 30 decibels on average (dB(A)) and 45 dB(A). Background noise levels in the project area are affected by wind and aircraft noise from the Francis Warren Air Force Base on the east side of Cheyenne, Wyoming and the Cheyenne airport.

No noise sensitive areas, such as occupied residences, are found within 1.5 miles of the project area. No potentially noise sensitive areas, such as raptor nest structures, were found during a survey of the project area. No Federal, state or local noise standards applicable to a wind project are known to apply to the project area.

3.9 Transportation

Three major highways can be used to reach the project area: Interstate 25, U.S. Highway 85 and State Highway. All of these highways can handle the proposed level of heavy truck traffic and can accommodate the transport of construction and turbine equipment. Numerous local roads

crisscross the project area and vicinity. Many of these roads are not shown on topographic maps (see Figure 2-1) but are evident in the field and on aerial photography supplied by Weld County. Use of roads across private property to reach the project area requires the permission of the landowner. Road construction across state or private land requires the approval of the affected landowner. In general, local private roads are intended for cattle operations and portions of them would not be suitable for heavy truck traffic without some improvements such as gravel and/or blading the road surface.

3.10 Cultural Resources

According to regulations promulgated under the National Historic Preservation Act (36 CFR 800.1(a)), a Federal agency having direct or indirect jurisdiction over a Federally-assisted undertaking is required--prior to the expenditure of any Federal funds for the undertaking--to "take into account" the effect of the undertaking on any district, site, building, structure, or object that is included or eligible for inclusion in the National Register of Historic Places. That the undertaking would occur on private land does not affect the applicability of this requirement. The agency is still required to make a reasonable and good faith effort to take into account the effects of the proposed activity on eligible and listed properties.

The project area is on top and at the edge of a large mesa in generally level to rolling grasslands. At its southernmost extent, the project area encounters breaks along the mesa edge, where erosional activity and subsequent down cutting have created steep-sided gullies. These gullies intermittently carry water southeastward for about four miles to Owl Creek, an intermittent tributary of the South Platte River, which is about 40 miles to the south. The nearest permanent drainages are several miles east and west of the project area. It is possible that any of the following prehistoric stages and their associated temporal sequences may be represented in this area: the Paleo-Indian (11,500-5,500 B.C.), Archaic (5,500 B.C.-A.D. 1), Ceramic (A.D. 1-1,550) and Protohistoric/Historic (A.D. 1,550-1,800) (Eighmy, 1984). Many historical themes discussed in Mehls (1984) have application to the project area. Those with the greatest relevance to the project area include Early Exploration (1841-1856), The Fur Trade (1800-1870), Territory and Conflict (1858-1876), Trails, Rails, and Transportation (1859-1940), and Ranching and Farming Before and After 1900.

Considering data from the files search and information found in Eighmy (1984), little is known about site density in the project area. Studies conducted further east in Weld County on the Pawnee National Grassland show that prehistoric site density averages about one site per 40 acres. A compilation of site data from the Colorado Historical Society, Office of Archaeology and Historic Preservation (OAPH) shows that surveys have been conducted on two percent of Weld County (approximately 51,072 acres) and that 1,220 known prehistoric sites have been found. Extrapolating from that small sample, an average site density is estimated to be one site per 42 acres. Unfortunately, the selection of survey parcels is not random and it is likely that areas of the County will have higher or lower site densities. Further, based on the OAPH data, the most likely prehistoric site types statewide are open lithic scatters and open camps; however, a

file search conducted at the Colorado Historical Society of a 144 square mile area centered on the project area found that stone circles account for the largest number of known sites. Nevertheless, given the project's distance from permanent water, it was anticipated that site density would be low and that sites would likely be single activity lithic procurement and/or reduction locales, rather than multi-activity, open campsites or stone circle sites.

It was anticipated that historical site density also would be low. Based on the area's traditional agricultural use, it was anticipated that any historical sites would probably postdate the early 1900's and be related to ranching activities. Such manifestations would likely be roads, trash dumps, sheds, fences, foundations or other ranch building-related features, or pieces of machinery.

An intensive pedestrian cultural resources survey of the entire project area was conducted in May 1997 and a report submitted to DOE and the SHPO (Tate, 1997). This survey of the project area found only the following cultural resources--all classified as "isolated finds":

- A prehistoric artifact that was a cobble of pinkish quartzite, with five flakes removed;
- An abandoned Ford truck of 1952 vintage which has a gross vehicle weight of 21,000 pounds and was last licensed in Wyoming in 1978; and,
- The remnants of an old two-track road long-abandoned and now completely overgrown with vegetation.

According to the project area's current landowners, the abandoned road apparently crossed the project parcel several decades ago when it served to connect surrounding parcels of land on the old Warren ranch. These parcels are presently owned by the Terry Bison Ranch and the Lazy D Grazing Association. While the Warren Livestock Company is associated with a regionally prominent person, Francis E. Warren, who is known for his role in Wyoming politics, the road has minimal integrity and low research value. For these reasons the road was recorded as an isolated find. More detailed information on these topics may be found in the cultural report prepared for this project (Tate, 1997) which is on file with DOE and OAPH.

3.11 Visual Resources

Vistas in the project area and vicinity include at least two major transmission lines, a railroad, highways, commercial developments, windmills, radio and communication towers, and ranch buildings. No visually sensitive areas such as natural areas, parks, scenic overlooks or undisturbed vistas are found near the project area.

3.12 Land Use

Weld County has classified this project as a major facility of a public utility. Construction of the project is dependent upon receiving a Land Use Permit (specifically, a Use by Special Review Permit) from the County. The purpose of this permit process is to ensure compatibility of the

project with existing and proposed land uses as well as County regulations intended to protect environmentally sensitive areas. The permit for the project was approved by Weld County in June 1997.

3.13 Public Health and Safety

The natural hazard most likely in the project area would be high winds and tornadoes. Wind turbines and electrical equipment would present the risk of electrocution, fall or aircraft collisions. The FAA requires written notification before construction of any structure 200 feet or greater. The FAA then determines whether the structure is a threat to aviation and what warning lights or markings would be required to enhance the structure's visibility. Discussion of potential health risks associated with high-voltage power lines would not be germane to this EA as no such lines have been proposed and no houses are found within at least 1.5 miles of the proposed substation. Roads into the project area are gated and generally not open to members of the public who might otherwise approach the turbine towers.

3.14 Wildlife

As many as 108 species of vertebrate wildlife potentially occur in the project area and vicinity (Appendix C). However, the small size of the project site, its heavily grazed vegetation, lack of topographic and vegetative variation, and limited availability of water and cover limit potential wildlife diversity. Few species are expected to be found in great numbers on the project area.

Information used in this section was obtained from published literature including government documents, unpublished wildlife agency reports and unpublished data, theses and dissertations; several site visits (including an aerial raptor nesting survey); and information received from the Wyoming Natural Diversity Database and the Colorado Natural Heritage Program.

Mule Deer and Pronghorn. Pronghorn and mule deer are the principal big game species found in the vicinity of the project area. White-tailed deer may occasionally be present, although they are probably restricted to riparian vegetation associated with Owl Creek and Lone Tree Creek (4-6 miles south of the project area). Pronghorn are the most abundant big game species in this area. Because they move across the Colorado-Wyoming border, they are managed by both the Wyoming Game and Fish Department (WGFD) and CDW. Because of the interstate nature of the population and the large amount of private land in the area, estimating population with any confidence has been difficult. Even so, WGFD considers the pronghorn herd to be over the population objective (more than 450 animals) in Wyoming (Olson, 1995a). Pronghorn in this area seem to have experienced a drop in buck:doe ratios since 1991 although doe:fawn ratios have remained consistent.

In 1985, CDW initiated a two-year trapping and marking study to assess pronghorn movements across the Wyoming-Colorado border (CDW, 1986). Results of the study showed that pronghorn do move back and forth between Colorado and Wyoming although no definitive migration

patterns were observed. Movements appear to be driven by the seasonal availability of forage. Studies conducted elsewhere have emphasized the importance of sagebrush to wintering pronghorn (Martinka, 1967; Severson et al., 1968; Bayless, 1969; Clary and Beale, 1983; Alldredge and Deblinger, 1988). Wintering pronghorn on Great Plains grasslands, however, have few shrubs available and may depend on cultivated winter wheat to sustain them (Sexton et al., 1981; Cook and Irwin, 1985). Pronghorn depredations on winter wheat have been a problem south of the project area near Nunn, Colorado (Wagner, 1997).

Fences can be physical barriers to pronghorn movements. The western edge of the project area borders the Terry Bison Ranch. There, a multi-strand, smooth, high-tensile wire, "New Zealand" fence is used to retain bison. Similar non-electric 15-strand high-tensile wire fences have been used successfully in Colorado to restrict big game and livestock from livestock feed and forage (Byrne, 1989). Pronghorn or mule deer are not expected to enter the project area from the west. However, the remainder of the site is fenced with 4-5 strand barbed wire. Unlike mule deer, pronghorn seldom jump fences and usually go under them at points having greatest ground clearance between to the bottom wire (Prenzlow, 1965; Anderson and Denton, 1980). The existing barbed-wire fence is not expected to be much of a barrier to pronghorn movement across the project site. Data from the CDW's pronghorn study (CDW, 1986) show that very few animals moved across the project area during north-south seasonal movements. Whether this is a real pattern, perhaps related to steeper topography on the south side of the project area, fences surrounding the project area, or an artifact of limited sample sizes could not be determined from the data.

Mule deer in this area are also part of an interstate herd that frequently moves across the Colorado-Wyoming border. Mule deer will use a variety of habitats in this region including short-grass prairie, riparian systems with irrigated crops, farmstead shelter belts, and extensive areas of winter wheat. Preferred habitat, however, will be shrub lands on rough, broken terrain, which provide abundant browse and cover (Fitzgerald et al., 1994). Because these habitats are limited in the region, deer are found scattered over large areas in relatively low densities. Due to a variety of factors, this herd appears to be experiencing a population decline which has also been seen in other regions of Wyoming (Olson, 1995b).

Other Mammals. Based on records from the Wyoming Natural Heritage Database, field observations, species ranges and habitat associations (Clark and Stromberg, 1987; Fitzgerald et al., 1994; Reeve, 1997), 34 mammal species are known to occur or may occur within the project area during at least a part of the year (Appendix C).

Carnivores occurring in the area include coyote, swift fox, badger, long-tailed weasel, and stripped skunk. Two coyotes were observed on the site during a field visit in May 1997 possibly attracted to a cow carcass (Reeve, 1997). What may be a coyote den was also found in a drainage south of the mesa. Because they can be significant predators of swift fox (Covell and Rongstad, 1990), the presence of coyotes in and around the wind energy project area may regulate swift fox numbers in the area.

As many as 16 rodent species could occur in the vicinity of the project area. Rodents are of particular interest because they are prey to resident and migrating raptors. A small canyon with an intermittent drainage on the south edge of the project area provides more habitat and topographic diversity relative to the rest of the project area. Small mammals are expected to be more abundant and diverse there. Although apparently not abundant, Wyoming ground squirrels were observed in the project area during May 1997. Mounds and tunnel casts of northern pocket gophers were also found within the project area. Although black-tailed prairie dogs might be expected in the area, none were observed during either ground or aerial surveys.

Prairie dogs were probably once common in the area but their numbers have been extensively controlled because of their negative impact on agriculture. Continued pressure from the livestock industry will likely continue to keep population numbers low (Fitzgerald et al., 1994) which would limit the potential for them to expand into the project area.

Desert cottontail, black-tailed jackrabbit, and white-tailed jackrabbit potentially occur in the project area or vicinity. Although these species are well adapted to open grasslands, they all require adequate hiding cover such as prairie dog burrows, scattered trees or shrubs, or crevices and spaces under rocks. Lagomorphs (e.g., various species of rabbits, hares) in the project area are most likely to be found in the drainage at the south edge of the project area where yucca and serviceberry are common.

Six species of bats potentially occur in the vicinity of the project area. These species roost in trees, rock crevices, caves, mines, and buildings. Although outbuildings are found within the project area, none of the other features are present. Because the distribution and abundance of North American bats are determined largely by the availability of suitable roost sites (Humphrey, 1975), it seems unlikely that bats are abundant at the site. Tree roosting species such as the hoary and silver-haired bat may pass through the area only during spring and fall migrations.

Raptors. Raptors refers to hawks, eagles, owls and related species. Before PSCo proposed a project area, CDW was consulted about the potential for avian conflicts and past observations of raptor nesting activities at several potential sites. The agency's raptor biologist surveyed five potential sites and adjacent lands from the air. In his opinion, the proposed project area had a low potential for conflicts with raptor species such as golden eagles (Appendix D). The project area was found to contain little suitable habitat (nesting substrates) for nesting raptors except for ground-nesting species. No trees or shrubs are present and grass-covered or cobble slopes characterize the sides of mesas in the project area and vicinity. There is no evidence that transmission line towers found on the east edge of the project area have been used for nesting although birds might perch on suitable horizontal structures.

In addition to protection provided by the Migratory Bird Treaty Act and the Endangered Species Act (discussed in more detail below), Federal regulations (50 CFR 22) implementing the Eagle Protection Act protect bald and golden eagles such that no person shall take, possess, or transport any bald eagle or golden eagle except as allowed under a valid permit (50 CFR 22.12). Permits

may be issued for scientific or exhibition purposes, Native American religious use, depredation control, falconry purposes or for an authorized take of a golden eagle nest. These permit regulations do not explicitly address a "take" or and "incidental take" of a bald or golden eagle due to collisions with aircraft, vehicles, towers, buildings, wind turbines or other structures.

To assess the risk of raptor collisions with the proposed wind turbines, raptor nesting surveys were conducted during spring 1997 within a 169-square mile survey area defined as a 13-mile by 13-mile square centered on the existing meteorological tower (see Figure 2-2). The decision to survey a 169-square mile area for raptor nests was based on two reasons: 1) breeding territories of golden eagles are usually about 4.4 miles; and, 2) golden eagles forage farther from their nest sites than any other raptors likely to nest within the survey area--with the exceptions of northern harriers and prairie falcons (Kochert, 1986). Nesting densities of golden eagles in the western U.S. range from one nest per 19 square miles to one nest per 55 square miles with an average distance between nests of 2.5 miles to 4.4 miles, respectively (Phillips and Beske, 1982; Johnsgard, 1990). Based on a study of 140 nest sites in northeast Wyoming, the distance between nearest-occupied golden eagle nests averaged 2.7 miles and ranged from 1.0 to 7.0 miles (Phillips and Beske, 1984). Surveying at least 6.5 miles from the meteorological tower was judged adequate to determine whether nesting golden eagles occurred within an area that could include the project area as part of a nesting territory. Once in the field, actual survey observations were made up to 9.2 miles from the center of the project area (Reeve, 1997).

