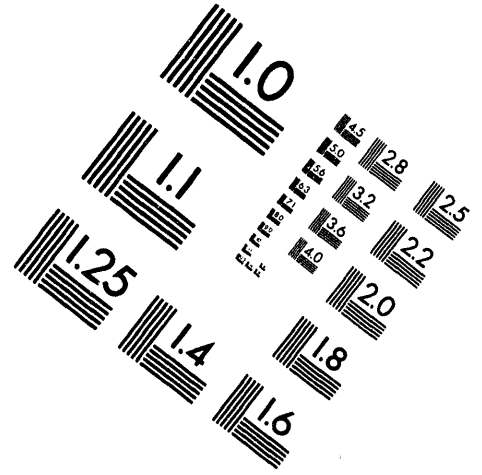
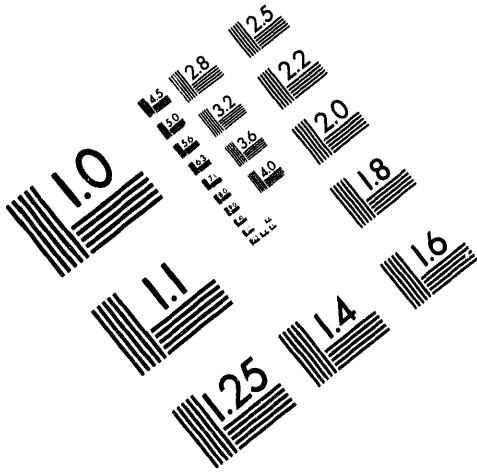




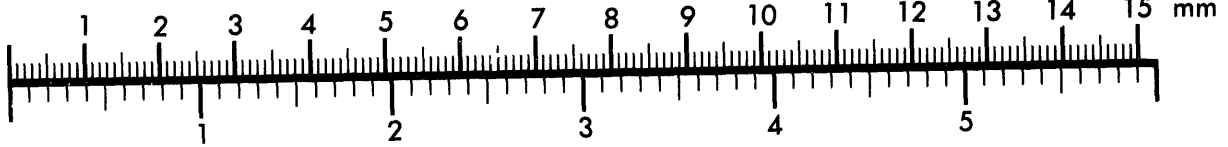
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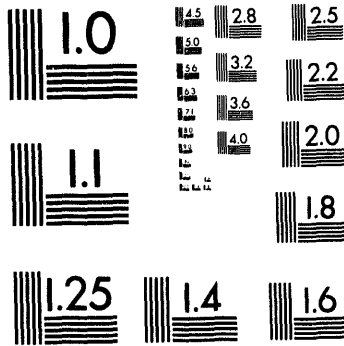
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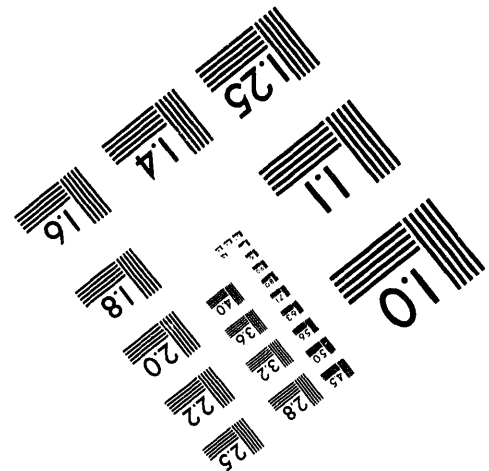
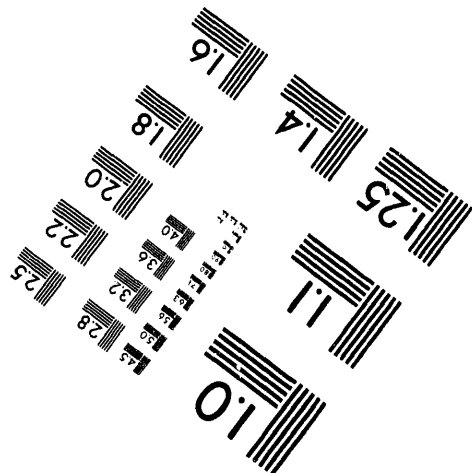
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1 of 3

ENVIRONMENTAL ASSESSMENT

BIG GEORGE TO CARTER MOUNTAIN
115-kV TRANSMISSION LINE
PROJECT

PARK AND HOT SPRINGS COUNTIES, WYOMING

U.S. DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
LOVELAND AREA OFFICE
LOVELAND, COLORADO

DOE/EA-0903
FEBRUARY 1994

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MASTER

EXECUTIVE SUMMARY

Introduction

The Western Area Power Administration (Western) is proposing to rebuild, operate, and maintain a 115-kilovolt (kV) transmission line between the Big George and Carter Mountain Substations in northwest Wyoming (Park and Hot Springs Counties). The project area is shown on Map S-1. This environmental assessment (EA) was prepared in compliance with the National Environmental Policy Act (NEPA) and the regulations of the Council on Environmental Quality (CEQ) and the Department of Energy (DOE). DOE is responsible for approval of the Proposed Action. The Bureau of Land Management (BLM) is a cooperating agency in the NEPA review and is the Federal agency responsible for granting rights-of-way (ROWs) across public land.

Purpose and Need

The existing Big George to Carter Mountain 69-kV transmission line was constructed in 1941 by the U.S. Department of Interior, Bureau of Reclamation, with 1/0 copper conductor on wood-pole H-frame structures without an overhead ground wire. The line should be replaced because of the deteriorated condition of the wood-pole H-frame structures. Because the line lacks an overhead ground wire, it is subject to numerous outages caused by lightning. The line will be 54 years old in 1995, which is the target date for line replacement. The normal service life of a wood-pole line is 45 years.

No Action Alternative

Under the No Action Alternative, no new transmission lines would be built in the project area. The existing 69-kV transmission line would continue to operate with routine maintenance, with no provisions made for replacement.

The primary advantage of this alternative is that no new investment would be made. Additional environmental studies, design summaries, etc., would not be required. However, under this alternative, the existing 69-kV transmission line would continue to be susceptible to numerous outages caused by lightning strikes. Susceptibility to lightning strikes has resulted in poor reliability of electrical service. Deteriorated wood poles would also need to be replaced to reduce hazards to Western's employees and the public.

Other Alternatives

Western considered adding lightning arresters and dual overhead groundwires as two alternatives for reducing lightning outages. However, the magnitude of these investments for a line with physically deteriorating poles was not considered prudent.

Western also considered replacing the transmission line with a line at the same voltage. However, for an additional 15 percent investment, a 115-kV line with up to three times the power delivery capability could be constructed. This would also eliminate future construction and associated environmental impacts. Underground construction was also considered but eliminated because of increased costs and environmental impacts.

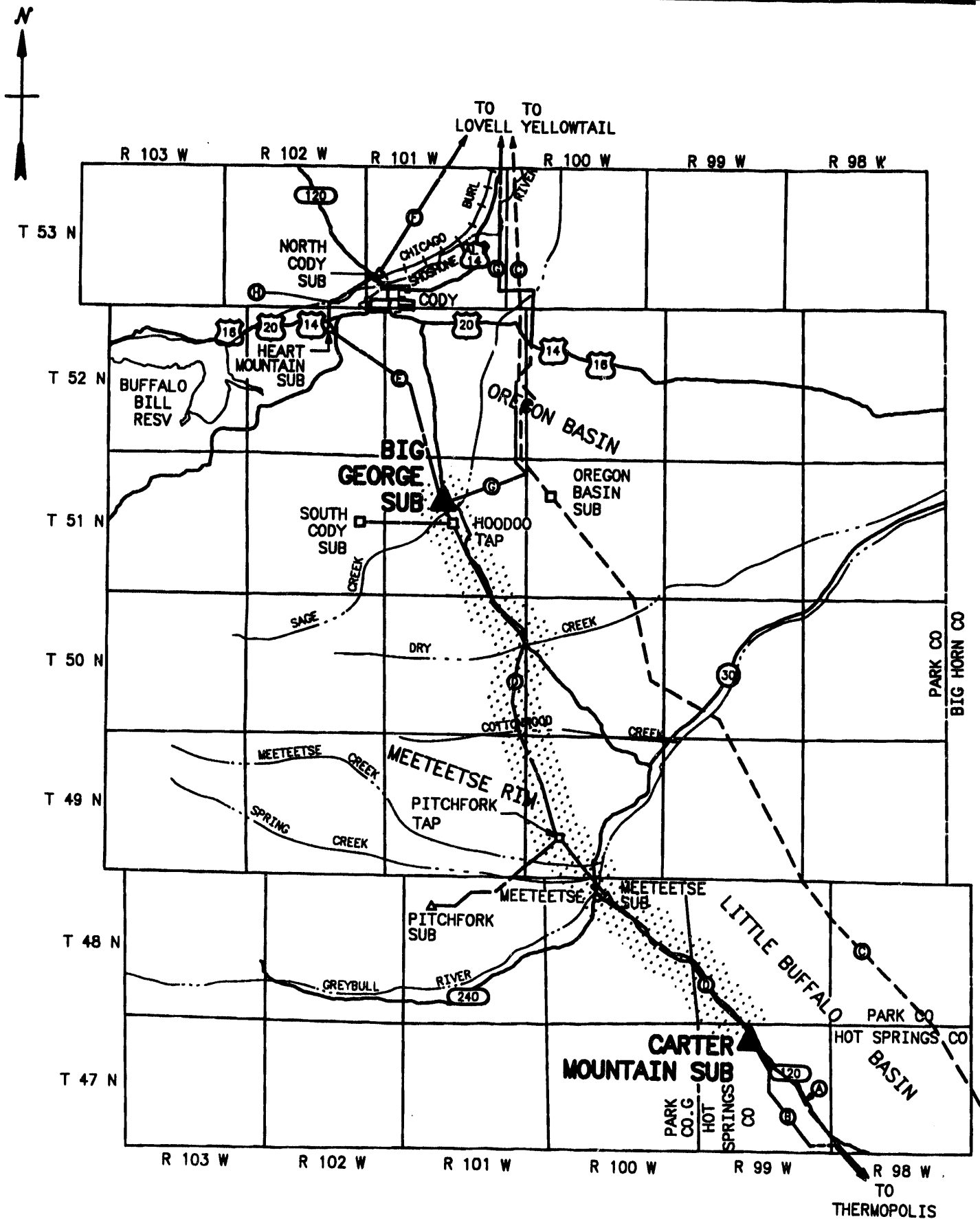
In response to public interest, Western also considered constructing a new line parallel to the existing line (before removing the existing line) in order to maintain service. However, it is possible to maintain service without parallel construction and the associated environmental impacts. Western also considered rebuilding the line entirely along the existing ROW but chose the Proposed Action, since visual impacts along the existing route would be reduced by rerouting a 2-mile section behind a ridgeline located north of the Carter Mountain Substation.

Finally, energy conservation was considered but will not meet the purpose and need of the project, that is, to eliminate lightning outages and replace deteriorated structures.

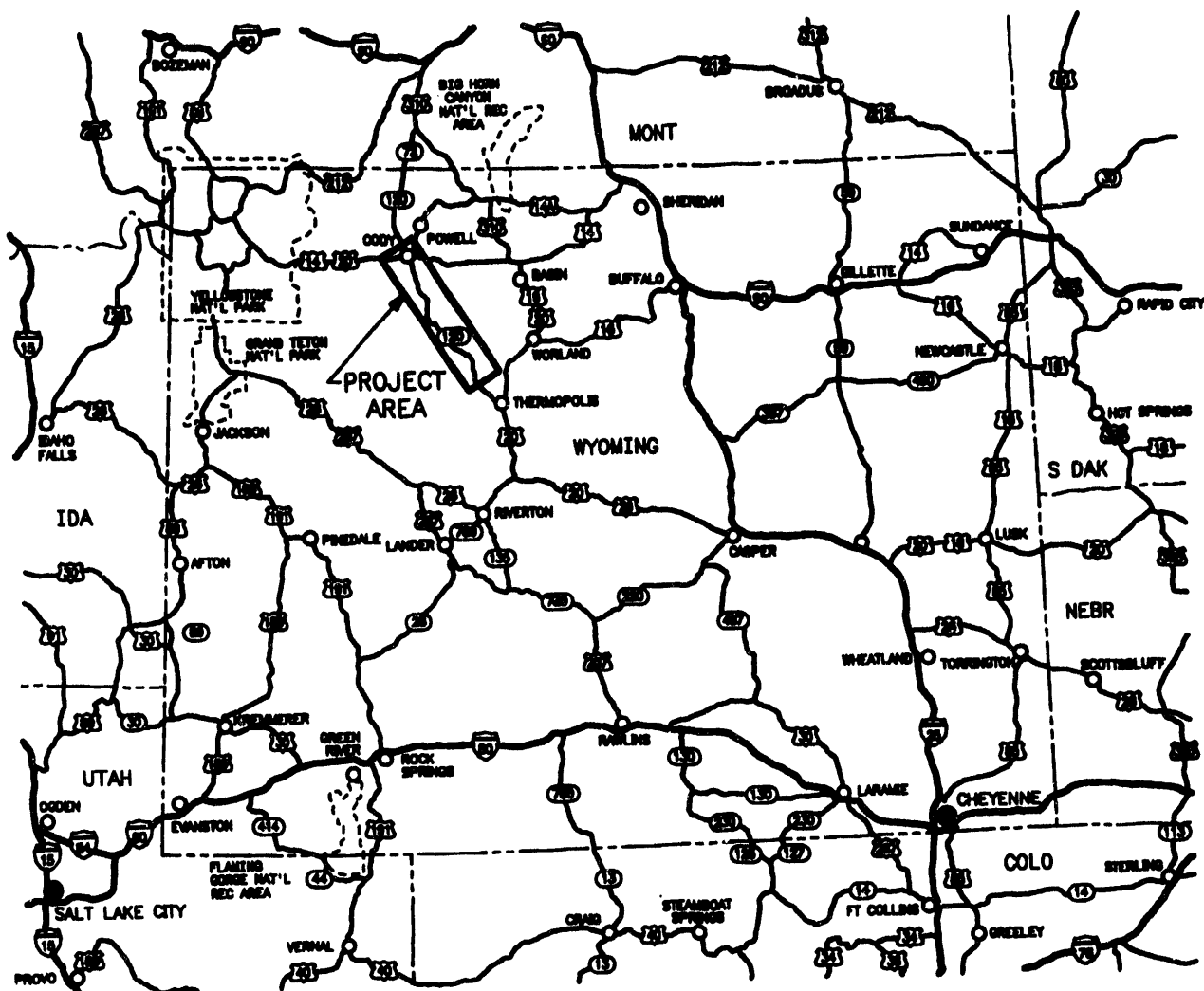
Proposed Action

Western proposes to remove the existing 28.2-mile-long Big George to Carter Mountain 69-kV transmission line, between Wyoming Municipal Power Agency's Big George Substation south of Cody, Wyoming, and Tri-State's Carter Mountain Substation located south of Meeteetse, Wyoming. Western would then replace the 69-kV line with a line constructed to 115-kV standards, but would initially energize it at 69 kV. Operation at 115 kV would depend on future transmission system needs in northern Wyoming. No additional land would be required for the terminals. The existing transmission line has a 40-foot ROW; Western would acquire a new 80-foot easement for the new 115-kV transmission line.

Western's proposed route for the 115-kV line is 28.3 miles long. The proposed transmission line structures would be single circuit, wood-pole, H-frame structures. Construction of the line would require approximately 1 year and is scheduled for 1994. The peak construction work force is estimated to be 25 to 35 workers.



LOCATION MAP



STATE MAP

KEY

- (A)— WESTERN'S CARTER MOUNTAIN-THERMOPOLIS 69KV LINE
- (B)— TRI-STATE'S CARTER MOUNTAIN-THERMOPOLIS 115KV LINE
- (C)— PP&L'S THERMOPOLIS-YELLOWTAIL 230KV LINE
- (D)— WESTERN'S BIG GEORGE-CARTER MOUNTAIN 69KV LINE
- (E)— WESTERN'S BIG GEORGE-HEART MOUNTAIN 69KV LINE
- (F)— WESTERN'S HEART MOUNTAIN-LOVELL 69KV LINE
- (G)— TRI-STATE'S BIG GEORGE-LOVELL 115KV LINE
- (H)— WESTERN'S HEART MOUNTAIN-NORTH CODY 69KV LINE

Map S-1 Big George to Carter Mountain Project Area

The existing transmission line route is shown on Map S-1. Routing options are limited because of the need to serve the existing taps and substations associated with the line. Western provides electrical service at the Hoodoo, Pitchfork, and Meeteetse Taps, which are all connected to the Big George to Carter Mountain transmission line. Two miles of line located immediately north of the Carter Mountain Substation would be relocated to reduce visibility from Highway 120. Minor realignments may also be necessary due to the Wyoming Department of Highway's planned widening of Highway 120.

Western's goal is to build the transmission line in a location that would minimize impacts but still provide reliable electrical service.

Comparison of Alternatives

The environmental differences between Western's proposed route and Western's existing 69-kV transmission line ROW are minor. Table S-1 compares features of the two routes. Western's proposed route would be visible from Highway 120 for 1.0 mile less than the existing 69-kV route. This is achieved by locating the line behind a ridge as it approaches and enters the Carter Mountain Substation.

The No Action Alternative and the Proposed Action would have similar impacts over the long-term. Land disturbance impacts associated with the Proposed Action would occur within one season across a broad area. The No Action Alternative would result in impacts within smaller areas, but would occur through several seasons and over a period of years.

Affected Environment and Environmental Consequences

The project study area is located in northwestern Wyoming. Environmental resources were identified and evaluated relative to project impacts. Some resources did not require detailed analyses because the project would have no effect on them. These resources include Air Quality, Climate, Geology, Groundwater, and Socioeconomics.

The proposed project occurs in a sparsely populated portion of Wyoming. The small construction workforce (25 to 35 workers) is not expected to adversely affect local communities. Impacts to cultural resources along the route would be avoided or mitigated during construction. Visual quality in the study area would change slightly as a result of construction of the new transmission line. The use of nonspecular conductors, and the proposed reroute would minimize visual impacts. Impacts to existing land use would be low to none.

Table S-1**Comparison of Proposed and Existing Routes for the
Big George to Carter Mountain Transmission Line Project**

Environmental Inventory Factor	Western's Proposed Route	Western's Existing 69-kV Transmission Line ROW
Total line length (miles)	28.3	28.2
Follows existing route (miles)	26.1	28.2
Existing trail access (miles)	27.9	28.2
Private land crossed (miles)	15.9	15.7
Residences within 0.25 mile (number)	8	8
Irrigated cropland crossed (miles)	2.7	2.7
Improved pastures crossed (miles)	0.5	0.5
Floodplains crossed (miles)	0.7	0.7
Perennial water sources crossed (number)	6	6
Structures located within floodplain (number)	3	4
Wetlands spanned (number)	9	9
Crucial mule deer winter-yearlong range crossed (miles)	11.1	11.1
Crucial pronghorn winter range crossed (miles)	0.6	0.6
National Register-eligible archaeological and historical sites affected (number)	4	4
Sensitive (VRM Class II) scenic areas crossed (miles)	1.8	1.8
Line visible from Highway 120 (miles)	9.9	10.9
Moderate (15 - 30%) slopes crossed (miles)	1.9	1.9
Excessive (>30%) slopes crossed (miles)	0	0

Since the Proposed Action would use existing access trails over 95 percent of its length, impacts normally associated with new construction would be greatly minimized. Approximately 30 to 50 percent (12 to 15 miles) of the existing trails would require repair. A total of 3 miles of new trails would be needed for project construction. Of those 3 miles, approximately 1 mile of new access trail would be located along the proposed line north of the Carter Mountain Substation.

Since the existing trail system would be used and disturbed sites would be reseeded, impacts to vegetation and wildlife are expected to be minimal. Project construction could impact wintering and migrating mule deer and pronghorn; however, construction scheduling would reduce or eliminate potential impacts.

The federally endangered bald eagle winters and forages along the Greybull River within the project area. The new overhead ground wire would increase the potential for bird collisions, including protected species such as the bald eagle. Western would install aerial marker balls at the Greybull River crossing, which would reduce potential bird collision hazards.

The federally endangered black-footed ferret may occur in prairie dog colonies located along the transmission line ROW. Western would conduct black-footed ferret clearance surveys, as directed by the U.S. Fish and Wildlife Service (USFWS), within 1 year of construction initiation. If ferrets are discovered, Western would consult with the USFWS to eliminate or minimize potential impacts to ferrets. The proposed project would not affect the federally endangered peregrine falcon, whooping crane, or gray wolf.

The proposed transmission line would span over surface water resources; therefore, no measurable effects on water quality are expected. Three structures would be located in the floodplains of Meeteetse Creek and the Greybull River. One less structure would be located in the floodplain when compared to the existing transmission line.

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1.0 PURPOSE AND NEED

1.1 Introduction

The Western Area Power Administration (Western) is one of five power marketing administrations within the Department of Energy (DOE) responsible for the transmission and marketing of hydroelectric power from Federal dams in the United States. Western is responsible for the Federal electric power marketing and transmission functions in 15 central and western states.

Western is proposing to construct, operate, and maintain approximately 28.3 miles of 115-kilovolt (kV) transmission line from Wyoming Municipal Power Agency's Big George Substation located south of Cody, Wyoming, to the Tri-State Generation and Transmission Association, Inc. (Tri-State) Carter Mountain Substation located near Meeteetse, Wyoming (Park and Hot Springs Counties). This environmental assessment (EA) was prepared in compliance with the National Environmental Policy Act (NEPA) and according to the regulations of the Council on Environmental Quality (CEQ) and the DOE (10 CFR Part 1021). DOE is responsible for approval of the Proposed Action. The Bureau of Land Management (BLM) is a cooperating agency in the NEPA review for the project and is the Federal agency responsible for granting rights-of-way (ROWS) across public land.

1.2 Purpose and Need

Western provides Tri-State and PacifiCorp with electrical service at the Hoodoo Tap, the Meeteetse Tap, and the Pitchfork Tap, which are all connected to the Big George to Carter Mountain 69-kV transmission line. Western needs to safely and reliably operate and maintain a high voltage transmission line between the Big George and Carter Mountain substations in order to serve these existing taps and substations. Western also needs to plan for economical future uses of the transmission system in northern Wyoming. Studies of this transmission system using computer modeling techniques show that this stretch of line may be required to operate at 115 kV sometime within its service life. Because the cost of constructing a transmission line to 115-kV standards is not prohibitively higher than the cost of constructing a new 69-kV line, Western has determined that it would be more cost effective to rebuild this line to 115-kV standards than to 69-kV standards.

The existing 28.2-mile-long Big George to Carter Mountain 69-kV transmission line was constructed in 1941 by the U.S. Department of Interior, Bureau of Reclamation, with 1/0 copper conductor on wood pole, H-frame structures without an overhead ground wire. The transmission line will be 54 years old when it is scheduled to be replaced in 1995. The normal service life of a wood-pole line is 45 years. Because of its age, most of the poles on the existing line are in an advanced state of shell rot to a depth of 1 to 2 inches for their entire lengths and circumferences. Shell rot is a progressive fungal condition in which the exterior, or "shell," of the wood-poles deteriorates and ultimately crumbles and falls away. Shell rot creates a hazard to maintenance personnel climbing the wood poles and increases the potential for structure failures.

The existing 69-kV transmission line lacks overhead ground wires, making the line very susceptible to lightning-caused outages. Outages have been so frequent that Tri-State has requested that the line be disconnected from the Carter Mountain Substation, which currently serves numerous oil wells in the project area. When lightning strikes the transmission line, the oil pumps shut down and must be manually restarted. Lightning surges also can cause damage to the newer electronic controls for oil pumps. The present line has had 28 outages in the past 3.5 years, which is unacceptable service to the customers served by the line. An upgraded line will need an overhead ground wire to protect against most lightning-caused outages.

Age also has caused the 1/0 copper conductor to become soft and lose strength. The soft conductor has sagged to near critical clearances in several locations, requiring existing structures to be replaced with taller structures or additional structures to be erected to maintain clearance.

1.3 Public Involvement

A public meeting was conducted in Meeteetse, Wyoming on September 1, 1992. The purpose of the meeting was to describe the project, purpose and need, preliminary environmental concerns, EA preparation, NEPA process, and project schedule and sequencing, and to solicit input from the public. Concerns and questions were expressed regarding unreliable energy supply and its effect on oil and gas production and small businesses; construction schedule; project alternatives, including ROW placement, cropland avoidance, and lightning protection; substation upgrades; power export; geologic hazards; ROW expansion; magnetic field exposure; effects from increased access along the project ROW; and the EA review process.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 No Action Alternative

Under the No Action Alternative, no changes would occur to the present Big George to Carter Mountain 69-kV transmission line. The line would continue to operate with poles and structure components being replaced as necessary. Lightning outages would continue to interrupt service.

2.2 Alternatives Considered but Eliminated from Detailed Analysis

2.2.1 Lightning Arrester Placement on the Existing Big George to Carter Mountain 69-kV Transmission Line

This alternative would require the installation of three lightning arresters at every third structure on the existing Big George to Carter Mountain 69-kV line to eliminate the impact of lightning-caused outages. This alternative would reduce the unacceptable voltage levels caused by lightning strikes. The estimated cost for placing lightning arresters on the existing 69-kV line is \$146,833. Expenditures of this magnitude to mitigate electrical performance of a line that needs to be replaced because of its physical deterioration is not considered prudent.

2.2.2 Dual Overhead Ground Wire Placement on the Existing Big George to Carter Mountain 69-kV Transmission Line

This alternative would require the installation of two overhead ground wires and associated hardware on each structure of the existing Big George to Carter Mountain 69-kV transmission line. This alternative would reduce the unacceptable voltage levels caused by lightning strikes. The estimated cost for installation of two overhead ground wires and associated hardware would be \$354,684. As discussed in Section 2.2.1, expenditures of this magnitude to mitigate electrical performance of a line that needs to be replaced because of its physical deterioration is not considered prudent. The installation of the equipment would occur in approximately 1.5 to 2 years, which is the same period that the proposed transmission line would be constructed.

2.2.3 Inkind Replacement of the Existing Big George to Carter Mountain 69-kV Transmission Line

This alternative would replace the existing Big George to Carter Mountain 69-kV transmission line with a new 69-kV line. The line would be constructed from the Big George Substation to the

Carter Mountain Substation. This alternative would provide acceptable voltage levels during single contingency outages and solve the maintenance and safety problems associated with the existing line. However, for only a 15 percent higher initial cost to build the line at 115-kV versus 69-kV ratings, the line would have up to three times the power delivery capability, which would provide a margin for future transmission system needs in northern Wyoming.

2.2.4 Parallel Construction Sequence

Under this construction sequence, new construction would occur between the Big George and Carter Mountain Substations on a new right-of-way (ROW) parallel to the existing Big George to Carter Mountain 69-kV line. The existing 69-kV line would remain energized. This sequence would require new ROW purchases and potentially increase environmental impacts. Location of the new line on new ROW also would create difficulties in avoiding existing irrigation equipment. Since segments of the existing 69-kV line can readily be taken out of service for replacement, constructing the new line parallel to the existing line is not considered viable.

2.2.5 Underground Construction

Underground construction is used primarily with distribution lines. With these types of low voltage lines, insulating each phase conductor and dissipating the heat from the conductor can be accomplished with relative ease. With lines of greater voltage, such as a 115-kV line, these problems are difficult to overcome. Therefore, the costs are greater, as much as ten times the cost of overhead construction. Underground construction is usually done in densely developed "downtown" areas where the costs are outweighed by the costs and difficulty of obtaining above-ground ROW.

Underground transmission lines have some environmental advantages over conventional overhead lines. Visual impacts would be less. The ROW required is much narrower, and therefore, some land use impacts and ROW acquisition costs would be reduced. Bird losses from collisions with conductors and shield wires would be eliminated.

Certain environmental impacts are increased when underground lines are compared with overhead lines of similar capacity. The decreased visual impact would be partly offset by the need for oil cooling system pumping and pressurizing facilities at intervals of about 15 miles along the line in level terrain. In mountainous terrain, facilities would need to be located at closer intervals. A new route and a new ROW would likely be required for underground construction.

Underground construction results in a continuous zone of disturbance along the ROW, with potentially adverse impacts to soils, water, cultural resources, and biological resources. In

addition, access for maintenance would be required along the entire length of the ROW, not just at intervals as at the structure sites of an overhead line.

The reliability of overhead and underground lines are probably comparable. While underground lines are immune to the effects of weather, they are susceptible to damage from geologic or subsoil instabilities and to mechanical failure of their cooling systems. A failure in an underground system often results in a power outage of several days or even weeks, since line failures are difficult to locate and repair. In contrast, overhead line outages can often be repaired within hours.

The differences between underground and overhead line construction and operation are dramatic. A publication by the Bonneville Power Administration (Department of Energy [DOE] 1980) reports that underground lines (of the voltage being considered here) are generally seven to eight times as costly as comparable overhead lines. A more recent publication by the DOE reports that the cost of undergrounding a 115-kV transmission line would be roughly eight to 10 times the cost of constructing an overhead system of comparable capability (DOE 1982).

Underground construction is generally used only at distribution (lower) voltages, where the problems of heat dissipation are far less severe, or for distances of not more than a few miles in intensively developed urban areas, extremely critical scenic areas, or areas where overhead lines would have a very severe impact from bird collisions.

For the above reasons, undergrounding of any of the elements of the proposed transmission line was not considered further as an alternative.

2.2.6 Energy Conservation

As part of its marketing policies, the Western Area Power Administration (Western) encourages energy conservation through the promotion of efficient and economic uses of energy, and through the use of renewable resources such as hydro, wind, solar, and geothermal energy sources. This policy is embodied in Western's Conservation and Renewable Energy (C&RE) Program (46 Fed. Reg. 56, 140 [1981]).

Energy conservation programs have the advantage of reducing energy consumption and have no significant environmental impacts. However, the purpose and need for the Big George to Carter Mountain 115-kV transmission line project cannot be met through energy conservation. Project need is based on reliability and deterioration. Energy conservation only affects the demand for energy but does not provide the means for transferring electric power. It cannot be considered as an alternative action for meeting the stated project need.

2.3 Description of the Proposed Action

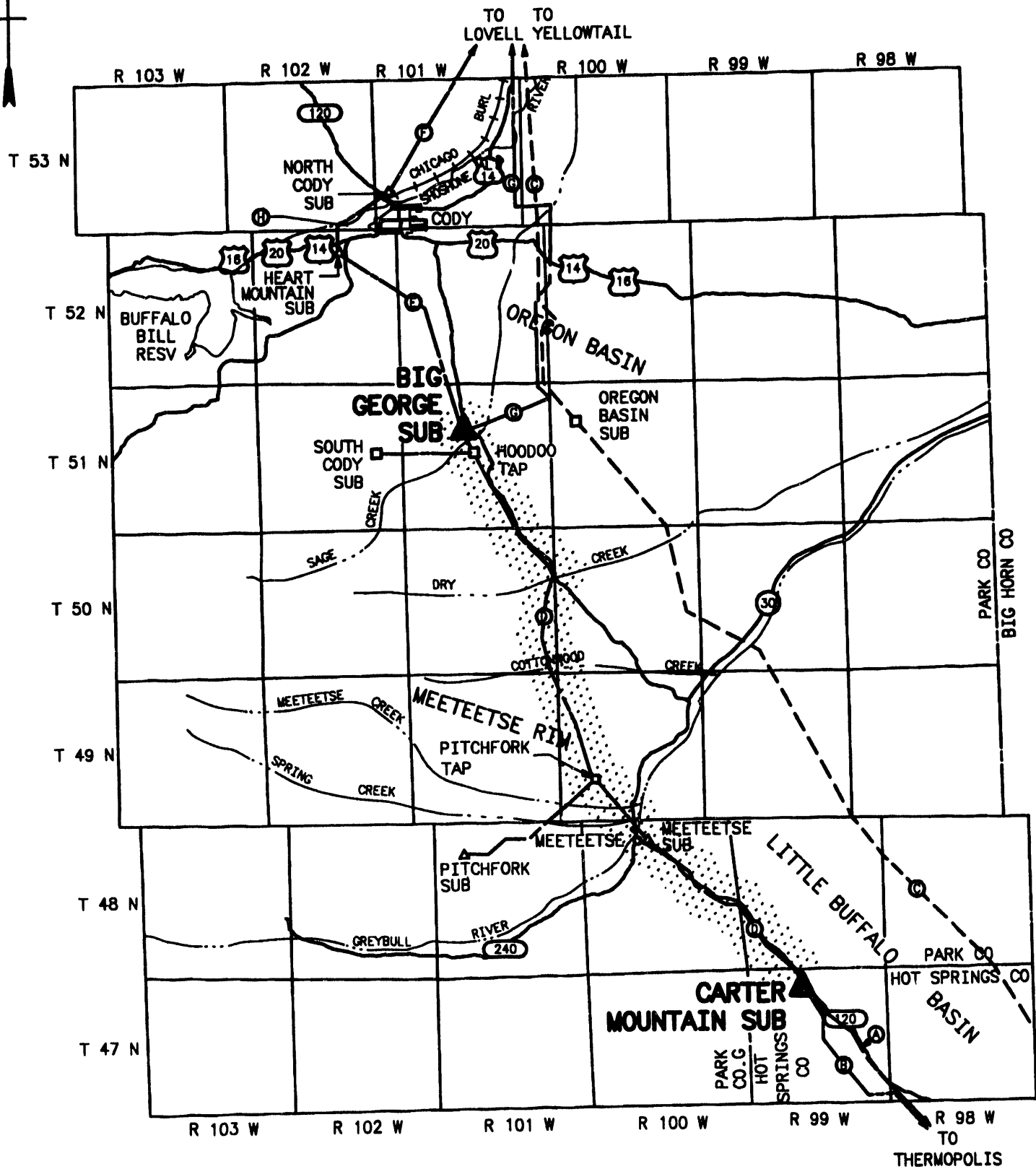
Western proposes to replace the existing Big George to Carter Mountain 69-kV transmission line with a line built to 115-kV standards (477 KCM ASCR conductor) between Wyoming Municipal Power Agency's Big George Substation located south of Cody, Wyoming, and Tri-State's Carter Mountain Substation located near Meeteetse, Wyoming. This alternative would correct maintenance and safety problems.

Western also proposes to rebuild the existing Meeteetse, Pitchfork, and Hoodoo 69-kV tap structures. The transmission line would be operated at 69 kV although in the future operation at 115 kV may be needed. At this time, operation of the line at 115 kV is speculative. However, if the transmission line is operated at 115 kV, it may be necessary to upgrade several substations and transmission taplines. These upgrades would include 8 miles of tapline between Pitchfork Tap and Pitchfork Substation and the Meeteetse and Pitchfork Substations. Should the system be upgraded for operation at 115 kV, the environmental effects would be evaluated at that time under a separate environmental process as required by the National Environmental Policy Act (NEPA).

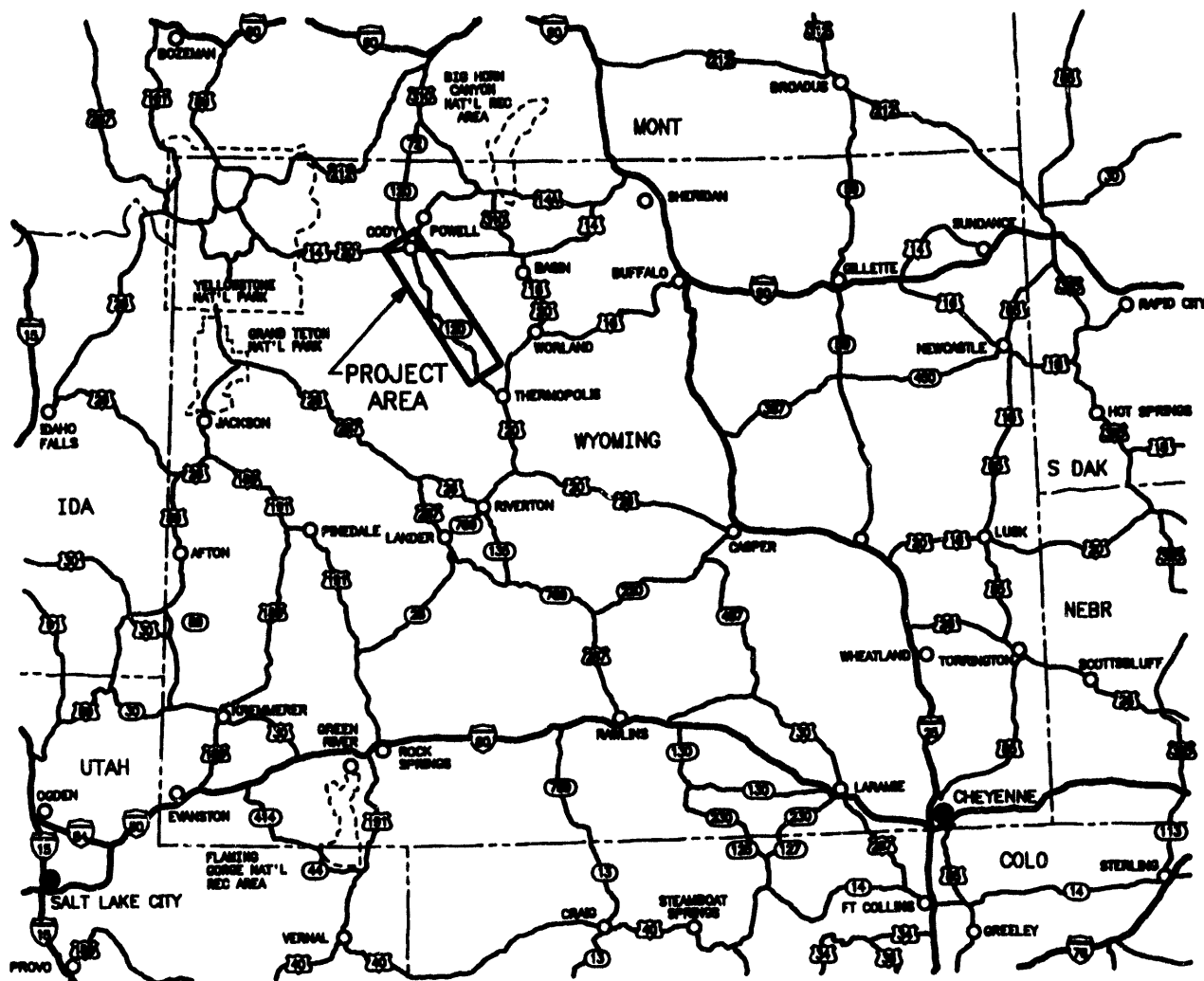
Map 2-1 shows the project area; Map 2-2 (located at the back of this document) presents the existing 69-kV transmission line route, existing and new access trails, and route modifications that were identified during the route evaluation process. Routing options are limited because of the need to serve the existing taps and substations along the line. The 2.2 miles of line located north of the Carter Mountain Substation would be relocated to reduce visibility of the line from Highway 120 (see Map 2-2). Minor realignments along the route also may be necessary due to the planned widening of Highway 120. Western's goal is to build the transmission line in a location that would minimize impacts but still provide reliable electrical service.

The existing transmission line has a 40-foot ROW; Western would acquire a new 80-foot easement for the 115-kV transmission line. A wider ROW would be required for the proposed transmission line because greater electrical clearance is required for a 115-kV line. Modifications to the existing terminal facilities would be required at a future date when the line is energized at 115 kV. All terminal facilities would be constructed within the existing substations.

As part of the Proposed Action, Western would remove the existing Big George to Carter Mountain 69-kV transmission line. The procedures for removal of the old line would be similar to those described for the proposed line in Section 2.3.1.6, Abandonment. The wood poles would be cut off at or below the ground to minimize disturbance associated with pole removal. Along the segment where the line would be removed and not replaced (north of the Carter Mountain



LOCATION MAP



STATE MAP

KEY

- (A)— WESTERN'S CARTER MOUNTAIN-THERMOPOLIS 69KV LINE
- (B)— TRI-STATE'S CARTER MOUNTAIN-THERMOPOLIS 115KV LINE
- (C)— PP&L'S THERMOPOLIS-YELLOWTAIL 230KV LINE
- (D)— WESTERN'S BIG GEORGE-CARTER MOUNTAIN 69KV LINE
- (E)— WESTERN'S BIG GEORGE-HEART MOUNTAIN 69KV LINE
- (F)— WESTERN'S HEART MOUNTAIN-LOVELL 69KV LINE
- (G)— TRI-STATE'S BIG GEORGE-LOVELL 115KV LINE
- (H)— WESTERN'S HEART MOUNTAIN-NORTH CODY 69KV LINE

Map 2-1 Big George to Carter Mountain Project Area

Substation), Western would relinquish interest in the easement and return all rights to the owners of the underlying fee title. The existing Big George to Carter Mountain 69-kV transmission line must be disconnected from Tri-State's Carter Mountain Substation during this period to prevent lightning-caused outages to Tri-State customers served out of the Carter Mountain Substation. Construction of the Proposed Action would begin at the Carter Mountain Substation progressing sequentially toward the Big George Substation. This construction sequence would allow the removal of the line section from the Carter Mountain Substation to the Meeteetse Tap, while the Carter Mountain Substation is disconnected from the existing Big George to Carter Mountain 69-kV line. Each newly constructed segment would then be energized and work would progress on removal of the next portion of existing line. Provisions would be made to "shoofly" the transmission line around the existing Meeteetse, Pitchfork, and Hoodoo taps to allow replacement of the tap structures. A shoofly in this case is the placement of a pole and equipment around tap locations that allow the circuit to maintain service.

2.3.1 Transmission Facilities

2.3.1.1 Design Characteristics

Physical characteristics of the proposed facilities are shown on Table 2-1. Western designs, constructs, operates, and maintains transmission lines to meet or exceed the requirements of the National Electrical Safety Code (NESC), U.S. Department of Labor Occupational Safety and Health Standards, and Western's own policies for maximum safety and protection of landowners, their property, and the public. All permanent improvements in proximity to the line, such as fences, gates, and metallic structures, would be grounded in accordance with existing codes. Western's 115-kV design meets and/or exceeds raptor protection guidelines established by the Raptor Research Foundation (Olendorff et al. 1981).

The proposed transmission line structures would be single circuit, wood-pole, H-frame structures. The structure type is depicted in Figure 2-1. Insulators would be attached to a horizontal member (cross-arm) near the top of each structure. Conductors would be attached to the insulators. The nonspecular conductors would consist of steel strands encased by aluminum strands. Insulators would be made of porcelain or a polymer material and would be light brown or gray in color. Overhead ground wires would be installed at the top of the structure to provide protection from direct lightning strikes.

Table 2-1**Typical 115-kV Transmission Line Design**

Description		1 oct. H-Frame Wood Pole
Voltage:	line design	115-kV
	initial operation	69-kV
ROW width (feet)		80
Span between structures: average (feet)		700
Span between structures: typical maximum (feet)		875
Number of structures/mile (average span)		7.5
Height of structures: average (feet)		52
Height of structures: typical range (feet)		43 to 79
Structure base area (square feet)		45
Land disturbed by construction at each structure base (maximum in square feet)		5,600
Miles of line per conductor stringing site		2 to 3
Land disturbed at each stringing site (acres)		1
Minimum ground clearance beneath conductor at 120°F (feet)		23
Minimum ground clearance beneath conductor at 176°F ¹ (feet)		21
Maximum height of agricultural machinery that can be safely operated on the ROW (feet)		15
Circuit configuration		Horizontal
Conductor size (circular mils)		477,000

¹Maximum expected temperature.

2.3.1.2 Right-of-Way Needs

Typically, an 80-foot ROW width would be needed for the 115-kV single-circuit line to meet the clearance requirements of electrical safety codes, to provide working space for maintenance activities, and to protect buildings or other structures near the ROW from electrical hazards. Additional easements would be acquired for the proposed ROW and for roads and trails required for off-ROW access to and from the line. Easements across Federal and state land would be negotiated with the managing agencies (e.g., Bureau of Land Management [BLM]). All easements across private land would be acquired in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646) and other applicable laws and regulations governing Federal acquisition of property rights. Landowners would be paid fair market value for rights acquired. Every effort would be made to acquire these rights by direct purchase; however, if the necessary rights cannot be acquired by negotiated agreement, eminent domain proceedings would be instituted to obtain these rights. All transmission line and access trail easements acquired would provide for the payment of damages caused by the construction or maintenance of the line. Following construction, the ROW may be used by the landowner for purposes that do not create a safety hazard or interfere with the rights of Western, as set forth in the contract and grant of easement or the declaration of taking.

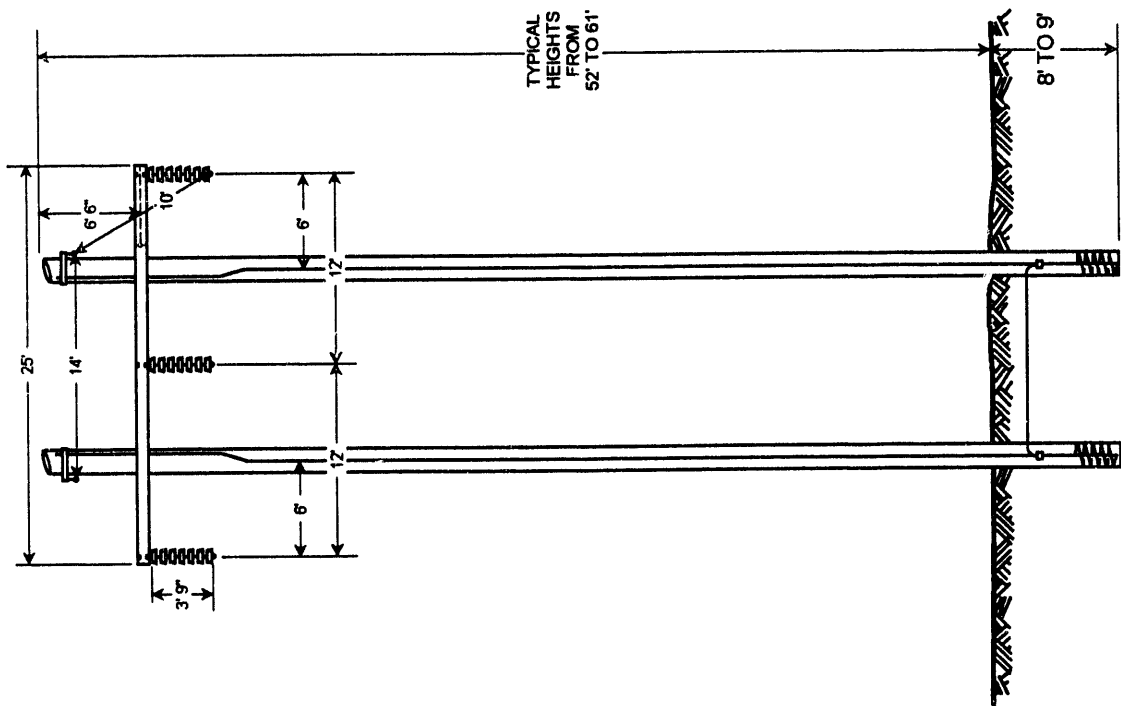
2.3.1.3 Construction

Construction of the proposed transmission line would begin with disconnecting the existing Big George to Carter Mountain 69-kV line from the Carter Mountain Substation and removing the existing 69-kV transmission line between the Carter Mountain Substation and Meeteetse Tap. Construction would progress toward the Big George Substation sequentially with removal of individual line segments followed by construction of the new transmission line segment. Provisions would be made to shoofly the transmission line around the existing Meeteetse, Pitchfork, and Hoodoo taps to allow replacement of the tap structures.

Construction of the proposed transmission line would include the following sequential activities performed by small crews progressing along a length of line:

- Surveying;
- Access trail repair/improvement;
- Demolition and removal of existing transmission line;
- Structure site clearing/grading;
- Construction materials hauling;
- Excavation of pole holes;

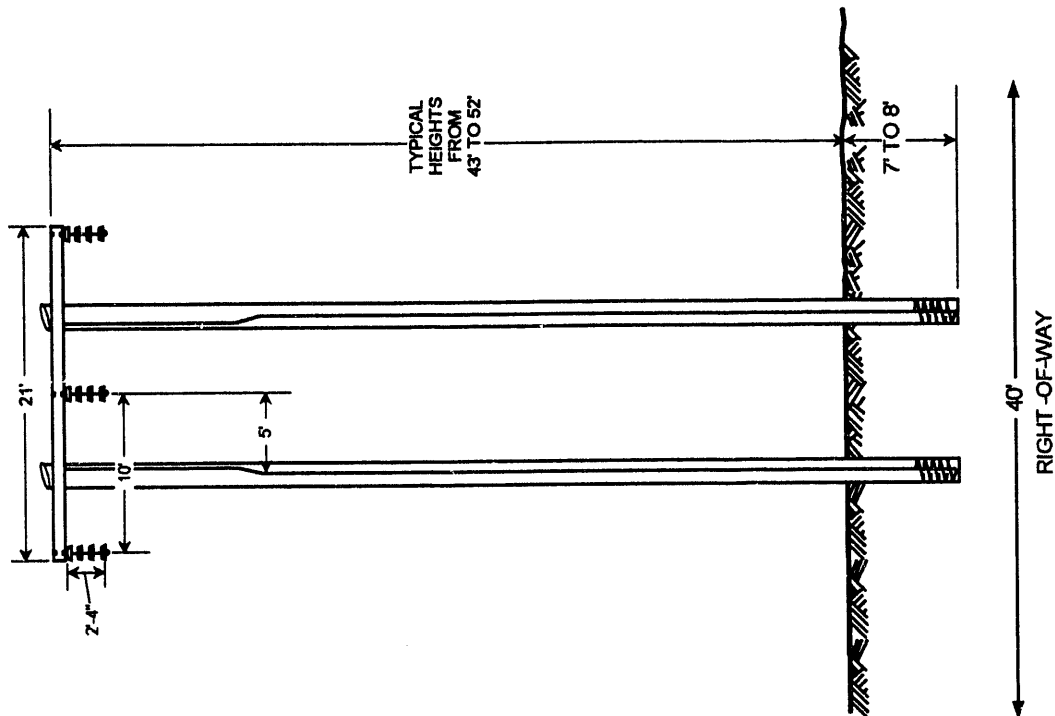
PROPOSED 115-KV WOOD H-FRAME STRUCTURE



80' RIGHT-OF-WAY

Figure 2-1. Proposed and Existing Transmission Line Structures

EXISTING 69-KV WOOD H-FRAME STRUCTURE



40' RIGHT-OF-WAY

-
- Structure assembly/erection;
 - Ground wire and conductor stringing; and
 - ROW cleanup and restoration

The approximate number of personnel and equipment required for construction of the project is shown in Table 2-2. The peak work force is estimated to be 25 to 35 workers. Construction of the line would require approximately 1 year and is scheduled for fall of 1994. The acres of disturbance associated with construction are shown in Table 2-3 by project activity.

Surveying. Survey work would locate the transmission line centerline, determine accurate profiles along the centerlines, locate structures, and determine the exact location and rough profiles of access trails.

Access. Access along the ROWs would be required for the construction, operation, and maintenance of the proposed transmission system. Access by heavy construction vehicles and equipment to each structure site would be required, but not necessarily along the entire length of the ROW. Wherever possible, access to the ROW and each structure would be by existing roads and trails. Most of the new transmission line would be built on the existing ROW, where road or trail access already exists. At most locations these access trails are located within the existing ROW. Map 2-2 (located at the back of this document) depicts the access trails to the proposed and existing transmission line ROWs.

Approximately 30 to 50 percent (12 to 15 miles) of the existing access trail system would be repaired to allow construction equipment to reach structure sites. In some locations, particularly on steep slopes, broken terrain, and drainageways, the existing roads and trails may require improvement (i.e., grading, widening, or culverting of drainageway crossings) to allow passage of construction equipment. Dry Creek drainage (mileposts [MPs] 6.8-7.55) may require improved access to avoid eroded stream banks and wetlands present within this area. A second area that may require both a new and/or improved access trail is located directly north of the Carter Mountain Substation (MPs 26.1-28.3) along the proposed ROW realignment.

An estimated 3 miles of new access trails would be required for project construction and operation. New access trails are depicted for the proposed reroute on Map 2-2, located at the back of this document. The majority of new access trails would be constructed as short spurs leading from existing roads to structure sites.

New access trails would be routed to minimize damage to terrain and vegetation. Trails would be aligned to cross intermittent drainages at right angles, wherever possible, and would normally

Table 2-2**Typical Personnel and Equipment
for Transmission Line Construction**

Activity	No. of Persons	Equipment
Surveying	4	Pickup trucks
Access trail construction and structure site grading	2	Dozer or blade, pickup trucks
Demolition and removal of existing transmission line	4 - 6	1-3 hydrocranes, 4-6 pickup trucks, 1-3 flatbed trucks
Clearing of ROW, construction yard, wire handling site, and structure site	2	Dozer or blade, pickup trucks
Materials hauling	8 - 12	2 tractor trailers, 2 hydrocranes, 3 pickup trucks, 2 flatbed trucks
Foundation excavation	4 - 8	2-4 tractors with augers, 2-4 pickup trucks, 2 backhoes
Structure assembly	6-12	1-3 hydrocranes, 4-6 pickup trucks, 1-3 flatbed trucks
Structure erection	4 - 6	1 crane (50- to 100-ton capacity), 2 pickup trucks
Groundwire and conductor stringing	5 - 10	Reel trailer, tensioner, puller, digger, winch truck, pickup trucks, high-reach dozers (bucket trucks)
Cleanup	3 - 6	Flatbed and/or pickup trucks
Seeding	3	Disc plow with tractor, drill seeder or hydroseeder, pickup truck, flatbed truck

Note: Most of the activities above are expected to progress sequentially, and the peak number of people in the area at any one time is expected to be 25 to 35.

Table 2-3**Surface Area Disturbed During Construction of
the Big George to Carter Mountain Transmission Line Project**

Project Component	Miles¹	Short-Term Disturbance (Acres)	Long-Term Disturbance (Acres)
New access trails required ²	3.0	4.3	4.3
Existing trails requiring repair ³	15.0	22.0	22.0
Structure sites ⁴	N/A	27	0.2
Conductor stringing sites ⁵	N/A	11	N/A
Staging areas (2 required)	N/A	10	N/A
Total	18.0	74.3	26.5

¹Based on a total line length of 28.3 miles. Currently about 1 mile of new access, located along the proposed reroute, has been identified on Map 2-2. It is anticipated that an additional 2 miles of spur roads will be necessary to access new structure locations.

²New access trail width would be 12 feet. Blading would be kept to the minimum necessary for construction access. Access trails would disturb pasture and rangeland; wetland and riparian areas would be avoided.

³Existing trails requiring repair include about 30 to 50 percent of the existing trails, or between 12 and 15 miles. Only areas with erosion problems or areas not passable to construction equipment would be repaired.

⁴Average span between H-frame wood pole structures would be 700 feet and land disturbance during construction at each structure would be 5,600 square feet. A total of 211 structures would be erected. Each structure would permanently occupy approximately 45 square feet.

⁵Average miles of line per conductor stringing site would be 2.5 miles. Land disturbance at each conductor stringing site would be 1 acre.

N/A = Not Applicable.

cross without culverts, if this can be achieved without eroding side banks. If a drainage is narrow with steep, high banks, then a culvert adequately sized to carry the heaviest construction equipment and large enough to carry the highest projected runoff would be installed. Access trails would be 10 to 12 feet wide on the running surface and would be outsloped. These trails would be used for construction, but also would be used throughout the life of the transmission line for operation and maintenance activities.

Demolition and Removal of Existing Transmission Line. The existing transmission line would be deenergized, and the conductors would be removed, followed by removal of all hardware. Existing poles would be completely removed (i.e., excavated from the ground), if new poles would be located on the same site. Structures also would be completely removed in irrigated fields or pasturelands where new structures were not required; abandoned holes would be backfilled and recompacted. All other poles would be cut off at or below ground level. Poles would be loaded on trucks and removed from the ROW. Some poles and conductors may be salvaged or sold by the contractor; other poles may be disposed of in approved landfills.

ROW Clearing. Clearing of trees is not expected. Clearing of other vegetation types would be performed where necessary to provide access for construction equipment. As part of this task, gates would be installed wherever an access trail crosses an existing fence. Gates would be kept closed but not locked, unless locks are requested by landowners. Construction of the transmission line through cultivated areas may result in temporary loss of crop production. Landowners would be compensated for any production losses incurred during ROW construction, and the cropland would be restored to the original condition, as nearly as practicable.

Construction Yard and Material Handling Sites (Staging Areas). It is estimated that 2 temporary construction yards of not more than 5 acres each would be required. These areas would serve as reporting locations for workers, parking space for vehicles, and storage for equipment and materials. It is anticipated that yard facilities, as needed by the construction contractor, would be provided at locations yet to be identified. The yard facilities would not be located on transmission line ROW. Western would specify in its construction contract that yard facilities would not be established in floodplains, wetlands, and known cultural sites, or near active raptor nests and important wildlife habitats (e.g., prairie dog colonies, crucial deer winter range).

Structure Site Clearing and Grading. At each structure site, an area would be disturbed by the movement of vehicles, assembly of structure elements, and other operations. A construction area measuring approximately 75 x 75 feet would be required temporarily for 115-kV structures. Once structures are erected they would permanently occupy a total of 45 square feet.

Construction Materials Hauling. Construction materials would be hauled to the construction yards from the local highway or rail network and then to structure sites using the access trails described above.

Structure Assembly/Erection. Erection crews would assemble the structures and, using a large crane, position them in excavations. In general, structures would be set directly into holes augured in the ground. The holes would be backfilled and compacted, and excess excavated material spread evenly around or adjacent to the site.

Ground Wire and Conductor Stringing. Reels of conductor and overhead ground wire would be delivered to wire-handling sites spaced approximately every 2 to 3 miles along the ROW. Level locations would be selected so little or no earth moving would be required. These sites may require vegetation clearing and would be disturbed by the movement of vehicles in addition to other construction activities. The conductors and ground wires would then be pulled into place from these locations.

ROW Cleanup and Restoration. All structure assembly and erection pads not required for normal maintenance would be graded to their original contour or to blend with adjacent landforms. Old poles, waste construction materials, and rubbish from all construction areas would be collected and disposed of at approved disposal sites. Cropland would be returned to cultivation, following construction. The intent would be to restore all construction areas as near as feasible to their original condition. Any damaged gates and fences would be repaired.

Erosion Control and Seeding. Western would comply with the requirements of the general NPDES storm water discharge permit since the project would disturb more than 5 acres. As part of this permit, Western would prepare a pollution prevention plan addressing erosion controls and measures. In addition, all disturbed areas on noncultivated land would be reseeded to minimize erosion. Western would consult with landowners and land management agencies on appropriate seed mixes and techniques.

Safety Program. Western would require the contractor to prepare and conduct a safety program (subject to Western's approval) in compliance with all applicable Federal, state, and local safety standards and requirements, and Western's general practices and policies. The safety program would include, but not be limited to, procedures for accident prevention, use of protective equipment, medical care of injured employees, safety education, fire protection, and general health and safety of employees and the public. Western also would establish provisions for taking appropriate actions in the event the contractor fails to comply with the approved safety program.

2.3.1.4 Standard Construction Practices

Western's Standard Construction Practices, which would apply to the proposed project, are presented in Table 2-4. Additional site-specific mitigation measures identified during the analysis of environmental impacts are described in Chapter 4.

2.3.1.5 Operation and Maintenance

The day-to-day operation of the line would be directed by system dispatchers from the Loveland, Colorado, power operations center. These dispatchers use communication facilities to operate circuit breakers that control the transfer of power through the line. These circuit breakers also operate automatically to ensure safety, e.g., in the event of a structure or conductor failure.

Western's preventive maintenance program for transmission lines would include routine aerial and ground patrols. Aerial patrols would be conducted four times per year. Ground patrols would be conducted once a year to identify damaged equipment (i.e., structures, insulators, and conductors). In addition, climbing inspections would be conducted on an on-going basis, with each structure being climbed and inspected once every 5 years. Maintenance may include repairing damaged conductors, inspecting and repairing structures, and replacing damaged and broken insulators. In addition to maintaining the transmission line, Western would maintain gates installed by Western on access trails and maintain the access trails to minimize erosion. Transmission lines may be damaged by storms, floods, vandalism, or accidents and require immediate repair. Emergency repair would involve prompt movement of crews to repair damage and replace any equipment. If access trails are damaged as a result of the repair activities, Western would repair them, as required.

Various practices may be used at structures and along the transmission line ROW to prevent undesirable vegetation. Because of the semiarid, sparsely vegetated nature of the project area, very minor and infrequent measures would be necessary to control vegetation. Herbicides would normally not be used within the transmission line ROW, unless requested by the landowner for the purposes of reducing noxious weeds around transmission line structures. In the event that cropland areas would be impacted by project operational procedures, the landowner would be compensated for any crop losses resulting from these activities.

2.3.1.6 Abandonment

At the end of the useful life of the proposed project, the transmission line would either be replaced or removed. In either case, the ground wires, conductors, insulators, and hardware would be dismantled and removed from the ROW. Wood poles would be cut off at or below ground level.

Table 2-4

Standard Construction Practices

-
1. The contractor shall limit the movement of crews and equipment to the ROW, including access routes. The contractor shall limit movement on the ROW to minimize damage to grazing land, crops, orchards, and property, and shall avoid marring the lands. The contractor shall coordinate with the landowners to avoid impacting the normal function of irrigation devices during project construction and operation.
 2. When weather and ground conditions permit, the contractor shall obliterate all construction-caused deep ruts that are hazardous to farming operations and to movement of equipment. Such ruts shall be leveled, filled and graded, or otherwise eliminated in an approved manner. Ruts, scars, and compacted soils in hay meadows, alfalfa fields, pastures, and cultivated productive lands shall have the soil loosened and leveled by scarifying, harrowing, disking, or other approved methods. Damage to ditches, tile drains, terraces, roads, and other features of the land shall be corrected. At the end of each construction season and before final acceptance of the work in these agricultural areas, all ruts shall be obliterated, and all trails and areas that are hard-packed as a result of construction operations shall be loosened and leveled. The land and facilities shall be restored as nearly as practicable to their original condition.
 3. Water turnoff bars or small terraces shall be constructed across all ROW trails on hillsides to prevent water erosion and to facilitate natural revegetation on the trails.
 4. The contractor shall comply with all Federal, state, and local environmental laws, orders, and regulations. Prior to construction, all supervisory construction personnel will be instructed on the protection of cultural and ecological resources. To assist in this effort, the construction contract will address: a) Federal and state laws regarding antiquities and plants and wildlife, including collection and removal; and b) the importance of these resources and the purpose and necessity of protecting them.
 5. The contractor shall exercise care to preserve the natural landscape and shall conduct his construction operations so as to prevent any unnecessary destruction, scarring, or defacing of the natural surroundings in the vicinity of the work. Except where clearing is required for permanent works, approved construction roads, or excavation operations, vegetation shall be preserved and shall be protected from damage by the contractor's construction operations and equipment.
 6. On completion of the work, all work areas except access trails shall be scarified or left in a condition that will facilitate natural revegetation, provide for proper drainage, and prevent erosion. All destruction, scarring, damage, or defacing of the landscape resulting from the contractor's operations shall be repaired by the contractor.
 7. Construction trails not required for maintenance access shall be restored to the original contour and made impassable to vehicular traffic. The surfaces of such construction trails shall be scarified as needed to provide a condition that will facilitate natural revegetation, provide for proper drainage, and prevent erosion.

Table 2-4 (Continued)

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8. Construction staging areas shall be located and arranged in a manner to preserve trees and vegetation to the maximum practicable extent. On abandonment, all storage and construction materials and debris shall be removed from the site. The area shall be regraded, as required, so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural revegetation, provide for proper drainage, and prevent erosion.
 9. Borrow pits shall be so excavated that water will not collect and stand therein. Before being abandoned, the sides of borrow pits shall be brought to stable slopes, with slope intersections shaped to carry the natural contour of adjacent, undisturbed terrain into the pit or borrow area, giving a natural appearance. Waste piles shall be shaped to provide a natural appearance.
 10. Construction activities shall be performed by methods that prevent entrance or accidental spillage of solid matter, contaminants, debris, and other objectionable pollutants and wastes into streams flowing or dry water courses, lakes, and underground water sources. Such pollutants and wastes include, but are not restricted to, refuse, garbage, cement, concrete, sanitary waste, industrial waste, radioactive substances, oil and other petroleum products, aggregate processing tailings, mineral salts, and thermal pollution.
 11. Dewatering work for structure foundations or earthwork operations adjacent to, or encroaching on, streams or water courses shall be conducted in a manner to prevent muddy water and eroded materials from entering the streams or water courses by construction of intercepting ditches, bypass channels, barriers, settling ponds, or by other approved means.
 12. Excavated material or other construction materials shall not be stockpiled or deposited near or on stream banks, lake shorelines, or other water course perimeters where they can be washed away by high water or storm runoff or can in any way encroach upon the actual water source itself.
 13. Waste waters from construction operations shall not enter streams, water courses, or other surface waters without use of such turbidity control methods as settling ponds, gravel-filter entrapment dikes, approved flocculating processes that are not harmful to fish, recirculation systems for washing of aggregates, or other approved methods. Any such waste waters discharged into surface waters shall be essentially free to settleable material. Settleable material is defined as that material that will settle from the water by gravity during a 1-hour quiescent detention period.
 14. The contractor shall utilize such practicable methods and devices as are reasonably available to control, prevent, and otherwise minimize atmospheric emissions or discharges of air contaminants.

Table 2-4 (Continued)

-
15. Equipment and vehicles that show excessive emissions of exhaust gases due to poor engine adjustments, or other inefficient operating conditions, shall not be operated until corrective repairs or adjustments are made.
 16. Burning or burying of waste materials on the ROW or at the construction site will not be allowed. The contractor shall remove all waste materials from the construction area. All materials resulting from the contractor's clearing operations shall be removed from the ROW.
 17. The contractor shall make all necessary provisions in conformance with safety requirements for maintaining the flow of public traffic and shall conduct his construction operations so as to offer the least possible obstruction and inconvenience to public traffic.
 18. Western will apply necessary mitigation to eliminate problems of induced currents and voltages onto conductive objects sharing a ROW, to the mutual satisfaction of the parties involved. Western will install fence grounds on all fences that cross or are parallel to the proposed line.
 19. The contractor will span the riparian areas located along the ROW and avoid physical disturbance to riparian vegetation. Equipment and vehicles will not cross riparian areas on the ROW during construction and operation activities. Existing bridges or fords will be used to access the ROW on either side of riparian areas.
-

Cranes, large trucks, and pickup trucks, as well as earth-moving equipment in a few of the steeper areas, would be required for efficient removal of the transmission line. Following abandonment and removal of the transmission line, any areas leveled for equipment required to dismantle the line would be regraded as near as feasible to their original condition. Similarly, areas disturbed and stripped of vegetation during the dismantling process would be regraded and reseeded to prevent erosion.

2.4 Comparison of Impacts of Western's Proposed and Existing Routes

Wester considered rebuilding the transmission line entirely along the existing ROW. Table 2-5 presents a comparison of Western's proposed route and Western's existing 69-kV transmission line ROW. The environmental differences between the routes are, for the most part, minor. Western's proposed route would be visible from Highway 120 for 1 mile less than the existing 69-kV route. This is achieved by locating the line behind a ridgeline located north of the Carter Mountain Substation.

Table 2-5**Comparison of Proposed and Existing Routes for the
Big George to Carter Mountain Transmission Line Project**

Environmental Inventory Factor	Western's Proposed Route	Western's Existing 69-kV Transmission Line ROW
Total line length (miles)	28.3	28.2
Follows existing route (miles)	26.1	28.2
Existing trail access (miles)	27.9	28.2
Private land crossed (miles)	15.9	15.7
Residences within 0.25 mile (number)	8	8
Irrigated cropland crossed (miles)	2.7	2.7
Improved pastures crossed (miles)	0.5	0.5
Floodplains crossed (miles)	0.7	0.7
Perennial water sources crossed (number)	6	6
Structures located within floodplain (number)	3	4
Wetlands spanned (number)	9	9
Crucial mule deer winter-yearlong range crossed (miles)	11.1	11.1
Crucial pronghorn winter range crossed (miles)	0.6	0.6
National Register-eligible archaeological and historical sites affected (number)	4	4
Sensitive (VRM Class II) scenic areas crossed (miles)	1.8	1.8
Line visible from Highway 120	9.9	10.9
Moderate (15 - 30%) slopes crossed (miles)	1.9	1.9
Excessive (>30%) slopes crossed (miles)	0	0

3.0 AFFECTED ENVIRONMENT

The study area covers about 240 square miles. Its northern boundary begins approximately 7 miles south of Cody, Wyoming, and extends to about 7 miles south of Meeteetse, Wyoming. The eastern and western boundaries extend 4 miles on either side of the existing Big George to Carter Mountain 69-kilovolt (kV) transmission line (see Map 3-1).

The study area is rural and undeveloped, characterized by a few scattered residences, the small town of Meeteetse, and miles of undeveloped open rangeland. Common land uses include livestock grazing, farming along stream bottoms, and oil and gas development. Highway 120, running north and south between Cody and Thermopolis, is the only major highway in the study area.

The following sections describe the environmental components potentially affected by transmission line construction and operation.

3.1 Climate and Air Quality

The climate of the study area is characterized as semi-arid continental. The region between Thermopolis and Cody is located in the foothills of the Absaroka Range of the Rocky Mountains. The mean annual temperature at Cody is 46°F. Monthly average temperatures at Cody range from 70°F in July to 24°F in January. The higher terrain within the majority of the study area is expected to generally produce slightly cooler average temperatures and more moderate temperature extremes relative to the Cody data. Maximum precipitation occurs during the spring with the driest months being during the winter. Mean annual precipitation in Cody is 9.69 inches of water equivalent moisture. Average growing season length is 151 days in Cody. Severe weather in the region can include periods of heavy snowfall accompanied by strong winds and blowing and drifting snow resulting in blizzard conditions. Springtime and summer bring severe thunderstorms accompanied by brief periods of heavy downpours, hail, lightning, and strong gusty winds (National Oceanic and Atmospheric Administration [NOAA] 1974).

Visibility in the region is excellent with median yearly visual range of approximately 70 miles. Air quality in the region is very good. With the exception of small local population centers, there are no known significant sources of air emissions. Particulate data from Cody, the only urban community in the study area, reflect the clean nature of local air quality. Data collected at Cody in 1991 show a mean maximum 24-hour Total Suspended Particulate (TSP) concentration of 37 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), well below the Wyoming TSP standard of 150 $\mu\text{g}/\text{m}^3$.

One recorded violation of TSP occurred in 1991 caused by local construction. Wyoming regulations allow one violation per year. The 24-hour Inhalable Particulates (PM-10) averaged $24 \mu\text{g}/\text{m}^3$ in 1991, which is well below the $50 \mu\text{g}/\text{m}^3$ Federal Standard (Wyoming Department of Environmental Quality [WDEQ] 1991). There are no gaseous pollutant data available for the region; however, no significant levels are believed to exist. Pollutant levels in rural undeveloped areas are generally lower than those found in urban settings such as Cody.

3.2 Paleontology, Geology, and Soils

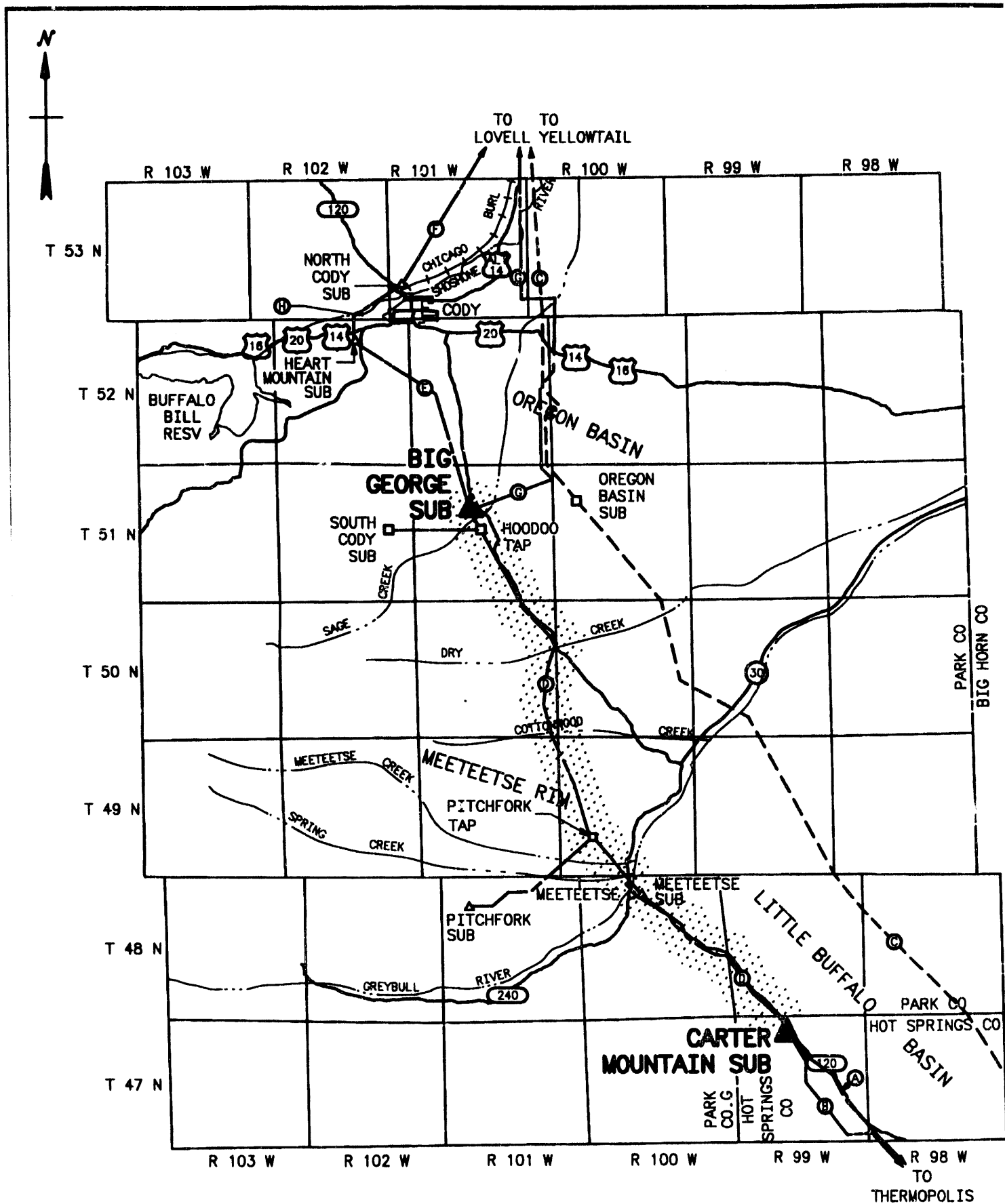
No protected paleontological resources have been documented in the project area (Bureau of Land Management [BLM] 1989a). Under Federal legislation, only scientifically important paleontological resources found on Federal land are protected against collection and destruction. The BLM typically regards only vertebrate fossils as being scientifically important.

Five geologic formations occurring in the project area have been recognized by the BLM as fossil-bearing formations. The following fossils may be found within these formations: Cody Shale - mollusks and crustaceans; Mesaverde - dinosaur bones; Meeteetse - dinosaur bones; Lance - dinosaur bones; and Fort Union - casts of fossil leaves and plants (BLM 1976; Bies 1992).