At least seven raptor species were found to nest within the 169-square mile survey area. These included golden eagle, ferruginous hawk, Swainson's hawk, red-tailed hawk, prairie falcon, American kestrel, and great-horned owl. Nest sites for each of these species were found during aerial and/or ground surveys conducted in April and May 1997 (Reeve, 1997). Other species, including northern harrier, barn owl, and burrowing owl may also nest within the area surveyed (Olendorff, 1973; Ryder, 1997).

No nests were found within the project area. The closest nest to the project area was an unoccupied nest structure found approximately 0.7 miles from the meteorological tower. That nest site had been used by golden eagles in 1971 (Olendorff, 1973) but no information on its recent history could be found.

A total of 27 active and inactive nest sites were found during 1997 surveys of the 169 square mile survey area. These included five golden eagle nests--four of which were occupied by adult birds. The fifth nest was inactive but had been active in 1996 (Ryder, 1997). One additional active golden eagle nest was seen outside the survey area about 8.5 miles from the meteorological tower. This nest was reported active in 1971 (Olendorff, 1973) but no more recent data is available. Within the survey area, two of the golden eagle nests were in trees and the other three were on cliffs. Distances of golden eagle nests to the meteorological tower ranged from 4.8 to 7.4 miles. If these same nest sites were occupied in the future, it is likely that the project area could be used by at least two nesting pairs of golden eagles for foraging during the nesting period (February through August) and by post-fledgling juveniles (late June through August).

Four ferruginous hawk nest sites within the nesting survey area were found occupied during the April-May surveys. Three additional ferruginous hawk nest structures were found unoccupied--one of which was active in 1970 and 1971 (Olendorff 1973). The closest ferruginous hawk nest was 4.0 miles from the meteorological tower. Since ferruginous hawks typically forage within 2 miles of their nests (Kochert, 1986) they are not expected to use the project area for foraging during the nesting period.

A potential nesting cavity in a cliff 4.2 miles from the project area was occupied by prairie falcons. Prairie falcons may hunt up to 15 miles from nests (Kochert, 1986) for prey which includes mostly ground squirrels but also horned larks, mourning doves, and common nighthawks (MacLaren, 1986). These prey items could occur on the project area.

Nests of Swainson's hawks, red-tailed hawks and great-horned owls were all found in trees within the 169 square-mile survey area. Of these species, the closest nest to the project area was a red-tailed hawk nest found 2.6 miles from the meteorological tower. These species typically forage within 2 miles of their nests (Kochert, 1986); however, a nesting pair and juveniles might search for prey as far as the project area. The nest site in a tree 0.7-mile from the meteorological tower used by golden eagles in early 1970's could be suitable for use by Swainson's or red-tailed hawks or great-horned owls. A pair of Swainson's hawks was observed at that site during the May 1997 survey but whether it was used for nesting could not be determined. The nest site is on private land on which public access is prohibited.

Many nest boxes designed for use by American kestrels have been installed on the Terry Bison Ranch near the project area and the City of Fort Collins Meadow Springs Ranch found west of Interstate 25 (Ryder, 1997). The closest box is approximately two miles from the meteorological tower. Also, artificial nesting platforms have been placed in trees along riparian zones south and west of the project area. These have been used for nesting by Swainson's hawks, red-tailed hawks and great-horned owls (Ryder, 1997). None of these structures is closer than 5.6 miles from the meteorological tower. Raptors species that might nest in those structures are not expected to forage within the project area.

Available data (Olendorff, 1973) shows that overall nesting density within the raptor survey area is greater now than it was in the early 1970's. Compared to the 1970-1971 nesting seasons, more golden eagles, ferruginous hawks, red-tailed hawks, Swainson's hawks and great-horned owls are nesting within the area. Elsewhere in northeastern Colorado, nesting ferruginous hawk populations declined between 1972 and 1990 while nesting populations of Swainson's hawks, red-tailed hawks, prairie falcons and great-horned owls increased during that time (Leslie, 1992). Decreased nesting success by ferruginous hawks may have been due to human disturbances but also increased nesting by other hawk species and great-horned owls (Leslie, 1992). Between 1993 and 1995, nesting activities of raptors on the Pawnee National Grasslands fluctuated from year-to-year due, in part, to cold, wet weather during April and May (M. Ball, 1996, unpublished data).

Besides species found nesting in the survey area, others are likely to winter or migrate through the survey area during fall and spring. Raptors that may winter in the vicinity of the project area include golden eagles, northern harriers, prairie falcons, ferruginous hawks, red-tailed hawks and rough-legged hawks (Marion, 1970). Fall migrations of American kestrels, northern harriers and Swainson's hawks peak from late August through mid-September while spring migrations of northern harriers begin by early March (Craig, 1970). Swainson's hawks are not likely to appear in the area until late April (Craig, 1970). Swainson's hawks captured and banded in northeast Colorado have been recovered in Argentina and Columbia while banded ferruginous hawks, red-tailed hawks and American kestrels nesting in northeast Colorado migrate to Texas and Mexico (Harmata, 1981; R. Ryder, unpublished data). Other potential migrants through the survey area include sharp-shinned hawk and turkey vultures (Craig, 1970). Peregrine falcons, listed as endangered under the Endangered Species Act, migrate through Northeast Colorado during spring and fall but appear to follow waterfowl migrations (Ryder, 1997). Since no waterfowl habitat exists within or near the project area, peregrine falcons are not expected to use the project area during migration.

Passerines, Migratory Birds. Most of the birds likely to be found in the project area or vicinity, including the more common species, are defined as migratory birds by Federal regulations (50 CFR 10.13) and the Migratory Bird Treaty Act as implemented by Federal regulations (50 CFR 21). The USFWS issues permits for the following types of activities involving migratory birds: bird banding or marking; scientific collecting; taxidermy; waterfowl sale and disposal; special agriculturist; species purpose; falconry; raptor propagation permit; and, depredation control. According to federal regulations (50 CFR 21), a special purpose permit may be issued for activities related to migratory birds which are outside the scope of the other permits. However, the special purpose permit is intended to allow for activities that show benefit to the migratory bird resource, address important research reasons or involve some other compelling justification. According to Federal regulations (50 CFR 21.27), such a permit is required before any person may lawfully take a migratory bird for any purpose not covered by the standard permits. However, Federal regulations do not explicitly address an accidental or unintentional take of a migratory bird. No specific permit system is in place to allow for the incidental or accidental "take" of migratory birds due to collisions with buildings, towers, vehicles or wind turbines. The USFWS has recognized this as an unresolved regulatory issue.

Thirty-six species of passerines (e.g., songbirds) have been observed or might be expected to occur on the project area during breeding, during the winter, or for short periods during migration. During a May 1997 visit, horned larks and McCown's longspurs appeared to be the two most common species observed within the project area. Of the two, horned larks were most abundant. Western meadowlarks and loggerhead shrikes were also observed, although less frequently. Because no suitable nesting habitat for loggerhead shrikes was present, it is likely that the individuals observed were migrating through the area. Given the lack of nesting substrate diversity, ground nesting species are expected to constitute the majority of passerines in the project area during the breeding season.

The route for the Nunn Breeding Bird Survey is 20 miles south of the project area but closer than any other route to the site. This survey is conducted annually by state agencies along a set route that allows year-to-year comparisons. The data is organized and maintained by the USGS Biological Resources Division. Although the Nunn route traverses a wider range of habitats than are present in the project area, data obtained the Nunn Survey provides information about regionally abundant species during the breeding period. According to that survey, the most common species were horned larks, lark buntings, and western meadowlarks (Sauer et al., 1996). McCown's longspurs, mourning dove, house sparrow, barn swallow, and killdeer are also frequently observed bird species (Sauer et al., 1996). These species would be expected to nest in the project area.

The highest species diversity in Northeast Colorado occurs during spring and fall migrations (Appendix C). Because the project area and vicinity contain no topographic features such as north to south drainages or ridges that might serve as natural corridors for the migratory movements of passerines, the density of birds migrating through the project area is likely to be low. In addition, the project area possesses no wetland, riparian or water features. During the winter months, horned lark and western meadowlark are likely to be the most abundant passerines but lapland longspur, snow bunting, house finch, black-billed magpie, American crow, and common raven may also be present.

Amphibians and Reptiles. Based on species' typical ranges and habitat preferences (Hammerson, 1986; Baxter and Stone, 1980), two amphibian and 11 reptile species were identified as potentially occurring within the project area (Appendix C). The two amphibians--the tiger salamander and the plains spadefoot--require water for breeding. Several temporary ponds that quickly dry up within a few weeks are found in the intermittent drainage along the south edge of the project area. These ponds may be suitable habitat but this drainage would not be affected by proposed activities. Both species could use rodent burrows in the project area for shelter. Reptiles that could occur in the project area and vicinity include five species of lizards and six species of snakes (Appendix C). Although these reptiles are found in open grassy or sand hill areas, they usually require hiding cover such as small mammal burrows, woody debris, or rocks/rocky outcrops (Hammerson, 1986; Baxter and Stone, 1980)--the latter two conditions being absent in the project area.

3.15 Threatened, Endangered, and Species of Concern

The USFWS was contacted and asked to provide a list of Federally-listed species potentially affected by the proposed project. A copy of that list is found in Appendix D. Species identified in that letter have been addressed below and in chapter four.

Bald Eagle. Bald eagles do not nest in the region. Wintering bald eagles do congregate at ponds associated with the Rawhide Power Plant approximately 20 miles southeast of the project area. The plant's cooling ponds remain unfrozen during winter and attract waterfowl and, consequently, bald eagles (Ryder, 1997). Wintering bald eagles will commonly use communal

roosts in trees that provide shelter from wind and low temperatures. Concentrations of wintering bald eagles tend to be found in trees or cliffs along lakes, streams or river courses. Where food availability coincides with water bodies, perches are usually trees. Selectivity of perches by bald eagles appears to favor dead trees and deciduous trees having substantial horizontal branches (Stalmaster and Newman, 1979; Steenhof et al., 1980) such as cottonwoods in riparian zones. No suitable roosting habitat or perch sites are present within the project area. Similarly, nesting attempts are usually made in that type of habitat. A field inspection of the project area and vicinity found no signs nesting or nest structures. Power lines along the east boundary of the project area could be used for perching. No nests were observed in these towers during the 1997 raptor survey (Reeve, 1997) and during a search of the project area and vicinity conducted by the CDW (see Appendix D).

Because suitable roosting areas may not be close to food sources, bald eagles will travel significant distances between the two. Carrion can be an important winter food. It is possible that an occasional bald eagle could pass through the project area in search of food sources such as road-kill, dead cattle or other sources of carrion. Otherwise, this species would be unlikely to occur in the project area.

Mountain Plover. Mountain plover, a candidate for Federal listing as endangered or threatened under the Endangered Species Act, inhabit semi-deserts and disturbed prairies throughout the western Great Plains. They nest in areas of low herbaceous vegetation, reduced shrub cover, and near prominent objects such as cow-manure piles or similar-sized rocks (Graul, 1975; Knopf and Miller, 1994). Frequently they have been associated with prairie dog towns where vegetation has been reduced (Knowles et al., 1982; Olson-Edge and Edge, 1987). Although this species breeds at many locations across the western Great Plains, the two hubs of plover breeding activity appear to be the Pawnee National Grassland in Colorado and the Charles M. Russell National Wildlife Refuge in Montana (Graul and Webster, 1976).

Because of the presence of suitable habitat near the project area and the proximity to the Pawnee National Grassland, the USFWS has expressed concern that the mountain plover may occur in the project area. PSCo requested the USGS Biological Resources Division to conduct a field inspection. An inspection by an experienced grassland ornithologist (Dr. Fritz Knopf) was conducted on September 4, 1996. Although no plovers were observed during the inspection, some potential was found for plovers to nest within the project area. This would be more likely to occur if cattle were allowed to continue grazing in the area (see Appendix D). During various field surveys, no prairie dog towns were found within the project area or on adjacent land (Reeve, 1997).

Swift Fox. The swift fox, a candidate for listing as endangered or threatened under the Endangered Species Act, is found in short-grass and mid-grass prairies over much of the Great Plains. In Northeast Colorado, this fox may be most numerous in flat to gently rolling terrain (Cameron, 1984; Loy, 1981) and rare in areas with highly eroded gullies, washes, and canyons (Fitzgerald, 1994). As carnivores, they feed on lagomorphs, ground squirrels, prairie dogs, mice,

invertebrates, and ground-nesting birds. In many areas--including Colorado--cottontails and jackrabbits are the bulk of their diet (Cameron, 1984; Zumbaugh et al., 1985). It has been suggested that swift fox population will decline during periods of low rabbit densities (Fitzgerald, 1994).

A variety of predators, including coyotes and golden eagles, prey on swift fox. Covell and Rongstad (1990) have suggested that high coyote densities may serve to limit swift fox numbers. Furthermore, because swift fox are quite easy to trap, humans may be another, major cause of mortality. Coyotes observed inhabiting the vicinity of the project area may preclude its use by swift fox.

Colorado Butterfly Plant. The Colorado Butterfly Plant (*Gaura neomexicana* ssp. *coloradensis*) is a member of the Evening Primrose Family (Onagraceae) and a Federal candidate for listing as endangered or threatened under the Endangered Species Act. It is infrequently found in scattered sites on the plains and piedmont valleys of Boulder, Larimer, and Weld Counties, Colorado and Laramie County, Wyoming (Fertig, 1994; Weber and Wittmann, 1996). Data obtained from the Wyoming Natural Diversity Database (April 1997) indicated that it is currently known from 21 populations in Laramie County and several historic sites in northern Colorado. It tends to grow in sub-irrigated, alluvial soils of drainage bottoms surrounded by mixed grass prairie (Dorn, 1992; Fertig, 1994)--conditions not found within the proposed project area. Although a plant survey has not been conducted, the lack of suitable habitat conditions, along with intensive grazing, appear to preclude its occurrence within the project area.

CHAPTER FOUR
ENVIRONMENTAL IMPACTS OF PROJECT ALTERNATIVES

4.1 Introduction

This chapter contains an examination of impacts on the affected resources discussed in chapter three. In chapter three, several resources were identified which, due to their lack of presence in the project area or the nature of the Proposed Action, were eliminated from consideration as part of the affected environment. Those resources are not considered further in this chapter. This analysis considers impacts due to the staged development of up to 27 wind turbines within the project area. Cumulative impacts are considered in chapter five.

4.2 Streams, Wetlands and Floodplains

A significant impact would occur if wetlands, natural stream channels and riparian areas were irretrievably lost or the threat of flood damage was substantially increased. Violation of Executive Order 11988 or 11990 would be considered a significant impact. None of these impacts are expected to occur.