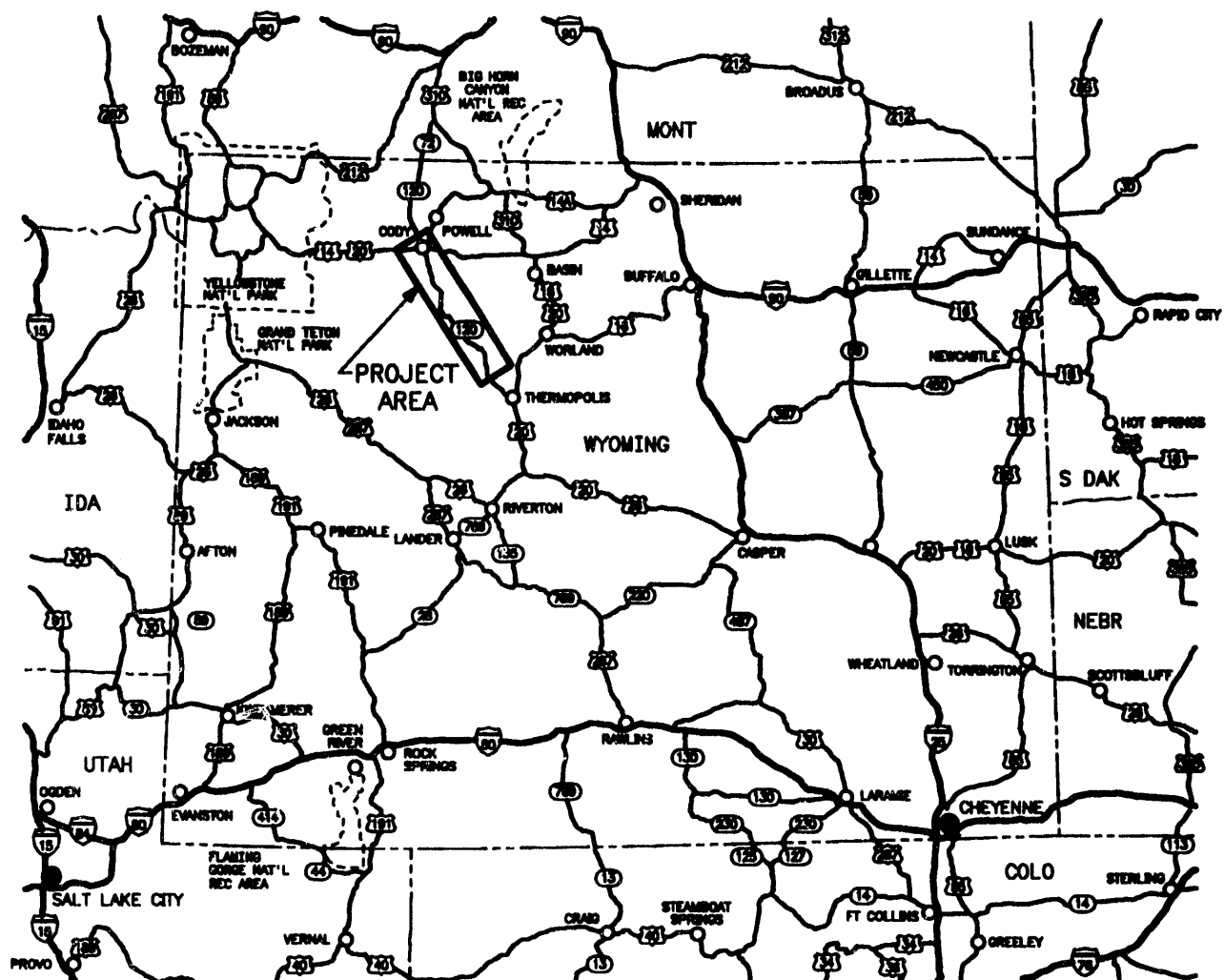
The project area is located on the southwestern "basin shoulder" of the Bighorn Basin in northcentral Wyoming (Lageson and Spearing 1988). The majority of the proposed route would traverse land that is underlain by bedrock composed of sandstone, claystone, sandy shale, and shale. These bedrock formations include the Cody Shale, Mesaverde, Meeteetse, Lance, and Fort Union Formations. Surficial geologic deposits include the alluvium, colluvium, pediments, alluvial fans, and glacial till.

The Greybull River Valley is a floodplain that consists of alluvium and colluvium. Alluvium and colluvium includes geologic materials such as clay, silt, sand, and gravel in floodplains, fans, terraces, and slopes. These geologic materials are currently being utilized by local farmers as cultivated cropland for the production of various agricultural crops.

No geologic hazards were observed during a reconnaissance of the project area, although areas of moderate to steep slopes (i.e., potential erosion hazard) were noted. No areas of slumping, subsidence, or unstable soils were observed. The proposed route would not traverse areas of.



LOCATION MAP



STATE MAP

KEY

- (A)— WESTERN'S CARTER MOUNTAIN-THERMOPOLIS 69KV LINE
- (B)— TRI-STATE'S CARTER MOUNTAIN-THERMOPOLIS 115KV LINE
- (C)— PP&L'S THERMOPOLIS-YELLOWTAIL 230KV LINE
- (D)— WESTERN'S BIG GEORGE-CARTER MOUNTAIN 69KV LINE
- (E)— WESTERN'S BIG GEORGE-HEART MOUNTAIN 69KV LINE
- (F)— WESTERN'S HEART MOUNTAIN-LOVELL 69KV LINE
- (G)— TRI-STATE'S BIG GEORGE-LOVELL 115KV LINE
- (H)— WESTERN'S HEART MOUNTAIN-NORTH CODY 69KV LINE

Map 3-1 Big George to Carter Mountain Project Area

active faults (Howard 1978) or with high susceptibility for landslide activity (Radbruch-Hall et al. 1976). The project area is located in a seismic zone that is not expected to have strong ground motion from a maximum credible earthquake (Algemissen et al. 1982). Soil surveys have been completed for the majority of the project area. The BLM recently conducted an Order III soil survey of the BLM-administered lands located in eastern Park County (Bateson 1992). The Soil Conservation Service (SCS) has conducted detailed surveys of private lands along drainage bottomlands, including Meeteetse Creek and the Greybull River. No detailed soil surveys have been conducted south of Meeteetse.

A total of 13 different soils would be traversed by the proposed route. These soils include: the Rock Outcrop-Shingle-Tassel complex, Fluvents-Fluvaquents complex, Forkwood-Cushman Dry-Hiland association, Hiland-Forkwood Variant association, Shingle-Thedalund-Midway complex, Zigweid-Thedalund-Shingle association, Gaynor-Midway-Stutzman silty clay loams, Zigweid-Stoneham complex, Midway-Shingle-Rock Outcrop complex, Tassel-Worland Variant-Rock Outcrop complex, Tassel-Bowbac-Terry complex, Midway very gravelly-Shingle very gravelly-Nihill complex, and Blazon-Rock Outcrop (BLM 1989b).

Soils located along Meeteetse Creek consist of various textures, which include loam, clay loam, sandy loam, and sandy clay loam (SCS 1992). These soils primarily range from 0 to 6 percent slope and are considered moderately deep to deep soils. Soils located along the Greybull River consist of various textures that include loam, clay loam, sandy clay loam, and silty clay. These soils primarily range from 0 to 6 percent slope and are considered deep soils. Soils located along Meeteetse Creek and the Greybull River are primarily used for the production of small grains and forage crops. No prime or unique farmland would be affected by the proposed route.

Soil limitations associated with the existing ROW and access trails are confined to small amounts of soil erosion along specific portions of the project ROW or trails. During the 1992 field reconnaissance (ENSR 1992), the only area exhibiting notable soil erosion occurred around the Dry Creek drainage at approximately MP 8.6 (see Map 2-2). Map 2-2 also shows the existing and planned access trails along the ROW, including those that would require repair prior to construction. Repair is most frequently needed where an access trail crosses a wash that has eroded steep banks since the original construction occurred. The remainder of the trail system is either stabilized with native range vegetation or is under cultivation. The condition of the existing access trails and presence of vegetation cover, minimizes the amount of erosion currently observed along the line and indicates good reclamation potential following construction of the new 115-kV line and repair of the access trails.

3.3 Surface Water

The project area is located in the Bighorn Basin within the larger Missouri River Basin (Peterson 1988). The proposed route would intersect six perennial water sources including Sage Creek, Dry Creek, Cottonwood Creek, Meeteetse Creek, Spring Creek, and the Greybull River. Sage Creek, Meeteetse Creek, Spring Creek, and the Greybull River flow easterly from their headwaters located along the eastern edge of the Carter Mountain Range and into the low rolling plains of the Bighorn Basin. Numerous intermittent drainages also are intersected by the proposed route.

All of these streams exhibit wide seasonal and annual variations of discharges based on differences in climatic conditions and physical features (Lowham 1988). Hydrologic changes within the Bighorn Basin also have occurred as a result of increased irrigation development and reservoir construction. These factors contribute to decreased historic flows within the streams and their tributaries.

The main source of perennial flow in the Bighorn Basin is from snowmelt in the mountains, with some additional groundwater discharge (Lowry et al. 1976; Lowham 1988). Annual discharges substantially increase in May and generally peak in June regulated predominantly by snowmelt; however, this may vary year-to-year depending on local weather conditions and specific geographical features (Lowham 1988; Peterson 1988). Subsequent perennial streamflow may be sustained during fall and winter months by groundwater discharge (BLM 1981). Intermittent flows are predominantly associated with snowmelt and rainfall and are, therefore, often separated by periods of no flow (Lowry et al. 1976; Lowham 1988).

Four classes of streams are identified by WDEQ Water Quality Regulations (WDEQ 1983). All Wyoming waters are designated as belonging to one of the following four water quality classifications; the water resources located in the project area are classified as either Class II or IV waters under these water quality standards:

Class I: Those surface waters that shall be maintained at their existing quality and in which no further water quality degradation by point source discharges will be allowed.

Class II: Those surface waters, other than those classified as Class I, that are determined by the WGFD to be presently supporting game fish or have the hydrologic and natural water quality potential to support game fish.

Class III: Those surface waters, other than those classified as Class I, that are determined by the WGFD to be presently supporting nongame fish or have the hydrologic and natural water quality potential to support nongame fish.

Class IV: Those surface waters, other than those classified as Class I, that are determined by the WDFD not to have the hydrologic or natural water quality to support game fish.

The Greybull River is classified as a Class II water. Hydrologic information collected by the United States Geological Service (USGS) for the Greybull River indicates that the river has the following hydrologic qualities:

- Average annual mean discharge of 333 cubic feet per second (cfs);
- Annual mean discharge range of 130 to 566 cfs; and
- Maximum instantaneous discharge of 13,600 cfs.

Dry Creek, Cottonwood Creek, and Meeteetse Creek also are classified as Class II waters; Sage Creek and Spring Creek are classified as Class IV waters. Gaging stations have not been established for these creeks; therefore, hydrologic data for these five streams have not been collected.

3.4 Aquatic Biology

Aquatic resources occurring in the study area are associated with the six perennial drainages crossed by the transmission line. Nearly 75 percent of the perennial stream channels and their associated riparian vegetation located on public lands is declining in overall stability and habitat quality for both fish and wildlife species (BLM 1982). In many of the primary watersheds, livestock grazing pressure has affected the riparian vegetation and has led to associated problems, such as enlarged gullies, increased soil erosion, and subsequent water quality degradation by channel sedimentation. This resource degradation is most apparent along the low elevation perennial drainages, where channel erosion has resulted in the loss of existing woody vegetation and the prevention of seedling establishment (BLM 1982, 1988).

Native fish species that occur in the streams located in the study area include both game and nongame species. Fish densities and species' compositions vary between each of the perennial drainages and their tributaries within the project area, depending on the relevant water quality, seasonal discharge, and the specific location of the proposed line crossing and how that stream segment may be affected by other water requirements such as agricultural activities (McKnight 1990). Nongame species include the mountain sucker, longnose sucker, lake chub,

and longnose dace (McKnight 1990; Baxter and Simon 1970; Yekel 1992). Game species include brown trout, Yellowstone cutthroat, Snake River cutthroat, and mountain whitefish (Yekel 1992).

Streams within the project area also have been classified by the Wyoming Game and Fish Department (WGFD) as to the quality of the fishery that exists according to the following system (WGFD 1987).

- Class 1 - Premium trout waters - fisheries of national importance.
- Class 2 - Very good trout waters - fisheries of statewide importance.
- Class 3 - Important trout waters - fisheries of regional importance.
- Class 4 - Low production trout waters - fisheries of local importance, incapable of sustaining substantial fishing pressure.
- Class 5 - Very low production waters - often incapable of sustaining a trout fishery.

Trout fisheries for the streams crossed by the proposed route are restricted to upstream reaches, while nongame species occur in the middle and downstream reaches where line crossings would be located. Stream classifications for the segments crossed by the proposed route may differ from the classifications that apply further upstream, depending on water flow and fish species present. The absence of fish in some of the stream segments can be attributed to low flows (BLM 1982).

The Greybull River is classified as a Class 4 fisheries along the stretch crossed by the proposed route (WGFD 1987). The river supports a number of both nongame and game fish species. Nongame species would include longnose sucker, mountain sucker, longnose dace, and lake chub. Game species would include brown trout, Yellowstone cutthroat, Snake River cutthroat, and mountain whitefish (Yekel 1992). The Greybull River is considered an important local fishery.

Sage Creek also is classified as Class 4 in the area crossed by the project route (WGFD 1987). No viable fishery is known to occur at this location (Yekel 1992).

Dry Creek is classified as Class 4. No prominent fisheries are associated with this drainage. A limited number of nongame species may inhabit certain reaches of the creek (Yekel 1992).

Cottonwood Creek is classified as Class 5. No fish species are associated with this drainage (Yekel 1992).

Meeteetse Creek is classified as Class 3 (WGFD 1987). This creek maintains a small fishery, with Yellowstone cutthroat, Snake River cutthroat, and mountain whitefish present (Yekel 1992).

Spring Creek is classified as Class 4 (WGFD 1987). No fisheries occur within this small drainage (Yekel 1992).

Existing stream habitats in the project area are characterized by the decreasing amount of riparian bank cover, scouring of the channel bottom, bank erosion, and increased sedimentation. Damaged stream banks wash away during annual high flows, consequently widening the channels, decreasing water depth, and contributing to the loss of spawning areas, thereby reducing the capabilities of these drainages to support viable fish populations.

3.5 Floodplains and Wetlands

The project area is located in the Bighorn River Basin within the larger Missouri River Basin (Peterson 1988). The surface hydrology of the region is discussed in Section 3.3. Floodplains and wetlands are associated with the perennial streams found in the project area. These sensitive areas were identified from color-infrared, high altitude aerial photography; low-altitude videotapes; and the field reconnaissance.

Flood hazard boundary maps produced by the Federal Emergency Management Agency (FEMA) did not provide complete coverage of the entire proposed route. Approximately 20 miles (71 percent) of the proposed route was covered by FEMA maps. Maps were not printed for approximately 8.2 miles (29 percent) of the proposed route. The two route segments for which flood hazard boundary maps were not printed include MPs 0.0 to 6.2 and MPs 26.2 to 28.2. Sage Creek is the only perennial stream that occurs in a portion of the project area for which flood hazard boundary maps have not been produced. The floodplain width for Sage Creek was determined using USGS topographic maps as described below.

The proposed route would traverse three special flood hazard areas (i.e., 100-year floodplains) (see Table 3-1). These floodplains include Sage Creek, Meeteetse Creek, and the Greybull River (FEMA 1978 and 1987), which are indicated on Map 2-2, Sheets 1, 3, and 4 (located at the back of this document).

Sage Creek would be crossed by the proposed route at MP 0.6. This creek meanders through a landscape consisting of rolling hills of rangeland. The active stream channel is 3 to 4 feet wide. Since the 100-year floodplain of Sage Creek has not been delineated by FEMA at the proposed crossing site, an extrapolation of various data was used to estimate the width. The 100-year floodplain along Sage Creek was delineated by FEMA on a published flood hazard boundary map

Table 3-1

Floodplains and Wetlands Traversed by the Proposed Route

Floodplains	Approximate MP	Width of Crossing	Number of Structures	
			Current ¹	Proposed ²
Sage Creek	0.6	500 feet	spanned	spanned
Meeteetse Creek	16.3	1,800 feet	3	2
Greybull River	18.8	1,200 feet	1	1

¹The number of 69-kV transmission line structures that currently occur within the floodplain.

²The estimated number of 115-kV structures that will likely be located within the floodplain, based on the proposed transmission line alignment and a 700-foot average span length.

Wetlands Number	Approximate MP	NWI ¹ Classification	Number of Structures ²	Associated Creek or Drainage
1	4.0	R4SBA	spanned	Coal Mine Gulch
2	7.4	PEMC	spanned	Unnamed drainage to Dry Creek
3	7.6	PABFh	spanned	Dry Creek
4	8.5	PEMA	spanned	Dry Creek
5	8.7	PEMC	spanned	Unnamed drainage to Dry Creek
6	11.8	R4SBA (PEMC)	spanned	Cottonwood Creek
7	12.3	PEMC	spanned	Unnamed drainage to Cottonwood Creek
8	14.6	PEMC	spanned	Long Hollow
9	18.7	PEMC	spanned	Wetland immediately adjacent to the Greybull River

¹PEMC - Seasonally flooded palustrine emergent wetland.
PEMA - Temporarily flooded palustrine emergent wetland.
R4SBA (PEMC):
R4SBA - Temporarily flooded intermittent river.
(PEMC) - Ground-truthed classification.
PABFh - Palustrine aquatic bed, diked/impounded.

whose coverage ends just west of the proposed crossing site. The width of the 100-year floodplain at the edge of this map and 0.6 mile west of the proposed crossing site is approximately 600 feet. The width at the crossing site was estimated to be approximately 500 feet, based on information obtained during a field reconnaissance and measurement of the floodplain width between distinctive topographic contours on the USGS 7.5 minute topographic map. The active stream channel is slightly incised and the streambed consists of sediments, such as clay, silt, and sand. Vegetation along the creek consists of herbaceous species with few shrub and tree species. Common plant species established along Sage Creek include sedges, spikerushes, rushes, bluegrass, western wheatgrass, big sagebrush, various forbs, and willows. Few willows were observed growing within the floodplain; those individuals that were located at the proposed crossing site had a low growth form and would not be considered a physical obstruction during construction or operation. Currently, no structures for the 69-kV transmission line occur within the Sage Creek floodplain. Construction of the proposed route would not result in the placement of additional structures within this floodplain area.

Meeteetse Creek meanders through irrigated pastures and rolling hills of rangeland in the vicinity of the proposed route crossing at MP 16.3. The active stream channel is 6 to 10 feet wide and the floodplain is approximately 1,800 feet wide. The streambed consists of sand, gravel, and small rocks in addition to minor amounts of silt and clay deposits. Vegetation established along the creek includes a mixture of herbaceous and shrub species. Herbaceous species include sedges, spikerushes, rushes, various forbs, bluegrass, and western wheatgrass. Shrub species that are established along the creek include willows and big sagebrush. A total of three structures currently occur within the Meeteetse Creek floodplain. In comparison, construction of the proposed route would result in the placement of only two transmission line structures within the floodplain.

The proposed route would cross the Greybull River at MP 18.8. This river intersects cultivated cropland that is situated within the 100-year floodplain. The river channel has a braided-channel configuration, which leads to the formation of numerous islands within the high-water mark boundaries. The streambed width at the crossing site of the proposed route is approximately 120 feet. The streambed substrate consists of small rocks, boulders, gravel, and sand. The floodplain width crossed is about 1,200 feet. Tree and shrub species at the crossing include narrow-leaved cottonwood, willows, and big sagebrush. Herbaceous species include sedges, bluegrass, and various forbs. Currently, one 69-kV transmission line structure occurs within the Greybull River floodplain. The proposed 115-kV transmission line would not add any additional structures within this floodplain area.

The proposed route would span nine wetlands. Table 3-1 lists these wetland areas by milepost, the National Wetland Inventory (NWI) classification, and the associated drainage. Wetland

locations are shown on Map 2-2, located at the back of this document. Wetlands located along intermittent drainages occur in depressions within the drainage that collect water during spring runoff and during periods of high runoff after intense thunderstorm activity. Vegetation includes herbaceous species such as sedges, spikerushes, bulrushes, and buttercups. Wetlands located along perennial water sources also occur in landscape depressions immediately adjacent to the creek or river. Plant species found growing in these wetlands were also herbaceous species. One of the nine wetlands spanned by the proposed route is a stock pond located at MP 7.6 (see Map 2-2, Sheet 2). Wetland species that were observed at the pond include sedges, spikerushes, rushes, and buttercups.

3.6 Vegetation

The proposed route would traverse the wheatgrass-needlegrass shrubsteppe (*Agropyron-Stipa-Artemisia*) and saltbush-greasewood (*Atriplex-Sarcobatus*) vegetation complexes, as mapped by Kuchler (1975). Elevation within the project area ranges from 4,500 to 5,500 feet with 8- to 10-inch annual precipitation. Seven vegetation types are located in the project area: 1) big sagebrush, 2) grassland, 3) saltbush, 4) greasewood, 5) Utah juniper, 6) riparian/wetland, and 7) cultivated cropland. The proposed route primarily crosses the big sagebrush and grassland types.

Big sagebrush is the most common vegetation type. It is characterized by low-growing big sagebrush with a limited herbaceous understory. Shrubs are relatively small due to the poor soil and climatic conditions. Understory species include blue grama, Sandberg bluegrass, western wheatgrass, Indian ricegrass, needle-and-thread, and prairie junegrass. Prickly pear, budsage, small rabbitbrush, and scarlet globemallow also may be found in this vegetation type.

The grassland vegetation type consists primarily of blue grama, Sandberg bluegrass, and western wheatgrass. Other grasses include squirreltail, Indian ricegrass, prairie junegrass, needle-and-thread, and red three-awn with some big sagebrush, plains pricklypear, and various forb species.

The saltbush type is generally found in lower flat lying areas where the soils have impermeable layers due to soil clay compaction and high salinity. Plant species include Nuttall saltbush, birdfoot sagewort, plains pricklypear, squirreltail, alkali sacaton, blue grama, red three-awn, and Sandberg bluegrass. On well drained sites, a few grasses such as western wheatgrass and Indian ricegrass remain.

The greasewood type is found on saline floodplains where the water table is near the surface along Sage Creek and other drainages in the project area. Dominant plant species include

greasewood, rubber rabbitbrush, western wheatgrass, Sandberg bluegrass, and various forb species.

The Utah juniper vegetation type occurs in narrow bands along rim rock areas, ridge crests, and rocky talus slopes, such as Cedar Ridge and a ridge located southeast of Meeteetse, Wyoming. This vegetation type is dominated by an overstory consisting of Utah juniper and limber pine with an understory of shrub and herbaceous species, including big sagebrush, black sagebrush, small rabbitbrush, skunkbrush, Indian ricegrass, junegrass, and various forbs.

The riparian/wetland vegetation type occurs along the perennial and intermittent streams. Common species include narrow-leaved cottonwood, willows, rushes, sedges, spikerushes, buttercups, and other forb and grass species. The wetlands that occur in the project area also support most of the species listed for the riparian areas. However, the vegetation growing within the wetlands are primarily herbaceous species. Specific information regarding riparian areas and wetlands are provided in Sections 3.3 and 3.5.

Cultivated cropland in the project area is located along Meeteetse Creek and the Greybull River. Crops include alfalfa, wheat, and other small grains.

3.7 Wildlife

3.7.1 Nongame Species

In the Big George to Carter Mountain study area, habitat types for wildlife include shrub steppe, prairie and foothill grasslands, foothill shrub and woodland, barren cliffs, rocky outcrops, saline bottoms and wet meadows, riparian drainages, and agricultural fields. Wildlife populations using water resources and riparian areas are influenced by stream size, associated wetland vegetation, and habitat structure and diversity.

As discussed in Section 3.4, riparian degradation is prominent along low elevation perennial drainages. Habitat degradation, such as the loss of woody vegetation and lack of seedling development, can limit the capability of riparian habitats to support wildlife (BLM 1982). Some habitat degradation is evident within the study area. However, at the proposed stream crossings, increased water flows originating from oil and gas activities have encouraged growth of riparian vegetation and promoted greater wildlife use. Without these discharges, many of the perennial streams (e.g., Dry Creek) would only be intermittent (Roop 1993).

Amphibian species in the project area include the plains spadefoot, Woodhouse's toad, tiger salamander, chorus frog, and northern leopard frog. Reptiles occurring in the project area include

the northern sagebrush lizard, eastern short-horned lizard, racer, bullsnake, prairie rattlesnake, wandering garter snake, and milk snake (BLM 1981 and 1985; U.S. Fish and Wildlife Service [USFWS] 1987).

Nongame water birds that may be observed in the study area include species such as the western grebe, great blue heron, American coot, American avocet, willet, greater and less yellowlegs, killdeer, and yellow-headed blackbird (BLM 1981; WGFD 1992; ENSR Consulting and Engineering [ENSR] 1992). Terrestrial bird species include the western meadowlark, lark bunting, Say's phoebe, horned lark, and common nighthawk, to mention a few (BLM 1981 and 1985; ENSR 1992).

The closest sandhill crane staging area occurs along the Greybull River west of Otto, Wyoming, over 20 miles northeast of the proposed line crossing of the Greybull River at Meeteetse (Easterly 1993). Sandhill crane use of this staging area has been increasing annually, with approximately 200 birds recorded during the 1992 spring migration (BLM 1988; Easterly 1993).

Raptor species that nest within the project area include the golden eagle, northern harrier, red-tailed hawk, prairie falcon, American kestrel, and great horned owl (Ritter 1989; BLM 1985; WGFD 1992; ENSR 1992). A golden eagle nest occurs within 0.1 mile of the project ROW (ENSR 1992); the nest was inactive the spring of 1992. A red-tailed hawk nest located within 50 yards of the ROW was active during the spring of 1992; one red-tailed adult and one nestling were observed (ENSR 1992). An active golden eagle nest occurs within 1.8 miles of the line, and an active red-tailed hawk's nest is located within 0.9 mile. Two red-tailed hawk nests that were previously active (in 1979) occur within 0.4 mile and 0.9 mile of the route (WGFD 1992). Nests known to be inactive in 1992 include three golden eagle nests located within 0.1, 0.8, and 2.0 miles from the route; one red-tailed hawk nest within 0.1 mile; and one unidentified raptor nest located within 0.3 mile from the project ROW (BLM 1988). The exact locations of these nesting sites will not be revealed to ensure protection of the nest sites and inhabitants. Other raptors that may use the project region include the rough-legged hawk, merlin, Cooper's hawk, sharp-shinned hawk, short-eared owl, and barn owl (Denton 1989; USFWS 1987).

Common nongame mammals inhabiting the project area include the masked shrew, California myotis, deer mouse, long-tailed vole, white-tailed prairie dog, thirteen-lined ground squirrel, and northern pocket gopher (Luce 1989; BLM 1982, 1985).

3.7.2 Game Species

Game animals occurring within the transmission line study area include a variety of bird and mammal species. Much of the area encompasses important habitat for both breeding and wintering animals. A portion of these areas delineated by the state and Federal agencies are considered not only important but also crucial to some species' survival and reproduction.

Upland game birds include sage grouse, chukar, gray (hungarian) partridge, ring-necked pheasant, and mourning dove. Sage grouse are associated with sagebrush, grassland, and saltbush habitats (BLM 1982, 1988). Although this species and its associated habitat occur throughout the project region, sage grouse populations have been declining due to loss of habitat, impacts to breeding or lek areas, and a decrease in preferred forage items (BLM 1982, 1986a, and 1988). Map 3-2 (located at the back of this document) shows known active lek areas or strutting grounds currently recorded within the study area. Two active leks have been reported within 0.75 mile of the project route; however, these data do not represent the total sage grouse breeding activities occurring within the project area (Hurley 1992; Roop 1992). Additional breeding sites may occur in other appropriate habitats (WGFD 1992; Roop 1992). Nesting areas are often located within 2 miles of the active lek site (Denton 1989).

Chukars prefer rocky outcrops and areas containing cheatgrass brome and Sandberg's bluegrass. Gray (hungarian) partridges occur near riparian, agricultural, and other upland areas and are considered widespread, but not abundant. A few ring-necked pheasants, associated with agricultural fields and riparian lands, occur in the project area (Denton 1989; BLM 1982 and 1986a). Mourning dove occur in the project area from spring until fall, breeding in a variety of habitat types, with the exception of heavily timbered areas (BLM 1986a)

Area reservoirs, rivers, creeks, small tributaries, and stock ponds provide habitat for a variety of both resident and migratory water birds. The BLM (1982) has recorded over 59 waterfowl and shorebird species in the Grass Creek Resource Area alone. Representative water bird species that may occur in both the Grass Creek and Cody Resource Areas include the eared grebe, Canada goose, northern pintail, gadwall, green-winged teal, mallard, American wigeon, common merganser, great blue heron, American avocet, killdeer, and spotted sandpiper (BLM 1982). No significant open water areas, however, are crossed by or occur near the transmission line ROW.

Although thousands of waterfowl annually migrate through the Bighorn Basin, no bird concentration areas are located along the project route. Loch Katrine, located approximately 5.8 miles east of the transmission line ROW, occurs in the Oregon Basin and provides both a valuable staging area for migratory birds and optimal habitat for year-round use. Other water resources closer to the project ROW are subject to irrigation fluctuations (e.g., Quick Reservoir)

or are too small (e.g., stock ponds) to provide the fundamental resources (e.g., prey species, aquatic vegetation) necessary to sustain migratory or resident bird populations (Hurley 1993; Roop 1993). Some species use the grain, hay, and pasturelands surrounding the Greybull River as brood rearing and year-long foraging habitat (BLM 1988); however, no water bird concentrations occur as a result of this use.

A number of game mammals occur within the project area. Important fur bearers include beaver, muskrat, mink, raccoon, badger, and bobcat (BLM 1986a). Mule deer, white-tailed deer, pronghorn, black bear, and mountain lion inhabit the study area, with mule deer being the most abundant big game species.

The WGFD has defined "crucial" seasonal ranges for big game species. Crucial habitat is described as any particular seasonal range or habitat component (e.g., winter or winter-yearlong range, forage, cover) that has been documented as the determining factor in a population's ability to maintain itself at a certain level over the long term. Map 3-3 (located at the back of this document) shows crucial seasonal ranges for mule deer and pronghorn that are located within 8 miles of the ROW.

Mule deer migrate between seasonal ranges delineated by the WGFD (1992) and the BLM (1982). Mule deer crucial winter-yearlong range is prominent in the project area (see Map 3-3); however, no important migration corridors are crossed by the proposed route (WGFD 1992). White-tailed deer sustain a more cyclic population than mule deer. Non-migratory white-tailed deer may occupy habitat found along the Greybull River and the South Fork of Shoshone River (Roop 1992).

Pronghorn are yearlong residents in the area, with crucial wintering areas and winter-yearlong ranges in the southern portion of the project area, near the Little Buffalo Basin south of Meeteetse Rim (see Map 3-3). An important pronghorn migration corridor currently exists along the Dry Creek drainage (see Map 3-3). Pronghorn use this drainage seasonally, migrating east-west along the riparian zone (Hurley 1992; Roop 1992). Timing of migrational periods is dependent upon weather patterns and environmental conditions (e.g., snow depth), with spring migration varying to a greater extent than the fall period (Denton 1989). Pronghorn fawning is diffuse and occurs throughout the basin area (Roop 1992).

Occasional black bear sightings have been reported along the Meeteetse Rim. Mountain lion also is reported as inhabiting the region. However, these reported sightings are presumed to be incidental (Hurley 1992).

3.8 Species of Special Concern

A number of wildlife species of special concern have been reported in proximity to the proposed and existing routes (Wyoming Natural Diversity Data Base [WNDDDB] 1992). Other sensitive species have been identified by the USFWS (1992) as potentially occurring in the overall project area.

Five federally listed endangered species may occur in the project area; these are the bald eagle, peregrine falcon, whooping crane, black-footed ferret, and gray wolf (USFWS 1992). In addition to these 5 species, 14 Federal candidate species also may occur in the project area (USFWS 1992; WNDDDB 1992). Table 3-2 lists all wildlife species of special concern for the Proposed Action.

A Biological Assessment that addresses the 5 federally listed and 14 Federal candidate species has been prepared for submittal to the USFWS. Western chose to include the 14 Federal candidate species in the Biological Assessment to ensure adequate impact assessment for each species of concern. The Biological Assessment is presented in Appendix A of this document.

The bald eagle (*Haliaeetus leucocephalus*) is a winter resident along the Greybull River (Ritter 1992; BLM 1988), an area listed as crucial eagle wintering habitat by the WGFD (1989). Individuals may forage throughout the study area, particularly within mule deer winter range and during cyclic highs in cottontail rabbit populations (Ritter 1989; Denton 1989). No historic or current communal roost sights are known to occur along the riparian habitats in the project area, including the Greybull River (Ritter 1992); although feeding areas, night roosts, and diurnal perches may be used during migration and wintering periods. The WGFD's 1992 mid-winter bald eagle surveys reported a large increase in wintering eagle use along the Greybull River; however, no bald eagle nesting has been documented in the project area (Ritter 1992).

The peregrine falcon (*Falco peregrinus*) is considered rare in the project area; no peregrine nesting has been recorded south of Cody (BLM 1988). The Arctic peregrine falcon would be considered a rare migrant (Ritter 1989; Denton 1989); the American peregrine falcon may forage in and migrate through the project area (Oakleaf 1992). The lakes located south of Cody eastward to the Oregon Basin provide excellent foraging habitat that is used by migrant peregrines, subadults, and possibly by resident birds (Oakleaf 1992). Crucial peregrine habitat is located northwest of the project area (Oakleaf 1992; WGFD 1989).

The whooping crane (*Grus americana*) is a rare summer resident of Wyoming (Dorn and Dorn 1990). Whooping cranes that have occurred in the state are associated with the Gray's Lake population (Lewis 1992). A whooping crane from the Gray's Lake population was sighted

Table 3-2
Species of Special Concern
Potentially Occurring Within the Study Area

Common Name	Scientific Name	Status ¹		
		Federal	WNDDB State Ranking	WQFD State Ranking
FEDERALLY LISTED:				
<u>Birds:</u>				
Bald eagle	(<i>Haliaeetus leucocephalus</i>)	E	S1	P-I
Peregrine falcon	(<i>Falco peregrinus</i>)	E	S1	P-I
Whooping crane	(<i>Grus americana</i>)	E	S1	P-I
<u>Mammals:</u>				
Black-footed ferret	(<i>Mustela nigripes</i>)	E	S1	P-I
Gray wolf	(<i>Canis lupus</i>)	E	S1	P-I
FEDERAL CANDIDATE				
<u>Plants:</u>				
Evert's waferparsnip	(<i>Cymopterus evertii</i>)	C-3C	S3	---
<u>Fish:</u>				
Sturgeon chub	(<i>Hybopsis gelida</i>)	C-2	S2	P-I
<u>Birds:</u>				
White-faced ibis	(<i>Plegadis chihi</i>)	C-2	S1	P-I
Trumpeter swan	(<i>Cygnus buccinator</i>)	C-2	S1	P-I
Northern goshawk	(<i>Accipiter gentilis</i>)	C-2	---	---
Ferruginous hawk	(<i>Buteo regalis</i>)	C-2	---	P-III
Mountain plover	(<i>Charadrius montanus</i>)	C-1	S3	---
Long-billed curlew	(<i>Numenius americanus</i>)	C-3C	S3	P-III
Black tern	(<i>Chlidonias niger</i>)	C-2	S2	P-II
Burrowing owl	(<i>Athene cunicularia</i>)	---	S2	P-II
Loggerhead shrike	(<i>Lanius ludovicianus</i>)	C-2	---	---
<u>Mammals:</u>				
Spotted bat	(<i>Euderma maculatum</i>)	C-2	S1	P-III
North American wolverine	(<i>Gulo gulo luscus</i>)	C-2	S1	P-III
North American lynx	(<i>Felis lynx canadensis</i>)	C-2	S2	P-III

Table 3-2 (Continued)

Common Name	Scientific Name	Status ¹		
		Federal	WNDDB State Ranking	WGFD State Ranking
Allen's thirteen-lined ground squirrel	(<i>Spermophilus tridecemlineatus alleni</i>)	C-2	S1	---

Sources: USFWS 1992; WGFD 1989 and 1992; WNDDB 1992.

Federal¹:

- E = Federally listed as endangered. A species that is in danger of extinction throughout all or a significant portion of its range.
- C-1 = Federal candidate species - category 1. A species that will likely be federally listed as threatened or endangered, but has been precluded by other listing activity. Federal listing is anticipated.
- C-2 = Federal candidate species - category 2. Threat and/or distribution data are insufficient to support federal listing at this time.
- C-3C = Federal candidate species - category 3C. Taxon that was once being considered for federal listing, but is not currently receiving such consideration. More abundant and/or widespread than previously thought.

Wyoming Natural Diversity Data Base (WNDDB) State Ranking:

- S1 = Critically imperiled in state because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state.
- S2 = Imperiled in state because of rarity or because of some factor(s) making it especially vulnerable to extirpation from the state.
- S3 = Rare or uncommon in state.

Wyoming Game and Fish Department (WGFD) State Ranking:

- P-I = Includes federally endangered and threatened wildlife and species in need of immediate attention and active management to ensure that extirpation or a significant decline in the breeding population does not occur.
- P-II = Species in need of additional study to determine level of management (i.e., intensive vs. low level) is warranted. Until intensive management is proven to be needed, low level management will be implemented.
- P-III = Species whose needs should be accommodated in resource management

by a WGFD biologist in March of 1984 along lower Sage Creek (Collins 1993). Other sightings include a summering bird in the mid-1980s at Ocean Lake in Fremont County, approximately 62 miles south of the Carter Mountain Substation (Ritter 1992).

The black-footed ferret (*Mustela nigripes*) occupied the Meeteetse area until 1987; however, no ferret populations are presently known to occur in this area. Ferrets are generally associated with prairie dog colonies. White-tailed prairie dogs are common in the project area and may maintain colony complexes over 200 acres in size (Luce 1989). Map 2-2 shows prairie dog colonies that have been recorded since 1988 (Luce 1992; ENSR 1992; ENSR 1993).

A portion of the transmission line route crosses the Meeteetse Black-Footed Ferret Management Area (see Map 3-2) (Luce 1992; WGFD 1990). The USFWS and WGFD designated the area located west of Meeteetse as a priority site for ferret reintroduction (WGFD 1990; USFWS 1991). The Management Area covers 208 square miles of rangeland and is buffered by a "zone of interest" (see Map 3-2). Management strategies will not be applied in this buffer zone, which was originally established as part of the Management Area to facilitate communication with landowners (WGFD 1990). Because the resident prairie dog population in the Management Area declined 52 percent in 1989, thereby lowering the area's carrying capacity for black-footed ferrets, the USFWS and WGFD identified another site, the Shirley Basin/Medicine Bow Management Area, as the priority reintroduction site. The Meeteetse Management Area was retained as a backup site for possible future ferret reintroductions. In the event that this site is used for reintroduction efforts, the ferrets to be released would be designated as a "nonessential experimental" population, in accordance with Section 10(j) of the Endangered Species Act (USFWS 1991). The "nonessential experimental" designation allows the USFWS the flexibility to ensure that reintroduced populations do not significantly impact existing or future land uses.