4.2.1 Proposed Action

No perennial streams would be directly or indirectly affected by project activities. The project area is a flat, dry mesa that sits above local intermittent streams and drainages and any wetlands or floodplains associated with them (see Figure 2-1). Use of existing access roads as the proposed access would avoid creating impacts to the few isolated wetlands or riparian areas found in the vicinity. Improvements to the existing access road would not affect wetland or riparian areas. The proposed 0.2 miles of new access road would avoid wetlands and riparian areas. No wetlands would be affected by the construction of the turbines, feeder lines or substation. The only intermittent stream found in the project area is at the southern edge of SW 1/4, Section 19 (see Figure 2-2) and would not be crossed by access roads. The locations of turbines would also be adjusted to avoid this area (see Figure 2-2).

Executive Order 11988 (42 FR 26951) addresses the protection of floodplains. Executive Order 11990 (42 FR 26961) addresses avoidance of adverse impacts associated with the destruction or modification of wetlands associated with new construction. DOE is prohibited from undertaking or providing assistance for new construction located in wetlands or floodplains unless the agency finds that there is no practicable alternative to the construction and that the action includes all practicable measures to minimize harm to these areas. The project would comply with these Executive Orders as construction in floodplains and wetlands would be avoided.

4.2.2 No Action Alternative

Implementation of the No Action Alternative would have no substantial effect, positive or negative, on the protection of streams, wetlands or floodplains.

4.3 Water Quality

An activity that results in a violation of Federal, state or local ambient water quality standards would be considered a significant impact. Given the lack of water bodies in the project area, no such impacts are likely to occur.

4.3.1 Proposed Action

Permanent water bodies or perennial streams would not be affected. The intermittent drainage at the south edge of the project area would be avoided. Given these conditions, the proposed use of existing access roads, and the implementation of erosion control and reclamation measures described in chapter two, no impacts to water quality associated with sedimentation or alternation of stream channels are expected to occur

4.3.2 No Action Alternative

Implementation of the No Action Alternative would have no impact, positive or negative, on surface water quality.

4.4 Soils and Vegetation

Failure to stabilize soils where vegetation cover has been removed would be considered a significant impact. Given the minimal surface disturbance involved and proposed reclamation measures, no such impact is expected to occur.

4.4.1 Proposed Action

Potentially affected soils are non-hydric and are well-drained with a high sand and/or gravel content. Affected soils are not expected to result in any unusual or difficult construction problems. According to the soil survey (SCS, 1982), the potential for soil erosion by water is slight; however, there is a relatively high potential for wind erosion of disturbed areas. Some disturbance to soils and vegetation would be unavoidable and necessary for access road improvements and the construction of feeder cables, turbine sites and the electric substation. Due to the flat (0-3 percent slope) topography of the project area and the type of foundation proposed, only minimal grading is expected to be necessary for turbine sites. Use of existing access roads will minimize new soil disturbance and road construction. Affected soils are generally well-drained and should provide an adequate road base. Trenches for underground feeder and communication cables would not require grading and their construction should create only minimal disturbance to

soils and vegetation. By not grading the trench line, root systems of the prairie vegetation would be kept intact and the potential for wind erosion reduced. For safety reasons, the area inside the substation must be kept clear of any vegetation. However, soils in this area would be covered with gravel or otherwise stabilized.

It is estimated that construction of 0.2 miles of new access road would disturb about 0.3 acres. The substation would require 0.9 acres of surface disturbance. The foundations of 27 towers would disturb about 0.25 acres but areas under towers would be reclaimed and revegetated. Installation of feeder lines would disturb about 0.25 acres for every mile of feeder line installed but his area also would be reclaimed and revegetated. Graveling or leveling portions of the existing access road and the need for unimproved, two-track roads to service turbine locations would result in a small, unquantifiable increase in disturbance to soils and vegetation.

PSCo would reclaim any disturbed soils not needed for maintenance or operations. Reclamation would use species adapted to local precipitation and soil conditions. Seed for these species (such as blue grama grass, needle-and-thread, buffalo grass or western wheatgrass) is generally available. Affected soils are well-suited for a variety of grain crops and reclamation potential is expected to be good. Seeding in the fall or early spring to take advantage of available moisture should enhance seed germination and reclamation success. However, reclamation success would depend upon the timing of the unpredictable and generally low precipitation characteristic of the area. Grazing pressure could also affect the success rate. Repeat seeding of disturbed areas may be necessary. Fertilization is not recommended and none has been proposed. Use of mulch would be difficult given the high winds characteristic of the mesa top. Minimum tillage and leaving the surface in a roughened condition is likely to be more effective in protecting soils from wind erosion and in trapping seed and moisture. PSCo has proposed the control of noxious weeds to ensure that disturbed areas are properly reclaimed with native species. With stabilization of disturbed areas as proposed, long-term impacts to soils and vegetation are expected to be minimal.

4.4.2 No Action Alternative

Implementation of the No Action Alternative would avoid short-term disturbance to soils and vegetation associated with construction activities and a small amount of long-term disturbance associated with service roads, the substation and turbine sites. Some increased potential for soil loss due to erosion also would be avoided.

4.5 Meteorology and Air Quality

Exceeding Federal or state ambient air quality standards would be a significant impact. No such impacts are expected to occur. The project would help reduce future emissions of regulated pollutants.

4.5.1 Proposed Action

Meteorology. Based on data gathered from the existing meteorological tower and a tower in Cheyenne, the proposed site appears to have excellent wind potential. Future data gathered from the meteorological tower would be used to refine estimates of potential electricity production from the turbines. Additional meteorological data generated by the project would be valuable to the State of Colorado for its wind monitoring studies and assessment of the commercial feasibility of other sites.

Air Quality. Using wind power would have a positive impact on regional air quality--particularly where it displaces the need for fossil fuel burning in non-attainment areas. Consumers choosing to purchase wind-generated electricity would reduce their contribution to the regional inventory of emissions. Assuming development of all 27 wind turbines and the use of best available pollution control technologies on a gas-fired power plant, implementation of the Proposed Action would avoid the production of 29,860 tons of carbon dioxide, 0.04 tons of sulfur dioxide, 67.7 tons of carbon monoxide, and 12.9 tons of nitrous oxides each year.

Construction of the proposed wind project would reduce demands on fossil-fuel power plants and would reduce the production of greenhouse gases and regulated sources of emissions associated with fossil fuel burning. PSCo estimates that in 1996 it was necessary to burn one ton of coal to produce 1800-1900 kWh. An average household in PSCo's service area consumes about 580 kWh of electricity a month or the equivalent of about one-third ton of coal per month. Based on its estimated output, one wind turbine could displace 940 tons of coal burning each year. At full development, 27 turbines could displace more than 25,000 tons of coal burning per year.

Construction of the wind project would result in a temporary, localized increase in particulate matter and emissions from vehicle and equipment exhaust. However, impacts from vehicle operations would be confined to the 90 days it would take to install and test wind turbines and related facilities. Construction activities would create a temporary increase in fugitive dust. However, this source would be reduced once affected soils are stabilized. Because the project area is far from any Class I area and is not within any non-attainment area for criteria air pollutants, its construction and operation are not expected to have any adverse effect on compliance with Federal or state air quality regulations.

4.5.2 No Action Alternative

Implementation of the No Action Alternative would avoid a temporary increase in fugitive dust and emissions from construction equipment; however, it would also result in the loss of positive impacts on air quality associated with reduced fossil fuel burning.

4.6 Socioeconomic Conditions

An increase in the demand for public services or housing that exceeds local availability or capacity would be considered a significant impact. A substantial decrease in local property values that results in a substantial decrease in County property tax revenues would be considered a significant impact. Based on the small size of the workforce involved, the site's distance from any residents or residential area, and the enhanced tax revenues likely to be produced by the project, no such impacts are expected to occur. Imposition of an unwanted facility on a disadvantaged population would be considered a significant impact. No such impact would occur as the project is not located near such a population and the project has been modified to reflect the wishes of local landowners.

4.6.1 Proposed Action

The proposed facility would not impose any environmental risks, nuisances or adverse socioeconomic impacts on a socially or economically disadvantaged ethnic group or area. The access road has been adjusted to reflect the requests of private landowners. Owners of the project area have willingly granted approval for the use of their property.

Imposition of the state's five percent sales and use tax on applicable purchases of materials, supplies and equipment for the project would generate additional state revenues. For Weld County, the conversion of unimproved range land to a wind project would increase property tax revenue derived from the project area which currently produces about $113 a year in property tax revenue. Implementation of additional project phases would generate additional revenues for the County. Increased tax revenues derived from the project could be used to support education and County services.

4.6.2 No Action Alternative

Implementation of this alternative would result in private propery owners' loss of income and the loss of increased state sales-use tax and County property tax revenues.

4.7 ENERGY RESOURCES

The loss of proven, commercial renewable energy resources would be considered a significant impact. The unnecessary, increased use of fossil fuels would be considered a significant impact. No such impacts are expected to occur as a result of the Proposed Action.

4.7.1 Proposed Action

The Proposed Action would result in several positive impacts on energy resources in the U.S. First, the data and experience gained from the proposed facility could improve the position of

U.S. industries to compete abroad--offering renewable energy technologies as well as planning, engineering and other services to developing countries.

Second, the project would avoid the need to construct new transmission lines to a new generation site as lines for an interconnection are adjacent to the project area. Thus, the proposed site is well situated to improve energy efficiency by reducing system losses.

Third, price is the major market barrier to the increased use of renewable energy technologies. When compared with existing PSCo rates, the price premium for wind-generated electricity could be substantial (i.e., much higher than $0.025/kWh associated with the Proposed Action). If DOE releases project funding, the premium paid for wind-generated electricity would be reduced to about $0.025/kWh. This would have the beneficial impacts of increasing consumers' and businesses' willingness to participate in a green energy program.

Fourth, by helping to sponsor this venture, DOE funding would have the positive impact of contributing to an improved understanding of wind turbine design, equipment, operations and reliability. The improvements suggested by this venture could reduce the cost of future equipment and projects and increase the adoption of these technologies at other sites.

Finally, the Proposed Action would help diversify U.S. and Colorado energy resources and would reduce the consumption of non-renewable, fossil fuels. It would offer thousands of customers an alternative to the increased consumption of fossil fuels. PSCo estimates that an average Front Range household in its service area consumes about 580 kWh/month. Depending upon actual net energy output, one of the proposed wind turbines could supply the equivalent of electricity consumed by 244 households with the full project (27 turbines) providing the electrical needs of more than 6,500 households. Actual output will depend upon wind conditions, operating efficiencies and other variables.

4.7.2 No Action Alternative

Under the No Action Alterative DOE would not assist in construction of the Ponnequin Wind Energy Project. Without DOE participation, consumers would pay a higher premium for wind-generated electricity and citizen participation in the program would likely be lower. Fewer turbines would be installed within the project area or it is possible that the project would prove infeasible to construct. Colorado consumers would lose the option of purchasing electricity generated from a renewable energy source. Colorado-based businesses, workers and scientists would lose an opportunity to expand their participation in the renewable energy field.

4.8 Noise

A violation of applicable Federal, state or local noise standards would be a significant impact. The project-related generation of noise levels greater than 55 dBA at occupied residences would be considered a significant impact. No such impacts are expected to occur.

4.8.1 Proposed Action

Executive Order 12088 requires conformance with applicable state and local noise standards. No specific state or local noise standards are known to apply to the operation of wind turbines in the project area.

Because they would be a new design, noise levels generated from the proposed turbines have not been determined at this time. In general, all wind turbines produce two types of noise: a low frequency noise that can be perceived as a thumping sound and a higher frequency, more continuous noise from gearboxes and airflow over turbine blades or through lattice towers. Perception of these noises will depend upon many physiological, environmental and turbine design factors. A noise study of a massive horizontal axis turbine with a 290-foot diameter upwind-rotor found that noise reached the limits of human observers' perception at 3,200 feet upwind and 6,400 feet downwind of the tower. The proposed type of turbine would be expected to generate much less noise (Spera, 1994). In any case, no residences are located less than 1.5 miles from the project area. An another example, early model turbines were reported to generate noise levels of 45-50 decibels at the base of the tower (Nelson and Curry, 1995). By contrast, the level of normal human speech is 55-60 dBA (Golden et al., 1980). Noise from high winds characteristic of the area, major highways (e.g., Interstate 25, U.S. Highway 85) and a railroad are likely to affect background noise levels and the perception of noise impacts in the vicinity of the project area. For these reasons noise impacts are expected to be negligible.

4.8.2 No Action Alternative

Implementation of the No Action Alternative would avoid an increase in noise within the project area but otherwise would not affect background noise levels at residences or other noise sensitive areas.

4.9 Transportation

A significant impact would occur if the project increased traffic volumes on Federal, state or County roads to the extent that average vehicle speeds were reduced, traffic flows were disrupted, and an increase in the traffic accident rate occurred. Based on the size of the proposed project and its phased development, none of these impacts are expected to occur.

4.9.1 Proposed Action

Because access into the project would be controlled (consistent with landowners' requests), they would be protected from increased, traffic-related impacts other than those necessary to construct and operate the project. The access road would be minimally improved to serve construction and operations traffic. Improved road conditions and PSCo maintenance of the access road would benefit local landowners by providing them with improved access to their property and livestock.

Peak traffic levels associated with the proposed project are unlikely to produce a noticeable increase in traffic on U.S. Highway 85, State Highway 223 or Interstate 25. Construction-related traffic would last for approximately 90 days. As proposed, the existing junction of the access road and State Highway 223 would be constructed and maintained in conformance with Wyoming Department of Transportation requirements which would help ensure that the potential for accidents at this intersection is minimized. Heavy truck traffic would end once construction has been completed. No impacts from heavy truck traffic would be associated with facility operations. After construction has been completed, project-related traffic on access roads into the project area would decrease to less than 1-2 light vehicle-trips per day.

4.9.2 No Action Alternative

A slight, short-term increase in traffic volume on area roads and highways would be avoided. Otherwise, implementation of the No Action Alternative is not expected to have any measurable effect on traffic levels, road conditions, or accident rates on Federal, state or county roads or highways. Improvements to the existing road used to reach the project area would not be made if the project were abandoned.

4.10 Cultural Resources

Loss of cultural resources eligible for the National Register of Historic Places would be a significant impact. A violation of Federal regulations protecting cultural resources would be a significant impact. Based on the results of the cultural resources survey, no such impacts or violations are expected to occur.

4.10.1 Proposed Action

The isolated finds identified during the on-site survey (discussed in chapter three), by their nature, are considered to lack significance and cannot be considered eligible for listing on the National Register of Historic Places. Therefore, no further work has been recommended for these finds. The limited cultural resources present, both of the prehistoric and historic eras, are likely due to the absence of a nearby reliable water source and the topography of the project area. Findings of the cultural resources survey indicate that implementation of the Proposed Action will be unlikely to affect significant cultural resources. While an increased but unknown potential to disturb subsurface sites would be unavoidable, the risk of this impact is likely to be low given the findings

of the cultural resources survey. In June 1997 the DOE provided the SHPO with these results and conclusions. No comments challenging these conclusions have been received.

4.10.2 No Action Alternative

Implementation of the No Action Alternative would avoid a small risk of disturbing subsurface sites. Otherwise, implementation of this alternative would have no effect on the protection of significant cultural resources.

4.11 Visual Resources

A significant impact would occur if the proposed project introduced visual elements not currently found in the vicinity of the project area which would disrupt views from designated, regionally-significant scenic overlooks. No such areas occur and no such impacts would be introduced by the project.

4.11.1 Proposed Action

Rotors from turbines within the project area could be visible in the distance from portions of U.S. Highway 85, Interstate 25 and Interstate 80. Due to its slim profile, the lattice tower would be very difficult to see from these highways. Where visible, the turbines would appear as small structures on the horizon that would not be substantially different in visual impact from the towers of major transmission lines already visible near the project area. Scenic vistas of undisturbed, natural landscapes would not be affected. Existing visual resources in the vicinity of the project area already compromised by the presence of transmission towers and lines, telephone lines, a railroad, highways and roads, pipeline corridors, windmills, and radio and communication towers. Visually sensitive areas such as natural areas, parks, or scenic overlooks would not be affected.

4.11.2 No Action Alternative

Implementation of the No Action Alternative would not protect any previously identified scenic resources from adverse impacts.

4.12 Land Use

A significant impact would occur if the project introduced a new land use that was not allowed by the County under its County Code. Such an impact is not expected to occur as the County has approved the Land Use Permit for this project.

4.12.1 Proposed Action

Construction of the proposed project requires a Land Use Permit (i.e., a Use by Special Review Permit) from Weld County for a major facility of a public utility. Compliance with this permit

process would ensure compatibility with existing and proposed land uses. Assuming compliance with the requirements of the permit approved by Weld County in June 1997, no adverse impacts on land use are expected to occur.

4.12.2 No Action Alternative

Lack of DOE funding could discourage the construction of the project and conversion of the project area from range land to a wind energy facility. However, if PSCo still proceeded with the project, and assuming compliance with Weld County land use permits, implementation of this alternative would have no impact (positive or negative) on land use.

4.13 Public Health and Safety

A substantial increase in risk to public health and safety, beyond that already associated with existing structures, land uses, and activities found in the project area and vicinity, would be considered a significant impact. Given the remoteness of the site, its lack of public access, and the proposed compliance with applicable Federal health and safety regulations, no such impacts are expected to occur.

4.13.1 Proposed Action

Four potential threats to public health and safety would be associated with the project: collapse or dismemberment of a turbine in the case of extremely high winds or a tornado; electrocution; a fall from a tower; and aircraft collision. Electrocution or a fall by a member of the public would require that person illegally enter the proposed facility. Given the remoteness of the location, the lack of nearby homes and the proposed, continued restriction on public access, there is a very low risk of this impact. Compliance with FAA requirements would minimize the risk of an aircraft collision. The turbines and towers would be designed to withstand winds higher than those reported by the project area meteorological tower and a similar tower in Cheyenne, Wyoming. To avoid damage from high winds, turbines could be shut down in accordance with manufacturer and PSCo-approved procedures. Operations and maintenance personnel would be trained in these procedures.

4.13.2 No Action Alternative

Implementation of the No Action Alternative would avoid a slight increase in the risk of an adverse impact to public health and safety.

4.14 Wildlife

Any project-related activity that would decrease wildlife populations due to the loss of habitat crucial for fawning, winter feeding or watering would be considered a significant impact. Any

project-related activities that would disturb active raptor nests would be considered a significant impact. Based on the analysis presented below, no such impacts are expected to occur.

4.14.1 Proposed Action

The Proposed Action could adversely affect wildlife in three ways: by direct mortality, habitat loss, or displacement of wildlife away from the project area. First, wildlife fatalities could occur from collisions with turbine blades, support towers, meteorological towers, collisions with construction and/or maintenance vehicles. Fatalities might also occur during excavation and surface preparation for the turbines, feeder lines and communication cables, and the substation. Wildlife fatalities due to avian collisions with turbines blades and other structures are considered in subsequent sections.

Clearing, grading, excavating, trenching, and/or burying habitats could lead to mortality of small mammals, reptiles, amphibians, invertebrates and nesting birds with eggs or young. Burrowing vertebrates would be especially vulnerable. Depending on species and soil characteristics, pocket gopher burrows are usually less than two feet deep (Chase et al., 1982). Burrows of thirteen-lined ground squirrels may be 20 feet long but only one foot deep; and Wyoming ground squirrels may burrow to depths of seven feet (Nowak, 1991). Rodent burrows may also be inhabited by spadefoot toads, salamanders, lizards and snakes, mice, weasels and birds, particularly burrowing owls (Chase et al., 1982; Clark et al., 1982). Loss of animals in burrows from excavation activities, if they occur at all, are only likely during construction of feeder line trenches and grading of the substation and turbine sites.

Construction machinery and project-related vehicles could collide with wildlife. Wildlife species particularly vulnerable to collisions with vehicles are those that move slowly, are inconspicuous, and/or nocturnal. Wildlife most susceptible to vehicle-related death include skunks, cottontails and jackrabbits, deer, coyotes, badgers, snakes, amphibians, and birds, particularly those such as mourning doves and meadowlarks that inhabit grasslands and shrubs next to roads (Leedy, 1975; Case, 1978; Wilkins and Schmidly, 1980). While increased construction traffic temporarily increases the risk of wildlife mortalities, overall impacts on wildlife populations are not anticipated to occur.

A second source of impact would be associated with the loss from excavation and grading activities of short-grass prairie habitat (blue gramma, needle-and-thread, prairie sandreed grasses, prickly pear cactus, yucca). Surface disturbance and long-term loss of short-grass prairie habitat would be reduced by reclamation, using existing access roads, limiting new road construction to 0.2 miles, limiting road widths to 12 feet, only minimally improving existing roads (rather than constructing standard crown-and-ditch roads), and using two-tracks for service roads to turbine sites. Disturbance to vegetation cover at each turbine site would be limited to about 400 square feet of short-term disturbance around the base of the lattice tower. This equates to 0.25 acres of disturbance for 27 turbines. An estimated 0.9 acres would be disturbed over the long term within the fence of the substation. An undetermined but a minor amount of short-term disturbance also

would be associated with digging trenches for buried feeder lines and communication cables. Trenching each mile of feeder line and communication cable would result in about 0.5 acres of disturbance. Construction of the proposed 0.2 miles of new access road would disturb about 0.3 acres of surface disturbance.

The third, general source of impact would be displacement of wildlife away from construction activities and operating turbines. Noise, machine activity, and dust from construction typically displaces birds, mammals, and other species beyond the actual construction site (Hanley et al., 1980). In addition, studies have shown that densities of some species of nesting birds decreased in fields near well traveled roads (van der Zande et al., 1980). Reports show that various mammals and birds escape from noises at 75 to 85 dBA (Golden et al,. 1980). Heavy equipment used in construction can emit noise levels within the 75-85 dBA range at distances beyond 200 feet (Golden et al., 1980). Displacement of wildlife during construction is expected to be temporary, if it occurs at all, and is not expected to adversely affect populations of resident or migratory species.

Although noise levels generated by the Z-46 or similar turbines have not yet been determined, early turbines were reported to generate noise levels of 45-50 decibels at the turbine base (Nelson and Curry, 1995). By contrast, normal human speech levels are 55-60 dBA (Golden et al., 1980) and sound produced under windy conditions in montane aspen and conifer stands can reach 56 dBA (Ward et al., 1976). Based on these sources, noise from turbines is not expected to displace wildlife.

Raptors. Although there have been only a few actual observations of raptors and other birds colliding with wind turbines, avian deaths can occur within wind energy project sites more often than in undeveloped reference areas. Causes of death on wind energy sites include collisions with turbines, electrocutions on power lines, collisions with electrical wires and guy wires and unknown causes (Orloff and Flannery, 1992). Since all project-related electrical power lines will be buried, the project will not contribute to risks of electrocution to raptors.

Studies have documented bird collisions with overhead transmission lines (Beaulaurier et al., 1984; Faanes, 1987) and with guyed communication towers (Avery and Clement, 1972; Seets and Bohlen, 1977) but raptor collisions with these structures appear to be rare. During a one-year monitoring program for bird fatalities at a site with two large wind turbines in Wyoming, all but two of 25 bird carcasses collected were found near a guyed 360-foot tall meteorological tower; none of the reported fatalities were raptors (Yeo et al., 1984). While it is possible that raptors and other birds may collide with the two, proposed 140-foot meteorological towers, accurate predictions of such occurrences are not possible. As proposed, placement of meteorological towers near operational turbines--which birds show a tendency to avoid--could help to reduce the risk of fatalities.

Most raptor deaths attributable to collisions with wind turbines have been reported at large-scale (i.e., hundreds or thousands of turbines) wind projects in California. There, unlike the proposed

project, hundreds of wind turbines with multiple designs cover many square miles. At those project areas turbines vary by height of support towers, tower structural components, turbine blade number and diameter, ground clearance of blades, and turbine orientation to the wind. For example, unlike the proposed towers, thousands of lattice towers at the Altamont Pass area incorporate horizontal supports which reports show are used as perches by raptors. Raptor mortality rates--defined as deaths (strikes) per turbine--were compiled from six wind energy site studies in California. Rates ranged from 0.007 to 0.058 deaths per turbine per year (Nelson and Curry, 1995). Although raptor overall mortality appears very low, actual deaths could be higher as it is unclear in some studies whether scavenging was not taken into account. The proposed monitoring plan would take this into account in reporting the results of project area surveys.

Investigators of these large-scale wind sites have documented patterns related to mortality (Orloff and Flannery, 1992). These include:

1. Some species (American kestrel, red-tailed hawk, golden eagle) were killed more frequently than expected by their local abundance while others (turkey vulture, common raven) were killed less frequently than expected.

2. Immature raptors (golden eagle, red-tailed hawk) were killed at greater levels than their proportions in local populations.

3. Raptor mortality was strongly associated with turbines at the ends of rows and with turbines near canyons--more so than other measured habitat and topographic variables.

4. Raptor mortality decreased with higher turbine densities and increased where turbines were spaced farther apart.

5. Raptor mortality rates were higher where turbines were supported by open lattice towers than other tower types (tubular towers, guyed-pipe support towers).

This last observation is undoubtedly related to raptor use of lattice towers for perching, especially at sites that have few or no alternative perch structures. Lattice towers with horizontal cross-members and/or platform catwalks used for servicing turbines have been used for perching by red-tailed hawks and golden eagles much more than towers that were supported by diagonal braces (Hunt, 1995). Since the towers used in the proposed project (see Figure 2-3) are designed with closely-spaced, sharply-angled diagonal braces, perching by raptors should be reduced. Tubular towers appear to make less attractive perch sites but still have been used by red-tailed hawks which perch on catwalks, platforms, and ladders (Hunt, 1995).

Intuitively, the risk of collisions with turbines for raptors and other bird species should increase with increased avian utilization of a wind energy site, proximity of flight to turbines (Anderson et al., 1996), and flight behaviors that place birds in the path of turbine rotors. Pre-development studies at proposed wind energy project sites in Wyoming revealed that raptors utilized areas

within 165 feet of the rim of plateaus significantly more than other areas. Moreover, within this spatial zone, raptors flew at heights that would coincide with the height of turbine rotors more often than in other parts of the study area (Johnson et al., 1997). In that study, eagles, buteo hawks and large falcons tended most often to fly at heights between 26 and 180 feet which would place them within the rotor sweep of proposed turbines (Johnson et al., 1997). In observations of golden eagles flying over the National Wind Technology Center in Colorado, nearly 50 percent of the relatively few eagles observed flew at or below 98 feet (the height of the site's tallest wind turbine) while nearly all of the golden eagles flew at or below 262 feet (Monahan, 1996). In comparison, the proposed turbines structures would be 244 to 251 feet tall (see Figure 2-3).

The results of these studies show that there is some risk of raptor collisions with wind turbines but that risk, and the risk of a fatality, will vary from site and site and with the turbine design adopted. The use of slower rpm, more visible turbine rotors is expected to decrease the risk of collision and to help raptors to avoid the blades. To monitor the potential for collisions by raptors and other bird species, an impact monitoring program has been incorporated into the Proposed Action (see Appendix B). Incremental installation of turbines will allow monitoring to establish actual impacts on birds as the project progresses. The USFWS has agreed to work with PSCo in monitoring the impacts of the proposed project on these species. Monitoring also would be conducted in cooperation with CDW to determine whether the project area is suitable for additional turbine capacity--assuming it is warranted by consumer participation in the Green Pricing Program.

To help avoid impacts to raptors, the Proposed Action calls for low rpm turbines, removal of carrion, placement of towers in accordance with the results of the avian impact monitoring program, and the implementation of additional mitigation measures identified as necessary by the avian monitoring program. Monitoring results could suggest additional measures to discourage raptors' use of the project area and vicinity. Some of these include more frequent removal and disposal of livestock and big game carcasses from access roads and nearby lands to discourage scavenging, installation of structures to discourage nesting on existing transmission line towers (with the cooperation of the lines' owners), installation of measures on lattice towers to discourage perching, and the use of markings to enhance the visibility of rotor blades, and the reduction or elimination of livestock grazing on the project area. This last measure is proposed to accomplish two goals: eliminate livestock as a source of carrion and/or food (e.g., discharged placentas after calving and calves) and promote vegetative cover that may obscure prey, especially ground squirrels, from foraging raptors. However, increased vegetative cover may stimulate the rodent population to increase, thereby promoting raptor use of the area. These issues would be resolved through the proposed monitoring plan and consultation with members of the Technical Review Committee.

Passerines and Other Migratory Birds. Horned larks and McCown's longspur are the two most commonly observed species in the project area, both of which are protected by the Migratory Bird Treaty Act. The average flight heights of these birds are below the proposed turbine blade height. Johnson et al. (1997) reported 85.7 percent of horned lark and 95.5 percent of McCown's longspur were observed flying from three to 23 feet from the ground. The

proposed turbine rotors would clear the ground by approximately 89 feet. Flight heights of passerines, at least during breeding periods, are expected to be well below rotor-swept zones. But because passerines may fly higher during migration, turbine-caused mortality may be temporarily higher during spring and fall. However, the use of slow turning, highly visible turbine rotors is expected to decrease this risk and make it easier for birds to avoid turbine blades.