A gray wolf (*Canis lupus*) was killed south of Yellowstone National Park in September of 1992, becoming the first confirmed wolf in the State of Wyoming since the species was extirpated earlier in this century. It is currently believed that the individual likely dispersed into Wyoming from the Montana population. No evidence of other wolves associated with this individual (i.e., pack activity) has been found in the Yellowstone area (Fritts 1993). Numerous unconfirmed wolf sightings are reported in the state each year. Three sightings of wolves have been reported within 20 miles of the project area. The USFWS has listed the species as a potential resident, designating these three reported sightings as unconfirmed (Roybal 1992). In February 1990, a BLM employee reported a pair of wolves along Horse Creek, approximately 5 miles west of the proposed transmission line; in October 1990, a WGFD ranger reported a wolf southwest of Sunshine Reservoir, 17 miles southwest of the proposed route; and during the fall of 1991, a BLM employee reportedly saw a wolf near the headwaters of Meeteetse Creek, about 17 miles west of the project route (Hurley 1992).

The trumpeter swan (*Cygnus buccinator*) occurs in the Snake River drainage, in Yellowstone National Park, and on the upper Green River drainage (Dorn and Dorn 1990; Ritter 1992). No active nest sites are known to occur near the project area; the closest historical observations of trumpeter swans have occurred at Yellowstone Lake, approximately 70 miles west of the project area. Potential presence in the study area would be limited to isolated occurrences along rivers and lakes during seasonal movements (Ritter 1992).

The ferruginous hawk (*Buteo regalis*) is a resident within the project area. The route crosses potential nesting and foraging habitat; however, no nesting ferruginous hawks have been recorded along the proposed ROW (WGFD 1992; BLM 1988).

The mountain plover (*Charadrius montanus*) has been observed in both Park and Hot Springs Counties, but have not been recorded by the BLM or WGFD in the project area. Mountain plovers are associated with prairie dog colonies and overgrazed grasslands (Ritter 1992). The current population level and trend are unknown for this species (BLM 1988).

The long-billed curlew (*Numenius americanus*) is listed as an uncommon summer resident that has been observed throughout most of the state (Dorn and Dorn 1990). The closest reported nesting curlews in proximity to the project area are in the BLM's Area of Critical Environmental Concern established on Chapman Bench, located north of Cody (Hurley 1993). Long-billed curlews have not been recorded in the project area. Based on indications elsewhere in the state, the population is declining (Ritter 1989) because of habitat loss (BLM 1988). Individual nesting sites may occur within the appropriate habitat types, but these areas have not been surveyed (Denton 1989).

The burrowing owl (*Athene cunicularia*) nests throughout the project area (Ritter 1989; WGFD 1989; BLM 1988). The WGFD has indicated that prairie dog colonies may be considered as crucial nesting habitat for this species (Ritter 1989).

The loggerhead shrike (*Lanius ludovicianus*) is a common summer resident and has been observed throughout the state (Dorn and Dorn 1990). Populations appear to be stable (Ritter 1992). Based on the data currently available from the WGFD and BLM, this species has not been documented to occur in the project area. However, the proposed route crosses potential nesting habitat.

The spotted bat (*Euderma maculatum*) has been recorded in the state; however, population estimates are lacking. (Luce 1989; Long 1965; BLM 1988). This species is associated with a variety of habitat types, including cliff areas and old buildings from low deserts to high conifer areas. It also is known to frequent perennial water sources (Luce 1989; BLM 1974). Spotted

bats potentially range throughout the project area. According to the WGFD, spotted bats likely occur throughout the Bighorn Basin, particularly where the mountains meet the desert areas (Luce 1992).

Allen's thirteen-lined ground squirrel (*Spermophilus tridecemlineatus alleni*) is a subspecies whose distribution is not well documented; although, the animal has been recorded near the project area (Luce 1989 and 1992; Long 1965). This subspecies is thought to inhabit mountains and foothills (Long 1965).

The North American lynx (*Felis lynx canadensis*) was known to occur at higher elevations in the northwestern part of Wyoming (Long 1965) and has been documented in the BLM's Cody Resource Area (BLM 1988). A number of lynx observations were recorded in eastern Park County, outside the project area (Reeve et al. 1986).

Based on habitat requirements and state records, the sturgeon chub, white-faced ibis, northern goshawk, black tern, and North American wolverine do not occur along the project ROW. These species are addressed in the Biological Assessment in Appendix A.

Information provided by the USFWS and the WNDDDB indicates that populations of federally listed or Federal proposed plant species do not occur in the project area (USFWS 1992; WNDDDB 1992). However, one Federal candidate species (3C), Evert's waferparsnip (*Cymopterus evertii*), has been documented to occur in the vicinity of the Carter Mountain Substation (WNDDDB 1992). At this location, one population was observed growing on rocky slopes 1.8 miles northeast of the Carter Mountain Substation. The proposed route would cross approximately 4 miles of potential habitat for Evert's waferparsnip; the areas of potential habitat are located along the southern portion of the route (MPs 22.0 to 25.2, MPs 26.2 to 26.6, and MPs 27.0 to 27.4).

3.9 Land Use

The project route crosses less than 1 mile of Hot Springs County with the remaining 27 miles being located in Park County in northeast Wyoming. The route extends along an existing 69-kV power line from the Carter Mountain Substation located southeast of the small community of Meeteetse, and travels in a northwest direction through Meeteetse to the Big George Substation, located south of Cody. The route generally parallels Wyoming State Highway 120 (Wyoming 120) with a western deviation from Meeteetse to Dry Creek, which is approximately 11 miles in length. Map 2-2 illustrates the proposed route. Land ownership along the line includes private landowners, land under the jurisdiction of the BLM, and State lands. Approximately 52 percent of the proposed route (14.5 miles) would cross private lands; 43 percent (12 miles) would cross BLM lands; and 5 percent (1.5 miles) would cross State lands.

The predominant land use along the transmission line ROW is open space/grazing. Essentially all public lands are included in grazing allotments. Irrigated cropland and pasture has been established near the Greybull River and Meeteetse Creek. Mineral extraction, particularly crude oil with some natural gas, occurs throughout the area, but extraction facilities are not in close proximity to the transmission line route. The Meeteetse land fill is located within 1 mile of the project route, southeast of the community of Meeteetse.

The southern portion of the proposed route from the Carter Mountain Substation to the Greybull River at Meeteetse is contained within the BLM's Grass Creek Resource Area. To date, the Grass Creek Resource Management Plan, the document intended to guide decisions in the Resource Area, is still in draft form. Therefore, BLM land management decisions are deferred to the Grass Creek Management Framework Plan (BLM 1983). The two following recommendations in the Management Framework Plan directly relate to utility line management:

Recommendation L-4.1 - Require utility lines to follow established corridors unless economic considerations and technology prohibit this practice.

Recommendation R-D-2.4 - Establish powerline corridors to contain impacts by future powerline construction. These corridors would follow the existing 69-kV Western Area Power Administration line between Thermopolis and Meeteetse. ROW in common should be used whenever practical.

The Grass Creek Resource Area generally regards Wyoming 120 as a utility corridor due to the existing linear uses.

The northern portion of the proposed route from the north bank of the Greybull River to the Big George Substation, is contained within the Cody Resource Area. In the Cody Resource Area, the area adjacent to Wyoming 120, on the west side of the road, has been designated as a transmission line corridor. Designated corridors are the preferred location for placement of future utility uses (BLM 1988). The Resource Management Plan further designates ROW avoidance areas within 1 mile of the Greybull River and Highway 120, stipulating that additional ROWs are not desirable. Goals of this designation are to reduce bird mortality along the Greybull River and reduce impairments to scenic values adjacent to Wyoming 120.

The proposed route would cross or affect three local jurisdictions: Hot Springs County; the town of Meeteetse; and Park County. There are no specific regulations in Hot Springs County affecting the Proposed Action. The Park County Land Use Implementation Program, adopted on March 5, 1980 and amended on December 3, 1991, would require any proposed industrial use or upgrade (e.g., powerlines) to be reviewed by the Park County Planning Commission for

compliance with County and Meeteetse specific performance standards. Applicable performance standards have been established for air quality, wildlife, erosion, floodplains, water quality, and agriculture.

The proposed route passes within 0.25 mile of 8 residences (see Map 2-2). The highest density of homes are located in the Meeteetse and Spring Creek Valleys.

3.10 Recreation

Dispersed recreation opportunities within the study area include hunting, fishing, off-road vehicle use, and pleasure driving. The Fort Washakie-Red Lodge stage and mail route historic trail, a BLM special recreation management area, lies to the west of the project area. This trail will be developed with interpretive signs (BLM 1988). The closest Wilderness Study Areas are Sheep Mountain and Bobcat, which are both located more than 10 miles from the proposed route.

The proposed route passes within view of a ballfield and rodeo grounds located south of Meeteetse. These facilities are the only developed recreation sites noted within the study area. Dispersed recreationists as well as travelers on Wyoming 120 bound for Yellowstone National Park or other major attractions, "use" the study area for its scenic value and for other short-term, transient activities.

3.11 Visual Resources

The BLM has implemented a visual resources inventory and analysis process to provide a systematic interdisciplinary approach to the management of aesthetic values on public lands. The Visual Resource Management (VRM) system inventories existing scenic quality and assigns visual resource inventory (VRI) categories based on a combination of scenic values, visual sensitivity, and viewing distance zones. Four visual resource classes have been established to serve two purposes: 1) as an inventory tool portraying relative value of existing visual resources and 2) as a management tool portraying visual management objectives. Management objectives for each of the visual resource classes are listed in Table 3-3. Much of the project area is rated VRM Class III. Some lands are rated Class II near the Greybull River, Meeteetse Creek, and just north of Meeteetse Creek, and are shown on Map 2-2, Sheets 3 and 4. A few Class IV areas also exist along the proposed route.

The landscape in the study area is characterized by broad sage/grassland valleys with rolling hills and a background view of snow-capped mountain ranges. Several ridges surround the proposed route, trending in a northwest to southeast direction. Landscape lines are horizontal with some vertical edges on steep embankments and rock outcroppings. Several upthrust

Table 3-3

Visual Resource Management Classes

Class I Objective:	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
Class II Objective:	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
Class III Objective:	The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
Class IV Objective:	The objective of this class is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.
Rehabilitation Areas:	Areas in need of rehabilitation from a visual standpoint should be flagged during the inventory process. The level of rehabilitation will be determined through the resource management planning (RMP) process by assigning the VRM class approved for that particular area.

Source: BLM 1986b.

geologic features add diagonal lines. Colors in the project area are tans, beiges, and browns in the winter with limited greening in the spring. Irrigated valleys, wetlands, and natural creek and river bottoms are brighter green with varied vegetation such as willow and cottonwood. Rock outcrops along the route are whiter, chalky grey beige with patches of dark green pinyon, juniper, and pine. Background views of distant mountains tend toward a blue-grey color. The texture of the foreground is mottled by intermittent sagebrush. Middleground and background views become smoother and homogeneous with distance.

Man-made structural features are uncommon in the project area except in and near Meeteetse, Meeteetse Creek, and Spring Creek. Existing transmission lines (including the 69-kV line to be replaced), distribution lines, and associated substations are the most visually prominent man-made features. Several agricultural buildings, residences, and structures associated with oil and gas processes can be found in the project area, as well as occasional fence lines and local phone lines.

Visual sensitivity is a function of numbers of viewers, duration of views, purpose for being in a position to view the landscape, and distance between viewers and the landscape feature. High sensitivity areas in the project area include viewsheds from the town of Meeteetse and Wyoming 120. Meeteetse has a residential population of 386 persons. Highway 120 is a major recreation travel route for Yellowstone National Park visitors, carrying as many as 1,600 vehicles per day in peak summer months.

3.12 Cultural Resources

The project ROW traverses the southwestern shoulder of the Bighorn Basin. Six major periods of aboriginal occupation are identified for the region: Paleo-Indian, Early Plains Archaic, Middle Plains Archaic, Late Plains Archaic, Late Prehistoric, and Protohistoric. Human history of the basin dates to at least 11,000 years ago. Previous archaeological investigations have shown that the earliest occupants of the basin hunted now-extinct animals such as mammoth and long-horned bison, and that subsequent peoples practiced a more generalized hunting and gathering economy (Frison 1991). Prehistoric site types that have been recorded in the general project area include lithic scatters (some with fire cracked rock and/or ground stone), hearths with and without associated lithic artifacts, stone circles with and without associated lithic artifacts, sites in rock shelters, rock art sites, lithic procurement/quarry sites, and isolated finds.

Historic activity in the project vicinity is documented from the 1740s, although major non-aboriginal use of the Bighorn Basin did not begin until the early 1800s (Larson 1965). Historical themes pertinent to the area are early exploration, trapping, and fur trading, pre-1860; transportation and overland immigration, 1840s-1900; homesteading and agricultural settlement, 1860s-1930; and energy exploration and development, 1890-1930. Historic site types of the project area include homesteads and associated facilities and structures, mines, irrigation ditches, refuse dumps and scatters, isolated cairns, bridges, historic transportation corridors, and isolated artifacts.

A file search (Class I study) of the project area was undertaken as part of the environmental assessment, followed by an intensive field survey (Class III study). The Class I study was based on information on file with the Wyoming State Historic Preservation Office (SHPO). The BLM Worland District Office also was consulted; however, information there duplicates that found in the Wyoming SHPO office and was not used in compiling the overview. The study area defined for the Class I study was 0.5-mile-wide corridor centered on the existing powerline ROW. The study area was expanded somewhat near the southern terminus of the line to accommodate a deviation between the existing line and the proposed line.

A total of 19 previous cultural resource investigations were identified within the 0.5-mile-wide Class I study corridor. These investigations are comprised of 7 block surveys ranging greatly in area and 12 linear surveys of varying length. None of the investigations overlaps the present project construction ROW to the extent that Class III inventory could be obviated.

A total of 45 archaeological and historical sites had been recorded with the 0.5-mile-wide Class I corridor prior to the field survey for this project, and another 28 cultural resources were recorded during the survey; the total number of known cultural resources therefore stands at 73. Prehistoric cultural resources consist of 10 lithic scatters, 2 lithic scatters with hearth(s), 8 lithic procurement/quarry locations, 3 stone circle sites, 20 "open camps", and 13 isolated finds. Historic cultural resources consist of 5 refuse scatters, 2 roads, 2 occurrences of structures or structural remnants, 1 stage stop, 2 canals, 1 sign painted on a rock face, 1 bridge, 1 transmission line, and 2 isolated finds. One multicomponent prehistoric/historic site comprised of a refuse scatter and rock alignment in association with a lithic scatter also has been recorded.

Of the 73 total recorded cultural resources in the Class I corridor, one site has been formally determined eligible for listing on the National Register of Historic Places by the Wyoming SHPO and 5 others were assessed as National Register-eligible by their recorders, although no formal determination of eligibility has been made. Sixty-five cultural resources are assessed as not significant and the remaining three are unevaluated.

Of the 73 recorded cultural resources, some 35, consisting of 20 sites and 15 isolates, are located within or immediately adjacent to the 200-foot-wide construction survey corridor. Five sites within this group are evaluated as National Register-eligible; these sites are: 48PA753 (Wiley Canal); 48PA949 (Cody-Meeteetse Stage Road); 48PA1331 (prehistoric lithic site with associated hearth); 48PA1335 (sign painted on natural rock face, associated with original Cody-Meeteetse Road); and Field No. CA-704 (Wilson-McNally Ditch).

Due to the sensitive nature of cultural resources, site-specific locations and maps showing the locations of previous cultural resource investigations and sites are being provided to Western as separate documents. These are not available for public inspection.

Because the project could affect sites associated with traditional Native American religious or cultural practices, several Indian tribes were contacted. These tribes included the Eastern Shoshone and Arapaho Tribes of the Wind River Indian Reservation, Wyoming; the Northern Cheyenne Tribe, Lame Deer, Montana; and the Crow Indian Tribe, Crow Agency, Montana. The single response was from Mr. Haman Wise, an Eastern Shoshone traditional leader from Fort Washakie, Wyoming, who asked to inspect the project area.

3.13 Socioeconomics and Community Resources

3.13.1 Population

In 1990 the State of Wyoming had a population of 453,588, revealing an overall population decrease of 3 percent from the 1980 census count. Much of this trend can be explained by the dramatic decrease in oil and gas production that occurred in the first quarter of the 1980s.

The population in Hot Springs County decreased by 16 percent from 1980 to 1990. The current population is 4,809 with 67 percent, or 3,247 persons, residing in the county seat of Thermopolis. Park County population in 1990 was 23,178, a 7 percent increase in population since 1980. Approximately 34 percent of the county population resides in Cody, the county seat, and 2 percent resides in the community of Meeteetse (Wyoming Department of Administration and Information 1991a).

3.13.2 Economic Base

Growth fluctuations in northwest Wyoming can be attributed to variable natural resources development, particularly oil and gas and some coal. Those sectors catering to the tourist industry, have experience stability and growth attributable to the consistent stream of visitors to Yellowstone National Park.

The employment in Hot Springs County is dominated by the service, government, and retail sectors, together employing 71 percent of the nonfarm labor force. Approximately 77 percent of the labor force in Park County is employed in the service sector, followed by the government, retail and construction sectors (Wyoming Department of Administration and Information 1991b). The 1990 census recorded an unemployment rate of 4.8 percent in Hot Springs County and 5.7 percent in Park County (U.S. Department of Commerce 1990).

In 1987, approximately 75 percent of the land in Hot Springs County was classified as farmland. This estimate, however, represents a decrease in acreage of 7 percent since 1982. Inventories of cattle, hogs, and sheep over this same period also indicate a decrease in agricultural activity.

A total of 23 percent of total acreage in Park County in 1987 was classified as farmland. This estimate also represents a decrease in acreage of 11 percent since 1982. The inventory of cattle and hogs decreased; however, sheep and lamb inventories increased significantly (Wyoming Department of Administration and Information 1991a).

The City of Cody, in Park County, is a regional trade and service center, drawing people from nearby communities and counties, and even north from Montana. The City of Cody also is along the eastern route into Yellowstone National Park. By providing hotel/motel accommodations, restaurants, and tourist attractions (e.g., the Buffalo Bill Museum) Cody benefits extensively from tourism dollars.

3.13.3 Housing

A total of 9 hotel/motels are located in Thermopolis, providing over 200 units to travelers and temporary residents. One motel occurs in Meeteetse with 19 units, and 30 hotel/motels are located in Cody with over 1,000 units (Wyoming Travel Commission 1990). There also are numerous campgrounds, dude ranches, and bed and breakfast inns. Occupancy rates are presumed to be full or nearly so during peak summer tourism periods.

Approximately 2,429 total housing units occur in Hot Springs County and 10,306 in Park County. Of these total units, 640 and 2,830 units, respectively, are renter occupied. Rental vacancy rates vary from 11 to 18 percent at a median contract rent of approximately \$250 per month (U.S. Department of Commerce 1990).

3.13.4 Fiscal Conditions

The assessed valuation in Hot Springs County in fiscal year 1991 was \$130,090,915, a 15 percent increase over the preceding year. Taxes levied totaled \$7,887,290 at an average county levy of 60.629 mills. One mill is \$1 paid on every \$1,000 of taxable value. Hot Springs County received \$2,023,932 from sales and use taxes. Transportation, retail, mining and service sectors generated the majority of 1991 tax revenue in Hot Springs County.

Park County assessed valuation in fiscal year 1991 was \$391,321,776, a 12 percent increase over the preceding year. The ten top contributors were all oil companies who collectively accounted for 73 percent of total county assessed valuation. In other words, approximately 73 percent of property tax revenue is contributed by the local oil industry (McMahn 1992). Taxes levied totaled \$28,052,175 at an average county levy of 71.686 mills. Park County received \$9,062,572 from sales and use taxes. The retail and service sectors generate the large majority of 1991 sales tax revenue in Park County.

3.13.5 Infrastructure

Park and Hot Springs Counties offer all standard infrastructure components. Transportation, as previously discussed, is maintained by Federal, state, and local agencies. Treated water is provided by the municipalities, as is sewer service. In rural locations, water is typically supplied from groundwater wells, and sewer is processed by on-site small wastewater systems. Gas and electric service is available from local cooperatives and private companies. Western supplies local distribution companies (e.g., rural electric cooperatives, town of Meeteetse) with electric power.

Due to the age of Western's transmission line from the Carter Mountain Substation to the Big George Substation, and because the line is not protected from lightning strikes, frequent power surges and outages occur, primarily during seasonal thunderstorms. All seven outages in 1991 and the six outages through August 1992 occurred between the months of May and September and were attributed to lightning. These surges and outages are a concern to local representatives seeking to promote the area for business and residential investment. Local officials have expressed concern that unreliable electric service may have a negative impact on economic development in the Cody area (Morrison 1992). Local oil companies are particularly concerned because power surges can destroy costly motors (e.g., \$40,000 submersible oil pumping motors) used for production in existing oil fields. Because the oil fields in this region are economically marginal producers, continued damage from power surges could cause field operations to become non-economical, thereby forcing shutdown. Immediate concerns regarding oil field shutdown are loss of county tax revenue, employment, and retail sales (Johnson 1992).

3.14 Transportation and Access

The major transportation routes in the study area include Wyoming 120, a north-south paved primary route from Thermopolis into Montana. Wyoming 120 intersects with U.S. Route 20 at Cody. U.S. Route 20 provides the eastern access into Yellowstone National Park. This route is busiest during the summer tourism months. State Highway 30 travels in an east-west direction from Meeteetse along the Greybull River.

The Wyoming State Highway Department is currently widening Wyoming 120 south of Meeteetse. The project will continue through 1994 and will result in a wider road and ROW, expanded from 100 feet on each side of the centerline to 200 feet on each side of the centerline. Utilities are not permitted within 100 feet of the roadway centerline due to safety concerns. They would, however, be permitted toward the outer edge of the larger ROW. The Highway Department has been and will continue to send planning documents to affected utilities (Milburn 1992).

The remainder of the region is accessed via a network of county and private paved and unimproved trails and roads. Unimproved roads, at times, become impassable due to adverse weather conditions.

The Burlington-Northern provides rail service from Cody and Thermopolis north into Montana and south to Casper. Airport facilities for both private and commercial services are located near Thermopolis and Cody.

4.0 ENVIRONMENTAL CONSEQUENCES

In this chapter, the environmental effects or "impacts" of constructing and operating the No Action Alternative and the Proposed Action are described. The methodology used to assess impacts is comprised of two basic steps. First, combinations of project actions and environmental components are defined. Second, actual quantities of effects at various levels are examined.

An impact is defined as a modification or effect on the existing environment brought about by the action. A direct impact is the primary result of the action. An indirect impact is a secondary result of the action. Impacts can be positive (beneficial) or negative (adverse). Impacts are considered "short-term" if they are temporary or of short duration. Short-term changes are associated primarily with construction. "Long-term" impacts result from permanent changes or long-lasting effects. Long-term effects are changes that remain for the life of the project and into the future (50 years or more). A residual impact is an indirect, long-term impact of the project. Mitigation measures are measures that reduce, eliminate, or otherwise minimize the impact.

4.1 No Action Alternative

Under the No Action Alternative, no upgraded transmission line would be built in the project area. The existing 69-kilovolt (kV) transmission line would continue to operate with poles and structure components being replaced as necessary. The need to replace poles is expected to increase as the line continues to age, with poles being replaced on a more frequent basis. The environmental impacts from surface disturbance associated with pole and hardware replacement on a continuing basis could equal or exceed the impacts associated with completely rebuilding the existing line, as planned for the Proposed Action. The existing access trails would continue to be used for maintenance; however, the frequency of access trail use would increase over time as more structures required maintenance and replacement. The No Action impacts would occur in small areas over several seasons and years, while the Proposed Action impacts would occur along the entire route over one construction season.

4.2 Proposed Action

4.2.1 Climate and Air Quality

All state and Federal air quality standards would be complied with during construction and operation of Western's proposed transmission line. Local climatological conditions would not be affected. A small amount of dust would be produced by construction activities during dry periods,

but this would not generally exceed the dust generated by normal traffic on unpaved roads in the area. No long-term air quality impacts would result from line construction or operation.

4.2.2 Paleontology, Geology, and Soils

4.2.2.1 Paleontology

Under Federal legislation, only scientifically important paleontological resources found on Federal land are protected against collection and destruction. The Bureau of Land Management (BLM) typically regards only vertebrate fossils as being scientifically important. Several potential fossil-bearing formations occur in the project area; however, no vertebrate fossils have been documented. Access trail construction and hole excavation for structure placement could damage or destroy fossils where the right-of-way (ROW) crosses fossil-bearing formations.

4.2.2.2 Geology

The majority of the proposed route traverses geologic formations of sandstone, shale, alluvium, and claystone that should provide an adequate foundation for tower structures. No landslide deposits would be crossed. No other geologic hazards are expected along the proposed route.

Geotechnical investigations will be conducted along the ROW alignment to identify geologic conditions requiring special design efforts for structure placement.

4.2.2.3 Soils

The proposed route would not cross any prime or unique farmland. Slopes of 15 to 30 percent occur along 1.9 miles of the route, and slopes greater than 30 percent are not present along the route. Some increased wind and water erosion in these areas may result from line construction, prior to the regrowth of vegetation. However, it is anticipated that most of these slope areas would be spanned and would not require structure placement. Western proposes to use existing access trails to the maximum extent possible. Based on the existing good condition of the access trails and implementation of Western's Standard Construction Practices (see Section 2.3.1.4) soil erosion would be minimized. Therefore soil erosion is not expected to be a long-term, adverse impact from construction or operation of the proposed project.

4.2.3 Surface Water

Six perennial streams are intersected by the proposed route; they include Sage Creek, Dry Creek, Cottonwood Creek, Meeteetse Creek, Spring Creek, and the Greybull River. As stated in Table 2-4, transmission line construction would span the riparian areas crossed by the ROW and avoid physical disturbance to riparian vegetation. This measure would prevent any loss of riparian vegetation that may result in increased soil erosion, channel sedimentation, and subsequent degradation of existing water quality within these specific water resources.

Constructing new access trails and repairing existing access trails and roads would have minimal impacts to water quality. As presented in Table 2-4 in Section 2.3.1.4, existing bridges and fords would be used to access the ROW on either side of sensitive riparian areas. Equipment and vehicles would not cross the riparian zone. Disturbed areas including channel banks would be subsequently reseeded. Based on Western's Proposed Action and Standard Construction Practices presented in Section 2.3.1.4, no impacts to surface water resources or the associated water quality are anticipated from construction or operation of the proposed transmission line.

4.2.4 Aquatic Biology

As discussed in Sections 2.3.1.4 and 4.2.3, the transmission line would span the water resources crossed by the proposed route, and construction and maintenance of access trails would avoid the riparian areas, avoiding physical disturbance to riparian vegetation. This measure would aid in minimizing soil erosion and avoiding channel sedimentation, thereby maintaining the existing water quality within these specific water sources. In addition, the probability of accidental oil or gasoline spills would be minimal, based on the implementation of Western's Standard Construction Practices (see Table 2-4). Therefore, no adverse impacts to aquatic resources, including trout fisheries, are anticipated from project construction or operation.

4.2.5 Floodplains and Wetlands

A floodplains/wetlands assessment has been prepared for the Proposed Action and is included in Appendix B. Construction within the 100-year floodplain would be necessary near Meeteetse Creek and the Greybull River. Two transmission line structures would be placed in the floodplain zone along Meeteetse Creek and one in the Greybull River floodplain.

The placement of transmission line structures during construction and the location of structures during project operation are not expected to alter the floodplain storage volume or cause a local increase in the flood stage. The final design for the transmission structure foundations will consider site-specific soil conditions, as well as the elevation of the 100-year flood and potential

debris loading of the structure during a flood. For these reasons, failure of a structure during a flood is not expected. No applicable floodplain protection standards would be violated.

The nine wetland areas crossed by the proposed route are limited to riparian zones that are located adjacent to both perennial and intermittent water sources (see Table 3-1). Only one location along the existing access trail for the project would affect riparian vegetation during project construction. A small, two-track ford currently crosses a tributary to Cottonwood Creek at MP 12.3, which is characterized by a small, low-flowing stream that meanders through a wet meadow (ENSR 1992) (see Map 2-2, Sheet 3). This existing ford is surrounded by riparian vegetation, including sedges, spikerushes, and rushes. Crushing or loss of this riparian vegetation may result from larger construction vehicles traveling across the ford for structure placement. However, effects to riparian vegetation would be limited to approximately 2,400 square feet (0.06 acre) and would be considered short-term.

The need for control of woody vegetation under the transmission line would be minimal, since the project route is located along Western's existing ROW. Therefore, impacts to wetlands or their associated riparian zones from removal of trees or large shrubs are not anticipated.

4.2.6 Vegetation

The proposed route would cross 25.6 miles of native vegetation and 2.7 miles of cropland. Vegetation would be affected primarily by construction of 3 miles of new access trails. New trail construction would remove 4.3 acres of vegetation, which would be a permanent long-term loss of rangeland. Access trail construction would not affect cropland or riparian habitats. Structure placement would permanently remove 45 square feet of vegetation at each structure site, or a total of 0.2 acre for the entire project.

Vegetation also would be affected by improving existing access trails. Approximately 15 miles of existing trails would require improvements or repair to allow access for construction equipment. An estimated 22 acres of vegetation would be removed for trail repair and improvement. The long-term loss of rangeland vegetation from the Proposed Action would, therefore, total 26.5 acres.

During construction, vegetation within the trails would be crushed by equipment traveling the access trails. Native vegetation also would be temporarily crushed by poles and conductor reels staged at stringing and laydown sites. These impacts would be limited to the 12-month construction period. Since these sites would not be graded, long-term productivity would not be affected. Therefore, the impacts would be short-term and minimal.

Riparian vegetation would be affected at one location by the use of an existing ford across Cottonwood Creek. The crossing contains wet meadow species such as sedges, rushes, and meadow grasses. About 2,400 square feet of vegetation would be affected (see Map 2-2, Sheet 3).

Grading trails with heavy equipment used on other construction sites could introduce noxious weeds from other areas into productive grasslands and croplands in the project area. Noxious weed infestations could reduce productivity over time. This would be a long-term adverse impact.

4.2.7 Wildlife

4.2.7.1 Nongame Species

Impacts to area wildlife species would occur from disturbance and habitat alteration from transmission line construction, primarily new access trail construction, and existing access trail repair. Impacts from habitat loss would be minimal, based on Western's Standard Construction Practices presented in Section 2.3.1.4. The placement of the transmission line within Western's existing ROW would minimize impacts to native habitats and the wildlife species dependent on them.

New access trails for the project consist of spurs from the existing trail system to structure locations. The increased access into the project area from an estimated 3 miles of additional access trails is not expected to produce adverse impacts to wildlife species, such as harassment or poaching. Since the proposed line would be replacing an existing transmission line, an increase in human presence is not anticipated over the current conditions.

Riparian habitat would be considered the most sensitive habitat type present in the project area. Many of the wetland and riparian areas have been augmented by the water discharged by ongoing oil and gas activities in northwestern Wyoming (ENSR 1992). Western's Standard Construction Practices, presented in Section 2.3.1.4 (see Table 2-4), indicate that the proposed transmission line would span riparian areas, vegetation removal and bank disturbance would be minimized. In addition, existing bridges and fords would be used to access the ROW on either side of riparian areas; equipment and vehicles would not cross the riparian zone. Therefore, transmission line construction would not affect the sensitive wetland/riparian habitat crossed by the route. No adverse effects to wildlife species are anticipated from use of the small, two-track ford that crosses a tributary drainage to Cottonwood Creek near MP 12.3 (see Section 4.2.5).

Line construction would result in the displacement or loss of smaller, less mobile wildlife species within the areas of disturbance. Small mammals, reptiles, and some amphibians would be more

susceptible to construction-related mortality than other animal groups. Some species of ground-nesting birds (e.g., western meadowlark, ring-necked pheasant) would not nest within the area of disturbance during construction but would return to nesting habitats located within the transmission line route following project reclamation.

According to recent data available from the BLM and Wyoming Game and Fish Department (WGFD), two active raptor nests are located within 0.5 mile of the proposed ROW. The proposed route travels within 0.1 mile of a golden eagle nest and within 50 yards of a red-tailed hawk nest (WGFD 1992; BLM 1988; ENSR 1992). Other raptor nests are located along the route, as discussed in Section 3.7.1; however, these include either active nest sites located over 0.5 mile from the project ROW or inactive nests. Additional species and nest sites that have not been recorded also may occur along the project ROW. Transmission line construction within 0.5 mile of an active raptor nest site may impact breeding individuals, possibly resulting in nest abandonment and loss of reproduction for that year. Breeding, nesting, and fledging periods are dependent on the nesting species (Denton 1989).

The addition of static wires for the proposed 115-kV transmission line would increase the potential for line collisions for both resident and migratory bird species. Faanes (1987) reported, in concurrence with previous studies, that most avian mortality at power lines results from collisions with the overhead ground or static wires. A number of variables contribute to the potential for line collision and increased avian mortality (Beaulaurier et al. 1982; Anderson 1978); the primary factor is the orientation of the transmission line to sensitive ecological features (e.g., water bodies, bird concentration areas, breeding sites) (Faanes 1987).

It has been shown that raptors may be more susceptible to power line strikes when preoccupied or distracted by activities such as territorial defense, prey pursuit, etc. (Thompson 1978). However, Olendorff and Lehman (1986) reported that several physical and behavioral attributes of raptors, such as keen eyesight, slow flight speed, maneuverability in flight, and use of utility poles for perch sites, decrease their susceptibility to collisions. Studies also suggest that collisions with utility lines do not result in a noticeable effect on bird population dynamics, except in the case of endangered species or when rare or threatened species are experiencing population declines. Although the potential for line strikes by raptors or other nongame bird species in the project area would increase, no effects to local or regional bird populations are anticipated.

The Oregon Basin and Little Buffalo Basin oil fields have been experiencing increased incidences of raptor electrocutions from power distribution lines. Golden eagles have been the primary species impacted, although other raptors also have been affected (Roop 1992). Most lines that electrocute raptors, however, are distribution lines that carry less than 69 kV. Higher voltage

transmission lines (e.g., 115 kV) present little electrocution hazard, because the separation between the conductors is sufficient to prevent contact that would result in electrocution (Olendorff et al. 1981). Western's proposed 115-kV transmission line will meet or exceed design recommendations included in "Suggested Practices for Raptor Protection on Power Lines" (Olendorff et al. 1981).

Potential effects from line strikes or electrocution for the bald eagle or peregrine falcon are discussed in Section 4.2.8 for Species of Special Concern.

4.2.7.2 Game Species

Sage grouse breeding occurs from mid-March to the end of April. Disturbance from construction activities on or adjacent to established and viable lek areas or nesting grounds from March 15 to May 30 could adversely impact breeding birds. Interference with breeding activities could possibly prevent successful reproduction and consequently affect local population numbers.

Secondary impacts to active lek areas may result from predation by raptors using adjacent transmission line structures as perch sites. Leks that are located near power lines have exhibited lek fragmentation and lower reproductive success rates due to golden eagle harassment (Roop 1992). However, no increased predation for sage grouse leks is anticipated, since the proposed transmission line would be replacing an existing line, and no leks are currently known to occur along the 2-mile realignment.

Waterfowl collisions with the transmission line during project operation would increase slightly, because of the addition of ground wires to the transmission line design. However, no bird concentrations are associated with water resources occurring along the project ROW (Hurley 1993; Roop 1993). At the Greybull River the transmission line would be equipped with aerial markers, which would minimize collision hazard for waterfowl. Because a transmission line presently occurs within the proposed ROW and the small open water areas crossed by the line receive limited use by waterfowl (i.e., no concentration areas), the proposed project would not result in long-term, adverse impacts to local populations.

The route crosses 11 miles of crucial mule deer winter-yearlong range and 0.6 mile of crucial pronghorn winter range (see Map 3-3). Crucial wintering periods occur between November 15 through April 30 (Denton 1989). Disturbance from project construction activities that would force individuals to avoid areas near line construction, thereby reducing the amount of winter habitat available, could adversely affect wintering populations for both of these species. The level of disturbance to wintering animals would depend on the environmental conditions (i.e., weather, fencing) and the seasonal period (i.e., late spring versus early fall).

Although mule deer and pronghorn migration occurs throughout the project area between their yearlong and winter ranges, migrational routes have been becoming more restricted, due to increased fencing and development. The corridor identified on Map 3-3 for the Dry Creek drainage is used extensively by pronghorn during both the spring and fall. During severe or sudden weather events, migratory movements can be rapid and concentrated (Roop 1992). During the fall, the animals will typically begin migrating after November 1 and may continue for a few days up to a month, depending on weather conditions. The spring period may be even more variable, with animals beginning to move in April or May and continuing into the early summer. Although these migration periods fluctuate annually, the overall periods extend from November 1 to December 15 in the fall and April 1 to June 15 in the spring (Denton 1989). Depending on the weather conditions present during migration, line construction along the Dry Creek drainage could adversely impact individuals moving between seasonal ranges. Construction activities occurring between these areas could prevent this movement during critical periods, possibly resulting in higher mule deer and pronghorn mortalities (Roop 1992).

Fawning for mule deer and pronghorn are dispersed throughout the project area (Roop 1992). No disturbance to females during the spring season would be anticipated; individuals would avoid construction activities in the area.

Potential effects to other game species (e.g., gray partridge, beaver, bobcat) in the vicinity of the project would be limited to construction disturbance. Individuals would avoid the area during construction.

4.2.8 Species of Special Concern

A Biological Assessment, presented in Appendix A of this document, contains a more in-depth analysis of wildlife and plant species of concern.

Construction and operation of the proposed transmission line are not likely to adversely affect nesting bald eagles because active nest sites closest to the project area occur along the Bighorn River. Wintering bald eagles occupy winter range along the Greybull River, and occasionally, birds may forage outside of the river corridor (Ritter 1989). Project construction during the period October through March may inhibit eagles from occupying the area near the project ROW, until the completion of construction activities. However, disturbance to wintering eagles is not anticipated to be greater than the existing activities associated with the town of Meeteetse, Highway 120, and ongoing agricultural practices. No other areas of significant bald eagle use would be crossed by the proposed route (Ritter 1992).