Although wind turbines have been the focus of much of the avian mortality research, meteorological towers (or other types of guyed towers) may also be a source of fatalities to passerine birds (Yeo et al., 1984). Wind energy sites do report the recovery of passerine carcasses; however these mortalities have been considered insignificant when compared with local populations of these species (Nelson and Curry, 1995). Technically, however, causing *any* death of passerine birds--including horned larks and McCown's longspur--without a permit is a violation of the Migratory Bird Treaty Act *whatever the cause.* The monitoring plan incorporated into the Proposed Action, and incremental installation of turbines, would allow evaluation of impacts to passerines and other migratory birds as the project progresses. These results would be reviewed with the USFWS which is the agency granted the authority to enforce the Migratory Bird Treaty Act. Taking into account site selection, current levels of relatively low avian activity, and the design of the turbines proposed for this project, the Proposed Action is expected to have negligible, adverse impact on passerines and migratory birds.

Mule Deer and Pronghorn. Big game species that occur within the project area may experience some disturbance due displacement from construction but this will be temporary, lasting 90 days or less for each stage. Minimal habitat loss will occur from the construction of wind turbines, access and service roads, and an interconnect substation. The project would not increase hunting pressure on local lands as access into the project area would continue to be restricted.

Construction and operation-maintenance activities involving heavy equipment (e.g., a crane) may temporarily cause pronghorn to be displaced away from the project area. However, the typical visit to the project area by a maintenance person in a pick up truck would be similar to activity already occurring as part of ranching operations in the project area and vicinity. Evidence suggests that pronghorn would habituate to human activities and become less responsive to alarm stimuli (Reeve, 1984; Segerstrom, 1982; Alldredge and Deblinger, 1986). Yeo et al. (1984) found that pronghorn were not displaced from their home ranges in response to two large wind turbines near Medicine Bow, Wyoming. Mule deer appear to be even less sensitive to human-caused disturbances than pronghorn (Ward et al., 1980). While use of the project area by pronghorn and mule deer has not been systematically evaluated, it is believed to be irregular. Cattle grazing and winter feeding would continue in the project area at the private landowner's discretion. Depending upon the season, continuation of this activity could affect the number of pronghorn or mule deer likely to be found in the project area. Both mule deer and pronghorn tend to avoid areas, such as the project area, where intensive cattle grazing occurs (Yoakum and O'Gara, 1990; Loft et al., 1991). Fences along the west side of the project area would continue to hinder pronghorn from moving into the project area. For these reasons the project is expected to have little if any impact on mule deer or pronghorn.

Other Species. Individual mammals, reptiles, and amphibians that may be present in the project area could be adversely affected by the Proposed Action (see discussion of general impacts above). It has been hypothesized that earth disturbed during construction activities would increase the potential for some burrowing species, especially ground squirrels, to increase within the project area, thereby increasing the prey base of predators such as raptors. Although burrowing rodents have been observed to recolonize recently disturbed ground on pipeline rights-of-way, it is difficult to predict how the ground squirrel population found within the project area would respond to the minor amount of disturbance associated with caisson foundations and buried feeder lines.

Five bat carcasses were collected from a wind energy site at Buffalo Ridge in Minnesota (Nelson and Curry, 1995). The small number of insectivorous bat species that might forage or travel through the project area would likely fly below the level of the proposed turbine blades. For example, highly maneuverable *Myotis* species tend to forage three to 20 feet above the ground or tree canopy (Fenton and Bell, 1979; Fitzgerald, 1994). (The project area is without trees.) Less maneuverable species such as the hoary, silver-haired and big brown bat tend to forage 20 to 33 feet above the ground (Fitzgerald, 1994). Since, the turbine rotors would clear the ground by approximately 89 feet, they are not expected to present a risk to bats that might be found in the project area.

Plains spadefoot toads may use ephemeral pools for breeding, but typically travel 1,000 feet or less after breeding (Hammerson, 1986). In Colorado, they are active from May to September. It is possible that the toads could occur near the intermittent drainage on the southern edge of the project area or in drainages and wetlands in the vicinity of the access road. However, they would probably be in hibernation burrows when construction of the first phase is initiated. Over the course of project development, impacts to this species would be minimized as no disturbance would occur in the draw at the south edge of the project area. Similarly, no disturbance to wetlands would occur. By avoiding the areas most likely utilized by breeding spadefoot toads, it is expected that this species would not be adversely affected by the project.

4.14.2 No Action Alternative

Implementation of the No Action Alternative would have no impact, positive or negative, on populations of pronghorn or mule deer. For some other species, implementation of this alternative would avoid a slight increased risk of adverse impact that would be associated with vehicle collisions, disturbance to burrows, and collisions with turbine blades. However, implementation of this alternative would result in the loss of impact monitoring data which could be used at other wind energy projects to refine environmental risk assessments, site selection criteria, and impact avoidance measures. Other environmental benefits (e.g., air quality) discussed elsewhere in this chapter would be lost, too.

4.15 Threatened, Endangered, and Species of Concern

Any activity that would adversely affect the population of a Federally-listed species would be considered a significant impact. Any project-related activity that would change the status of a candidate species under the Endangered Species Act would be considered a significant impact. Loss of any critical habitat for Federally-listed species would be considered a significant impact. Based on the analysis conducted for this EA, none of these impacts are expected to occur.

4.15.1 Proposed Action

Section 7(a) of the Endangered Species Act obligates DOE to insure that actions which they authorize or permit are not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat for such species. Because the Proposed Action has incorporated design, environmental protection, impact avoidance and other strategies intended to avoid impacts to these species, the Proposed Action is unlikely to result in adverse impacts to any Federally-listed threatened or endangered species. No critical habitat for such species would be affected. As discussed below, implementation of the Proposed Action is not likely to reduce the reproduction, number or distribution of a Federally-listed species such that it would appreciably reduce the likelihood of the survival and recovery of that species in the wild (50 CFR 420.02). Furthermore, in compliance with Section 7(d) of the Endangered Species Act, monitoring of project phases would occur to ensure that no irreversible or irretrievable commitment of resources is made which would be likely to adversely affect Federally-listed species.

Bald Eagle. Bald eagles are predominately found near large bodies of water such as lakes, rivers, or reservoirs where they feed on fish and/or waterfowl (Terres, 1980) but they will occasionally be seen in semideserts or grasslands, especially near prairie dog towns (Andrews and Righter, 1992). Because carrion can be an important winter food, sometimes eagles can be found on winter ranges for cattle and pronghorn, particularly during harsh winters when water sources have frozen (Davenport and Weaver, 1982). When suitable roost or perch sites are not available proximate to food sources, bald eagles can travel significant distances between the two.
Based on all available information, bald eagles are expected to be very rare within or near the project area even during the winter or migrations. There are no known nests, roost or perch sites or concentration areas in the vicinity of the project area. No nests were found in a Spring 1997 survey of a 169 square-mile area centered on the project area or in an earlier survey conducted by the CDW (see Appendix D). Nonetheless, bald eagles may migrate through this part of Colorado. During winter months they can be seen along the South Platte River and some eagles congregate at ponds associated with the Rawhide Power Plant approximately 20 miles southeast of the project area. The cooling ponds associated with the power plant remain unfrozen during winter and attract waterfowl and consequently, bald eagles (Ryder, 1997). No ponds, lakes or water bodies likely to be used by eagles are found in the project area of vicinity.

In the unlikely event that one were to pass through the project area, the same risks discussed for raptors would apply to bald eagles. Likewise, measures taken to minimize mortality of raptors and other birds would also minimize the risks to bald eagles. As proposed, carcasses found within the project area and access road would be promptly removed and disposed to discourage eagles from using the project area as a source of carrion. The use of slow turning, highly visible turbine rotors is expected to decrease the chance of collision and to allow birds to avoid turbines. Burial of electrical feeder lines and communication cables between turbines and the substation would deny birds another source of perches and avoid the risk of collision or electrocution associated with these structures.

In addition, as part of its Proposed Action, PSCo has agreed to monitor eagle activity and perching at the project area. The proposed monitoring would be conducted in cooperation with the USFWS and CDW and would be used to adjust operations to ensure that the risk of mortality remains negligible. Monitoring data also would be used to determine whether the project area can accommodate additional turbine capacity with minimal risk to this species. If bald eagles are observed perching on existing power line towers or turbine towers in the project area and vicinity, steps would be taken (in cooperation with the USFWS) to install structures, barriers or other measures to discourage continued perching. Addition discussion of these measures may also be found in the discussion of avian impacts and impacts to raptors (Section 4.10) and in Chapter Two. With implementation of proposed environmental protection measures (see chapter two) and the proposed monitoring plan discussed in Appendix B, the Proposed Action would be unlikely to adversely affect this species or to jeopardize its continued existence.

Mountain Plover. The project area appears to provide suitable habitat for mountain plover which is a candidate species. However, none have been observed on the area (Appendix D). In response to concerns expressed by the USFWS, construction activities would be scheduled to avoid nesting mountain plover (mid-April through July) found in the project area. Mountain plover's typical flight and escape patterns typically do not reach the height of the proposed turbine blades which would be approximately 89 feet or more from the ground. Johnson et al. (1997) reported plover flying less than 23 feet in 87.5 percent of their observations. Under these conditions, implementation of the Proposed Action would be unlikely to adversely affect this species or its continued existence or status as a Federal candidate species.

Swift Fox. Swift fox, a candidate species, could use grassland habitats in the vicinity of the project area. However, close cropping of grassland vegetation by cattle may reduce a potential habitat for this species and it probably uses the project area and vicinity only infrequently. While occasionally killed by vehicular traffic, this has been estimated as contributing only five percent of annual swift fox mortality (Rongstad et al., 1989). Although little documentation exists, road kills are probably associated with high-speed thoroughfares. Traffic volume on the access road and any slight increase in traffic on other roads would not affect its population. Swift fox populations are not expected to be negatively affected by the Proposed Action.

Colorado Butterfly Plant. The Colorado butterfly plant, a candidate species, is found growing in sub-irrigated, alluvial soils of drainage bottoms (Dorn, 1992; Fertig, 1994) which would not be affected by the project. Although this species occurs in the region, no populations have been reported anywhere in the vicinity of the project area. For these reasons, no negative impacts to this species are expected to occur.

4.15.2 No Action Alternative

Implementation of the No Action Alternative would neither increase nor decrease the risk of jeopardizing the continued existence of any Federally-listed endangered or threatened species. Nor would it affect any critical habitat of such species. Implementation of this alternative is not expected to increase or reduce the reproduction, number, or distribution of a Federally-listed species such that it would appreciably affect the likelihood of the survival and recovery of that species in the wild. The status of candidate of species under the Endangered Species Act would not be affected, positively or negatively, if this alternative were implemented.

CHAPTER FIVE
CUMULATIVE IMPACTS

5.1 Introduction

This section examines the cumulative impacts that could occur from existing and reasonably foreseeable human activities in the project area and vicinity, taken in combination with the proposed Ponnequin Wind Energy Project. Federal regulations define a cumulative impact as the impact on the environment which results from the incremental impact of the Proposed Action when added to other past, present and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or persons undertake such actions (40 CFR Part 1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. No other projects are known to be proposed for the project area or adjacent lands. Existing lands have been altered by past and current transportation, transmission line, railroad, agricultural, bison and cattle grazing operations. This analysis assumes that impacts associated with these activities would continue. It also assumes that environmental protection measures discussed in chapter two as part of the Proposed Action and an impact monitoring program (Appendix B) would be implemented. No other projects are known to be proposed for the project area or adjacent lands.

The installation of wind turbines within the project area would depend upon consumer demand and their willingness to pay a premium for wind-generated electricity. The Colorado Public Utilities Commission has approved up to 20 MW of capacity. The first two stages of the project call for the installation of up to 14 turbines or about 10 MW of capacity. However, the project area would accommodate up to 27 turbines which could generate up to 22 MW. For purposes of analyzing cumulative impacts, it was assumed that all 27 turbines would eventually be installed within the project area. The actual size of the project would depend upon consumer demand, the actual cost of constructing initial stages of the project, equipment performance and reliability, avian impacts (if any) found during the monitoring, and many other factors. As such, 27 turbines should be viewed as a reasonably foreseeable, maximum development scenario.

Incremental increases in cumulative impacts are noted below. Resources which would be avoided or otherwise not adversely affected by the Proposed Action or No Action Alternative--such as wetlands, floodplains, streams, surface water quality--have not been considered in this section.

5.2 Soils and Vegetation

Cumulative impacts of the project and existing grazing operations would increase slightly during the first stage of project development. However, cumulative impacts associated with the first stage of the project would be reduced by using all but 0.2 miles of existing ranch roads (requiring approximately 0.3 acres of surface disturbance) to access the project area. The substation would add another 0.9 acres of long-term surface disturbance to that already caused by existing roads

and structures. Service roads within the project area would be two tracks. Other surface disturbance (e.g., trenches from cables) would be reclaimed. Future stages of project development would introduce only minimal changes in cumulative impacts to soil and vegetation as two-track service roads, ranch roads used for access, the substation and main feeder lines would already be in place. In addition, areas disturbed by earlier stages of the project would be undergoing reclamation and revegetation during the installation of additional turbine capacity at later stages of the project. Overall, even with the construction of a full 27 turbine facility, cumulative impacts to soils and vegetation would be nearly identical to those caused by existing roads, structures and agricultural operations.

5.3 Air Quality

A fully developed wind facility would have a positive, cumulative impact on air quality when taken in combination with other environmental measures (e.g., energy conservation) being encouraged by the DOE and the State of Colorado to avoid the need for increased fossil-fuel burning at conventional generating stations. This savings in "avoided" emissions would be a positive, cumulative impact on regional air quality.

5.4 Socioeconomic Conditions

Construction of a full 22 MW would increase benefits to Colorado-based businesses, contractors, workers and renewable energy ventures while allowing current economic uses of the project area and vicinity to continue. Cumulative, county property tax revenues would increase. Additional state sales and use tax revenue would be collected. At the same time, the project would not contribute to adverse, cumulative impacts on community infrastructure or quality of life that can be associated with population and urban growth.

5.5 Energy Resources

No energy production occurs within the project area of vicinity. Development of a 22 MW facility would have a positive, cumulative impact on the diversity of energy sources available to Colorado consumers and, in combination with other energy conservation programs, would have a positive, cumulative impact on reduced consumption of non-renewable energy sources.

5.6 Noise

Current activities in the project area produce little or no noise impacts. The proposed project would not contribute to a cumulative increase in impacts on noise-sensitive areas due to the relatively small size of the project, the use of a new design turbine, and the nearest residents' distance (at least 1.5 miles) from the project area.

5.7 Transportation

Construction traffic would be short-term and traffic associated with project maintenance--regardless of the number of turbines--would consist of no more than 1-2 pickup truck trips per day. As a result, no perceptible increase in long-term, cumulative impacts on transportation is expected to occur.

5.8 Cultural Resources

A slight increase in the potential for impacts to subsurface sites would occur. Otherwise, the cultural resources inventory completed for the project area suggests that no increase in cumulative impacts is likely to occur. Additional cultural resources work on the access road would ensure the protection of sites, especially those which may be found in the vicinity of the old railroad grade.

5.9 Visual Resources

Wind turbines would draw attention to the site but would not produce adverse, cumulative impacts on designated scenic overlooks. Some decrease in the rural appearance of the project area and vicinity would be unavoidable due to the cumulative effects of the existing communication towers and transmission power lines in combination with the proposed wind turbines.

5.10 Land Use

While introducing a new, utility development to an agricultural area, development of up to 22 MW of capacity within the project area would be compatible with existing land uses. Agricultural use of the project area could continue. Compliance with Weld County permit requirements would ensure that the project does not contribute to cumulative, adverse impacts on land use.

5.11 Public Health and Safety

Existing communication towers taller than the proposed turbines are found in the vicinity of the project area. Because introduction of turbines up to a 22 MW facility would comply with applicable FAA regulations, no cumulative impact on risks to public health and safety is expected to occur.

5.12 Wildlife

Communication towers and guy lines already found in the vicinity of the project area constitute a potential threat to raptors and other species of birds. Construction of a full 22 MW facility could contribute to the cumulative risk of an avian fatality. However, an avian impact monitoring program would be started to assess ongoing, site-specific impacts associated with the initial and

subsequent stages of the project. If increased impacts were noted, additional environmental protection measures discussed in chapter two or developed by the Technical Review Committee could be implemented to ensure that the project's contribution to cumulative impacts was minimized. Given the expected low probability of avian mortality due to site conditions, the proposed turbine design, the small-scale nature of the project, its phased development, and opportunities to implement additional mitigation measures, development of up to 22 MW of turbine capacity would be unlikely to add to cumulative impacts. Existing fences, roads, grazing, and agricultural practices already affect local wildlife populations. However, in comparison to these existing impacts, the project's contribution to cumulative impacts on wildlife populations is expected to be minimal due to the small amount of surface disturbance involved, the lack of new fencing, the use of existing roads, and the reclamation of disturbed areas.

5.13 Threatened, Endangered and Species of Concern

As proposed, the project's risk of impacts to Federally-listed species is already negligible. Environmental protection measures and the monitoring program discussed in chapter two would be adequate to ensure that the project does not result in cumulative, adverse impacts to candidate and Federally-listed these species.

CHAPTER SIX
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APPENDIX A
PUBLIC SCOPING

Denver Regional Support Office
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

May 5, 1997

TO: Distribution List Attached

NOTICE OF SCOPING: ENVIRONMENTAL ASSESSMENT OF THE COLORADO GREEN PRICING PROGRAM WIND ENERGY FARM

The Denver Regional Support Office of the U.S. Department of Energy (DOE) is proposing to enter into negotiations with the State of Colorado Office of Energy Conservation to develop a wind energy farm in Northeast Colorado as part of the Colorado Green Pricing Program which would be implemented by Public Service Company of Colorado (PSCo). The DOE could assist in the development of the Green Pricing Program as part of its Commercialization Ventures Program. DOE initiated the Commercialization Ventures Program following passage of the Renewable Energy and Energy Efficiency Technology Competitiveness Act of 1989 (P.L. 101-218) as amended by the Energy Policy Act of 1992 (P.L. 102-486). One goal of the Act is to assist the introduction of renewable energy technologies into the marketplace. The Commercialization Ventures Program was established to increase the rate of deployment of these technologies and to decrease the perceived risk of introducing and financing these technologies.

Under the Colorado Green Pricing Program, PSCo would offer citizens and businesses the opportunity to purchase electricity generated by a proposed wind farm in Northeast Colorado. Several citizen groups and consumer-owned utilities would help PSCo market this renewable energy source to consumers.

Proposed Location

PSCo identified the proposed site for the wind farm following a wind monitoring study and discussion with the Colorado Division of Wildlife and the U.S. Fish & Wildlife Service about potential impacts on raptors and threatened, endangered and candidate species. The site is on private land in Weld County, Colorado within Township 12 North, Range 66 West. The location is a mesa of high plains rangeland currently used for cattle grazing and feeding. The site is approximately four miles east of Interstate 25 and 1.5 miles west of U.S. Highway 85 near the Colorado-Wyoming border. The closest residence is 1.5 miles.

Proposed Activities

Proposed activities would include the construction of wind turbines, access-service roads, buried feeder lines, two meterological towers, an electric substation, and ancillary equipment. The actual number of turbines constructed would depend, in part, upon consumer demand. However, in the near-term, public demand for up to 10 megawatts of wind generated electricity appears likely. It is estimated that 14 turbines would be required to generate 10 megawatts of electricity. Total height of the wind turbines would be approximately 240 feet, including the blades. Two transmission lines of the Western Area Power Administration are found adjacent to the proposed wind turbine site. Buried feeder lines would connect individual turbines to a new electrical substation which would be constructed adjacent to the existing transmission lines. Construction of the first phase of the project (six turbines) is planned to begin in August, 1997 and to end in November, 1997.

1617 Cole Boulevard Golden, Colorado 80401 Phone: 303/275-4800 Fax: 303/275-4830

Preliminary List of Issues to be Addressed

A preliminary review of this project identified the following issues associated with development of a wind farm within the proposed project area:

- impacts to raptors and migratory birds;
- impacts to Federally-listed threatened and endangered species, and candidate species;
- noise impacts;
- visibility impacts;
- impacts on energy consumption;
- impacts on air quality;
- socio-economic impacts;
- impacts on wildlife;
- impacts to soils and vegetation;
- impacts on County tax revenues; and,
- impacts on cultural and historic resources.

Impacts to be considered in the EA could be positive as well as negative impacts.

Cumulative Impacts

Council on Environmental Quality (CEQ) guidelines define a cumulative impact as the impact on the environment which results from the incremental impact of the Proposed Action when added to other past, present and reasonably foreseeable future actions. Under an agreement reached among PSCo and citizen groups, the Colorado Public Utilities Commission would allow up to 20 megawatts of wind generating capacity. As proposed, the site could accommodate up to 27 properly-spaced wind turbines. For purposes of analyzing cumulative impacts as required by CEQ guidelines, the EA will address incremental impacts caused by the possible expansion of the proposed wind farm up to approximately 20 megawatts.

Purpose of the EA

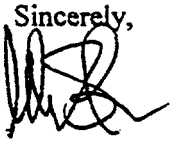
The purpose of an EA, as stated in 40 CFR 1508.9, is to provide a concise public document which serves to "briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact." The EA will include brief discussions of the need for the project, project alternatives, environmental impacts of the proposed action and alternatives, and agencies and persons consulted.

Request for Public Response to this Scoping Notice

Scoping is being conducted to identify additional issues and concerns which should be addressed in the EA. Under 40 CFR 1501, DOE is required to provide opportunities for public involvement during the preparation of an EA. In accordance with DOE policy on implementation of NEPA, the department is providing public notice of its intent to prepare an environmental assessment and to offer interested parties the opportunity to identify issues and concerns which should be addressed in the EA.

Responses to this notice should be addressed to Stephen L. Sargent, U.S. Department of Energy, Denver Regional Support Office at the above address. Responses must be postmarked within 15 days from the date of this notice to be considered in the pre-decisional draft which will be released to the public for review. All parties responding to this scoping notice will receive a copy of the pre-decisional draft.

Sincerely,



William S. Becker, Director
Denver Regional Support Office

SCOPING MAILING LIST

Industry

Rick L. Thompson
Public Service Company of Colorado
550 15th Street, Suite 700
Denver, Colorado 80202-4256

Bob Gardner
Holy Cross Electric Association, Inc.
P.O. Drawer 2150
3799 Highway 82
Glenwood Springs, CO 81602

Dale Osborne
DISGEN
30402 Heavenly Court
Evergreen, Colorado 80439

William Y. Leung
Nebraska Municipal Power Pool
1111 "O" Street, Suite 200
Lincoln, Nebraska 68508-3614

Lawrence D. Covillo
Yampa Valley Electric Association
P.O. Box 1218
Steamboat Springs, Colorado 80477

James Henderson
Arkansas River Power Authority
P.O. Box 70
Lamar, Colorado 81052

Citizen Groups

John Nielsen
Land and Water Fund
2260 Baseline Road, Suite 200
Boulder, Colorado 80302

Mona L. Newton
Boulder Energy Conservation Center
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Boulder, Colorado 80302

Randy Udall
Community Office for Resource Efficiency
Box 9707
Aspen, Colorado 81612

Terry Ross
Center for Energy & Economic Development
7853 East Arapahoe Court, Suite 2600
Englewood, Colorado 80112

Local Government

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Office of the City Attorney
P.O. Box 791
Boulder, Colorado 80306

Sue Ellen Harrison
Office of the City Attorney
P.O. Box 791
Boulder, Colorado 80306

Monica Daniels-Mika, Director
Weld County Planning Department
1400 North 17th Avenue
Greeley, Colorado 80631

Spence Garrett, Director
Laramie County Planning Department
5300 Bishop Boulevard
Cheyenne, Wyoming 82009

State Government

The Hon. Roy Romer
Office of the Governor
136 State Capitol Building
Denver, Colorado 80203-1792

Marcus Roper
Colorado State Office of Energy
Conservation
1675 Broadway, Suite 1300
Denver, Colorado 80202-4613

Bruce Smith, Director
Colorado Public Utilities Commissions
1580 Logan Street, OL 2
Denver, Colorado 80203

Gerald R. Craig
State Raptor Biologist
Colorado Division of Wildlife
317 Prospect Road
Fort Collins, CO 80526

Susan Collins
Deputy State Historic Preservation Officer
Colorado Historical Society
1300 Broadway
Denver, Colorado 80203

The Honorable Jim Geringer
Office of the Governor of Wyoming
State Capitol
Cheyenne, Wyoming 82002-0010

Wyoming State Clearinghouse Coordinator
Ms. Julie Hamilton
Wyoming Federal Land Policy Office
Herschler Building
Cheyenne, Wyoming 82002

Federal Agencies

Fritz L. Knopf, Ph.D.
U.S. Department of the Interior
4512 McMurry Avenue
Fort Collins, CO 80525

Ms. Carol Campbell
Director, Ecosystem Protection
U.S. EPA- Region 8
999 18th Street, Suite 500
Denver, Colorado 80202-2405

Landowners

Keith & Myrna Roman
1015 Pearl Court
Cheyenne, WY 82007

Terry Grazing Association
138 Iron Mountain Route
Cheyenne, WY 82009

Lazy D Grazing Association
c/o Mr. Arvid de Porter
14503 Weld County Road 108
Nunn, CO 80648

Colorado State Board of Land
Commissioners
1313 Sherman Street, Room 620
Denver, Colorado 80203

Other Interested Parties

(from PUC list)

Dr. Ronald W. Larson
Secretary, CRES
21547 Mountsfield Drive
Golden, Colorado 80401

Thomas D. Bath
2525 Urban Street
Lakewood, Colorado 80215

Stuart A. Sanderson, Pres.
Colorado Mining Association
1600 Broadway, Suite 1770
Denver, Colorado 80203

Bureau of Land Management
Environmental Compliance Office
2850 Youngfield Street
Lakewood, CO 80215

Mr. Larry Linder
NEPA Compliance, 8WMEA
EPA Region VIII
999 18th Street
Denver, CO 80202-2466

Mr. Duain Johnson
Soil Conservation Service
Room E20C
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Lakewood, CO 80215

Ms. Linda Coulter
CO Dept. of Agriculture
700 Kipling Street, Suite 4000
Lakewood, CO 80215

CDPHE
Office of the Environment
4300 Cherry Creek Dr. So.
Denver, CO 80222-1530

Mr. Bob Sturtevant
CO State Forest Service
Colorado State University
Fort Collins, CO 80523

Colorado Coop Fish & Wildlife Unit
201 Wagar Building
Dept. Fishery and Wildlife Biology
Colorado State University
Fort Collins, CO 80523-1484

Federal Aviation Administration
Northwest Mountain Office
Cindy Felis
ANM-450 (Mail Stop)
1601 Lind Avenue SW
Renton, WA 98055

Mr. Grady Towns
US Fish and Wildlife Service
Denver Regional Office
P.O. Box 25486
Denver, CO 80225

CO Dept of Natural Resources
Office of Environment
1313 Sherman Street
Denver, CO 80203

CO Office of Energy Conservation
Environmental Compliance
1975 Broadway
Denver, CO 80202

CO State Forest Service
Boulder County Office
936 Lefthand Canyon Dr.
Boulder, CO 80302

Mr. Kim Gambrill
Environmental Services
CO Transportation Dept.
4201 E. Arkansas Ave.
Denver, CO 80222

Audubon Society
Rocky Mountain Regional Office
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Boulder, CO 80303

Mr. Glen Anderson
Colorado Association of Soil
Conservation Districts
3000 Youngfield, Suite 163
Lakewood, CO 80215

National Wildlife Federation
2260 Baseline Road
Boulder, CO 80302

Sierra Club
Rocky Mountain Chapter
777 Grant Street, Suite 606
Denver, CO 80203

Colorado Environmental Coalition, Inc.
777 Grant Street
Denver, CO 80203

Timothy T. Carey
Dept. of the Army, Corps of Engineers
Omaha District
Tri-Lakes Project Office
9307 State Hwy. 121
Littleton, CO 80123

Gary Finstad
U.S. Department of Agriculture
Natural Resource Conservation Service
Metro Office
65 Parfet, Room E-300
Lakewood, CO 80215-5517

LeRoy W. Carlson
U.S. Fish & Wildlife Service
P.O. Box 25486
Denver Federal Center
Denver, CO 80225-0207

Mr. R. Steven Warner
Lands Manager
Western Area Power Administration
P.O. Box 3402
Golden, CO 80401-0098

Mr. John Wagner
Colorado Division of Wildlife
825 Fifth Street
Eaton, CO 80615

Ms. Linda Berti
Sierra Club
995 Humboldt, #309
Denver, CO 80218

Mr. John Corneali
U.S. Fish & Wildlife Service
P.O. Box 25486
Denver Federal Center
Denver, CO 80225

Mr. Chuck Davis
U.S. Fish & Wildlife Service
P.O. Box 25486
Denver Federal Center
Denver, CO 80225

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
TRI-LAKES PROJECT OFFICE, 9307 STATE HWY 121
LITTLETON, COLORADO 80123-6901

REPLY TO
ATTENTION OF

May 20, 1997

Mr. Stephen L. Sargent
U. S. Department of Energy
Denver Regional Support Office
1617 Cole Boulevard
Golden, Colorado 80401

RE: Environmental Assessment of the Colorado Green Pricing Program Wind Energy Farm, Corps File #199780374

Dear Mr. Sargent:

Reference is made to the project to develop a wind energy farm in northeast Colorado. The proposed location is Township 12 North, Range 66 West, Weld County.