Because wintering eagle use along the Greybull River corridor has been increasing (Ritter 1992), the potential for eagle collisions with the transmission line conductors or ground wires during project operation also may increase. Locating the transmission line corridor adjacent to the town of Meeteetse and installing aerial markers minimize the potential for eagle collision with the line at the river crossing. The physical dimensions of the proposed 115-kV transmission line preclude an electrocution hazard to bald eagles (Olendorff et al. 1981), as discussed in Section 4.2.7.1.

No adverse impacts to the peregrine falcon are anticipated from the proposed Big George to Carter Mountain transmission line project, since no active peregrine eyries occur in the project area. The probability of the project affecting foraging birds traveling from crucial habitat areas or migratory individuals also is low.

The project area does not include known feeding or nesting habitat or designated critical habitat for the whooping crane. The potential for increased collisions with the transmission line by migratory birds, including the whooping crane, would increase due to the addition of ground wires to the line. However, the lack of habitat for whooping cranes along the project ROW, the presence of the existing 69-kV line, and the addition of aerial markers at the Greybull River crossing would minimize the potential for crane collisions. The physical dimensions of the proposed 115-kV transmission line would preclude electrocution hazard to cranes.

Because the black-footed ferret is so closely associated with prairie dog populations, all prairie dog colonies or complexes are considered to be potential habitat for this endangered species. Until it is determined whether ferrets occur along the project route, a determination of impacts cannot be made for the black-footed ferret. A total of 11 prairie dog colonies presently occur within 0.5 mile of the ROW centerline, with a portion of these colonies part of larger complexes. The activity status of these colonies is currently unknown. No conflict between the proposed transmission line upgrade and the proposed ferret reintroduction plan for the Meeteetse Management Area is anticipated under the current project conditions (Luce 1992).

One gray wolf has been confirmed as occurring within the State of Wyoming; the remainder of the sightings reported are designated by the U.S. Fish and Wildlife Service (USFWS) as unconfirmed. No impacts to the gray wolf from the Proposed Action are anticipated. If present, wolves would likely avoid construction activities. No natal denning areas are known to occur, and with the lack of pack activity, breeding wolves are not likely. No long-term, adverse impacts to wolf prey species are expected, as discussed in Sections 4.2.7.1 and 4.2.7.2 for nongame and game species, respectively.

Ferruginous hawk populations have been declining throughout the west, primarily due to nest disturbances, which in turn affect the reproductive success of the birds (Snow 1974). Ferruginous

hawks are highly susceptible to nest abandonment during the period prior to hatching (Snow 1974). No ferruginous hawk nests are known to occur along the proposed route; however, the route crosses potential nesting and foraging habitat. If construction activities were to occur near an active ferruginous hawk nest during the breeding and nesting season, project construction could adversely affect breeding birds. The new transmission line would pose a somewhat greater risk for in-flight collisions than the currently operating transmission line. As discussed for the bald eagle and whooping crane, no electrocution hazards are anticipated for the new 115-kV transmission line because of the transmission line configuration.

No long-term, adverse impacts are anticipated for the burrowing owl from construction or operation of the proposed project. Project construction would be considered a short-term disturbance, if an active nest burrow were located near the transmission line ROW.

Impacts to other wildlife species of concern are not anticipated, based on their limited occurrence in the project area or the lack of appropriate habitat located along the existing/proposed ROW. The Biological Assessment (see Appendix A) presents complete impact analyses for species of concern identified by the USFWS.

Known populations of federally or state-listed plant species have not been documented within the project area. Everet's waferparsnip (*Cymopterus evertii*), a Federal candidate-category 3C and a WNDDDB species of special concern, has been recorded approximately 1.8 miles northeast of the Carter Mountain Substation. The proposed route would cross approximately 4 miles of potential habitat for this species. Disturbance from transmission construction may result in adverse impacts to this plant species.

4.2.9 Land Use

Construction of the Proposed Action would not change current land use. The proposed transmission line would be in compliance with local land use directives. Western, as a Federal agency, does not apply for permits from state and local agencies. However, Western would substantively comply with state and local policies regarding utility corridors. The Proposed Action also would comply with the Grass Creek Resource Area Management Framework Plan and the Cody Resource Area Resource Management Plan, by following a designated utility corridor.

The project would result in the permanent loss of 26.5 acres of rangeland. However, 22 acres of this rangeland is of marginal value, since it is currently used as an access trail for the existing transmission line. Only about 4.5 acres of the disturbance associated with new trail construction and structure placement would affect previously undisturbed areas. The largest continuous area of disturbance anticipated along the access trail would total 1.6 acres. Loss of these 4.5 acres

would not likely affect livestock stocking rates since the 4.5 acre loss would be distributed between several grazing allotments.

Approximately 20 structures would be located in irrigated cropland. Each structure would permanently occupy about 45 square feet. However, these structures would replace the existing structures located within the fields. Elevated irrigation systems (i.e., pivot and walker) were erected after the original line was constructed, and no crops are currently produced under the line. Therefore, no crop loss would occur in these areas. At the Meeteetse Creek and Greybull River crossings, the Proposed Action also would replace existing structures. As discussed in Section 2.3.1.4, Western would coordinate with landowners to avoid impacting irrigation or harvesting activity. Landowners also would be compensated for lost crop production during project construction and operation.

The proposed route is located within 0.25 mile of 8 residences (see Map 2-2), which are located predominantly near Meeteetse. Construction of the upgraded transmission line would be temporary, and operation of the Proposed Action would not alter land use in these areas. Therefore, no impacts to these residences or the associated land uses are anticipated.

4.2.10 Recreation

The Proposed Action would have no affect on recreation facilities or resources. Short-term impacts to dispersed recreation may result from construction traffic and associated activities. These impacts, however, would not affect functional enjoyment of these resources.

4.2.11 Visual Resources

Because the proposed Big George to Carter Mountain transmission line would replace an existing line, potential effects to the visual environment would be minor. Western would install aerial marker balls at the Greybull River crossing, which would introduce new contrasting elements into the visual environment. The aerial markers would not distract or draw the attention of nearby viewers. In addition, Western's proposed route would be visible from Highway 120 for 1.0 mile less than the existing 69-kV route. This would be achieved by locating the line behind a ridgeline located north of the Carter Mountain Substation.

4.2.12 Cultural Resources

Cultural resources are very sensitive to construction-related activities and increased access created by the addition or upgrading of roads. Potential impacts to cultural resources by the Big George to Carter Mountain transmission line project may include disturbance or destruction of

prehistoric and historic sites that might qualify for listing on the National Register of Historic Places; disturbance to areas that are culturally sensitive to contemporary Native American groups; accelerated erosion caused by construction; vandalism and destruction caused by increased public access; and visual impacts on historic sites caused by the construction of transmission line structures.

A Class III inventory has been completed of an entire 200-foot-wide survey corridor, as well as access trails where they diverge from this corridor. Significance assessments have been made for all newly recorded cultural resources. A draft technical report of the Class III inventory has been prepared, and significance assessments have been reviewed by the BLM. However, the Wyoming SHPO has not reviewed the draft report, and impact evaluations are therefore preliminary. During the course of the Class III inventory, all previously recorded cultural resources within the 200-foot-wide survey corridor were located again, and all were rerecorded and reassessed for significance.

A total of 35 archaeological and historical sites and isolates are located within the 200-foot-wide survey corridor. One of these sites has been determined eligible for the National Register of Historic Places and four others have been assessed as eligible based on field data. The remaining 30 sites and isolates are evaluated as not National Register-eligible. One of the five significant sites is prehistoric and the remainder are historic. Since actual transmission line construction plans are not finalized, it has been assumed that direct impacts could occur to all four of the significant sites.

4.2.13 Socioeconomics and Community Resources

Due to the short construction duration (18 months) and the relatively small size of the construction work force (25 to 35 people), it is not anticipated that secondary or indirect employment would occur. Operation of the upgraded transmission line would have no impact on local population.

Public services and facilities and local temporary housing could absorb the temporary construction work force without generating significant capacity problems. During the busier summer months, housing constraints may occur as construction personnel compete with tourists for vacancies. Likewise, during the off-season, local housing providers may benefit from the increased demand for accommodations by construction personnel.

The local economy would benefit in the short term from local expenditures made by construction personnel. The project would not affect permissible livestock stocking rates on public lands, and therefore, would not affect livestock operations. The construction of the powerline may cause short-term impacts to crop production. Local landowners would be compensated for any

damages or crop loss caused by Western (see Sections 2.3.1 and 2.3.1.4). Further, landowners would benefit from payment for the ROW acquired by Western.

Due to the Federal tax-exempt status of this project, tax revenue would not be generated for the affected counties.

Local economic development efforts would benefit from the project, since the project would reduce power surges and outages caused by lightning and other natural occurrences. The region would be promoted as having a modern and dependable electric power supply, thereby potentially attracting investment.

Benefits would be realized (i.e., costs would be minimized) by local oil companies with the implementation of the upgraded transmission line. Oil companies would avoid a majority of losses or damage to costly equipment with the installation of shield wires (i.e., lightning strike protection) on the new transmission line.

4.2.14 Transportation and Access

Only very minor traffic delays (less than 5 minutes) or interference with the highway system would result from project construction. Transmission line construction techniques would not require even temporary closure of area roads or highways. Users of highways and smaller gravel roads may experience minor delays as trucks turn off the roadway onto access trails or the ROW. Western's construction contractor would be required to obtain permits and work closely with state and county road departments.

It would be necessary to construct approximately 3 miles of new trail and repair 15 miles of existing trail. Trail improving would not affect the volume or speed of existing traffic in the area. New access could allow ingress by other parties; however, no increases in user volumes are anticipated.

No adverse effects on railroads or air traffic are expected. Prior to construction, appropriate notice will be given to the Federal Aviation Administration (FAA) and airport operators, if necessary, concerning the potential for effects on aircraft operations.

No adverse effects to local communication networks are anticipated.

4.3 Mitigation Measures

4.3.1 Climate and Air Quality

No mitigation measures would be required for climate and air quality resources.

4.3.2 Paleontology, Geology, and Soils

Paleontology

- In the event that vertebrate fossils are uncovered landowners or resource managers would be notified and a qualified paleontologist would evaluate the reported paleontological resource. Appropriate scientific data recovery would be undertaken, if impacts could not be avoided by structure relocation.

Geology

No mitigation measures would be required for geological resources.

4.3.3 Surface Water

No mitigation measures would be required for surface water resources.

4.3.4 Aquatic Biology

No mitigation measures would be required for aquatic resources.

4.3.5 Floodplains and Wetlands

Floodplains

No mitigation measures would be required for floodplains crossed by the proposed route.

Wetlands

- Construction mats or other protection techniques would be used for large construction vehicles crossing the existing ford of a tributary to Cottonwood Creek, located at MP 12.3 along the existing ROW access trail, to minimize rutting along the ford area,

disturbance to riparian vegetation, and soil compaction, if at the time of construction the ford area is wet.

4.3.6 Vegetation

- In order to aid in noxious weed prevention, a "clean vehicle policy" would be implemented while entering and leaving construction areas. Contractors would transport only construction vehicles that are free of mud and vegetation debris to staging areas and the project ROW. Western would comply with local weed control policies or ordinances.

4.3.7 Wildlife

Nongame Species

- Western would coordinate location of construction staging areas with state and Federal agencies.
- Surveys to identify active raptor nests located within 0.5 mile of the transmission line route would be conducted prior to project construction.
- No construction would be allowed within 0.5 mile of a raptor nest site during the breeding period, unless it is determined by the USFWS, BLM, and/or WGFD that project construction would not adversely affect the nesting birds (e.g., by topographic shielding of the nest site). Western would coordinate with the USFWS, BLM, and WGFD regarding mitigation for active raptor nests.

Game Species

- Prior to construction, sage grouse surveys that follow WGFD guidelines would be conducted between March 15 and April 15 to locate active lek areas crossed by the project route.
- Construction activities would not commence within 0.25 mile of active sage grouse leks until after 9:00 a.m. during the period from February 1 through April 15. Within 2 miles of active leks, construction would not occur until after May 30, in coordination with the BLM and WGFD.

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- Construction activities would be curtailed from November 15 to March 1 within designated mule deer crucial winter-yearlong range and pronghorn crucial winter range.
 - During severe weather events (i.e., fall and spring storms), project construction, including line stringing activities, would not be allowed along the Dry Creek pronghorn migrational corridor between November 1 and December 15 and between April 1 and June 15.

4.3.8 Species of Special Concern

Wildlife

Select mitigation measures (e.g., raptor nest clearance surveys) presented in Section 4.3.7 also are applicable for the protection of sensitive wildlife species and would be implemented where appropriate.

- Western would install aerial markers on the overhead static wires at the Greybull River crossing to minimize potential collision impact to wintering bald eagles and other bird species.
- Prior to project construction, prairie dog colonies would be mapped within 0.5 mile of the ROW. Within 1 year of construction initiation, black-footed ferret clearance surveys would be conducted within active prairie dog colonies, as required by the USFWS.
- As presented in Section 4.3.7 for Nongame Species, raptor nest surveys would be completed prior to construction initiation to identify active raptor nest sites located within 0.5 mile of the ROW. No construction would be allowed within 0.5 mile of the active nests during the breeding period. The period of nest avoidance would be specifically identified for the breeding individuals. Western would coordinate with the USFWS, BLM, and WGFD regarding nest avoidance, if an active raptor nest were recorded.

Vegetation

- Potential habitat for the Evert's waferparsnip would be surveyed for the plant prior to construction. Western would coordinate with BLM and USFWS, if Evert's waferparsnip were affected by the Proposed Action.

4.3.9 Land Use

No mitigation measures would be required for land use and zoning.

4.3.10 Recreation

No mitigation measures would be required for recreation resources.

4.3.11 Visual Resources

No mitigation measures would be required for visual resources.

4.3.12 Cultural Resources

- Mitigation measures for cultural resources evaluated as significant would be detailed in the technical report and would be finalized in consultation with the Wyoming SHPO and other affected parties. Avoidance of impacts is the preferred form of mitigation in all cases. Where avoidance is not possible, data recovery would be undertaken. If previously undetected cultural resources were located during construction, work in the immediate vicinity of the find would cease until it could be evaluated by Western and, if necessary, impacts to the find mitigated.

4.3.13 Socioeconomics and Community Resources

No mitigation measures would be required for the socioeconomics and community resources associated with this project.

4.3.14 Transportation and Access

No mitigation measures would be required for transportation.

4.4 Electrical Characteristics

Potential electrical effects associated with transmission lines include ozone generation, radio and television interference, audible noise, electric and magnetic field interference, and safety concerns. The first three of these potential effects are caused by corona, which is the electrical breakdown of air into charged particles created by the electrical field at the surface of the conductors.

Corona effects are generally associated with transmission lines operating at voltages of 345-kV or above. For the Proposed Action (built to 115 kV), corona effects would be negligible; ozone generation would be undetectable; and radio and television interference is not expected to be a problem. However, mitigative techniques do exist, and, if any problem occurred, Western would take corrective action. Noise may be noticeable directly under a line during foul weather. However, line noise would remain very low and would probably be masked by background storm noise during inclement weather. Audible noise is not expected to be an annoyance.

The proposed transmission line would be designed and constructed to meet or exceed all applicable requirements of the National Electrical Safety Code (NESC). Western will correct any induced shocks on fences or buildings associated with the transmission line. However, persons working near the transmission line should exercise caution not to contact the conductors with long, metallic objects (e.g., irrigation pipe). Such contact would produce a lethal electric shock.

Much attention has focused recently on reports of health effects associated with electric and magnetic fields. The evidence, however, has not established a cause and effect relationship. Magnetic and electric field strengths drop rapidly as distance increases from the ROW. The Big George to Carter Mountain transmission line crosses remote, uninhabited areas. Only 8 residences occur within 0.25 mile of the line. Therefore, electric and magnetic field effects are not expected to be a health concern.

For more detail regarding electrical characteristics, refer to Appendix C.

4.5 Cumulative Impacts

Three projects were identified as ongoing in the Big George to Carter Mountain area. These projects might result in cumulative impacts with the proposed transmission line and were evaluated as to their location and schedule. It was determined that the construction of a new transmission line from Worland to Thermopolis and ongoing oil and gas development in Park and Hot Springs Counties would be well removed from the Big George to Carter Mountain transmission line and would not result in cumulative impacts.

The Wyoming Department of Transportation is currently upgrading Highway 120 from 0.8 mile north of the Park County line to the eastern city limit of Meeteetse. This project is scheduled to be completed by the end of 1993, well before the start of construction of the new transmission line in the spring of 1995. Thus, no cumulative impacts are anticipated from this project.

During the preparation of this EA, residential development was noted both north and south of Meeteetse and along Meeteetse Creek. It is anticipated that this development will continue at a

pace unrelated to the construction of the proposed transmission line. Transmission lines have not generally been considered to facilitate or induce urban or rural growth. Further, since the proposed line will replace an existing line with an increase in ROW width from 40 feet to 80 feet, the new line should not interfere with future rural residential development. Residential development and transmission line construction have different types of impacts, which are not expected to interact in a cumulative manner.

The proposed transmission line would be designed and built to operate at 115 kV. As proposed, this line would be operated at 69 kV; operation at 115 kV is speculative and would be dependent on future transmission system needs in northern Wyoming. However, by planning for future transmission system needs now, the need to build an additional 115-kV transmission line in the future would be avoided. This would reduce future and overall cumulative impacts.

4.6 Long-Term Effects

The long-term effects associated with the physical presence of the proposed transmission line would be associated primarily with the visibility of the line from Highway 120; however, this would not represent a change in the situation that has existed since 1941 when the original 69-kV line was constructed. Land uses along the line have developed after the existing line was constructed, so reconstruction along the existing route would avoid conflicts. The increased potential for bald eagle collisions along the Greybull River also would be considered a long-term impact. A potential increase in bird collision may result from the addition of static wires on the new 115-kV line. A total of 26.5 acres of primarily rangeland, consisting of native grassland, would be permanently removed as the result of constructing new access trails, repairing existing access trails, and erecting structures. Long-term effects would continue until the proposed project is no longer needed and the transmission structures are removed.

5.0 CONSULTATION AND COORDINATION

During preparation of the EA, the following agencies and private organizations were contacted to obtain data.

5.1 Agencies Contacted During Preparation of EA

Federal

- Bureau of Land Management - Worland District Office - Grass Creek Resource Area - Worland, WY; Cody Resource Area - Cody, WY
- Fish and Wildlife Service - Cheyenne, WY
- Soil Conservation Service - Powell, WY

State

- Colorado Division of Wildlife - Monte Vista, CO
- Wyoming Natural Diversity Data Base - The Nature Conservancy - Laramie, WY
- Wyoming Department of Highways
- Wyoming Game and Fish Department - Cheyenne, WY; Cody, WY; Lander, WY; and Thermopolis, WY

Indian Tribes

- Arapaho Business Council - Mr. Burton Hutchinson, Chairman - Fort Washakie, Wyoming
- Crow Cultural Chairman - Mr. Lloyd Old Coyote - Crow Agency, Montana
- Crow Tribal Council - Ms. Clara Nomee, Chairwoman - Crow Agency, Montana

-
- Medicine Wheel Coalition on Sacred Sites of North America - Mr. Francis Brown, Chairman - Riverton, Wyoming
 - Northern Cheyenne Spokesman - Mr. Steven Brady - Lame Deer, Montana
 - Northern Cheyenne Traditional Leader - Mr. Bill Tall Bull - Busby, Montana
 - Northern Cheyenne Tribal Council - Mr. Edwin Dahle - Lame Deer, Montana
 - Eastern Shoshone Spiritual Leader - Mr. John Tarnesse - Fort Washakie, Wyoming
 - Eastern Shoshone Traditional Leader - Mr. Haman Wise - Fort Washakie, Wyoming
 - Eastern Shoshone Business Council - Mr. Alfred Ward, Chairman - Fort Washakie, Wyoming

County and Local

- Hot Springs County - County Planner
- Park County - Assessor and Planning and Zoning
- Meeteetse - Mayor

Private and Other

- Marathon Oil Co. - Cody, WY
- Pacific Power & Light - Portland, OR
- Rocky Mountain Herbarium - Curator

5.2 Public Meeting

During preparation of the EA, the following public meeting was conducted to inform the public about the project and to solicit input:

- Public meeting at the Meeteetse Recreation District in Meeteetse, Wyoming on September 1, 1992.

Purpose: To describe the project, purpose and need, preliminary environmental concerns, EA preparation, route evaluation process, the NEPA process, schedule, and to solicit input from the public.

6.0 LIST OF PREPARERS

6.0 LIST OF PREPARERS

Name	Education/Experience	EA Responsibility
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Jim Hartman	M.S. (Zoology) Michigan State University B.S. (Zoology) University of Wisconsin at Madison 16 Years Professional Experience	Review and coordination
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Lori Nielsen Assistant Project Manager	B.S. (Wildlife Management and Ecology) Oklahoma State University 9 Years Professional Experience	Assistant project management, EA preparation, wildlife, aquatic ecology, sensitive species, and BA preparation
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Name	Education/Experience	EA Responsibility
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<u>Centennial Archaeology, Inc.</u>		
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William Arbogast	M.A. (Anthropology) Colorado State University B.A. (Anthropology) Georgetown University 8 Years Professional Experience	Cultural resources
Daniel Meyer	B.A. (Anthropology) University of Pennsylvania 3 Years Professional Experience	Cultural resources

LIST OF ABBREVIATIONS AND ACRONYMS

AN	-	audible noise
BLM	-	Bureau of Land Management
C&RE	-	Western's Conservation and Renewable Energy Program
CB	-	citizen's band
CEQ	-	Council on Environmental Quality
cfs	-	cubic feet per second
dB	-	decibels-A-weighted
dBuV/m	-	decibels above 1 microvolt per meter
DOE	-	U.S. Department of Energy
EA	-	Environmental Assessment
ENSR	-	ENSR Consulting and Engineering
FAA	-	Federal Aviation Administration
FEMA	-	Federal Emergency Management Agency
FM	-	frequency modulation
HCC	-	high-current configurations
Hz	-	hertz
kV	-	kilovolt
kV/m	-	kilovolts/meter
LCC	-	low-current configurations
µg/m ³	-	microgram/cubic meter
mA	-	milliamperes
mG	-	milligauss
MP	-	milepost
NEPA	-	National Environmental Policy Act of 1969
NESC	-	National Electrical Safety Code
NOAA	-	National Oceanic and Atmospheric Administration
NWI	-	National Wetland Inventory
PM-10	-	inhalable particulates with the aerodynamic diameter of less than 10 microns
ppb	-	parts per billion
RI	-	radio interference
ROW	-	right-of-way
SCS	-	U.S. Soil Conservation Service
SHPO	-	Wyoming State Historic Preservation Office
Tri-State	-	Tri-State Generation and Transmission Association, Inc.
TSP	-	Total Suspended Particulate
TVI	-	television interference
USFWS	-	U.S. Fish and Wildlife Service
USGS	-	U.S. Geological Survey
V/m	-	volts/meter
VRI	-	Visual Resource Inventory
VRM	-	Visual Resource Management
WDEQ	-	Wyoming Department of Environmental Quality
Western	-	Western Area Power Administration
WGFD	-	Wyoming Game and Fish Department
WNDDDB	-	Wyoming Natural Diversity Database
Wyoming 120	-	Wyoming State Highway 120

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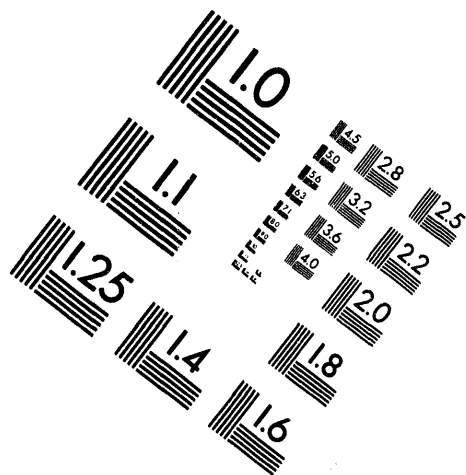
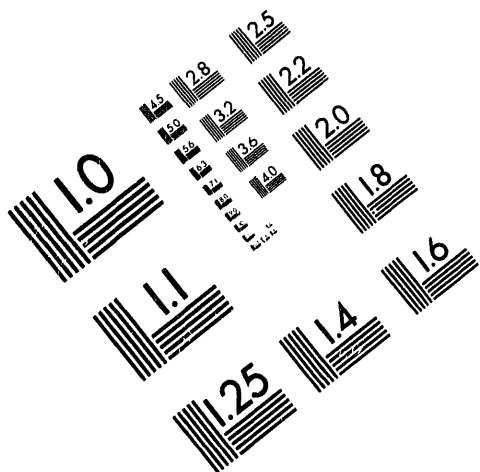
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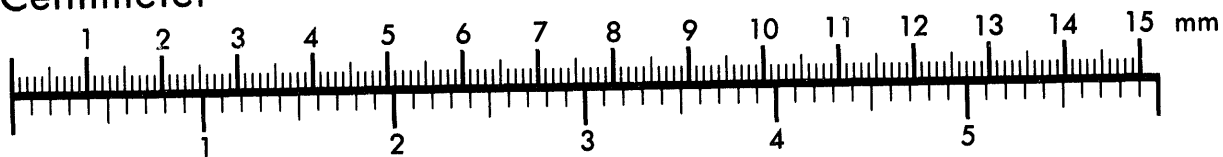
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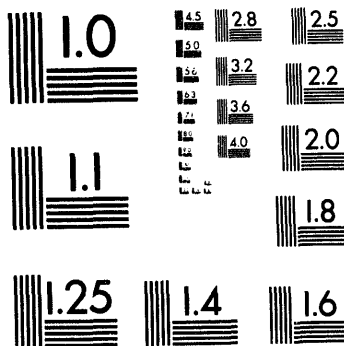
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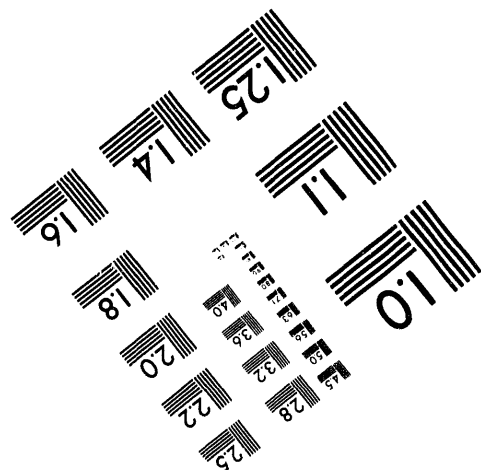
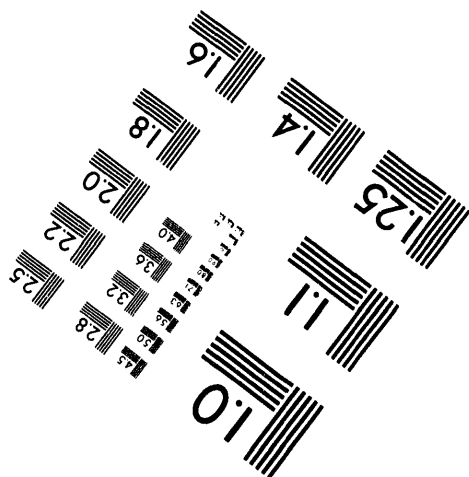
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APPENDIX A

**BIOLOGICAL ASSESSMENT FOR THE
BIG GEORGE TO CARTER MOUNTAIN 115-kV TRANSMISSION LINE**

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ATTACHMENT 1 - AGENCY CORRESPONDENCE

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A-1 Comparison of Proposed and Existing Routes for the Big George to Carter
Mountain Transmission Line Project **A2-3**

A1.0 INTRODUCTION

Federal agencies, in consultation with the U.S. Fish and Wildlife Service (USFWS), are required to ensure that any action they authorize, fund, or carry out will not adversely affect a federally listed threatened or endangered species. A Biological Assessment is required if major Federal actions may impact any federally listed or proposed species or critical habitat.

The U.S. Department of Energy, Western Area Power Administration (Western), as lead Federal agency for the proposed Big George to Carter Mountain 115-kV Transmission Line Project, has determined that the Proposed Action may impact federally listed threatened or endangered species. Western has requested informal consultation with the USFWS under Section 7(a) of the Endangered Species Act.

During informal consultation, the USFWS identified five species potentially affected by the Big George to Carter Mountain Project. These endangered species include the bald eagle, peregrine falcon, whooping crane, black-footed ferret, and gray wolf. In addition to these 5 federally-listed species, a total of 14 Federal candidate species also are associated with the proposed project. These candidate species include the Evert's waferparsnip, sturgeon chub, white-faced ibis, trumpeter swan, northern goshawk, ferruginous hawk, mountain plover, long-billed curlew, black tern, loggerhead shrike, spotted bat, Northern American wolverine, North American lynx, and Allen's thirteen-lined ground squirrel.

This assessment considers potential impacts of the Proposed Action on these 19 species. Analyses were performed using existing data, interviews with local biologists, agency documents (e.g., environmental impact statements [EISs], environmental assessments [EAs], resource management plans, and maps of the project area. Data were requested from the Wyoming Natural Diversity Data Base (WNDDDB), Bureau of Land Management (BLM), Wyoming Game and Fish Department (WGFD), USFWS, and specialists familiar with the current status and trends of the species of concern. Impact analyses examined direct and indirect effects of the Proposed Action and cumulative effects of other projects in the same project area.

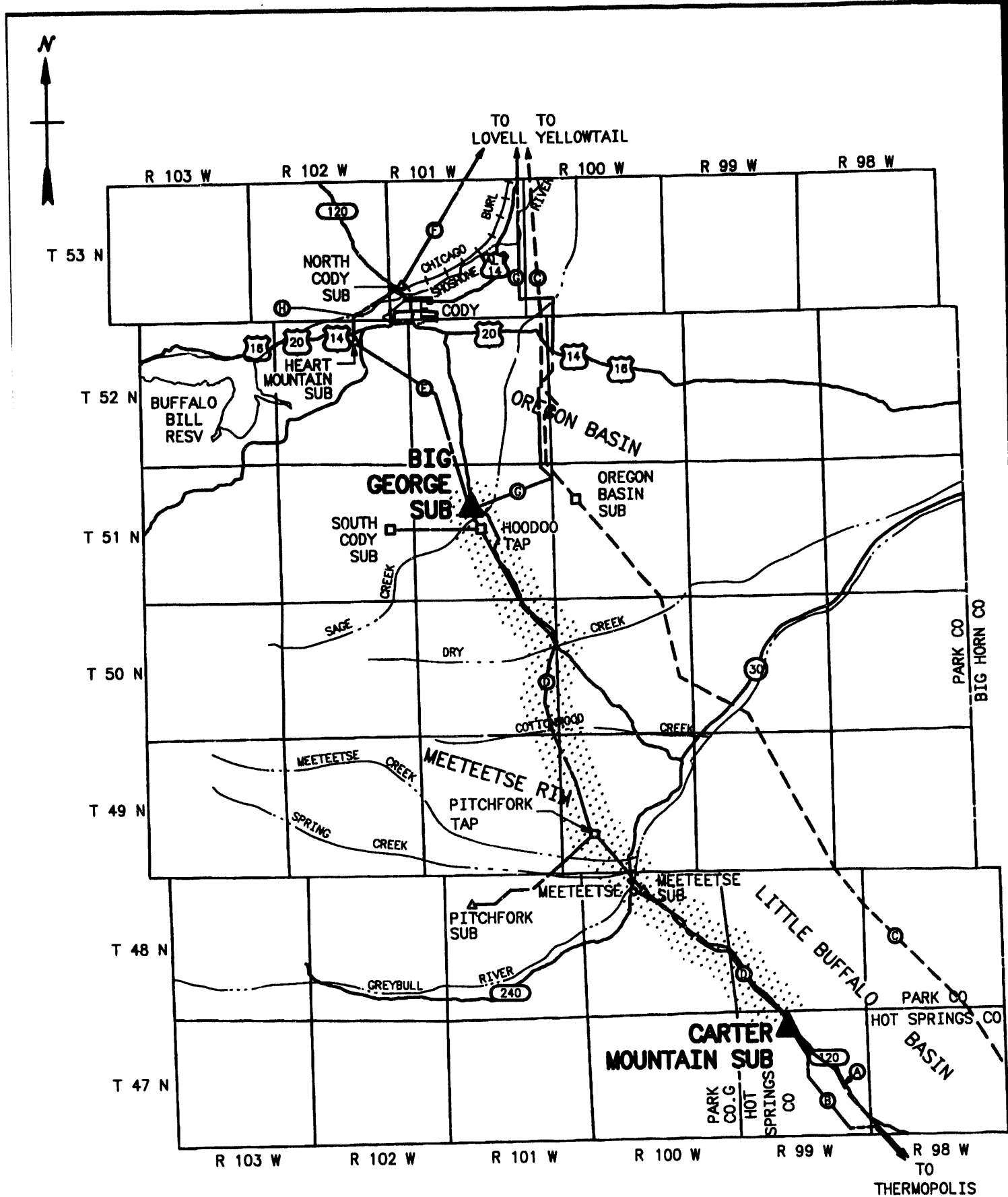
A2.0 PROJECT DESCRIPTION

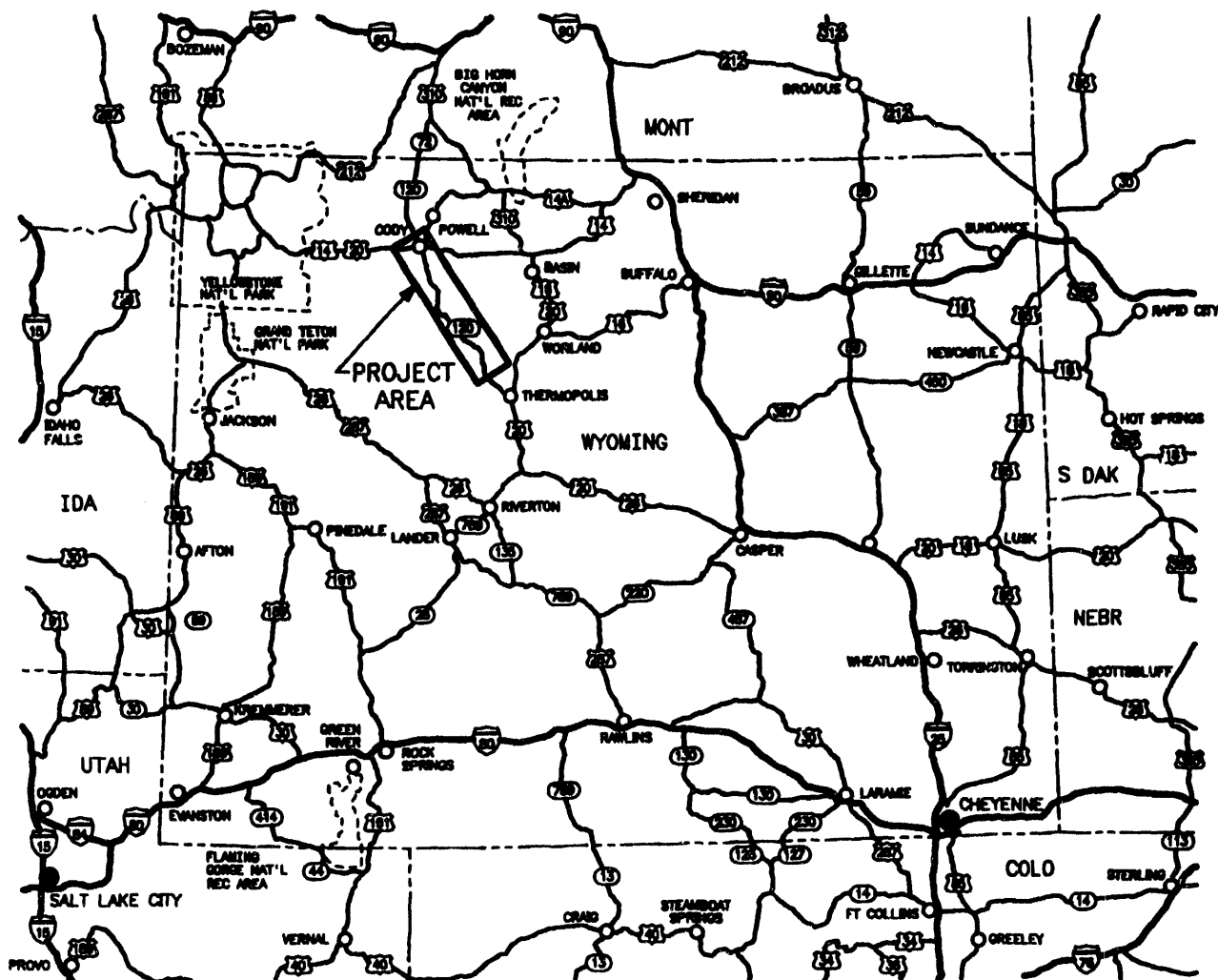
A2.1 Project Description

Western proposes to remove the existing Big George to Carter Mountain 69-kV transmission line located between the Big George Substation south of Cody, Wyoming, and the Carter Mountain Substation south of Meeteetse, Wyoming, and construct a new transmission line to 115-kV standards. Map A-1 depicts the project area. A detailed discussion of the project description is included in Chapter 2.0 of the EA prepared for the project.

The new line would consist of single circuit, wood-pole, H-frame structures similar to the existing line. However, the new line would be equipped with overhead ground wires. The new 28.3-mile transmission line would be constructed on the same right-of-way (ROW) as the existing transmission line except for a 2-mile section. This 2-mile section of line would be rerouted on new ROW behind a ridge north of the Carter Mountain Substation in order to minimize visual impacts (see Map 2-2, located at the back of this document).

Construction of the project would require 1 year and is scheduled between spring 1995 and summer 1996. The peak work force is expected to be about 25 to 35 workers.