If any work associated with this project requires the placement of dredged or fill material, and any excavation associated with a dredged or fill project, either temporary or permanent, in streams or wetlands at this location, this office should be contacted by a proponent of the project for proper Department of the Army permits or changes in permit requirements pursuant to Section 404 of the Clean Water Act.

If there are any questions concerning this matter, contact **Mr. Terry McKee** of this office at 303-979-4120 and reference **Corps file #199780374.**

Sincerely,

Timothy T. Carey
Project Manager

Sierra Club - Rocky Mountain Chapter
777 Grant Street, Suite 606
Denver, CO 80203

U.S. Department Of Energy
1617 Cole Boulevard
Golden, CO 80401

Attn: Stephen L. Sargent

The Sierra Club - Rocky Mountain Chapter has received and reviewed the Notice of Scoping letter dated May 5, 1997 concerning the Environmental Assessment of the Colorado green pricing program wind energy farm. Upon review of the preliminary list of issues to be addressed we find that issues the Sierra Club considers important are included. Therefore, we have no new issues to add. We request that we be considered as responding to the scoping notice in order to receive a copy of the pre-decisional draft and to be included in all other opportunities for public involvement.

Sincerely,

Linda J. Bert
Energy Chair
Sierra Club - RMC

2525 Urban Street
Lakewood, CO 80215

May 20, 1997

Dr. Stephen L. Sargent
U. S. Department of Energy
Denver Regional Support Office
1617 Cole Boulevard
Golden, CO 80401

Dear Steve:

In response to Mr. Becker's request for public comment regarding the scoping of the environmental assessment for the "Colorado Green Pricing Program Wind Energy Farm", I offer the following thought. As you are aware, the Colorado Public Service Company intends to offer this product to its customers at an increased rate on the premise that some of the customers will be willing to pay more for the satisfaction of knowing that they have purchased power from an environmentally benign energy resource. Thus, it is important that customers who subscribe be assured that the resource is both anticipated to be benign and actually is found to be benign in practice. Therefore, I feel that the project environmental assessment should define the expectations of the DOE with regard to continued reporting by the Grantee as to the environmental impacts of the project over the period of time that wind energy will be sold to the subscribers. I do not see any indication that such reporting requirements will be included in the DOE document (or the terms of the grant) in the May 5 scoping notice. I hope you find this input useful to the Department.

Sincerely,

Tom Bath

Thomas D. Bath

APPENDIX B
AVIAN IMPACTS MONITORING PLAN

PROPOSED AVIAN IMPACTS MONITORING PLAN

PONNEQUIN WIND PROJECT

The Proposed Avian Impacts Monitoring Plan is part of the Proposed Action. The plan is an explanation of how potential avian and wildlife impacts related to the development and operation of the proposed wind project would be monitored. Avian species--primarily raptors--would be the focus of the monitoring program which is intended to determine whether and/or how the project may actually be affecting these species. Observations conducted at other wind projects suggest that the level of risk to these species may be a function of 1) the frequency and duration of flight activity in proximity to wind turbines; and, 2) the type of behavior that occurs in close proximity to the turbines. For example, hunting within the project area and the use of lattice turbine towers for perching would be of concern. Monitoring activities include systematically observing and documenting these activities during the construction and operation of the facility. The data collected would be crucial in an ongoing assessment of the project and informing decisions about adjustments in facility design and operations that may (not) be needed as progressive phases of the project are implemented.

This monitoring plan was written as joint effort by PSCo, personnel from the National Renewable Energy Lab, and specialists on wildlife biology and avian impacts. Implementation of the plan would be the responsibility of PSCo. PSCo is working with Dr. Ron Ryder, Professor Emeritus, Colorado State University, Department of Fishery and Wildlife Biology to begin implementing the plan in 1997. Past work of the National Wind Coordinating Committee was instrumental in providing guidance on factors considered in the development of the plan. Keeping in mind the goals of the DOE Commercialization Ventures Program (see chapter one), this plan should be viewed as a cost-effective, first-year, "first-step" in project monitoring. Because bird-turbine collisions are statistically rare events, the plan is an attempt to cost-effectively capture as much data as possible during scheduled site visits. In response to actual field conditions, it is possible, however, that data collection goals and methodologies could be revised as the study proceeds. For example, sampling frequency could be intensified or reduced depending upon initial results. Observational techniques could be refined or adjusted to meet field conditions. The plan incorporates a technical review committee that would conduct reviews and make revisions as necessary. Data collection at reference or control areas, using techniques similar to those applied in the project area, would be contingent upon the availability of funding from the National Renewable Energy Lab. For these reasons, this plan should be considered a "work in progress."

I. Monitoring Plan Objectives

A. Document avian use and behaviors within the project area during construction and at least through the first year of operation.

B. Document the use of existing power line poles and fence posts found within, and adjacent to, the project area and perching and/or nesting on lattice turbine towers

C. Document raptor nesting within the raptor nesting survey area.

D. Document possible changes in the prey base (e.g., as indicated by burrowing activities of ground squirrels) during project development.

E. Record and report avian fatalities proximate to wind turbines during construction and operation of the facility.

II. Data Acquisition

Monitoring of development is intended to provide several types of data that can be used to analyze factors related to the following:

A. Avian use and abundance

B. Prey base response to site development

C. Avian fatalities

D. Avian use of perching structures

E. Raptor nesting activity within the nesting survey area

III. Data Collection Methods

Data collection methods will be applied to the project area and the raptor survey areas as described below. These methods would also be applied to a reference or control area assuming the availability of funding.

A. Avian Use

Three transect lines will be established. The first transect will be along the line of the tower structures. Point count observations will be made at each end of this transect line. The two remaining transects will be parallel to each other and perpendicular to the row of turbines and will intersect the turbine string. This configuration will allow the observer to look down the axis of a turbine row and document the flights across the row. Walking the parallel transects which are perpendicular to the axis of the turbine row will permit observations of local passerine activity at various points of distance from the turbine row.

A 90 minute sampling cycle would begin with a 10 minute point count at one end of the turbine string axis transect. Each of the perpendicular transects would be walked with passerine observations made and recorded on a continuous basis. In addition, continuous observations of raptor behavior will be made and recorded on a separate data form. The cycle will end with an additional 10 minute point count at the other end of the turbine axis transect. From April through October, two cycles will be run in the morning and in the afternoon, one day each week. The cycles will be repeated one day every other week from November through March.

The observer(s) will record pertinent information (temp, wind, cloud cover, etc.) on standard data forms as well as estimated flight heights relative to wind turbine structures along the turbine axis. Random observations made outside of a specific sampling protocol will be recorded separately. For example, after the point count has been completed raptor observations can be made but the data will not be recorded on the same data sheet. This will enable some real time data collection on specific behaviors which could provide more descriptive information on which to base future management decisions.

B. Raptor Perching

Prior to construction all perching activity on the project area and on existing power line towers within the range of the point count observation stations will be recorded during the field observations referenced above. During and after construction raptor perching behavior will continue to be recorded. In addition, searches will be made for any additional evidence of perching on towers and other locations on the site.

C. Raptor Nesting

Two aerial surveys will be conducted from early May, to mid-June within the Raptor Nesting Survey Area (previously established by the Spring 1997 survey) to determine nest site occupancy and estimate the production of young. A decline in nesting activity coupled with fatalities recorded within the project area could trigger investigations into the population impact issue.

One on-the-ground survey of nesting raptors within the 169 square-mile Raptor Nesting Survey Area will be conducted in the spring by mid-June. Due to the presence of private land with restricted access, this survey must be confined to portions of the Terry Bison Ranch and the City of Fort Collins Meadow Springs Ranch located west of Interstate 25 which are within the Raptor Nesting Survey Area.

D. Prey Base Inventory

Prior to construction, test plots will be established. Plots will be monitored on a systematic basis through the phases of project development and operations. Various methods, as described in the biological literature, could be used to inventory prey base within these plots.

E. Avian Fatalities

A rectangular area extending 200 ft from all sides of the turbine string(s) will be methodically searched at a rate of frequency still to be determined. The interval between searches will be determined by the scavenger rate for the site for the particular season of the year. Due to the size of the project are, all the turbines will be included in the survey. Unless the vegetation is no longer grazed, it will not be necessary to test the observational abilities of the searcher(s). It is anticipated that a carcass survey could be conducted each day that other observational data is collected. The function of these surveys is to determine if there are any turbine related injuries and/or fatalities.

IV. Data Analysis

As appropriate, statistical analysis will be conducted on the collected data. Actual data analysis techniques and reporting methods will be developed in consultation with various experts in the field of avian impacts.

V. Reference-Control Sites

Subject to funding from the National Renewal Energy Laboratory and the permission of adjacent landowners, one or more reference sites will be established. The same study design will be implemented at the reference site(s) which will enable comparisons of raptor use, etc. to be made between the project area and undeveloped site(s).

V. Reporting and Reviewing the Results of the Monitoring Program

A. Reporting

Quarterly reports of the results of the monitoring program will be prepared. An annual summary of the monitoring program will also be prepared and will be made available for public review.

All fatalities will be documented and reported to the U.S. Fish and Wildlife Service using the Wildlife Response and Reporting System already in use at several wind projects. A second raptor fatality will trigger a more intensive field investigation in an attempt to determine the circumstances under which the collision(s) occurred and whether some form of mitigation can be suggested. This more intensive field investigation will be developed and implemented in consultation with the Technical Review Committee.

B. Technical Review Committee

A Technical Review Committee will be established. Representatives of the U.S. Fish and Wildlife Service, the Colorado Division of Wildlife, Public Service of Colorado, DOE and a public interest/environmental group will be invited to participate on this Committee. Quarterly

summaries of monitoring results will be forwarded to each of the representatives. An annual review of the project and the findings of the monitoring program will be completed and available for the Committee's and public review. Additional consultations will be scheduled as needed or on the request of any representative. Significant changes in study methodology, reporting of data collection methods will be discussed with Committee members prior to implementation.

APPENDIX C

WILDLIFE SPECIES LIST

Appendix C.
Wildlife Species Potentially Occurring or Known to Occur in the Project Area and Vicinity

Common Name	Scientific Name	Seasonal Presence
Mammals		
Dwarf Shrew	*Sorex nanus*	Year Round
Merriam's Shrew	*Sorex merriami*	Year Round
Small-footed Myotis	*Myotis ciliolabrum*	Year Round
Little Brown Myotis	*Myotis lucifugus*	Year Round
Fringed Myotis	*Myotis thysanodes*	Year Round
Silver-haired Bat	*Lasionycteris noctivagans*	Spring-Fall Migration
Big Brown Bat	*Eptesicus fuscus*	Year Round
Hoary Bat	*Lasiurus cinereus*	Spring-Fall Migration
Desert Cottontail	*Sylvilagus audubonii*	Year Round
Black-tailed Jackrabbit	*Lepus californicus*	Year Round
White-tailed Jackrabbit	*Lepus townsendii*	Year Round
Wyoming Ground Squirrel	*Spermophilus elegans*	Year Round
Spotted Ground Squirrel	*Spermopphilus spilosoma*	Year Round
Thirteen-lined Ground Squirrel	*Spermophilus tridecemlineatus*	Year Round
Black-tailed Prairie Dog	*Cynomys ludovicianus*	Year Round
Northern Pocket Gopher	*Thomomys talpoides*	Year Round
Olive-backed Pocket Mouse	*Perognathus fasciatus*	Year Round
Plains Pocket Mouse	*Perognathus flavescens*	Year Round
Silky Pocket Mouse	*Perognathus flavus*	Year Round
Hispid Pocket Mouse	*Perognathus hispidus*	Year Round
Ord's Kangaroo Rat	*Dipodomys ordii*	Year Round
Plains Harvest Mouse	*Reithrodontomys montanus*	Year Round
Western Harvest Mouse	*Reithrodontomys megalotis*	Year Round
Deer Mouse	*Peromyscus maniculatus*	Year Round
Northern Grasshopper Mouse	*Onychomys leucogaster*	Year Round
Bushy-tailed Woodrat	*Neotoma cinerea*	Year Round
Prairie Vole	*Microtus ochrogaster*	Year Round
Coyote	*Canis latrans*	Year Round
Swift Fox	*Vulpers velox*	Year Round
Long-tailed Weasel	*Mustela frenata*	Year Round
Badger	*Taxidea taxus*	Year Round
Striped Skunk	*Mephitis mephitis*	Year Round
Mule Deer	*Odocoileus hemionus*	Year Round
Pronghorn	*Antilocapra americana*	Year Round

Appendix C.
Wildlife Species Potentially Occurring or Known to Occur in the Project Area and Vicinity

Common Name	Scientific Name	Seasonal Presence
Birds		
Turkey Vulture	*Cathartes aura*	Spring-Fall Migration
Bald Eagle	*Haliaeetus leucocephalus*	Winter, Migration
Northern Harrier	*Circus cyaneus*	Year Round
Sharp-shinned Hawk	*Accipiter striatus*	Spring-Fall Migration
Cooper's Hawk	*Accipiter cooperii*	Spring-Fall Migration
Northern Goshawk	*Accipiter gentilis*	Spring-Fall Migration
Swainson's Hawk	*Buteo swainsoni*	Summer, Migration
Red-tailed Hawk	*Buteo jamaicensis*	Year Round
Ferruginous Hawk	*Buteo regalis*	Year Round
Rough-legged Hawk	*Buteo lagopus*	Winter, Migration
Golden Eagle	*Aquila chrysaetos*	Year Round
American Kestrel	*Falco sparverius*	Year Round
Merlin	*Falco columbarius*	Winter, Migration
Prairie Falcon	*Falco mexicanus*	Year Round
Peregrine Falcon	*Falco peregrinus*	Spring-Fall Migration
Killdeer	*Charadrius vociferus*	Year Round
Mountain Plover	*Charadrius montanus*	Summer, Migration
Long-billed Curlew	*Numenius americanus*	Spring-Fall Migration
Mourning Dove	*Zenaida macroura*	Summer, Migration
Barn Owl	*Tyto alba*	Summer, Migration
Great Horned Owl	*Bubo virginianus*	Year Round
Snowy Owl	*Nyctea scandiaca*	Winter, Migration
Burrowing Owl	*Athene cunicularia*	Summer, Migration
Short-eared Owl	*Asio flammeus*	Winter, Migration
Common Nighthawk	*Chordeiles minor*	Summer, Migration
Say's Phoebe	*Sayornis saya*	Summer, Migration
Western Kingbird	*Tyrannus vertiualis*	Summer, Migration
Scissor-tailed Flycatcher	*Tyrannus forficatus*	Summer, Migration
Horned Lark	*Eremophila alpestris*	Year Round
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	Summer, Migration
Bank Swallow	*Riparia riparia*	Summer, Migration
Cliff Swallow	*Hirundo pyrrhonota*	Summer, Migration
Barn Swallow	*Hirundo rustica*	Summer, Migration
Black-billed Magpie	*Pica pica*	Year Round
American Crow	*Corvus brachyrhynchos*	Year Round

Appendix C.
Wildlife Species Potentially Occurring or Known to Occur in the Project Area and Vicinity

Common Name	Scientific Name	Seasonal Presence
Common Raven	*Corvus corax*	Year Round
Rock Wren	*Salpinctes obsoletus*	Spring-Fall Migration
Mountain Bluebird	*Sialia currucoides*	Spring-Fall Migration
Northern Mockingbird	*Mimus polyglottos*	Summer, Migration
Sage Thrasher	*Oreoscoptes montanus*	Winter, Migration
Northern Shrike	*Lanius excubitor*	Winter, Migration
Loggerhead Shrike	*Lanius ludovicianus*	Summer, Migration
Dickcissel	*Spiza americana*	Summer, Migration
Cassin's Sparrow	*Aimophila cassinii*	Summer, Migration
Chipping Sparrow	*Spizella passerina*	Spring-Fall Migration
Brewer's Sparrow	*Spizella breweri*	Summer, Migration
Vesper Sparrow	*Pooecetes gramineus*	Spring-Fall Migration
Lark Sparrow	*Chondestes grammacus*	Summer, Migration
Lark Bunting	*Calamospiza melanocorys*	Summer, Migration
Savannah Sparrow	*Passerculus sandwichensis*	Spring-Fall Migration
Grasshopper Sparrow	*Ammodramus savannarum*	Summer, Migration
McCown's Longspur	*Calcarius mccownii*	Summer, Migration
Lapland Longspur	*Calcarius lapponicus*	Winter, Migration
Chestnut-collared Longspur	*Calcarius ornatus*	Summer, Migration
Snow Bunting	*Plectrophenax nivalis*	Winter, Migration
Western Meadowlark	*Sturnella neglecta*	Year Round
Brewer's Blackbird	*Euphagus cyanocephalus*	Summer, Migration
Brown-headed Cowbird	*Molothrus ater*	Summer, Migration
House Finch	*Carpodacus mexicanus*	Year Round
Common Redpoll	*Carduelis flammea*	Winter, Migration
Pine Siskin	*Carduelis pinus*	Winter, Migration
Reptiles		
Lesser Earless Lizard	*Holbrookia maculata*	Year Round
Short-horned Lizard	*Phrynosoma douglassii*	Year Round
Eastern Fence Lizard	*Sceloporus graciousus*	Year Round
Many-lined Skink	*Eumeces multivirgatus*	Year Round
Six-lined Racerunner	*Cnemidophorus sexlineatus*	Year Round
Racer	*Coluber constrictor*	Year Round
Western Hognose Snake	*Heterodon nasicus*	Year Round
Milk Snake	*Lampropeltis triangulum*	Year Round
Bullsnake	*Pituophis melanoleucus*	Year Round

Appendix C.
Wildlife Species Potentially Occurring or Known to Occur in the Project Area and Vicinity

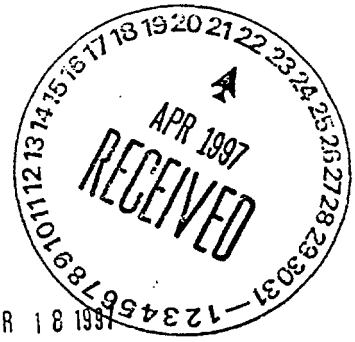
Common Name	Scientific Name	Seasonal Presence
Plains Blackhead Snake	*Tantilla nigriceps*	Year Round
Western Rattlesnake	*Crotalus viridis*	Year Round
Amphibians		
Tiger Salamander	*Ambystoma tigrinum*	Year Round
Plains Spadefoot	*Scaphiopus bombifrons*	Year Round

APPENDIX D
WILDLIFE AGENCIES -- CORRESPONDENCE

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
Colorado Field Office
P.O. Box 25486
Denver Federal Center
Denver, Colorado 80225-0207



ES/CO:Species List
Mail Stop 65412

Mr. William Becker
Director, Denver Regional Support Office
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy
1617 Cole Boulevard
Golden, Colorado 80401

Dear Mr. Becker:

In response to your letter of March 26, 1997, the U.S. Fish and Wildlife Service is providing the list of Federally listed species requested for the proposed wind energy farm to be located in Weld County, Colorado. This list and comments should be helpful in your preparation of the environmental evaluation of the project area. These comments have been prepared under the provisions of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et. seq.).

The federally listed threatened and endangered species that could occur at or visit the proposed site include:

Birds: Bald eagle, *Haliaeetus leucocephalus*, Threatened

The Service also is interested in the protection of species which are candidates for official listing as threatened or endangered (Federal Register, Vol. 56, No. 225, November 21, 1991; Vol. 55, No. 35, February 21, 1990). While these species presently have no legal protection under the ESA, it is within the spirit of this Act to consider project impacts to potentially sensitive candidate species. It is the intention of the Service to protect these species before human-related activities adversely impact their habitat to a degree that they would need to be listed and, therefore, protected under the ESA. Additionally, we wish to make you aware of the presence of Federal candidates should any be proposed or listed prior to the time that all Federal actions related to the project are completed. If any candidate species will be unavoidably impacted, appropriate mitigation should be proposed and discussed with this office.

The list of Federal candidate species that could occur at or visit the proposed site include:

Mammals: Swift fox, *Vulpes velox*, Candidate

Plants: Colorado butterflyweed, *Gaura neomexicana* ssp. *coloradensis*, Candidate

Birds: Mountain plover, *Charadrius montanus*, Candidate

Additionally, the Service is concerned with migratory bird issues. The migratory bird patterns in the area need to be determined as well as the species that occur in the area. This information should be used to determine the potential hazard and to create a base line for the project site.

If the Service can be of further assistance, contact Clay Ronish of this office at (303) 275-2370.

Sincerely,

LeRoy W. Carlson
Colorado Field Supervisor

cc: CDOW, Fort Collins, CO (Attn: Rick Moss)
CDOW, Eaton, CO (Attn: John Wagner)
Gerold Jacob, Boulder, CO
Reading file
Project file

Reference: CRR*SPECLIST.087

Public Service

Public Service
Company of Colorado

550 15th Street, Suite 700
Denver, CO 80202-4256

FAX (303) 571-7877

October 14, 1996

Fritz L. Knopf, Ph.D.
Leader, Vertebrate Ecology
U.S. Department of Interior
4512 McMurry Avenue
Fort Collins, CO 80525

Re: Weld County Field Inspection - September 13, 1996

Dear Fritz:

The purpose of this letter is to summarize the field inspection conducted at a proposed wind farm site in Weld County on September 13, 1996. As we discussed by telephone, I am using this means to document the results of that field inspection. This information will be included in a proposal to solicit funding from the Electric Power Research Institute (EPRI) for the potential development of a renewable energy project utilizing the wind resources at the Weld County Site. EPRI, in conjunction with the Department of Energy (DOE), is encouraging the implementation of renewable energy projects, and has an open "Request for Proposal" (RFP) for "Distributed Wind Turbines as a Utility Generation Resource" available to qualifying utilities. Public Service Co. of Colorado (PSCo), in conjunction with a company known as Distributed Generation Systems, Inc. (DISGEN), is preparing a proposal for this funding. Information from this letter will be included along with results from an August 1, 1996 helicopter survey, conducted by PSCo with Jerry Craig the State Raptor Biologist from the Colorado Division of Wildlife (CDOW), to help assess environmental consequences associated with a potential wind development project at this location.

The information below is not a commitment to action, but a description of observations from our site visit, and also a summary of discussions regarding potential mitigation measures if wind farm development occurs at this site. I have included a signature block for your concurrence as a biological expert familiar with the habitat requirements for a bird species known as the Mountain Plover, and also as an expert regarding other species that inhabit the high plains environment of northeastern Colorado where the Weld County Site is located.

Site Description and Inspection Results

The Weld County Site is located in Section 19, Township 12 North, Range 66 West, of the 6th Principal Meridian within Weld County, Colorado. This proposed site occupies an approximately 1 mile square area of private land owned by Keith and Myrna Roman. This location is a typical high plains rangeland setting on a relatively flat mesa approximately 4 miles east of Interstate 25 and 1.5 miles west of U.S. Highway 85 along the Colorado-Wyoming border. The landowner is currently grazing cattle on the site.

On September 13, 1996, you and representatives from PSCo, including myself, met the landowner at the Weld County Site to determine whether this site contained habitat suitable for the Mountain Plover. This bird species is recognized in the biological community as potentially threatened in northeastern Colorado because of its relatively small numbers and the fact that Mountain Plovers are known to nest on the plains of northeast Colorado. You did not observe any Mountain Plovers on the site. However, you did indicate that the site could potentially support nesting Mountain Plovers in the spring of the year due to cattle grazing activities occurring on the site. The Mountain Plover prefers to conduct nesting activities on grasslands where grazing activities by cattle or buffalo have been heavy, or even extreme. This species prefers to nest on exposed ground between mid-April and July.

Although the prairie grasslands on the Weld County site are not currently being overgrazed, the potential for overgrazing and the associated presence of nesting Mountain Plovers will continue to exist as long as cattle occupy the site. Also during the site visit, several groups of Pronghorn Antelope were observed on and around the site.

Mitigation Measures

You advised that construction activities associated with a proposed wind farm project should not be conducted at this site during the months between mid-April and July to avoid potential conflicts with nesting Mountain Plovers and other possible nesting bird species utilizing this site. The reduction or elimination of grazing activities on the Weld County Site will also minimize potential conflicts with nesting Mountain Plovers by avoiding the creation of habitat conditions preferred by this ground-nesting bird.

Enclosed please find a second copy of this letter. Please sign the Concurrence block below if I have accurately summarized the discussions that occurred during

the visit to the Weld County Site conducted on September 13, 1996, and return one copy to me. I appreciate you sharing your expertise and assistance with this process. Also, please contact me at (303) 571-7568 with any additional questions regarding the project. I look forward to your future input.

Sincerely yours,

Rick Thompson
Project Land Rights Agent
Right-of-Way, Siting & Permits

CONCURRENCE:

Fritz L. Knopf, Ph.D.
Leader, Vertebrate Ecology
U.S. Department of Interior

Rt/rt

cc: D.W. Osborn (DISGEN); J. T. Lazear; G.J. Vonesh, Jr.; N. B. Faes; J. W. Steck

Public Service

Public Service
Company of Colorado

550 15th Street, Suite 700
Denver, CO 80202-4256

FAX (303) 571-7877

October 14, 1996

Gerald R. Craig
State Raptor Biologist
Colorado Division of Wildlife
317 Prospect Road
Fort Collins, CO 80526

Re: Weld County Field Inspection - August 1, 1996

Dear Gerry:

The purpose of this letter is to summarize the helicopter aerial inspection conducted at a proposed wind farm site in Weld County on August 1, 1996 to look for eagle nests and other potential raptor activities at that location. I am using this letter to document the results of that aerial inspection as it relates to raptor activities we observed on that day. This information will be included in a proposal to solicit funding from the Electric Power Research Institute (EPRI) for the potential development of a renewable energy project utilizing the wind resources at the Weld County Site. EPRI, in conjunction with the Department of Energy (DOE), is encouraging the implementation of renewable energy projects, and has an open "Request for Proposal" (RFP) for "Distributed Wind Turbines as a Utility Generation Resource" available to qualifying utilities. Public Service Co. of Colorado (PSCo), in conjunction with a company known as Distributed Generation Systems, Inc. (DISGEN), is preparing a proposal for this funding. Information from this letter will be included along with a similar letter from a September 13, 1996 field inspection, conducted by PSCo with Fritz Knopf, Vertebrate Ecologist from the U.S. Department of Interior, to help assess environmental consequences associated with a potential wind development project at this location.

The information below is not a commitment to action, but a description of observations from our aerial survey around the Weld County Site. I have included a signature block for your concurrence as the Colorado State Raptor Biologist with expertise regarding eagles and other raptor species that might be observed at this potential wind development site.

Site Description and Inspection Results

The Weld County Site is located in Section 19, Township 12 North, Range 66 West, of the 6th Principal Meridian within Weld County, Colorado. This proposed site occupies an approximately 1 mile square area of private land owned by Keith and Myrna Roman. This location is a typical high plains rangeland setting on a relatively flat mesa

approximately 4 miles east of Interstate 25 and 1.5 miles west of U.S. Highway 85 along the Colorado-Wyoming border. The landowner is currently grazing cattle on the site.

On August 1, 1996, you and representatives from PSCo, including myself, conducted a helicopter tour at and around the Weld County Site to look for active eagle nests and other raptor activities. This aerial inspection was a part of an overall survey of various potential wind monitoring and/or development sites located in Northeastern Colorado. No eagle nests were observed on the Weld County Site or on lands within the immediate vicinity of this site during our helicopter tour on August 1, 1996. Raptors may utilize the area for hunting activities, but no evidence of nesting activities was observed at this location.

Enclosed please find a second copy of this letter. Please sign the Concurrence block below if I have accurately summarized the results of the August 1, 1996 inspection of the Weld County Site, and return one copy to me. I appreciate you sharing your expertise and assistance with this process. Contact me at (303) 571-7568 with any additional questions regarding this project. I will keep you informed regarding activities at the Weld County Site, and look forward to your future input regarding the implementation of wind monitoring and/or development activities at other locations within Colorado.

Sincerely yours,

Rick Thompson
Project Land Rights Agent
Right-of-Way, Siting & Permits

CONCURRENCE:

G R Craig

Gerald R. Craig
State Raptor Biologist
Colorado Division of Wildlife

Rt/rt

cc: D.W. Osborn (DISGEN); J. T. Lazear; G.J. Vonesh, Jr.; N. B. Faes; J. W. Steck