STATE MAP

KEY

- (A)— WESTERN'S CARTER MOUNTAIN-THERMOPOLIS 69KV LINE
- (B)— TRI-STATE'S CARTER MOUNTAIN-THERMOPOLIS 115KV LINE
- (C)— PP&L'S THERMOPOLIS-YELLOWTAIL 230KV LINE
- (D)— WESTERN'S BIG GEORGE-CARTER MOUNTAIN 69KV LINE
- (E)— WESTERN'S BIG GEORGE-HEART MOUNTAIN 69KV LINE
- (F)— WESTERN'S HEART MOUNTAIN-LOVELL 69KV LINE
- (G)— TRI-STATE'S BIG GEORGE-LOVELL 115KV LINE
- (H)— WESTERN'S HEART MOUNTAIN-NORTH CODY 69KV LINE

Map A-1 Big George to Carter Mountain Project Area

TO
THERMOPOLIS

A3.0 ENDANGERED SPECIES EVALUATIONS

A3.1 Bald Eagle

A3.1.1 Status and Distribution

The U.S. Department of Interior has listed the bald eagle (*Haliaeetus leucocephalus*) as endangered in 43 of the 48 conterminous United States and as threatened within the states of Washington, Oregon, Minnesota, Wisconsin, and Michigan (USFWS 1991). Bald eagles also are protected under the Bald Eagle Protection Act of June 8, 1940, as amended, and the Migratory Bird Treaty Act of July 3, 1918, as amended June 20, 1936 in all states, including Alaska.

The 1992 national mid-winter bald eagle survey estimated 16,309 eagles for the 45 states that participated in this annual count (Steenhof 1992). The 1990 estimate of the breeding population in the lower 48 states totaled 3,014 occupied territories, which has risen from the 1,188 occupied territories recorded less than a decade ago (Kjos 1992).

The bald eagle's breeding range formerly included most of the continent; the species historically nested in areas where suitable habitat occurred (USFWS 1986). The eagle's winter range includes most of the breeding range but extends predominantly southward from southern Alaska and southern Canada (USFWS 1986). The largest wintering eagle concentrations in the lower 48 states occur in the Klamath Basin, California; in the Midwestern states along the Mississippi, Missouri, Illinois, Platte, and Arkansas Rivers; and in the Northwest, encompassing Washington, Oregon, Idaho, and western Montana. Major rivers and other open water bodies in Wyoming, Montana, and North Dakota also serve as wintering grounds for the bald eagle (Spencer 1976).

Both nesting and wintering bald eagles occur within the State of Wyoming (USFWS 1986). Wyoming recorded a total of 49 occupied breeding territories in 1990 (Kjos 1992), with a majority of these located in the northwestern portion of the state (USFWS 1986). Bald eagles that nest in northwestern Wyoming contribute to a significant part of the nesting population in the Rocky Mountain West (WGFD 1989). Other nesting pairs occur in widely scattered areas of the state, including the Bighorn and Tongue Rivers in northern Wyoming and the North Platte River in southern Wyoming (USFWS 1986). Several new eagle nests in the state were reported in 1992 (WGFD 1992).

Wintering eagles are distributed throughout Wyoming, with concentrations associated with the North Platte, Green, Snake, Greybull, and Bighorn Rivers, and the Woodruff Narrows Reservoir

located north of Evanston (USFWS 1986; Ritter 1992). In 1991, mid-winter bald eagle surveys conducted in cooperation with the National Wildlife Federation reported 319 birds within the state (National Wildlife Federation 1991). The WGFD reported a total of 501 eagles during the 1992 mid-winter counts (Ritter 1992).

A3.1.2 Life History and Habitat Requirements

Bald eagles normally reach breeding age at about 5 years, which roughly coincides with full adult plumage (Hancock 1973). The breeding season of the bald eagle varies with latitude. Pre-nesting activities occur as early as January, but typically take place in February or early March and include courtship flights, nest repair, and nest building. Egg laying and incubation usually begins in March, lasting approximately 35 days. One to four eggs (average two) are laid (Brown and Amadon 1968). The period from hatching to fledgling is about 10 to 13 weeks, with a post-fledgling period of 3 to 10 weeks (Todd 1979).

Nests are usually located in multi-storied trees; optimum nesting habitat includes proximity to open water providing an adequate food source, large nest trees with sturdy branches at sufficient height, and stand heterogeneity. Good visibility from the nest and a clear flight path are essential (Grubb 1976). In Wyoming, 83 percent of the active bald eagle nests are located within 600 feet of water (Alt 1980). Eagles often use the same nest each year and will supplement with new nesting material or rebuild the nest, if destroyed. Consequently, nests may become very large and may be 2 to 3 feet deep and 5 feet in diameter (Grubb 1976; Anderson and Bruce 1980). Prey items during the nesting season consist primarily of fish (Grubb and Hansel 1978). Other food items include songbirds, invertebrates, small animals, and carrion.

Bald eagles migrate from breeding areas between September and December and generally winter as far north as open water and food are available. The major components of habitat on wintering grounds include a food source and suitable trees for diurnal perching and night roosting. Wintering bald eagles may gather in large aggregations and share communal roosts, diurnal perches, and feeding areas. Eagles are attracted to large bodies of water, particularly areas located downstream of hydroelectric dams where there is access to dead or dying fish or waterfowl (Cooksey 1962; Ingram 1965), but may use arid valleys as well (Edwards 1969). Food availability is probably the single most important factor affecting winter eagle distribution and abundance (Steenhof 1976). Waterfowl, particularly dead or crippled individuals, are often taken when fish are not readily available (Shickley 1961; Spencer 1976). In some regions, carrion is an important food source; deer, cattle, sheep, antelope, and road-killed cottontails and jackrabbits are readily utilized. Live mammals such as mice, cottontails, jackrabbits, gophers, woodrats, and kangaroo rats also are taken (Lish and Lewis 1975; Platt 1976; Beck 1980). Eagles may maximize alternate food sources, as availability changes.

Perches are an essential element in bald eagles' selection of foraging areas, since they are necessary for hunting and resting (Stalmaster and Newman 1979). Perch sites must be in open view of potential food sources and are generally within 160 feet of water (Vian 1971). Night roost sites offer protection from predators and a degree of protection from inclement weather. Large, live trees that occur in sheltered areas are preferred (Lish 1975). Eagles may roost individually or in small groups, and roosts can be used for successive years. Eagles generally leave the roost for feeding areas in the early morning and return in the evening, except during severe weather when they may remain at the roost throughout the day. Cottonwood (*Populus* spp.) would comprise preferred perches and roosting areas in the vicinity of the proposed project.

A3.1.3 Endangerment Factors

The decline in eagle numbers is attributed to loss of habitat; human disturbance; pesticide and lead contamination of prey; illegal shooting, poisoning, and trapping; and electrocution. It has been estimated that the most severe declines in bald eagle numbers in Wyoming most likely occurred in the late 1800s and early 1900s. Human settlement along the major river systems and extensive poisoning and shooting of all predators were prevalent during this period and affected both resident and migratory eagle populations (USFWS 1986).

Habitat loss for both breeding and wintering bald eagles is increasing within the United States. Land development and human activity in breeding and wintering habitats eliminate otherwise suitable habitat for bald eagles. Human activity near a nest site during the breeding season can result in nest abandonment and lowered reproductive success. Illegal hunting or poaching also reduces eagle numbers.

In the past, direct and indirect effects of organochlorine pesticides severely impacted bald eagle populations (Bailey 1984). Secondary poisoning from eating lead-contaminated prey, particularly in wintering areas where eagles feed on crippled ducks and geese, and feeding on poisoned carcasses also reduce eagle numbers (Jacobson et al. 1977; USFWS 1986).

Electric power lines can pose a threat to bald eagles and other raptors, depending on the line's size and configuration. The Oregon Basin and Little Buffalo Basin in the project area have experienced an increased incidence in golden eagle electrocutions from power distribution lines associated with an increase in oil and gas activities. The incidences of electrocutions increase in high wind areas and during migration (Roop 1992) and with juvenile birds whose flight skills are not fully developed (USFWS 1986).

Overall, bald eagle collisions with power lines appear to occur with less frequency than electrocutions. However, in specific areas where bald eagles concentrate, transmission lines can

represent a threat (USFWS 1986). Of these endangerment factors, collision, human disturbance, and electrocution hazard are the potential impacts associated with the Proposed Action.

A3.1.4 Presence in the Study Area

No breeding areas or nest sites occur along the proposed route. The bald eagle is a winter resident along the Greybull River (Ritter 1992; BLM 1988), an area listed as crucial eagle wintering habitat by the WGFD (1989). Individuals may forage throughout the study area, particularly within mule deer winter range and during cyclic highs in cottontail rabbit populations (Ritter 1989; Denton 1989). No historical or communal roost sights are known to occur along the riparian habitats in the project area, including the Greybull River (Ritter 1989); although feeding areas, night roosts, and diurnal perches may be used during migration and wintering periods. The WGFD's 1992 mid-winter bald eagle surveys reported a large increase in wintering eagle use along the Greybull River (Ritter 1992).

A3.1.5 Impact of the Proposed Action

No impacts to nesting bald eagles are anticipated from the Proposed Action. Project construction that occurs during the wintering period (October through March) would not likely affect wintering birds inhabiting the Greybull River corridor. One transmission line structure would be located in the Greybull River floodplain. Structure removal, structure placement, and line stringing would be completed during three separate periods, with 4 days of continual activity being the longest period of disturbance. Since the project ROW is located adjacent to the town of Meeteetse, disturbance associated with line construction is not expected to be greater than the existing baseline conditions, which include human activities associated with the town, the Highway 120 bridge, and current agricultural activities. Therefore, no adverse effects to bald eagles are anticipated from human activity.

Because wintering bald eagles may forage throughout the project area (Ritter 1989), line construction may inhibit eagles from feeding in other locations (e.g., Meeteetse Creek). This potential impact would not be considered a long-term, adverse effect, however, since line construction would be temporary and individuals would likely return to the foraging area upon completion of construction activities. Bald eagle foraging along the proposed route and outside of the Greybull River corridor is expected to be widely dispersed.

During project operation, the potential for eagle collision with the transmission line would increase for wintering eagles along the Greybull River. Although the Proposed Action would be replacing an existing transmission line, the upgraded line would be equipped with overhead ground wires. Studies on avian collisions with power lines have indicated that 80 to 93 percent of observed

collisions occurred with these overhead ground or static wires (Faanes 1987; Beaulaurier et al. 1982; James and Haak 1979). However, collision potential is dependent on a number of variables such as habitat type, line orientation, numbers of birds present, existing disturbances in the area, visibility, and area familiarity (Beaulaurier et al. 1982; Anderson 1978). The location of the transmission line corridor adjacent to the town of Meeteetse minimizes the potential for collision, since human disturbance continually occurs in this area, and eagles would typically avoid these disturbances to forage along other, more remote, reaches of the river. In addition, several physical and behavioral attributes of raptors decrease their susceptibility to collisions (e.g., keen eyesight, slow flight speed, maneuverability) (Olendorff et al. 1981), and no communal roost sites for wintering eagles are known to occur near the proposed route (Ritter 1992). Aerial markers would be placed on the overhead ground wires at the Greybull River transmission line crossing to minimize the potential for bald eagle collisions.

Electrocution of raptors during project operation is not typically considered a problem with transmission lines of 69 kV or greater. Transmission lines and distribution lines responsible for raptor electrocutions are smaller than 69 kV. The physical dimensions and configuration of the proposed Big George to Carter Mountain 115-kV transmission line would meet or exceed design requirements for raptor protection (Olendorff et al. 1981) and would not introduce an electrocution hazard to bald eagles.

Other projects or development that are ongoing or proposed for the project area were examined to assess potential cumulative impacts to the bald eagle. Effects from the widening of Highway 120, current oil gas activities, and increased residential development in the project area are not expected to significantly impact bald eagles in conjunction with the Big George to Carter Mountain project. Project schedule and location of the transmission line ROW minimizes the potential for cumulative effects with these other activities.

Based on the impacts analyses and the development of this mitigation measure, the Proposed Action would not likely adversely affect breeding or wintering bald eagles.

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A3.2 Peregrine Falcon

A3.2.1 Status and Distribution

The American peregrine falcon (*Falco peregrinus anatum*) is federally listed as endangered. The Arctic peregrine falcon (*F. p. tundrius*) is listed as threatened on its breeding range, but either peregrine falcon occurring within the lower 48 states is considered endangered. Currently, Region 2 of the USFWS is evaluating a formal petition to change the Federal classification of the American peregrine falcon from endangered to threatened (Craig 1992). This proposal is based on the assumption that 4 additional years of releases will bring peregrine populations near the recovery goals identified for the states that presently maintain recovery programs. In the event that the planned releases achieve these population goals and the species continues to expand, the Fund recommends that both peregrine subspecies be delisted entirely (Peregrine Fund 1992).

Historically, the American peregrine falcon bred in an area ranging from Canada and Alaska south to Mexico. Reintroduction and management efforts have reestablished nesting peregrine falcons in many areas of the Rocky Mountains. Both the American and Arctic peregrine falcon may winter in or migrate through much of the lower 48 states.

The peregrine falcon has been reported as rare within Wyoming. Eighteen nest sites were known in the state prior to 1975; however, adequate documentation of all but seven of these sites was not completed until after 1975. No sites were known to be occupied by breeding birds from 1980 to 1983 (USFWS 1984).

Due to the reductions in peregrine numbers, reintroduction of birds was initiated in Wyoming in 1980. A total of 150 peregrines were successfully introduced to the wild between 1980 and 1988. In 1984, a pair from previous reintroduction efforts nested at a historical eyrie that had not been occupied since 1969 and produced three young. In 1991, 14 pairs were recorded within the state, and a total of 21 pairs of peregrines were known to nest in the state in 1992 (Peregrine Fund 1992). The goal of the Wyoming reintroduction program is to annually release approximately 15 peregrines and establish 30 breeding pairs within the state by 1996 (WGFD 1991). Modeling results and observations of returning peregrines presently indicate that the reintroduction program is progressing as anticipated (WGFD 1989).

A3.2.2 Life History and Habitat Requirements

Peregrine falcons mature at about 2 to 3 years of age. Adults usually return in mid-March to the same nest site each year, exhibiting a strong nest site attachment; however, an alternate nest site also may occur within the breeding territory (Fyfe et al. 1976). The female lays a clutch of three to four eggs in April, and both the male and female birds may incubate. The female typically performs the majority of the incubation, while the male provides prey species. The young hatch at about 33 days and are then cared for by both parents. Fledging occurs in June or July; soon afterwards the young are independent (USFWS 1984).

The four major habitat requirements for nesting are: 1) an inaccessible nest site; 2) adequate prey base; 3) proximity to water; and 4) isolation from human disturbance (Haynam et al. 1977). Peregrine falcons typically nest on cliffs near rivers, lakes, or marshes. Most nest sites are 150 feet or more in height with a small cave or overhanging ledge (USFWS 1984). The nest ledge will have loose soil, sand, gravel, or dead vegetation to allow the peregrine to construct a scrape for egg laying (Enderson and Craig 1974; Cade 1960).

The average hunting territory for a peregrine pair is usually within 10 miles of the nest, although individuals may travel up to 17 miles from nesting cliffs to forage (USFWS 1984). Preferred hunting areas include cropland, meadows, marshes, lakes, and rivers where prey species are abundant (Porter and White 1973).

A3.2.3 Endangerment Factors

Several factors that have contributed to the decline of the peregrine include: 1) eggshell thinning caused by pesticide poisoning; 2) trapping and taking of young by falconers; 3) shooting; 4) disturbance of nest sites by human encroachment; and 5) habitat destruction, resulting in reduction of prey availability (Herbert and Herbert 1965; Peakall 1974; Thelander 1978).

The marked decline in active peregrine eyries and the greatly reduced productivity of peregrines in the United States has primarily been in response to chemical poisoning and loss of habitat. A metabolite of DDT (DDE) has been proven to cause eggshell thinning, other chemicals and pesticides also may be a factor in successful reproduction efforts (USFWS 1984). Concentrations of DDT as low as 15 parts per million can result in unsuccessful hatching and reproductive failure (Peakall 1974)

Disturbance of nest sites by human activities and habitat loss would be the potential impacts associated with the Proposed Action.

A3.2.4 Presence in the Study Area

In 1992, a total of 21 pairs of peregrines were known to nest within the State of Wyoming (Peregrine Fund 1992). No active peregrine falcon eyries occur between the Big George Substation and the Carter Mountain Substation. The Arctic peregrine falcon would be considered a rare migrant (Ritter 1989; Denton 1989); the American peregrine falcon may forage in and migrate through the project area (Oakleaf 1992). Lakes located south of Cody eastward to the Oregon Basin provide excellent foraging habitat that is used by migrant peregrines, subadults, and possibly by resident birds foraging from other areas of northwest Wyoming (Oakleaf 1992).

Rocky outcrops and cliffs in the project area provide potential peregrine habitat (Denton 1989). Wetlands and open water areas crossed by or occurring near the transmission line route do not attract large numbers of birds (Hurley 1993; Roop 1993) that would provide a sufficient prey base for peregrines (i.e., no bird concentration areas are present that would attract foraging peregrines). The closest reintroduction efforts of the American peregrine falcon have been concentrated within crucial peregrine recovery habitat located along the South Fork of the Shoshone River directly north of the project area. No release sites occur near the Proposed Action or within the project area (Oakleaf 1992; WGFD 1989).

A3.2.5 Impact of the Proposed Action

No adverse impacts to breeding peregrine falcons (e.g., eyrie abandonment, loss of eggs or young) are anticipated from the Proposed Action, since no active peregrine eyries exist in the project area. The likelihood of the project affecting migrating individuals is low, since the migratory arctic peregrine falcon is considered rare in the project area. Although occasional peregrines may forage in the project area, no optimal foraging habitat is crossed by the line and no bird concentrations occur near the proposed ROW that would attract feeding peregrines. Based on the low probability of peregrine falcons in the project area, the Big George to Carter Mountain Project would not likely adversely affect either the American or Arctic peregrine falcon.

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A3.3 Whooping Crane

A3.3.1 Status and Distribution

The whooping crane (*Grus americana*) is federally listed as endangered. Although population estimates vary, Allen (1952) postulated that whooping cranes were never abundant and estimated a maximum population size of 1,500 birds, based on the extent of available winter range. In 1941 only 21 individuals remained, only 15 of which were wild (USFWS 1986). Intensive management and breeding programs for the whooping crane have resulted in an increase in its overall population. Two wild flocks of whooping cranes exist; in November 1992, the Wood Buffalo-Aransas flock contained a minimum of 140 birds and the Grays Lake population reported 9 birds (Lewis 1992).

The historic breeding range during the period of North American settlement extended across the central plains states into the Canadian prairie provinces. Winter distribution occurred primarily along the Gulf of Mexico. Historically, several migration routes were used by whooping cranes within the United States, Canada, and Mexico (USFWS 1986).

Currently, cranes from the Wood Buffalo-Aransas flock annually nest at Wood Buffalo National Park in Canada and winter at Aransas National Wildlife Refuge in Texas. Whooping cranes in the Grays Lake population summer in southern Idaho and western Wyoming near Grays Lake, Idaho. These birds migrate with sandhill cranes through northeastern Utah and Colorado to the

Rio Grande Valley of New Mexico, where a majority of the birds winter. A few birds also winter in northern Mexico (Lewis 1986).

A3.3.2 Life History and Habitat Requirements

Wintering grounds, breeding and nesting areas, and migration stopovers are selected by individuals primarily as a combination of migratory behavior and habitat requirements. Although whooping cranes are dependent on traditional nesting and wintering grounds and migratory routes, cranes do not use the same migration stopover sites from season to season, or from year to year, exhibiting an opportunistic selection strategy along the flyway (USFWS 1986; EA Engineering 1985).

Whooping cranes select an open expanse of shallow water in rivers, lakes, reservoirs, and native wetlands for nightly roosting. These sites include stockponds (as small as 0.25 acre), marshes, flooded grain fields, and shallow reservoirs and rivers. Such sites provide protection from predators, a high degree of visibility, and isolation from human disturbance. Birds observed on the ground during migration are found either on a roost site or within a short flight distance of a roosting area. Feeding sites include the same wetland types as those used during roosting. Whooping cranes use standing water wetlands in agricultural areas, upland grasslands, and rivers for foraging and roosting.

A3.3.3 Endangerment Factors

The whooping crane population declined drastically in the late 19th and early 20th centuries. The principal reasons for this decline included hunting, specimen collection, human disturbance, and conversion of the primary nesting habitat to hay, pastureland, and grain production (Allen 1952). Current threats to the whooping crane include human disturbance, habitat modification, disease (e.g., avian tuberculosis), collisions with powerlines, and accidental shooting (Lewis 1986). Of these threats to cranes, human disturbance and line collision would be the potential impacts associated with the Proposed Action.

A3.3.4 Presence in the Study Area

The whooping crane is a rare summer resident of Wyoming (Dorn and Dorn 1990). Whooping cranes observed in the state are predominantly associated with the Gray's Lake population (Lewis 1992). However, one historical observation of a whooping crane associated with the Wood Buffalo-Aransas flock occurred in southeastern Wyoming (WGFD 1992). No critical habitat for whooping cranes has been designated in Wyoming.

Individuals have been observed during migration in western Wyoming, particularly in Lincoln and Sublette Counties (Dorn and Dorn 1990; WGFD 1992). One confirmed sighting of a whooping crane was reported along lower Sage Creek in March 1984. The banded crane was from the Gray's Lake population and is the only confirmed sighting reported in the Bighorn Basin (Collins 1993). A second sighting of a whooping crane, relative to the project area, was a summering bird in the mid-1980s observed at Ocean Lake in Fremont County, approximately 62 miles south of the Carter Mountain Substation (Ritter 1989).

During migration, whooping cranes use wet meadows, riparian zones, and floodplains as staging or stopover areas for both foraging and social interaction. They often use these areas in conjunction with the more common sandhill cranes. Individual whooping cranes from the Gray's Lake population have been recorded using such stopover areas in northwestern Wyoming (Brockmann 1993); however, no traditional stopover areas are known to occur near the proposed transmission line route. The closest staging or stopover area for migrating sandhill cranes occurs along the Greybull River west of Otto, Wyoming. This area is located over 20 miles northeast of the proposed transmission line crossing of the Greybull River at Meeteetse. Sandhill use of this staging area has been increasing annually, with approximately 200 birds recorded during the 1992 spring migration; however, no whooping cranes have been recorded using this stopover area, and no sandhill crane staging has been reported west along the Greybull River toward Meeteetse (Easterly 1993).

A3.3.5 Impact of the Proposed Action

The addition of a groundwire to the proposed transmission line would increase the risk of collision for all birds, including a rare migrant such as the whooping crane. The Proposed Action does not affect potential feeding or nesting habitat or USFWS designated critical habitat. Aerial markers would be placed on the overhead ground wires at the transmission line crossing of the Greybull River, which would minimize collision hazard. The physical dimensions of the proposed 115-kV transmission line would preclude an electrocution hazard to cranes. Based on these factors, the proposed transmission line upgrade would not likely adversely affect the whooping crane.

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A3.4 Black-Footed Ferret

A3.4.1 Status and Distribution

The black-footed ferret (*Mustela nigripes*) is federally listed as endangered (Hall 1981). The black-footed ferret was considered extinct by the middle of this century, until it was observed in Mellette County, South Dakota in August 1964. This discovery instigated 11 years of ferret studies, indicating a highly dispersed, low density population distributed within a minimum of 8 counties (Hillman 1968; Henderson et al. 1969; Sheets 1970; Linder et al. 1972; Fortenbery 1972). This population disappeared by 1974, and only scattered reports of individuals persisted.

In 1981, a viable population of ferrets was discovered in northwest Wyoming near Meeteetse (USFWS 1988). These animals comprised the only known wild population of the black-footed ferret in existence. Population estimates at Meeteetse were approximately 129 ferrets (43 adults

and 86 juveniles) during the summer of 1984 (USFWS 1988). However, the population subsequently declined to roughly 65 known animals during the winter of 1984-1985, and with the outbreak of canine distemper in the colony during the summer of 1985, the colony declined further to only a few remaining individuals. In an attempt to save the black-footed ferret from possible extinction, the last ferrets known to exist in the wild were captured: 6 animals were captured during the fall of 1985, 11 animals were captured during the summer of 1986, and 1 additional male was taken in February 1987 (USFWS 1988; Morkill et al. 1987). These 18 animals (7 males and 11 females) provided the basis for a captive breeding program. The captive breeding program has resulted in a total of 242 adult ferrets and 186 juvenile ferrets, or kits, existing in captivity as of mid-September 1992 (Luce 1992).

During the fall of 1991, the USFWS and WGFD released 49 ferrets (32 males, 17 females) into the wild near Shirley Basin, Wyoming approximately 175 miles south of the project area. Surveys conducted during July and August of 1992 indicated that at least 2 solitary adult males and 2 adult females (observed with litters of 2 and 4) were known to have survived since their release last fall. Between September 22 and October 22, 90 additional kits that were born during the 1992 season were released in Shirley Basin. A post-release survey conducted November 9, 10, and 11, 1992 verified 19 animals from the 90 that were previously released (Luce 1992).

Historically, the range of the black-footed ferret coincided closely with that of the prairie dog (*Cynomys* spp.) throughout the Great Plains, semi-arid grasslands, and mountain basins of North America (Hillman 1968). The species is thought to have been distributed from southern Alberta and Saskatchewan, south to Arizona and Texas (Henderson et al. 1969). No black-footed ferrets are currently known to occur outside of the captive and reintroduced populations; however, remnant ferret populations may exist in portions of its former range (Hillman and Carpenter 1980).

A3.4.2 Life History and Habitat Requirements

Black-footed ferrets are primarily nocturnal, solitary carnivores that are obligate associates of the prairie dog (*Cynomys* spp.). In addition to relying on prairie dogs as their primary prey source, ferrets use the burrows to raise their young. Although ferrets are primarily nocturnal, they also may be active during daylight hours, particularly during the summer period (Henderson et al. 1969; Linder et al. 1972; Fortenbery 1972; Hillman 1968; Forrest et al. 1985).

Black-footed ferrets have been reported to breed from March to May (USFWS 1988). The gestation period ranges from 41 to 45 days, with as many as five young born in late May and early June. The kits remain underground until late June or early July. In early summer, the kits most often occupy one burrow; however, as the season progresses, the female may place the

offspring in separate burrows scattered throughout the prairie dog colony. The kits may then accompany her during nocturnal foraging within the colony.

Ferrets are most commonly observed in late summer or early fall. Male ferrets are not active in rearing the young and live a solitary life except during the breeding season. A detailed discussion of the black-footed ferret's life history is presented in Hillman and Carpenter (1980).

A3.4.3 Endangerment Factors

Control or extermination of prairie dogs, habitat alteration, and disease are the major contributors to ferret decline (USFWS 1988; Linder et al. 1972; Clark 1978; Carpenter et al. 1976; Budd 1981; Williams 1982). Estimates suggest a reduction of 90 to 95 percent of historically occupied prairie dog habitat from the early 1900s to the present (Choate et al. 1982; Anderson et al. 1986; Flath and Clark 1986).

While none of these factors is associated with the Proposed Action, as a Federal agency, Western is committed to conservation of the species and routinely maps prairie dog colonies and conducts ferret surveys in coordination with the USFWS.

A3.4.4 Presence in the Study Area

The black-footed ferret historically inhabited the project area. The last known wild population of ferrets occupied the area near Meeteetse until 1987, when the last ferret was captured for captive breeding. No ferret populations are presently known to occur in the project area (USFWS 1988; Morkill et al. 1987).

Map 2-2 of the EA (located at the back of this document) shows the prairie dog colonies that have been recorded since 1988 by the WGFD (Luce 1992), those recorded during the field reconnaissance in June 1992 (ENSR 1992), and the colonies observed during an aerial survey conducted in January 1993 to delineate active colonies located within 0.5 mile of the proposed ROW (ENSR 1993). A total of 11 prairie dog colonies presently occur within 0.5 mile of the ROW centerline, with a portion of these colonies part of larger complexes. The activity status of these colonies is currently unknown.

A portion of the transmission line route traveling northwest from the town of Meeteetse crosses the Meeteetse Black-Footed Ferret Management Area (see Map 3-2 of the EA, located at the back of this document) (Luce 1992). The USFWS and WGFD designated this area, located west of Meeteetse, as a priority site for ferret reintroduction, since: 1) it was the area most recently occupied by wild ferrets, 2) efforts to maintain this protected habitat are ongoing and successful,

3) most black-footed ferret data were obtained from the Meeteetse area, and 4) ferret individuals and their offspring in captivity may be best adapted to environmental conditions in the Meeteetse area (WGFD 1990; USFWS 1991).

The Meeteetse Black-Footed Ferret Management Area covers 208 square miles of rangeland and is buffered by a "zone of interest" (see Map 3-2 of the EA). Management strategies will not be applied in this buffer zone, which was established as part of the Management Area to facilitate communication with all landowners (WGFD 1990). The existing 69-kV transmission line crosses a total of 6.8 miles of the Management Area. Of those 6.8 miles, 3.2 miles cross the buffer zone of interest. Currently, a total of 62 transmission line structures are located within the Management Area, and 30 structures occur within the buffer zone. This alignment averages a 580-foot span between structures. Based on Western's anticipated line design (see Table 2-1 of the EA), the average span between structures for the 115-kV line would be 700 feet. Therefore, the number of structures that would be located within the entire Meeteetse Management Area would decrease to approximately 51 structures, with 24 of those structures occurring in the buffer zone of interest. Therefore, an estimated 27 structures would occur in the Management Area administered under the recommended guidelines developed by the WGFD in the Cooperative Management Plan (WGFD 1990).

Because the resident prairie dog population located within the Meeteetse Management Area declined 52 percent in 1989, thereby lowering the site's carrying capacity for black-footed ferrets, the USFWS and WGFD identified another site, the Shirley Basin/Medicine Bow Management Area, as the priority reintroduction site. The Meeteetse Management Area was retained as a backup site for possible future ferret reintroductions.

In the event that the Meeteetse Management Area is used for reintroduction efforts, the ferrets to be released would be designated as a "nonessential experimental" population, in accordance with Section 10(j) of the Endangered Species Act (USFWS 1991). The "nonessential experimental" designation allows the USFWS the flexibility to ensure that reintroduced populations will not significantly impact existing or future land uses. Under this designation, only two provisions of Section 7 of the Endangered Species Act would apply: 1) conservation programs would be established and 2) informal consultation would be necessary with the USFWS on actions likely to jeopardize the continued existence of the species.

A3.4.5 Impact of the Proposed Action

Because the black-footed ferret is so closely associated with prairie dog populations, all prairie dog colonies or complexes are considered to be potential habitat for this endangered species.

Until it is determined whether ferrets occur along the project route, a determination of effect cannot be made for the black-footed ferret.

If ferrets were present in prairie dog colonies crossed by the proposed transmission line, they could be affected by trail building, trail repair, and structure placement. Clearing trails and excavating holes for poles could destroy portions of prairie dog burrows occupied by black-footed ferrets. Ferrets would be most vulnerable in early summer when young kits would be present in the burrows. However, these impacts are unlikely since the existing access trails and ROWs would be used for the Proposed Action.

Black-footed ferret clearance surveys would be conducted within active colonies or colony complexes exceeding 200 acres in size that are located within 0.5 mile of the ROW centerline. In January of 1993, 11 prairie dog colonies were recorded within 0.5 mile of the ROW centerline. Of these 11 colonies, 1 colony totaled 208 acres and 2 colonies (105 and 36 acres) were part of larger prairie dog complexes that exceed the 200-acre minimum to warrant ferret clearance surveys, according to the guidelines identified by the USFWS (1989). The eight remaining colonies would not require black-footed ferret clearance surveys due to their small size, the distance from adjacent colonies within the complex, and their locations relative to the proposed route (see Map 2-2 of the EA).

Prairie dog colonies or complexes of sufficient size would initially be examined to determine if they are active; clearance surveys would subsequently be conducted within 1 year of construction initiation. Because of previous survey coverage of the colonies located within the Meeteetse Management Area (see Map 3-2 of the EA), the three active prairie dog colonies that occur within 0.5 mile of the ROW in the Management Area would not require clearance surveys (Brockmann 1993). Ferret surveys would determine ferret presence in areas affected by the project route. Prairie dog colony complexes that exceed 1,000 acres in size would be reported to the USFWS, BLM, and WGFD in order to evaluate these areas for possible ferret reintroductions.

Due to the sensitivity of the Meeteetse Black-Footed Ferret Management Area, the multi-agency Black-Footed Ferret Advisory Team (BFAT) reviewed the proposed project to determine if potential conflicts could arise between the ferret reintroduction plan for the Meeteetse Management Area and the proposed transmission line upgrade. No response from the BFAT was deemed necessary. Therefore, according to the BFAT and the WGFD, no conflict between the proposed transmission line upgrade and the proposed reintroduction plan would be anticipated under the current conditions (Luce 1992). Western would continue to coordinate the black-footed ferret clearance surveys, to be conducted within 1 year of construction initiation, with the USFWS, BLM, and WGFD.

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A3.5 Gray Wolf

A3.5.1 Status and Distribution

The Northern Rocky Mountain wolf, a subspecies, (*Canis lupus irremotus*) was listed as endangered by the Secretary of the Interior in 1973 (38 Federal Register 14678, June 4, 1973). In 1978 (43 Federal Register 9612, March 9, 1978) the entire species was listed as endangered throughout the lower 48 states, except Minnesota (USFWS 1987).

Three recovery areas have been identified by the Northern Rocky Mountain Wolf Recovery Plan (USFWS 1987). The recovery plan goal is to secure and maintain a minimum of 10 breeding pairs of wolves in each of the recovery areas for a minimum of 3 successive years. These areas include northwest Montana, central Idaho, and the Greater Yellowstone Area. Wolf recovery is occurring naturally in Montana, Idaho, and Washington, and wolves are reappearing intermittently in the Dakotas and in Wyoming (Fritts 1992a; Fritts 1993). The USFWS, in consultation with the National Park Service and Forest Service, is currently developing an EIS, describing options for re-establishing wolves in the Yellowstone ecosystem and central Idaho (Roybal 1992; Fritts 1992a). The draft EIS is scheduled for public review during the summer of 1991 (Fritts 1992a).

Historically, the Northern Rocky Mountain wolf subspecies occurred throughout Idaho, the eastern third of Washington and Oregon, all but the northeastern third of Montana, the northern two-thirds of Wyoming, and the Black Hills of South Dakota (Hall and Kelson 1959). Currently, both confirmed and unconfirmed sightings of wolves throughout the northern Rocky Mountains, primarily within Montana, Idaho, and Washington, are submitted to the USFWS annually. Sporadic reports of individuals also occur in Wyoming (Fritts 1992a; USFWS 1987).

The gray wolf once existed in fairly large numbers in Wyoming (Long 1965), but was extirpated or nearly so by the 1940s (Clark and Dorn 1979). As discussed in Section 2.5.5 of this Biological Assessment, there have been numerous unconfirmed sightings of gray wolves in Wyoming, including near the project area, over the past 3 to 4 years (Roybal 1992; Hurley 1992).

A3.5.2 Life History and Habitat Requirements

The niche or ecological role of the wolf has been that of the predominant predator of large ungulates in the Northern Hemisphere; from its survival capabilities to its unique behavior, the wolf has adapted well to this role. Wolves have occupied nearly all habitat types except for true deserts (Mech 1970; Pimlott 1975). Habitat for wolves would be defined as including: 1) an adequate year-round prey base of ungulates and alternate prey species, 2) suitable and somewhat secluded denning and rendezvous sites, and 3) sufficient range with minimal exposure to humans (USFWS 1987).

The basic unit of wolf populations is the pack, which is typically a cohesive group of two or more individual wolves traveling, hunting, and resting together throughout the year (Mech 1970). Most packs include a pair of breeding adults, pups, and often yearlings and/or extra adult wolves (Murie 1944; Fuller and Novakowski 1955; Mech 1970). The number of wolves in a pack varies from a minimum of 2 to a maximum of 36 reported in Alaska (Rausch 1967) and is regulated by specific social and nutritional factors (Mech 1970).

Behavioral interactions within a wolf pack occur in an established but dynamic framework (Mech 1970; Fox 1973). A dominant (alpha) male and female are the central members of the pack, and the other pack members are typically related to the alpha pair. The alpha pair maintains social order within the pack and promotes pack stability (Peterson 1977). The size and location of a pack's territory may be stable or shifting (Mech 1973; Haber 1977; Carbyn 1980; Fritts and Mech 1981), and wolves associated with a pack often exhibit a certain pattern of individual movement within the territory during the year (Mech 1970). These variables can be dependent on factors such as prey availability, season, and breeding activities (USFWS 1987).

Typically, the alpha pair will mate and prevent subordinates within the pack from mating through active harassment (USFWS 1987). The breeding season occurs from late January through April, with pups arriving in late March to May following a 63-day gestation period (Woolpy 1968; Mech 1970). Wolves may dig out or visit whelping dens weeks before the birth of the pups, and some particular dens or denning areas may receive traditional use by a wolf pack over time (USFWS 1987). Litter sizes of wolves generally range from four to seven (Mech 1970). Wild wolves do not typically breed until 22 months of age (Mech 1970; Rausch 1967), and 2-year-old females will have slightly smaller litter sizes on the average than older animals (Rausch 1967).

Wolves use rendezvous sites, which are specific resting and gathering areas occupied by wolf packs during summer and early fall, after the whelping den has been abandoned. These are typically characterized by matted vegetation in a meadow, a system of well-used trails through the adjacent forest and across the meadow, and resting beds adjacent to trees. A pack will

usually move from the whelping den to the first rendezvous site when the pups are 6 to 10 weeks of age (in late May to early July). The first rendezvous site is often located within 1 to 6 miles of the whelping den, and a succession of sites are used by the pack until the pups are mature enough to travel with the adults (from September to early October). Rendezvous sites also may receive traditional use by wolf packs (USFWS 1987).

Dispersal of individual wolves from a pack unit appears to be related to associated wolf density and prey resources (Fritts and Mech 1981; Zimen 1976). Wolves may disperse at ages ranging from 9 to 28 months, or more (Packard and Mech 1980), and dispersal in the fall by yearlings (17 to 20 months old) is common (Fritts and Mech 1981).

Communication between members of a wolf pack and between other packs basically includes howling and scent-marking. Communication maintains social order within an individual pack and will delineate specific territories to avoid conflicts with other wolf packs (USFWS 1987).

Wolves are basically opportunistic predators (Mech 1970); however, specific prey selection is apparent with wolves. In general, wolves depend upon ungulates for food in the winter and supplement this from the spring to the fall with beaver and smaller mammals (Mech 1970; Pimlott 1975). Because the wolf's prey varies in size from beaver to bison, the kill rate of each species varies according to the amount of food each provides in relation to the number of wolves it feeds (Mech 1970). Most of the research on wolf-prey relations indicates that wolves usually do not deplete their prey populations (Murie 1944; Mech 1970); however, wolf predation may be a factor in reducing ungulate populations in certain areas (Mech and Karns 1977).

A3.5.3 Endangerment Factors

According to Young and Goldman (1944) and Mech (1970), the population decline of the eastern timber wolf that occurred within the eastern United States was a result of: 1) intensive human settlement, 2) direct conflict with domestic livestock, 3) a lack of understanding of the wolf's ecology and habits, 4) human fears and superstitions, and 5) the control programs designed to eradicate the species. These factors caused the decline in all the wolf populations within the United States, including those located in the northern Rocky Mountains. Land development, habitat loss, poisoning, trapping, and hunting are the primary factors related to the decline of the gray wolf populations located in the northern Rocky Mountains (USFWS 1973).

The expansion of human settlements has ultimately eliminated the wolf from all but remote areas within the contiguous 48 states, and within these areas, wolf sightings are predominantly composed of lone or transient individuals. A few locations, primarily National Parks and Forests, could currently support a viable wolf population. Although maintenance and improvement of

suitable habitat may be the key long-term factors in wolf conservation, an important element limiting wolf recovery in the northern Rocky Mountains is human-induced mortality (USFWS 1987). Because depredation by wolves on livestock has been the fundamental reason for the virtual extermination of wolves in the western United States, wolf recovery in certain areas will depend, in part, upon enlightened management that recognizes and addresses the ecological, ethical, and economic aspects of the relationship and overall public information and education.

A3.5.4 Presence in the Study Area

The gray wolf had historically inhabited all of Wyoming (Long 1965), but was probably extirpated by the 1940s (Clark and Dorn 1979). Occasional reports of wolf sightings come from the Yellowstone area. During 1967-1977, a total of 81 "probable" reports of 109 large canids were recorded in and near Yellowstone National Park. However, sustained pack activity in the Park and vicinity has not been documented for many years. BLM's Worland District Office received an additional five reports of large canids or their associated sign in 1978 and four reports during the period between 1980 and 1985 (USFWS 1987).

In 1992, a total of 91 unconfirmed wolf sightings were reported for the State of Wyoming. A wolf-like animal was filmed in Hayden Valley in Yellowstone National Park in August of 1992. An animal also was shot and killed by a hunter 2.5 miles south of the Park on September 30, 1992. Following DNA analysis and comparison, the individual was determined to be the first confirmed wolf in the State of Wyoming since the species was believed extirpated. This wolf was thought to have likely dispersed into Wyoming from the Montana population. No evidence has been found of other wolves associated with this individual (i.e., pack activity) in the Yellowstone area (Fritts 1993).

Over the past 3 years, there have been 3 reported wolf sightings within 20 miles of the project area. In February 1990, a BLM employee reported a pair of wolves along Horse Creek, approximately 5 miles west of the proposed transmission line; in October 1990, a WGFD ranger reported a wolf southwest of Sunshine Reservoir, 17 miles southwest of the proposed ROW; and during the fall of 1991, a BLM employee reportedly saw a wolf near the headwaters of Meeteetse Creek, approximately 17 miles west of the project route (Hurley 1992).

The southernmost wolf pack activity confirmed for the Northern Rocky Mountain subspecies has been recorded in the Ninemile Valley area, approximately 30 miles northwest of Missoula. The USFWS has estimated seven animals associated with this pack. Wolf activity also has been confirmed in the Beaverhead National Forest, approximately 110 miles from Yellowstone, although a definite pack has not been established for this area (Fritts 1992b).

A3.5.5 Impact of the Proposed Action

It has been confirmed that wolves are dispersing into Wyoming, although no pack activity has been observed or documented. No impacts to the gray wolf from the Proposed Action are anticipated because of the infrequent, unconfirmed sightings reported in the project area. No natal denning areas are known to occur, and with the lack of pack activity, breeding wolves are not likely. The Proposed Action would not affect wolf prey, and wolves would likely avoid construction areas when humans are present. Based on the nature of the proposed project and the known habits of this species, the transmission line upgrade between the Big George and Carter Mountain Substations would not likely adversely affect the gray wolf.

A3.5.6 References

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A4.0 CANDIDATE SPECIES EVALUATION

A4.1 Evert's Waferparsnip

A4.1.1 Status and Habitat Requirements

Evert's waferparsnip (*Cymopterus evertii*) is a Federal candidate-category 3c species that occurs in northwestern Wyoming (USFWS 1991). A category 3c species has been either proven to be more abundant or widespread than previously thought or is not currently subject to an identifiable threat. With a significant decline, this species may be re-evaluated for possible listing as federally threatened or endangered. Potential habitat for this species occurs on alpine slopes, alpine fellfields, riverine meadows, and sagebrush grasslands (WNDDDB 1992). Known populations located in high elevation habitats (i.e., 7,700 to 10,300 feet) were observed in areas that consisted of shallow, rocky soils (WNDDDB 1992). Known populations located at moderate elevation habitats (i.e., 5,500 to 7,200 feet) were observed in areas that consisted of rocky and sandy soils (WNDDDB 1992). The flowering and fruiting periods for known populations of Evert's waferparsnip at these elevations occur during late March through mid-June and May through mid-June, respectively (Hartman 1992).

A4.1.2 Presence in the Project Area

This species has a limited distribution within the state and occurs only in northwestern/northcentral Wyoming (WNDDDB 1992). A total of 20 populations are known to occur in south-central Park and northwestern Hot Springs Counties (WNDDDB 1992). Known occurrences of Evert's waferparsnip have not been recorded along the project route. Populations were observed in the Carter Mountain vicinity by Dr. Hartman, curator for the Rocky Mountain Herbarium, while conducting floristic surveys in 1983. All of the populations observed during this survey occurred at 7,200 feet elevation or greater (Hartman 1992). The nearest historically documented population in the project area is located approximately 1.8 miles northeast of the Carter Mountain Substation (WNDDDB 1992); approximately 4 miles of potential habitat is crossed by the project route at MPs 22.0 to 25.2, MPs 26.2 to 26.6, and MPs 27.0 to 27.4.

A4.1.3 Impact Evaluation

Disturbance from transmission line construction may result in adverse impacts to this plant species from removal or destruction of individual plants during project construction. Potential habitat for Evert's waferparsnip occurs along 4 miles of the project route, and the species has

been located approximately 1.8 miles northeast of the Carter Mountain Substation (WNDDDB 1992). Potential habitat would be surveyed for the plant species prior to construction; surveys for Evert's waferparsnip would be coordinated with the BLM and USFWS. The optimal period to conduct surveys for the Evert's waferparsnip in the project area would be early to late May. If this species were located within the construction ROW, the BLM and USFWS would be notified, and a mitigation plan would be developed with Western to eliminate or reduce impacts to the species.

A4.1.4 References

Hartman, R. 1992. Curator, Rocky Mountain Herbarium. Personal communication with J. Alstad, ENSR Consulting and Engineering. July 16 and December 3, 1992.

U.S. Fish and Wildlife Service (USFWS). 1991. Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species, Proposed Rule. Federal Register 50 CFR Part 17. November 21, 1991.

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A4.2 Sturgeon Chub

A4.2.1 Status and Habitat Requirements

The sturgeon chub (*Hybopsis gelida*) is a Federal candidate-category 2 species (USFWS 1991). A category 2 species may be listed as federally threatened or endangered, but conclusive biological data to support these listings are not currently available. The sturgeon chub inhabits continuously and heavily turbid, warm, medium to large rivers (WGFD 1992). Stream habitat that is preferred by the sturgeon chub consists of shallow water of strong current with a coarse sand or gravel bottom (WGFD 1992). The species' distribution within Wyoming indicates that it is rare in this part of its range (Baxter and Simon 1970).

A4.2.2 Presence in the Project Area

The sturgeon chub occurs almost exclusively in the Missouri River drainage from below its mouth in the Mississippi River to the headwaters in Montana and Wyoming (Baxter and Simon 1970). In Wyoming, the sturgeon chub inhabits the lower Bighorn River and the Powder River in

Sheridan County (Baxter and Simon 1970; Yekel 1992). Based on currently available data from the WGFD and BLM, the sturgeon chub has not been documented to occur in the Greybull River or other perennial creeks that are crossed by the proposed route.

A4.2.3 Impact Evaluation

The sturgeon chub does not occur in the project area. The transmission line would span the riparian areas crossed by the ROW and no equipment or vehicles would cross perennial streams, thereby preventing increased soil erosion and channel sedimentation. Use of the small, two-track ford crossing of the tributary to Cottonwood Creek (MP 12.3) during project construction would not increase stream sedimentation downstream, due to the low flow associated with this tributary. Based on these conditions, no adverse impacts to the sturgeon chub are anticipated from project construction or operation.

A4.2.4 References

- Baxter, G. T. and J. R. Simon. 1970. Wyoming Fishes. 168 pp.
- U.S. Fish and Wildlife Service (USFWS). 1991. Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species, Proposed Rule. Federal Register 50 CFR Part 17. November 21, 1991.
- Wyoming Game and Fish Department (WGFD). 1992. Vertebrate Characterization Abstract - Sturgeon Chub (*Hybopsis gelida*). 3pp.
- Yekel, S. 1992. Wyoming Game and Fish Department-Cody. Personal communication with L. Nielsen, ENSR. September 17, 1992.

A4.3 Trumpeter Swan

A4.3.1 Status and Habitat Requirements

The trumpeter swan (*Cygnus buccinator*) is a Federal candidate-category 2 species (USFWS 1991). The trumpeter swan nests in ponds, lakes, and streams that support the growth of reeds, sedges, and similar emergent vegetation (WNDDDB 1992). Swans prefer to nest in or near freshwater. Cygnet production within Montana, Idaho, and Wyoming was generally good to excellent in 1990; however, Wyoming's production was low with only 11 cygnets produced (WGFD 1991).

A4.3.2 Presence in the Project Area

In Wyoming, the swan is a yearlong resident and primarily inhabits Yellowstone Lake and Yellowstone River in Hayden Valley of Yellowstone National Park and in Grand Teton Park (Dorn and Dorn 1990). Swans also are associated with the Snake River drainage and occur on the upper Green River drainage (Ritter 1992). Trumpeter swans in Wyoming spend winters on open ponds and lakes and do not migrate to locations in the southern United States, as do other interior populations of trumpeter swans (WNDDDB 1992). Trumpeter swans have not been documented to occur in the immediate project area. Historical observations of trumpeter swans in the nearest proximity to the project area have occurred at Yellowstone Lake, approximately 70 miles west of the project area (Dorn and Dorn 1990). Potential presence in the study area would be limited to isolated occurrences along rivers and lakes during seasonal movements.

A4.3.3 Impact Evaluation

The Proposed Action does not cross trumpeter swan feeding or nesting sites. No open water areas crossed by or located adjacent to the transmission line ROW are of sufficient size or provide adequate habitat for swan foraging or nesting. It is not anticipated that the proposed project will adversely impact this species.

A4.3.4 References

- Dorn, J. L. and R. D. Dorn. 1990. Wyoming Birds. 138 pp.
- Ritter, S. 1992. Nongame Bird Biologist, Wyoming Game and Fish Department. Correspondence to and personal communication with L. Nielsen, ENSR Consulting and Engineering. July 20 and August 10, 1992.
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- Wyoming Game and Fish Department (WGFD). 1991. Endangered and Nongame Bird and Mammal Investigations Annual Completion Report. April 15, 1990 to April 14, 1991.
- Wyoming Natural Diversity Data Base (WNDDDB). 1992. Vertebrate Characterization Abstract - Trumpeter Swan (*Cygnus buccinator*). 4 pp.

A4.4 White-Faced Ibis

A4.4.1 Status and Habitat Requirements

The white-faced ibis (*Plegadis chihi*) is a Federal candidate-category 2 species (USFWS 1991). Ibises nest in freshwater marshes that support the growth of hardstem bulrush (*Scirpus acutus*) and, to a lesser extent, cattail stands (*Typha* spp.). The birds generally inhabit areas with stable water levels. This species' nesting requirements are specific, and individuals are readily displaced from areas without adequate nesting conditions (USFWS 1985). Feeding habitats for the white-faced ibis include freshwater marshes, wet meadows, and vegetated shorelines (Dorn and Dorn 1990; Terres 1980).

A4.4.2 Presence in the Project Area

The breeding range of the white-faced ibis in North America includes such states as California, Oregon, Utah, Idaho, Wyoming, and Minnesota locally to Texas, Louisiana, and Florida (Terres 1980). The species winters from southern California, Baja California, and the Gulf coast of Texas and Louisiana south into Latin America and South America (AOU 1983). The white-faced ibis is a resident in the southern part of its breeding range and migrates in the northern areas (WGFD 1992).

In Wyoming, the white-faced ibis is primarily an uncommon summer resident (Dorn and Dorn 1990). During spring migration, however, ibises may be located at several reservoirs located in Goshen and Albany Counties, which are located in southeastern Wyoming. Nesting populations also have been observed in freshwater marshes located in Lincoln and Uinta Counties (Dorn and Dorn 1990). Based on WGFD surveys, only six sites in Wyoming have recorded breeding ibis populations (Ritter and Cerovski 1990).

White-faced ibises may migrate through the project area. No known nest sites occur along the proposed ROW.

A4.4.3 Impact Evaluation

Water availability is a limiting factor for ibis in portions of its range. The proposed transmission line route would not cross freshwater marshes that would support breeding birds. The project area also does not contain known feeding or nesting habitat for the white-faced ibis. Therefore, no adverse impacts to this species are anticipated from project construction or operation.

A4.4.4 References

- American Ornithologists' Union (AOU). 1983. Check-List of North American Birds. Sixth Edition.
- Dorn, J. L. and R. D. Dorn. 1990. Wyoming Birds. 138 pp.
- Terres, J. K. 1980. The Audubon Society Encyclopedia of North American Birds. 1109 pp.
- Ritter, S. A. and A. O. Cerovski. 1990. 1990 Update on the Status and Distribution of Colonially Nesting Waterbirds in Wyoming. Nongame Special Report, Biological Services, Wyoming Game and Fish Department. November 8, 1990.
- U.S. Fish and Wildlife Service (USFWS). 1985. White-Faced Ibis, Management Guidelines Great Basin Population. Portland, OR. January 1985. 31 pp.
- _____. 1991. Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species, Proposed Rule. Federal Register 50 CFR Part 17. November 21, 1991.
- Wyoming Game and Fish Department (WGFD). 1992. Vertebrate Characterization Abstract - White-Faced Ibis (*Plegadis chihi*). 4 pp.

A4.5 Ferruginous Hawk

A4.5.1 Status and Habitat Requirements

The ferruginous hawk (*Buteo regalis*) is a Federal candidate-category 2 species (USFWS 1991). The breeding range of the ferruginous hawk is found primarily in the semi-arid regions of the western United States and the southernmost portion of the prairie in Canada, especially the Great Basin and Great Plains (Snow 1974; Terres 1980). In Wyoming, the ferruginous hawk inhabits various habitats that include prairie shrubland, eastern great plains, great basin foothills, riparian ecosystems, and mountain foothill grasslands (WGFD 1992). This hawk may nest in trees along streams or on low cliffs, rock outcrops, and cutbanks. The species also nests on the borders of pinyon-juniper communities in either junipers or sagebrush. Ground nests can be common in certain habitat types (Snow 1974; Terres 1980; WGFD 1992).

A4.5.2 Presence in the Project Area

In Wyoming, the ferruginous hawk is a common resident and has been observed throughout the state (Dorn and Dorn 1990; WGFD 1992). Ferruginous hawks have been observed in the general vicinity of the proposed route; however, nesting individuals have not been documented by the WGFD or BLM along the proposed ROW. The transmission line route crosses both potential nesting and foraging habitat for ferruginous hawks. Migrating ferruginous hawks also may use the project area.

A4.5.3 Impact Evaluation

Ferruginous hawk populations have been declining throughout the west, primarily due to nest disturbances, which in turn affect the reproductive success of the birds. With the increasing demand on public lands, human activity in areas with nesting populations of ferruginous hawks has become a limiting factor, if such activity occurs during the period prior to hatching. Ferruginous hawks are highly susceptible to nest abandonment during this time (Snow 1974).

No known nesting locations of ferruginous hawks have been documented along the project ROW (BLM 1988; WGFD 1992); however, the route crosses both potential nesting and foraging habitat. If construction activities were to occur near an active ferruginous hawk nest during the breeding and nesting season, adult birds may abandon the nest, resulting in the loss of production for one season. Since ferruginous hawk populations are declining, loss of the reproductive potential for one season would be considered an adverse impact.

Surveys to identify active raptor nests located within 0.5 mile of the proposed route would be conducted prior to the initiation of construction activities. The appropriate Federal and state agencies would be contacted if an active ferruginous hawk nest were recorded within 0.5 mile of the route. Construction activities would not be scheduled within 0.5 mile of the nest site during the active breeding period, unless it can be determined by the USFWS, BLM, and/or WGFD that nesting birds would not be affected by construction (e.g., by topographical shielding). The ferruginous hawk's breeding season is typically from March 1 through July 31; however, the period of nest avoidance would be specifically identified and applied for the breeding individuals. Western would coordinate with the USFWS, BLM, and WGFD, regarding nest avoidance.

The upgraded 115-kV transmission line would pose a somewhat greater risk for in-flight collisions than the currently operating transmission line, with the addition of the overhead ground wires. Since breeding ferruginous hawks would likely occupy rocky ridges, outcrops, and tree areas, those areas that occur in close proximity to the line would be examined closely for nest sites and foraging perches during the nest surveys conducted prior to line construction. No electrocution

hazard is associated with the 115-kV upgrade, based on the transmission line's configuration. Given the ROW location and presence of the existing transmission line, it is not likely that project operation of the Proposed Action would impact local populations of the ferruginous hawk.

A4.5.4 References

- Bureau of Land Management (BLM). 1988. Cody Resource Area Management Plan, Draft and Final EIS. February and September 1988.
- Dorn, J. L. and R. D. Dorn. 1990. Wyoming Birds. 138 pp.
- Snow, C. 1974. Habitat Management Series for Unique or Endangered Species. Report No. 13, Ferruginous Hawk, *Buteo regalis*. U.S. Department of the Interior - Bureau of Land Management. December 1974.
- Terres, J. K. 1980. The Audubon Society Encyclopedia of North American Birds. 1109 pp.
- U.S. Fish and Wildlife Service (USFWS). 1991. Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species, Proposed Rule. Federal Register 50 CFR Part 17. November 21, 1991.
- Wyoming Game and Fish Department (WGFD). 1992. Wyoming Bird and Mammal Atlas. 170 pp. WGFD, Game Division. September 1992.

A4.6 Northern Goshawk

A4.6.1 Status and Habitat Requirements

The northern goshawk (*Accipiter gentilis*) is a Federal candidate-category 2 species (USFWS 1991) that nests in mature coniferous forests. It is often found in stands of Douglas fir, lodgepole pine, and aspen (WGFD 1992). Foraging areas include forested areas and openings within the forest.

A4.6.2 Presence in the Project Area

In Wyoming, the northern goshawk is a year-long resident and has been observed throughout most of the state (Dorn and Dorn 1990; WGFD 1992). The nesting range includes the majority of Wyoming, except for the southeastern portion of the state (WGFD 1992). Northern goshawks have not been reported by the WGFD or the BLM in the project area.

A4.6.3 Impact Evaluation

The proposed route does not cross the appropriate habitat type to support breeding northern goshawks, and individuals are not likely to inhabit the immediate project area. No adverse impacts to the northern goshawk are anticipated from the proposed project.

A4.6.4 References

Dorn, J. L. and R. D. Dorn. 1990. Wyoming Birds. 138 pp.

U.S. Fish and Wildlife Service (USFWS). 1991. Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species, Proposed Rule. Federal Register 50 CFR Part 17. November 21, 1991.

Wyoming Game and Fish Department (WGFD). 1992. Wyoming Bird and Mammal Atlas. 170 pp. WGFD, Game Division. September 1992.

A4.7 Mountain Plover

A4.7.1 Status and Habitat Requirements

The mountain plover (*Charadrius montanus*) is a Federal candidate-category 1 species (USFWS 1992). A category 1 species is biologically vulnerable and will likely be federally listed as threatened or endangered. A listing package has been prepared for the species and publication of a proposed rule is anticipated for 1993 (USFWS 1993). This upland bird nests in shortgrass prairie and shortgrass/sagebrush plains of Wyoming (Dorn and Dorn 1990). Mountain plovers feed in small flocks, primarily on insects.

A4.7.2 Presence in the Project Area

In Wyoming, the mountain plover is an uncommon summer resident and primarily nests in the Laramie Plain region, which is located in eastern and southeastern Wyoming. Birds have been recorded primarily in Carbon and Albany Counties (Dorn and Dorn 1990). The mountain plover also nests in north-central Wyoming in counties that include Park, Hot Springs, Bighorn, Washakie, and Fremont (WGFD 1992). The plover is usually associated with prairie dog colonies and overgrazed grasslands (Ritter 1992). The current population level and trend in the project area are unknown for this species (BLM 1988). Although mountain plovers have not been recorded in the immediate project area (Atkins 1993; BLM 1988) they may occur in the vicinity since the appropriate habitat for this species is present along the project ROW.

A4.7.3 Impact Evaluation

Construction within prairie dog colonies may impact breeding mountain plovers by disturbing adult birds during courtship or incubation or destroying nests by trail repair and structure placement. However, based on the current data from the WGFD and the BLM on mountain plover occurrence within Wyoming, no known feeding or nesting areas are located along the proposed route. Because the 115-kV upgrade would affect small areas of potential plover habitat, it is not anticipated that the Proposed Action would result in long-term, adverse impacts to this species.

A4.7.4 References

- Atkins, M. 1993. Wildlife Biologist. BLM, Grass Creek Resource Area. Personal communication with L. Nielsen, ENSR Consulting and Engineering. April 15, 1993.
- Bureau of Land Management (BLM). 1988. Cody Resource Management Plan, Draft and Final EIS. February and September 1988.
- Dorn, J. L. and R.D. Dorn. 1990. Wyoming Birds. 138 pp.
- Ritter, S. 1992. Nongame Bird Biologist, Wyoming Game and Fish Department. Correspondence to and personal communication with L. Nielsen, ENSR Consulting and Engineering. July 20 and August 10, 1992.
- U.S. Fish and Wildlife Service (USFWS). 1992. Letter to Western Area Power Administration. July 9, 1992.
- _____. 1993. Letter to Western Area power Administration. January 15, 1993.
- Wyoming Game and Fish Department (WGFD). 1992. Wyoming Bird and Mammal Atlas. 170 pp. WGFD, Game Division. September 1992.

A4.8 Long-billed Curlew

A4.8.1 Status and Habitat Requirements

The long-billed curlew (*Numenius americanus*) is a Federal candidate-category 3C species (USFWS 1992). Long-billed curlews use a variety of habitats that include sagebrush-grasslands, eastern great plains, great basin foothills, mountain-foothills, wet-moist meadows, irrigated native

meadows, other agricultural areas, and shorelines. This species nests on the ground in upland areas near water and occasionally in a moist hollow (WGFD 1992a).

A4.8.2 Presence in the Project Area

In Wyoming, this species is listed as an uncommon summer resident that has been observed throughout most of the state (Dorn and Dorn 1990). Nesting curlews have been recorded in western and southeastern Wyoming, particularly in Bighorn, Park, Teton, Lincoln, Sublette, and Uinta Counties (WGFD 1992a). Seven long-billed curlews were recorded flying near the project area in 1989 (WGFD 1992b); however, according to the WGFD and BLM, no active curlew nests have been recorded for the project area. The closest reported nesting curlews in proximity to the project area are in the BLM's Area of Critical Environmental Concern, established on Chapman Bench, located north of Cody (Hurley 1993).

A4.8.3 Impact Evaluation

The proposed ROW crosses upland areas near water sources that may be used by breeding curlews for nest sites. Based on the current data from the WGFD and BLM, however, no known feeding or nesting sites for the long-billed curlew are located along the project ROW. Individual nesting or foraging sites may occur within the appropriate habitat types, but these areas have not been surveyed (Denton 1989). The Proposed Action would have only short-term effects (e.g., human activity) on these habitats, possibly resulting in the loss of breeding for one season or disturbance to foraging birds. No long-term, adverse impacts are anticipated for this species.

A4.8.4 References

- Denton, J. 1989. Previous Wildlife Biologist, Bureau of Land Management, Grass Creek Resource Area, Worland District. Wildlife distribution data and personal communication with L. Nielsen, ENSR Consulting and Engineering. November 16, 1989.
- Dorn, J. L. and R. D. Dorn. 1990. Wyoming Birds. 138 pp.
- Hurley, K. 1993. District Wildlife Biologist, Wyoming Game and Fish Department. Personal communication with L. Nielsen, ENSR Consulting and Engineering. March 19, 1993.
- U.S. Fish and Wildlife Service (USFWS). 1992. Letter to Western Area Power Administration. July 9, 1992.

Wyoming Game and Fish Department (WGFD). 1992a. Wyoming Bird and Mammal Atlas. 170 pp. WGFD, Game Division, September 1992.

_____. 1992b. Wildlife Observation System. Computerized wildlife data. May 1992.

A4.9 Black Tern

A4.9.1 Status and Habitat Requirements

The black tern (*Chlidonias niger*) is a Federal candidate-category 2 species (USFWS 1991). Breeding habitat for the black tern includes ponds, lakes, marshes, sloughs, wet meadows, and other fresh water areas. Nests are often set close together on floating mats of vegetation that are surrounded by dense emergent vegetation (Dorn and Dorn 1990; WGFD 1992; Ritter and Cerovski 1990).

A4.9.2 Presence in the Project Area

In Wyoming, black terns are considered uncommon summer residents (Dorn and Dorn 1990). Nesting locations for black terns have been documented to occur in northwestern, southwestern, and southeastern portions of the state, and general observations of black terns have been recorded throughout most of the state (WGFD 1992). A historic nesting location closest to the project area was in the vicinity of Yellowstone Lake, approximately 70 miles west of the project area (WGFD 1992). According to the WGFD and BLM data currently available, no records of breeding black terns exist for the project area (Ritter and Cerovski 1990).

A4.9.3 Impact Evaluation

As stated in Section 2.3.1.4 of the EA, wetland vegetation will not be affected by project construction. In addition, no open water areas that are crossed by or occur adjacent to the transmission line ROW are of sufficient size or provide adequate nesting habitat for the black tern. Therefore, no long-term, adverse impacts to the black tern are anticipated from the Proposed Action.

A4.9.4 References

Dorn, J. L. and R. D. Dorn. 1990. Wyoming Birds. 138 pp.

Ritter, S. A. and A. O. Cerovski. 1990. 1990 Update on the Status and Distribution of Colonially Nesting Waterbirds in Wyoming. Nongame Special Report, Biological Services, Wyoming Game and Fish Department. November 8, 1990.

U.S. Fish and Wildlife Service (USFWS). 1991. Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species, Proposed Rule. Federal Register 50 CFR Part 17. November 21, 1991.

Wyoming Game and Fish Department (WGFD). 1992. Wyoming Bird and Mammal Atlas. 170 pp. WGFD, Game Division. September 1992.

A4.10 Loggerhead Shrike

A4.10.1 Status and Habitat Requirements

The loggerhead shrike (*Lanius ludovicianus*) is a Federal candidate-category 2 species (USFWS 1991). The species is declining throughout most of its range within the United States. The loggerhead shrike nests in various habitats that include open country with scattered trees and shrubs, pine-juniper, woodland-chaparral, basin-prairie, desert scrub, and mountain foothills-shrublands (WGFD 1992).

A4.10.2 Presence in the Project Area

The breeding range for the loggerhead shrike in North America extends from southern Canada south through the Great Basin, California, Mexico, the Gulf Coast, and southern Florida (Bent 1950; Terres 1980). In Wyoming, the loggerhead shrike is a common summer resident and has been observed throughout the state (Dorn and Dorn 1990; WGFD 1992). The Breeding Bird Survey data for 1968 to 1991 indicate populations are stable (Ritter 1992). Observations of nesting loggerhead shrikes have been recorded in the north-central and southern portions of Wyoming (WGFD 1992). Based on the data currently available from the WGFD and BLM, loggerhead shrikes have not been documented to occur in the project area. However, the proposed route crosses potential nesting habitat.

A4.10.3 Impact Evaluation

Based on currently available data, no loggerhead shrike nests have been documented along the project ROW. The proposed route crosses potential nesting habitat for this species; however, because the proposed project would be located within Western's existing ROW, the disturbance

to appropriate nesting sites would be minimal. The Proposed Action would not likely result in long-term adverse impacts to the loggerhead shrike.

A4.10.4 References

- Bent, A. C. 1950. Life Histories of North American Wagtails, Shrikes, Vireos, and their Allies. Smithsonian Institution, U.S. National Museum. Bulletin 197.
- Dorn, J. L. and R. D. Dorn. 1990. Wyoming Birds. 138 pp.
- Ritter, S. 1992. Nongame Bird Biologist, Wyoming Game and Fish Department. Correspondence to and personal communication with L. Nielsen, ENSR Consulting and Engineering. July 20 and August 10, 1992.
- Terres, J. K. 1980. The Audubon Society Encyclopedia of North American Birds. 1109 pp.
- U.S. Fish and Wildlife Service (USFWS). 1991. Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species, Proposed Rule. Federal Register 50 CFR Part 17. November 21, 1991.
- Wyoming Game and Fish Department (WGFD). 1992. Wyoming Bird and Mammal Atlas. 170 pp. WGFD, Game Division. September 1992.

A4.11 Spotted Bat

A4.11.1 Status and Habitat Requirements

The spotted bat (*Euderma maculatum*) is a Federal candidate-category 2 species (USFWS 1991). The spotted bat is considered rare and was found historically throughout much of the western United States and Mexico.

The spotted bat forages nocturnally in a wide variety of habitats (Wai-Ping and Fenton 1989; Navo et al. 1992). Spotted bats in Wyoming are known only from juniper shrublands and desert sagebrush-grasslands; cliffs over perennial water are an important habitat component (WGFD 1992). Spotted bats are thought to roost in horizontal rock crevices in cliffs (WGFD 1992; Wai-Ping and Fenton 1989; Watkins 1977). Moths are the primary food item of this bat (WGFD 1992; Wai-Ping and Fenton 1989; Watkins 1977; Snow 1974; Barbour and Davis 1969).

A4.11.2 Presence In the Project Area

Spotted bats potentially range throughout the project area (Luce 1992). According to the WGFD (Luce 1992), spotted bats probably occur throughout the Bighorn Basin, especially where the mountains meet the desert. The WGFD recorded this species during surveys conducted in The Nature Conservancy's Tensleep Preserve (located approximately 85 miles east of Meeteetse) and in the Bighorn Basin northeast of Lovell (at least 50 miles northeast of Cody) (Luce 1992).

A4.11.3 Impact Evaluation

Spotted bats may forage throughout the project area, but no known roosting areas occur along the proposed route. Since the species is considered rare and the proposed line upgrade would be located within an existing ROW, no adverse impacts to the spotted bat are anticipated.

A4.11.4 References

- Barbour, R. W. and W. H. Davis. 1969. Bats of America. The University Press of Kentucky. 286 pp.
- Bureau of Land Management. 1988. Cody Resource Management Plan, Draft and Final Environmental Impact Statement. February and September, 1988.
- Long, C. A. 1965. The Mammals of Wyoming. University of Kansas Publications, Museum of Natural History. Volume 14, No. 18. July 6, 1965.
- Luce, B. 1992. Nongame Mammal Biologist, Wyoming Game and Fish Department. Personal communication with C. Riebe, ENSR Consulting and Engineering. September 17, 1992.
- Navo, K. W., J. A. Gore, and G. T. Skiba. 1992. Observations on the Spotted Bat, *Euderma maculatum*, in Northwestern Colorado. Journal of Mammology, 73(3):547-551.
- Snow, C. 1974. Habitat Management Series for Endangered Species, Spotted Bat *Euderma maculatum*, Report No. 4. Bureau of Land Management, U. S. Department of Interior, Technical Note. 13pp.
- U. S. Fish and Wildlife Service (USFWS). 1991. Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species, Proposed Rule. Federal Register 50 CFR Part 17. November 21, 1991.

Wai-Ping, V. and M. B. Fenton. 1989. Ecology of Spotted Bat (*Euderma maculatum*) Roosting and Foraging Behavior. *Journal of Mammalogy* Vol. 70: 617-622.

Watkins, L. C. 1977. Mammalian Species - *Euderma maculatum*. Published by the American Society of Mammalogists, June 15, 1977. No. 77, 4 pp.

Wyoming Game and Fish Department (WGFD). 1992. Wyoming Bird and Mammal Atlas. 170 pp. WGFD, Game Division. September 1992.

A4.12 Allen's Thirteen-lined Ground Squirrel

A4.12.1 Status and Habitat Requirements

Allen's thirteen-lined ground squirrel (*Spermophilus tridecemlineatus alleni*) is a Federal candidate-category 2 subspecies (USFWS 1991). This ground squirrel was first collected in Wyoming in 1898 from the west slope of the Bighorn Mountains at an elevation of 8,000 feet. Allen's thirteen-lined ground squirrel is thought to inhabit mountains and foothills, but the limits of its range are not well known (Long 1965). According to Luce (1992), the WGFD may have captured a small number of Allen's thirteen-lined ground squirrels, incidentally taken during routine small mammal surveys conducted in 1990. These specimens have been submitted to the USFWS's National Ecology Research Center in Fort Collins, Colorado to determine the subspecies. One of these thirteen-lined ground squirrels that is being examined was trapped approximately 2 miles south of Thermopolis.

A4.12.2 Presence in the Project Area

According to the WGFD (1992), the Allen's thirteen-lined ground squirrel has not been documented in the project area; however, the actual distribution of this subspecies is not currently known (Garber 1992). The USFWS will determine whether the individual trapped south of Thermopolis is *S. t. alleni*, which would represent a new occurrence in the state.

A4.12.3 Impact Evaluation

The Allen's thirteened-lined ground squirrel is considered rare, and few occurrences have been recorded within Wyoming. Although the proposed route crosses habitat types appropriate for this species, the species is not known to occur in the project area. Because of the species' rarity and the proposed line upgrade would be located within an existing ROW, no long-term, adverse impacts are anticipated from project construction or operation for the Allen's thirteened-lined ground squirrel.

A4.12.4 References

Garber, C. 1992. Research Zoologist. The Nature Conservancy. Personal communication with C. Riebe, ENSR Consulting and Engineering. September 29, 1992.

Long, C. A. 1965. The Mammals of Wyoming. University of Kansas Publications, Museum of Natural History. Volume 14, No. 18. July 6, 1965.

Luce, B. 1992. Nongame Mammal Biologist, Wyoming Game and Fish Department. Personal communication with L. Nielsen, ENSR Consulting and Engineering, June 26, July 10, and December 7, 1992 and with C. Riebe, ENSR, September 7, 1992.

Wyoming Game and Fish Department (WGFD). 1992. Wyoming Bird and Mammal Atlas. 170 pp. WGFD, Game Division. September 1992.

U.S. Fish and Wildlife Service (USFWS). 1991. Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species, Proposed Rule. Federal Register 50 CFR Part 17. November 21, 1991.

A4.13 North American Wolverine

A4.13.1 Status and Habitat Requirements

The North American wolverine (*Gulo gulo*) is a Federal candidate-category 2 species (USFWS 1991). Wolverine habitat encompasses coniferous forests, especially dense, continuous stands in remote areas (WGFD 1992). Although wolverines are found mainly north of Wyoming (WGFD 1992), they have been recorded in the northwestern part of the state, primarily in the greater Yellowstone ecosystem (Garber 1992).

A4.13.2 Presence in the Project Area

Although wolverine distribution is not fully known (Garber 1992), wolverines have not been documented in the project area (WGFD 1992).

A4.13.3 Impact Evaluation

The proposed route does not cross habitat types used by the North American wolverine. Based on the nature of the proposed line upgrade and the lack of habitat, no long-term, adverse impacts to this species would be expected.

A4.13.4 References

- Bureau of Land Management (BLM). 1988. Cody Resource Management Plan, Draft and Final Environmental Impact Statement. February and September, 1988.
- Garber, C. 1992. Research Zoologist. The Nature Conservancy. Personal communication with C. Riebe, ENSR Consulting and Engineering. September 29, 1992.
- U.S. Fish and Wildlife Service (USFWS). 1991. Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species, Proposed Rule. Federal Register 50 CFR Part 17. November 21, 1991.
- Wyoming Game and Fish Department (WGFD). 1992. Wyoming Bird and Mammal Atlas. 170 pp. WGFD, Game Division. September 1992.

A4.14 North American Lynx

A4.14.1 Status and Habitat Requirements

The North American lynx (*Felis lynx canadensis*) is a Federal candidate-category 2 species (USFWS 1991). The lynx is generally associated with the boreal forests of Alaska and Canada, but also occurs in the contiguous United States (Reeve et al. 1986). In Wyoming, lynx habitat encompasses dense coniferous forests, especially Englemann spruce-subalpine fir, at high elevations (WGFD 1992).

A4.14.2 Presence in the Project Area

According to a Wyoming study conducted in 1984 and 1985 (Reeve et al. 1986), lynx observations were concentrated in the western part of the state. Lynx populations likely exist in the mountainous regions of western and northern Wyoming, including the Salt River, Wyoming, Teton, northern Wind River, Gros Ventre, and Absaroka mountain ranges (Reeve et al. 1986). A small population may be present in the higher elevations of the Bighorn range, but most lynx records in this region fall below 6,000 feet in elevation (Reeve et al. 1986).

Several lynx observations were recorded in eastern Park County, outside of the actual project area (Reeve et al. 1986). The WGFD (1992) reports the lynx as historically occurring (prior to 1965) in the Wapiti latilong; the proposed transmission line is located in the southeastern portion of the Wapiti latilong. According to the BLM (1988), lynx have been documented in the Cody Resource Area.

A4.14.3 Impact Evaluation

Although lynx have been recorded in Park County and in the Cody Resource Area, the appropriate habitat for this species is not crossed by the proposed route. The proposed 115-kV upgrade would be primarily placed within an existing ROW; therefore, no long-term, adverse impact to the North American lynx are anticipated.

A4.14.4 References

- Bureau of Land Management (BLM). 1988. Cody Resource Management Plan, Draft and Final Environmental Impact Statement. February and September, 1988.
- Reeve, A., F. Lindzey, and S. Buskirk. 1986. Historic and Recent Distribution of the Lynx in Wyoming. Prepared for the Wyoming Game and Fish Department, Cheyenne, by the Wyoming Cooperative Fishery and Wildlife Research Unit, Laramie. July 1986. 55 pp.
- U.S. Fish and Wildlife Service (USFWS). 1991. Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species, Proposed Rule. Federal Register 50 CFR Part 17. November 21, 1991.
- Wyoming Game and Fish Department (WGFD). 1992. Wyoming Bird and Mammal Atlas. 170 pp. WGFD, Game Division. September 1992.

ATTACHMENT 1
AGENCY CORRESPONDENCE



Department of Energy
Western Area Power Administration
Loveland Area Office
P.O. Box 3700
Loveland, CO 80539-3003

JUN - 9 1992

Mr. Charles P. Davis
Wyoming State Supervisor
U.S. Fish and Wildlife Service
2617 E. Lincoln Way, Suite A
Cheyenne, WY 82002

Dear Mr. Davis:

The Western Area Power Administration (Western) plans to rebuild approximately 28 miles of 69,000 volt (69-kV) transmission line between Big George Substation, south of Cody, Wyoming, to Carter Mountain Substation near Meeteetse, Wyoming (map enclosed). The project is known as the Carter Mountain-Big George Transmission Line Project and is located in Park and Hot Springs Counties, Wyoming. The line was constructed in 1941 by the U.S. Bureau of Reclamation and would be 54-years old at the proposed time of the replacement project award date in 1995. The line is susceptible to numerous lightning-caused outages because of the lack of an overhead ground wire and the structures exhibit the typical characteristics of their age, including shell rot. A new line will include an overhead ground wire to protect against most lightning-caused outages. Western is proposing to replace the 69-kV line with a 115-kV line, which would be operated at 69-kV until future needs require uprating to 115-kV.

In accordance with the Endangered Species Act of 1973, P.L. 93-205 (87 Stat. 884) as amended, Section 7, we are requesting that your agency furnish us with a listing of federally proposed, candidate, and listed endangered species that may occur in the area of the proposed action. The information received will be utilized in the environmental evaluation to be conducted for the proposal.

If you have questions concerning the proposed project, please telephone Rodney Jones, Environmental Specialist, at (303) 490-7371.

Sincerely,

ROBERT H. JONES

Robert H. Jones
Acting Area Manager

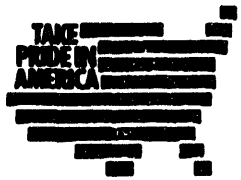
Enclosure

cc:(with enclosure)
Mr. Francis Petera
Director
Wyoming Game and Fish Department
5400 Bishop Blvd.
Cheyenne, WY 82002

Mr. Joe Vessels
Area Manager
Grass Creek Resource Area
Bureau of Land Management
P.O. Box 119
Worland, WY 82401



United States Department of the Interior
FISH AND WILDLIFE SERVICE



IN REPLY REFER TO:

Fish and Wildlife Enhancement
2617 East Lincolnway
Cheyenne, WY 82001

FWE-61411
VSM/W.25--WAPA(Bigeorge)

July 9, 1992

Robert M. Jones, Acting Area Manager
Department of Energy
Western Area Power Administration
P.O. Box 3700
Loveland, Colorado 80539-3003

Dear Mr. Jones:

This responds to your letter of June 9, 1992, received by this office on June 11, 1992, regarding the rebuilding of 28 miles of 69 kV transmission line from the Big George Substation to the Carter Mountain substation in Hot Springs and Park Counties, Wyoming.

In accordance with Section 7(c) of the Endangered Species Act of 1973, as amended (ESA), we have determined that the following threatened or endangered (T/E) species may be present in the project area.

SPECIES	STATUS	EXPECTED OCCURRENCE
Black-footed ferret (<u>Mustela nigripes</u>)	Endangered	Potential resident in prairie dog (<u>Cynomys</u> sp.) colonies.
Bald eagle (<u>Haliaeetus leucocephalus</u>)	Endangered	Migrant. Crucial winter habitat occurs east of alignment along the Bighorn River and north along the Greybull River. Nesting occurs along the Bighorn River.
Peregrine falcon (<u>Falco peregrinus</u>)	Endangered	Migrant.
Whooping crane (<u>Grus americana</u>)	Endangered	Migrant.
Gray wolf (<u>Canis lupus</u>)	Endangered	Potential resident

Category 2 candidate species that may occur within the project area are identified below, unless indicated otherwise. A Category 2 species is one

that lacks sufficient biological information to warrant consideration for listing. Therefore, any information agencies can provide about these species is appreciated.

Many federal agencies have instituted policies to protect candidate species. Your consideration of these species is important in preventing their inclusion on the Endangered Species list.

<u>Mammals</u>	<u>Scientific Name</u>	<u>Range</u>
Spotted bat	<u>Euderma maculatum</u>	Bighorn County
Allen's 13-lined ground squirrel	<u>Spermophilus tridecemlineatus alleni</u>	W.slope BH mts. & upper Green R.
North American wolverine	<u>Gulo gulo luscus</u>	all major mt ranges
North American lynx	<u>Felis lynx canadensis</u>	all major mt ranges
<u>Birds</u>		
Trumpeter swan	<u>Cygnus buccinator</u>	West, central to NE Wyoming
White-faced ibis	<u>Plegadis chihi</u>	statewide
Ferruginous hawk	<u>Buteo regalis</u>	statewide
Northern Goshawk	<u>Accipiter gentilis</u>	statewide
Mountain plover ¹ .	<u>Charadrius montanus</u>	grasslands statewide
Long-billed curlew ² .	<u>Numenius americanus</u>	statewide; breeds in western Wyoming.
Black tern	<u>Chlidonias niger</u>	statewide
Loggerhead shrike	<u>Lanius ludovicianus</u>	statewide
<u>Fish</u>		
Sturgeon chub	<u>Hybopsis gelida</u>	Powder & BH R.

1. C1 species; Information exists to warrant decision for listing.
2. 3C species; Population more secure than previously known; numbers considered sufficient for species survival as of this time.

Plants

Currently, no plant species in Wyoming are listed as threatened or endangered; however, federal agencies are encouraged to consider candidate plants in project review. The Wyoming Natural Diversity Database maintains the most current information on sensitive plants in Wyoming. It must charge for data retrieval in order to financially support the database and staff. The staff can be contacted at (307) 766-3441.

Based on information obtained from this office, no Candidate plant species are present in the project area.

According to Dr. Ron Hartman, Curator of the Rocky Mountain Herbarium, a floristic survey has been conducted by his staff within the project area. The environmental compliance staff is encouraged to contact Dr. Hartman concerning this information.

Section 7(c) of ESA requires that federal agencies proposing major construction actions complete a biological assessment to determine the effects of the proposed actions on listed and proposed species. If a biological

assessment is not required (i.e., all other actions), your agency is responsible for review of proposed activities to determine whether listed species will be affected. We would appreciate the opportunity to review your determination document.

For those actions where a biological assessment is necessary, it should be completed within 180 days of initiation, but can be extended by mutual agreement between your agency and the Fish and Wildlife Service (Service). If the assessment is not initiated within 90 days, the list of T/E species should be verified with the Service prior to initiation of the assessment. The biological assessment may be undertaken as part of your agency's compliance of Section 102 of the National Environmental Policy Act (NEPA), and incorporated into the NEPA documents. We recommend that biological assessments include:

1. a description of the project;
2. a description of the specific area that may be affected by the action;
3. the current status, habitat use, and behavior of T/E species in the project area;
4. discussion of the methods used to determine the information in item 3;
5. direct and indirect impacts of the project to T/E species;
6. an analysis of the effects of the action on listed and proposed species and their habitats including cumulative impacts from federal, state, or private projects in the area;
7. coordination measures that will reduce/eliminate adverse impacts to T/E species;
8. the expected status of T/E species in the future (short and long term) during and after project completion;
9. determination of "is likely to adversely affect" or "is not likely to adversely affect" for listed species;
10. determination of "is likely to jeopardize" or "is not likely to jeopardize" for proposed species;
11. citation of literature and personal contacts used in assessment.

If it is determined that any agency program or project "is likely to adversely affect" any listed species, formal consultation should be initiated with us. If it is concluded that the project "is not likely to adversely affect" listed species, we should be asked to review the assessment and concur with the determination of no adverse effect.

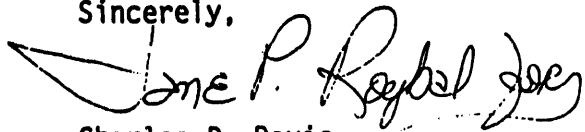
A federal agency may designate a non-federal representative to conduct informal consultation or prepare biological assessments. However, the

ultimate responsibility for Section 7 compliance remains with the federal agency, and written notice should be provided to the Service upon such a designation. We recommend that federal agencies provide their non-federal representatives with proper guidance and oversight during preparation of biological assessments and evaluation of potential impacts to listed species.

Section 7(d) of ESA requires that the federal agency and permit or license applicant shall not make any irreversible or irretrievable commitment of resources which would preclude the formulation of reasonable and prudent alternatives until consultation on listed species is completed.

If you have any questions please contact Virginia Moran of my staff at the letterhead address or phone (307) 772-2374.

Sincerely,

A handwritten signature in black ink, appearing to read "Charles P. Davis", with a stylized flourish at the end.

Charles P. Davis
State Supervisor
Wyoming State Office

cc: Assistant Regional Director, FWE, Denver, CO (60120)
Director, WGFD, Cheyenne, WY
Nongame Coordinator, WGFD, Lander, WY
ENSR Consulting and Engineering, Loveland, Colorado

APPENDIX B
FLOODPLAINS AND WETLANDS ASSESSMENT

FLOODPLAINS AND WETLANDS ASSESSMENT

B.1 Introduction

Executive Order 11988 mandates that floodplain management and flood hazards be considered in planning projects. Pursuant to DOE's "Compliance with Floodplain/Wetland Environmental Review Requirements," 10 CFR 1022, Western has determined that this project would involve activities within a floodplain area. A notice of floodplains/wetlands involvement was published in the Federal Register (Vol. 58, No. 22; February 4, 1993) in accordance with 10 CFR 1022. A public meeting also was held on September 1, 1992 in Meeteetse, Wyoming, and the public was informed of potential activities in the floodplain. Floodplains are defined as lowlands adjoining inland waters, and include the area that would be inundated by a 1 percent (100-year) or greater probability flood in any given year. Flood hazard maps were obtained for this portion of Park County, Wyoming (Federal Emergency Management Agency 1978 and 1987). From these maps and the field reconnaissance, it has been determined that two water sources crossed by the project (Greybull River and Meeteetse Creek) would have structures located in a floodplain.

Executive Order 11990 mandates that government agencies consider preservation of wetlands in planning and management actions. Wetlands are defined by the U.S. Department of Energy as areas inundated by surface or groundwater with a frequency sufficient to support vegetation or aquatic life requiring saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands include swamps, potholes, marshes, bogs, sloughs, floodplains, lakes, reservoirs, and springs. For this project, wetlands are limited to the floodplain meadows/marshes and riparian vegetation associated with primarily perennial streams.

The following constitutes the floodplains-wetlands assessment for the Big George-Carter Mountain 115-kV Transmission Line Project. Details on the proposed project, existing environment, impact assessment, and maps of the project area are provided in the EA.

B.2 Floodplains and Wetlands in the Project Area

The project area is located in the Bighorn River Basin within the larger Missouri River Basin (Peterson 1988). Floodplains and wetlands are associated with the perennial streams found in the project area. These sensitive areas were identified from color-infrared, high altitude aerial photography; low-altitude videotapes; and the June 1992 field reconnaissance. Flood hazard boundary maps produced by the Federal Emergency Management Agency (FEMA) did not provide complete coverage of the entire proposed route. Approximately 20.0 miles (71 percent)

of the proposed route was covered by FEMA maps. Maps were not printed for approximately 8.2 miles (29 percent) of the proposed route. Two route segments for which flood hazard boundary maps were not printed include MPs 0.0 to 6.2 and MPs 26.2 to 28.2. Sage Creek is the only perennial stream that occurs in a portion of the project area for which flood hazard boundary maps have not been produced.

According to the flood hazard boundary maps, the proposed route would traverse three special flood hazard areas (see Table B-1), including Sage Creek, Meeteetse Creek, and the Greybull River, which are indicated on Map 2-2 in the EA (FEMA 1978 and 1987).

Sage Creek would be crossed by the proposed route at MP 0.6. This creek meanders through a landscape consisting of rolling hills of rangeland. The active stream channel is predominantly 3 to 4 feet wide. Since the 100-year floodplain of Sage Creek has not been delineated by FEMA at the proposed crossing site, an extrapolation of various data was used to estimate the width. The 100-year floodplain along Sage Creek was delineated by FEMA on a published flood hazard boundary map whose coverage ends just west of the proposed crossing site. The width of the 100-year floodplain at the edge of this map, 0.6 mile west of the proposed crossing site, is approximately 600 feet. The width at the crossing site was estimated to be approximately 500 feet, based on information obtained during a field reconnaissance and measurement of the floodplain width between distinctive topographic contours on the USGS 7.5 minute topographic map.

The stream channel is slightly incised and the streambed consists of sediments, such as clay, silt, and sand. Vegetation along the creek consists of herbaceous species with few shrub and tree species. Common plant species established along Sage Creek include sedges, spikerushes, rushes, bluegrass, western wheatgrass, big sagebrush, various forbs, and willows. The plant species that were located at the proposed crossing site had a low growth form and would not be considered a physical obstruction during construction. Currently, structures for the 69-kV transmission line do not occur within the Sage Creek floodplain. The proposed action would not result in the placement of transmission line structures within the floodplain.

Meeteetse Creek meanders through irrigated pastures and rolling hills of rangeland in the vicinity of the proposed route crossing; the proposed crossing is located at MP 16.3. The active stream channel is 6 to 10 feet wide and the floodplain is approximately 1,800 feet wide. The streambed consists of sand, gravel, and small rocks in addition to minor amounts of silt and clay deposits. Vegetation established along the creek includes a mixture of herbaceous and shrub species. Herbaceous species include sedges, spikerushes, rushes, various forbs, bluegrass, and western wheatgrass. Shrub species that occur along the creek include willows and big sagebrush. A

Table B-1

Floodplains and Wetlands Traversed by the Proposed Route

Floodplains	Approximate MP	Width of Crossing	Number of Structures	
			Current ¹	Proposed ²
Sage Creek	0.6	500 feet	spanned	spanned
Meeteetse Creek	16.3	1,800 feet	3	2
Greybull River	18.8	1,200 feet	1	1

¹The number of 69-kV transmission line structures that currently occur within the floodplain.

²The estimated number of 115-kV structures that will likely be located within the floodplain, based on the proposed transmission line alignment and a 700-foot average span length.

Wetlands Number	Approximate MP	NWI ¹ Classification	Number of Structures ²	Associated Creek or Drainage
1	4.0	R4SBA	spanned	Coal Mine Gulch
2	7.4	PEMC	spanned	Unnamed drainage to Dry Creek
3	7.6	PABFh	spanned	Dry Creek
4	8.5	PEMA	spanned	Dry Creek
5	8.7	PEMC	spanned	Unnamed drainage to Dry Creek
6	11.8	R4SBA (PEMC)	spanned	Cottonwood Creek
7	12.3	PEMC	spanned	Unnamed drainage to Cottonwood Creek
8	14.6	PEMC	spanned	Long Hollow
9	18.7	PEMC	spanned	Wetland immediately adjacent to the Greybull River

¹PEMC - Seasonally flooded palustrine emergent wetland.

PEMA - Temporarily flooded palustrine emergent wetland.

R4SBA (PEMC):

R4SBA - Temporarily flooded intermittent river.

(PEMC) - Ground-truthed classification.

PABFh - Palustrine aquatic bed, diked/impounded.

total of three structures currently occur within the Meeteetse Creek floodplain. In comparison, the proposed action would result in the placement of one less structure within the floodplain.

The Greybull River would be crossed by the proposed route at MP 18.8. This river intersects cultivated cropland that is situated within the 100-year floodplain. The river channel has a braided-channel configuration, which leads to the formation of numerous islands within the high-water mark boundaries. The streambed and floodplain width at the crossing site of the proposed route is approximately 120 and 1,200 feet, respectively. The streambed substrate consists of small rocks, boulders, gravel, and sand. Vegetation present at the crossing is dominated by tree and shrub species with a minor herbaceous understory. Tree and shrub species include narrow-leaved cottonwood, willows, and big sagebrush. Herbaceous species include sedges, rushes, bluegrass, and various forbs. Currently, one transmission line structure occurs within the Greybull River floodplain. The construction of the proposed route also would result in the placement of one structure within the floodplain area.

The proposed route would cross nine wetlands. These wetlands are palustrine emergent wetlands and are positioned along intermittent drainages, perennial creeks, and the Greybull River. Table B-1 lists these wetland areas by milepost, the National Wetland Inventory (NWI) classification, and the associated drainage name. These wetland locations are shown on Map 2-2 in the EA, by their respective wetlands number. Wetlands located along intermittent drainages are located in depressions within the drainage adjacent to the drainage that collect water during spring runoff and during periods of high runoff after intense thunderstorm activity. One of the nine wetlands traversed by the proposed route is a stock pond located at MP 7.6. Wetland species that were observed at the pond included sedges, spikerushes, rushes, and buttercups (see Map 2-2, Sheet 2; located at the back of this document).

B.3 Floodplains and Wetlands Effects

The floodplains located along the Greybull River and Meeteetse Creek are the only floodplains potentially impacted by the proposed transmission line. Transmission line structures would not be placed in the floodplain associated with Sage Creek. All other perennial and intermittent drainages crossed by the project would be spanned. Existing access roads would be used and construction would occur during dry conditions. No impacts to these other drainages are anticipated.

In the floodplain zone along Meeteetse Creek, one of the transmission structures that is currently present in the floodplain would be eliminated. It is estimated that one transmission line structure would be replaced in the floodplain zone along the Greybull River for the proposed project. The placement of transmission line structures during construction and the physical presence of

structures during project operation are not expected to alter the floodplain storage volume or cause a local increase in the flood stage.

The nine wetland areas crossed by the proposed route are restricted to riparian zones. Based on Western's Standard Construction Practices presented in Section 2.3.1.4 of the EA, no impacts to these wetland/riparian areas are anticipated from project construction or operation.

Only one location along the existing access road for the project may affect riparian vegetation during project construction. A small, two-track ford currently crosses a tributary to Cottonwood Creek at MP 12.3. The riparian ecosystem present at this location is characterized by a small, low-flowing stream that meanders through a wet meadow. The stream channel was not readily distinguishable from the wet meadow due to the absence of high, water-eroded banks. Slope gradients immediately adjacent to the wet meadow were gradual and would not impact construction activities. Plant species observed at the site included sedges, spikerushes, and rushes. This existing ford is surrounded by a minimal amount of riparian vegetation. Impacts to this riparian vegetation may result from larger construction vehicles traveling across the ford for structure placement. Impacts to riparian vegetation would be limited to approximately 2,400 square feet (0.06 acre) and would be considered short-term. Construction mats or other protection techniques will be used for large construction vehicles using the existing ford. Matting will be used at the tributary crossing where areas of saturated soils are encountered. Use of matting will minimize rutting along the ford area, disturbance to riparian vegetation, and soil compaction.

In summary, the transmission line would span all flowing and dry channels of perennial and intermittent streams. Riparian vegetation would not be removed. The contractor would use existing access and would be prohibited from crossing live streams or staging in wetlands or floodplains. No removal of vegetation for routine maintenance is necessary. Impacts to the floodplain at the Greybull River and Meeteetse Creek would be minimal. One less structure would be located in the floodplain at Meeteetse Creek.

The final design for the transmission line structures located in the floodplain would include foundation design that considers site-specific soil conditions, as well as elevation of the 100-year flood and potential debris loading at each structure during flooding. Therefore, failure of a structure during a flood is not expected. No watercourses would be altered or relocated as a result of the project. No applicable state or local floodplain protection standards would be violated.

APPENDIX C
ELECTRICAL CHARACTERISTICS

ELECTRICAL CHARACTERISTICS

C.1 Line Characteristics

The electrical effects of the proposed 115-kV transmission line can be characterized as "corona effects" and "field effects." Corona is the electrical breakdown of air into charged particles caused by the electrical field at the surface of the conductors. Effects of corona are audible noise (AN), visible light, radio and television interference (RI and TVI), and photochemical oxidants. Calculated corona effects for the proposed project are shown in Table C-1. Field effects are induced currents and voltages in conducting objects near the line, and related effects that occur as a result of electric and magnetic fields at ground level. Calculated field values for the proposed project are shown in Table C-2.

C.1.1 Corona Effects

Corona can occur on the conductors, insulators, and hardware of an energized high-voltage transmission line.

1. AN. Transmission line AN is measured and predicted in decibels (A-weighted) or dBA. Some typical noise levels are: library, 40 dBA; light automobile traffic at 100 feet, 50 dBA; an operating air conditioning unit at 200 feet, 60 dBA; and freeway traffic or a freight train at 50 feet, 70 dBA. This last level represents the point at which a contribution to hearing impairment begins. The calculated average noise levels during wet weather and fair weather at the edge of the ROW for the proposed line are shown in Table C-1. These predicted levels would be below ambient levels.
2. RI, TVI, and Other Communication Band Interference. Corona-generated RI is most likely to affect the AM broadcast band. FM radio reception is rarely affected. In general, only AM radio receivers near transmission lines are affected by RI. An acceptable level of maximum fair weather RI at the edge of a ROW is 40 to 45 decibels above 1 microvolt per meter (dBdV/m). The predicted fair-weather and foul-weather levels for the proposed transmission line are shown in Table C-1.

The level of corona-generated TVI expected from the line is also shown in Table C-1. These levels are not expected to produce a TVI problem. Corona can affect the reception of the video (picture) portion of a TV signal. TVI due to corona appears as three bands of "snow" on the television screen. TVI at the edge of the right-of-way due to corona occurs during foul weather and is generally of concern for transmission lines with voltages of 345-kV or above.

TABLE C-1

**Calculated Corona Effects for the Big George to
Carter Mountain Transmission Line Project¹**

	Voltage, kilovolts (kV)	ROW Width, feet	Average Conductor Height Above Ground, feet	Average Wet-weather Audible Noise at Edge of ROW, decibels A-weighted (dBA)	Average Fair-weather Audible Noise at Edge of ROW, decibels A-weighted (dBA)	Average Wet-weather Radio Interference (RI) at Edge of ROW, decibels above 1 microvolt per meter (dBμV/m)	Average Fair-weather Radio Interference (RI) at Edge of ROW, decibels above 1 microvolt per meter (dBμV/m)	Wet-weather Television Interference (TVI) at Edge of ROW, decibels above 1 microvolt per meter (dBuV/m)	Maximum Incremental Ozone-levels at Ground Level, parts per billion (ppb) ³
Existing 69-kV system with No. 1/0 AWG copper conductor on H-frame wood pole	69	75	32	15.2	-9.8	37.6	20.6	-0.3	0.01
<hr/>									
69-kV operation of proposed system built for 115-kV ultimate operation (477,000 circular mil conductor)									
H-frame wood pole ²	69	80	32	-2.4	-27.4	14.3	-2.7	-23.4	0.01
<hr/>									
115-kV operation (477,000 circular mil conductor)									
H-frame wood pole ²	115	80	32	24.2	-0.8	40.9	23.9	3.3	0.02

¹ Since corona effects are produced as a result of system voltage, the corona effects will be the same for all system currents (loads).

² Single-circuit (1 ckt.) configuration.

³ Calculation assumes a 1.0 mph perpendicular wind and a 0.05 inch/hr rain.

TABLE C-2

**Calculated Field Effects for the Big George to
Carter Mountain Transmission Line Project**

	Existing 69-kV System with No. 1/0 AWG Copper Conductor		69-kV Operation of Proposed System Built for 115-kV Ultimate Operation (477,000 Circular MIL, 24/7, ACSR Conductor)		115-kV Operation (477,000 Circular MIL, 24/7, ACSR Conductor)	
	1	2	1A	2A	1A	2A
	H-frame Wood Pole ¹	H-frame Wood Pole ²	H-frame Wood Pole ³	H-frame Wood Pole ³	H-frame Wood Pole ³	H-frame Wood Pole ³
Voltage, kilovolts (kV)	69	69	69	69	115	115
Current, amperes (A) ⁵	176	202	183	226	127	153
ROW width, feet	75	75	80	80	80	80
Minimum conductor height above ground, feet	22	22	24	24	24	24
Maximum electric field, kilovolts per meter (kV/m)	0.85	0.85	0.88	0.88	1.46	1.46
Electric field at edge of ROW, kilovolts per meter (kV/m)	0.35	0.35	0.39	0.39	0.65	0.65
Maximum magnetic field, Gauss (MG)	45.35	52.05	43.52	53.75	30.20	36.39
Magnetic field at edge of ROW, Gauss (MG)	12.38	14.21	12.92	15.95	8.96	10.80

¹ Predicted maximum current with power system intact.

² Predicted maximum current based on an outage of one line or other element in power system.

³ Single-circuit (1 ckt.).

⁴ The transmission line design criteria would be based on maintaining a minimum conductor to ground height of 23 feet with a conductor temperature of 80°C. This condition would be expected to occur with a 477 MCM conductor maximum current of 488 amperes based on a conductor temperature rise of 40°C above a 40°C ambient air temperature. It is not anticipated that actual system operating currents would ever reach this conductor maximum.

⁵ All the given system operating currents are projected values calculated from the system planning studies used to authorize the project.

The proposed line will be designed to minimize TVI. Corona-generated interference usually does not cause disruption on other communication bands such as the citizens' (CB) and mobile bands due to the higher frequencies of these signals. Complaints of interference to CB radios are rare. Mobile radio communications are not susceptible to transmission line interference because they are generally frequency modulated (FM). These FM signals would not normally be affected.

There are various mitigative techniques for eliminating adverse impacts to radio, television, and other communication band reception. In the unlikely event that interference occurs with these types of communications, various mitigation measures are available to correct specific problems. Individual complaints about interference, should they occur, will be resolved by Western.

3. Visible Light. Corona is visible as a bluish glow or as bluish plumes. On the proposed line, corona levels will be so low that corona on the conductors will not be observable.
4. Photochemical Oxidants. When corona is present, the air surrounding the conductors is ionized and chemical reactions can take place, producing extremely small amounts of ozone and other oxidants. Approximately 90 percent of the oxidant is ozone and the remainder is mainly nitrogen oxides.

The National Primary Ambient Air Quality Standard for photochemical oxidants, of which ozone is the principal component, is 235 micrograms/cubic meter ($\mu\text{g}/\text{m}^3$) or 120 parts per billion (ppb). The approximate maximum incremental ozone levels at ground level calculated for the proposed line are given in Table C-1 and are well below the 120 ppb standard. Measurements near transmission lines have shown that the amount of oxidants produced by operating transmission lines is barely measurable and of no environmental consequence.

C.1.2 Field Effects

As indicated earlier, field effects are induced currents and voltages in conducting objects near the line, and related effects that occur as a result of electric and magnetic fields near ground level. Table C-2 has been prepared to assist the reader in understanding the changes in intensity of the field parameters for the various construction alternatives. The table shows the calculated value for the various field parameters for the three voltage classes (69, 115, 230-kV), structure type and configuration, and the predicted system load currents.

1. Electric Field

The electrical field created by a high-voltage transmission line extends from the energized conductors to other conducting objects, such as the ground, structures, vegetation, buildings, vehicles, people, and animals. The electric field or voltage gradient is expressed in units of volts/meter (V/m) or kilovolts/meter (kV/m).

- a. Induced Currents. When a conducting object, such as a vehicle or person, is placed in an electric field, currents and voltages are induced in the object. The magnitude of the induced current depends on the electric-field strength and the size and shape of the object. If the object is grounded, then the induced current flows to earth and is called the short-circuit current of the object. In this case, the voltage on the object is effectively zero. If the object is insulated (not grounded), then it assumes some voltage relative to ground. These induced currents and voltages could represent a potential source of nuisance shocks near a high-voltage transmission line.

Some representative short-circuit currents in electric fields of 1.0 kV/m and 3.0 kV/m are given in Table C-3.

The possibility of the total short-circuit current being available for a shock is further diminished by less-than-ideal conditions, such as conducting tires, vegetation touching the vehicle, or moisture. However, the values in Table C-3 do allow an upper limit to be placed on short-circuit currents. If a person provides the only conducting path from the object to ground, then the currents listed in Table C-3 would flow through the person and cause a nuisance shock.

- b. Steady-State Induced Current. Steady-state currents are those that flow continuously after a person contacts an object and provides a path to ground for the induced current. The response of persons to such currents has been extensively studied and levels of human response documented (Keeseey 1969). Primary shocks are those that can result in direct physiological harm. The lowest category of primary shocks is "let go," which represents the steady-state current that cannot be released voluntarily. The "let go" threshold was established for adult males at 9.0 mA and 6.0 mA for adult females. These thresholds were established for adult men weighing 180 pounds and adult women weighing 120 pounds. Let-go thresholds for adults have been established from actual experimentation. Thresholds for children, however, have been derived from the data for adults, since no actual measurements were

TABLE C-3
Short-Circuit Currents for Various Objects
in Milliamperes (mA) - 120° NESC Conditions

Object	Electric Field	
	1 kV/m	3.0 kV/m
Person	0.016	0.05
Cow	0.024	0.07
Sedan	0.11	0.33
Camper Truck (28' long)	0.28	0.84
Largest anticipated vehicle without special permit (70 x 8.5 x 13) ¹	0.93	2.79*
Large haystacker and a 4 WD tractor ²	0.89	2.67*
3-strand fence (200' long)	0.30	0.90

¹ Largest anticipated vehicle (CRS 42-4-401 et. seq.).

² Estimated from vehicle with increment of 0.07 mA/kV/m for 4-wheel drive versus 2-wheel drive tractor.

* - Note: Practically, the average field over the larger objects will result in a lower induced current than reported here. The NESC maximum induced current criterion for vehicles is 5 mA. Large pieces of farm equipment, such as hay wagons and combines, would have large short-circuit currents but would not exceed this level.

taken from children. The derivation of a threshold for children was based on body weight, and is generally accepted as 5.0 mA (the value adopted by the National Electric Safety Code [NESC]). Primary shocks will not be possible from the induced currents under the proposed line because of the line's relatively low field strengths and the grounding practices that will be used. Potential, steady-state current shocks from vehicles under the proposed line would be at or below the secondary shock level, where secondary shocks are defined as those that could cause an involuntary and potentially harmful movement, but cause no direct physiological harm.

Several factors tend to reduce the opportunity for secondary shocks to occur. If activities are distributed over the whole right-of-way, then only a small percentage of time will be spent in areas where the field is at or close to the maximum value. If road crossings are kept near the towers, where conductors are highest, the vehicular traffic in high field-strength areas, where conductors are lowest, will be restricted to farm machinery on soil or vegetation, which tends to reduce shock currents substantially.

Because of these mitigating factors, it is very likely that most steady-state current shocks will be below the 1.1 mA perception level for 50 percent of men and, in fact, less than the 0.5 mA standard for maximum leakage current from portable appliances. Thus, steady-state current shocks are not anticipated often, and, if they occur, would represent a nuisance rather than a hazard.

- c. Spark-Discharge Shocks. Induced voltages appear on objects, such as vehicles, when there is an inadequate ground. If the voltage is sufficiently high, then a spark-discharge shock can occur as contact is made with the object. Such shocks are similar to "carpet" shocks, which occur when touching a door knob after walking across a carpet on a dry day. Spark-discharge shocks could occur under the proposed line. However, the magnitude of the electric field would be low enough that this type of shock would be rare and would occur only in a small area under the line near midspan.

Carrying or handling conducting objects under the line can also result in spark discharges that are a nuisance. Irrigation pipe should be carried as low to the ground as possible and preferably unloaded at a distance from the transmission line to eliminate spark-discharge nuisance shocks. The primary hazard with irrigation pipe is direct contact with the conductors.

- d. Field Perception. When the electric field under a transmission line is sufficiently great, it can be perceived by hair erection on an upraised hand similar to the sensation of a slight breeze blowing over the hand or arm. It is very unlikely that the electric field under the line would be perceivable when standing on the ground. When working on top of equipment, there is probably enough skin stimulation during normal activities to preclude perception of the field at all.
- e. Grounding and Shielding. Normal grounding policies effectively mitigate the possibility of nuisance shocks due to induced currents from stationary objects such as fences and buildings. Since the electric field extends beyond the right-of-way, grounding requirements extend beyond the right-of-way for very large objects or extremely long fences. Electric fences require a special grounding technique because they can only operate if they are insulated. Application of the grounding policy during and after construction will effectively mitigate the potential for shocks from stationary objects near the proposed line.

Mobile objects, such as vehicles and farm machinery, cannot be grounded permanently like a fence or building. Limiting the coupled currents to persons from such objects is accomplished in three ways. First, the NESC requires that lines be designed such that the conductor clearance for lines with voltage exceeding 169-kV results in an induced short-circuit current in the largest anticipated vehicle under the line of less than 5 mA.

A second method of reducing potential currents to persons is through the intentional use of grounds. For example, a chain or other conductor can be dragged by a vehicle; a ground strap can be attached to the vehicle when it is stopped.

Third, the very nature of large vehicles and their use tend to provide some grounding and reduce the electrical resistance of the vehicle to ground. Tires tend to be conductive, farm machinery is usually in direct contact with the soil, and conducting vegetation is in contact with equipment. Because of these factors, the realization of a well-insulated (worst-case) vehicle is a remote possibility.

Electric-field reduction and the accompanying reduction in induced effects, such as shocks, is also accomplished by conductive shielding. Persons inside a conducting-vehicle cab or canopy will be shielded from the electric field. Similarly, a row of trees or a low-voltage distribution line will reduce the field on the ground in their vicinity. Metal pipes, wiring, and other conductors in a residence or building will shield the interior from the electric field due to the transmission line.

Impacts of electric-field coupling can be mitigated through grounding policies and adherence to the NESC. Worst-case levels are used for safety analysis, but, in practice, currents and voltages are reduced considerably by both intentional and inadvertent grounding. Shielding by conducting objects, such as vehicles and vegetation, also reduces the potential for electric-field effects.

2. Magnetic Fields

Magnetic fields are produced by the flow of electrons or current. Magnetic fields are present near any energized current-carrying object, or conductor, including all common electrical household appliances and home wiring during use. Since the standard North American power frequency is 60-hertz (Hz), magnetic fields also alternate at the standard 60-Hz a-c frequency. Magnetic fields have been traditionally measured in Gauss (G), which is a measure of the intensity of the magnetic attraction (lines of force) per unit area, or magnetic flux density. Since the Gauss is a relatively large quantity, the milligauss (mG) unit is often used when dealing with the low field strengths associated with most human exposures ($1 \text{ Gauss} = 1,000 \text{ mG}$ or $0.001\text{G} = 1 \text{ mG}$). Magnetic field strengths are directly related to, among other factors, the amount of current flowing in the conductor; the greater the current flow, the higher the magnetic field. Therefore, unlike electric fields, magnetic fields can vary significantly over time, fluctuating with system loads.

Magnetic fields associated with transmission lines behave similarly to electric fields in that they are most intense very near the conductors and fall away relatively quickly as the distance from the conductor increases. The partial cancellation effect of adjacent conductors also occurs with magnetic fields, as it does with electric fields. However, where electric fields are rather easily shielded, magnetic fields penetrate structures and soil with little decrease of field strength. Physical distance, thus, becomes a very important factor in limiting magnetic fields.

The actual level of magnetic field will vary with current loading, conductor temperature, and ground clearance. The maximum calculated 60-Hz magnetic field on the right-of-way is shown in Table C-2 for various system loading conditions and structure types.

The maximum magnetic field levels shown in Table C-2 are comparable with maximum magnetic fields of other transmission lines and with levels of magnetic fields measured close to some common household appliances as shown in Table C-4 (Silva et al. 1989; Lee et al. 1985; Gauger et al. 1985).

TABLE C-4
Magnetic Field Environment
Summary of Domestic Appliance Magnetic Field Measurements

Appliance Type	Body Location	Magnetic Field - mG Typical Range	Maximum Value
Range	Belt	1-80	175-625
Refrigerator	Chest	1-8	12-187
Microwave Oven	Belt	3-40	65-812
Can Opener	Belt	30-225	288-2750
Oven	Belt	1-8	14-67
Toaster	Belt	2-6	9
Coffee Maker	Chest	1-2	4-25
Freezer	Head	1-3	4-6
Mixer	Belt	2-11	16-387
Clothes Dryer	Belt	1-24	45-93
Dishwasher	Belt	1-15	28-712
Garbage Disposal	Belt	1-5	8-33
Ceiling Fan	Head	1-11	125
Electric Blanket	Belt	3-50	65
Waterbed Heater	Belt	1-9	20-27
Blow Dryer	Head	1-75	112-2125
Computer	Belt	1-25	49-1875
Typewriter	Belt	1-23	38
Make-up Mirror	Chest	1-29	44-125
Shaver	Head	50-300	500-6875
Aquarium	Belt	1-40	50-2000
Sewing Machine	Chest	1-23	26-1125
Electric Drill	Chest	56-194	300-1500
Circular Saw	Belt	19-48	84-562

- a. **Magnetically Induced Currents and Voltages.** Alternating magnetic fields induce voltages at the open ends of conducting loops. The conducting loop can be formed by such things as a fence, an irrigation pipe, a pipeline, an electrical distribution line, or a telephone line. The earth to which one end of the conductor is grounded forms the other portion of the loop. The possibility for a shock exists if a person closes the loop at the open end by contacting both the ground and the conductor. Shocks due to magnetically induced currents and voltages are the same type as those due to electric field-induced currents and voltages. In the case of magnetic induction, the voltages are generally quite low and the currents are limited by the resistance in the current path.

Normally, the resistance of shoes will limit the current to levels below the threshold for perception. However, a low resistance contact (standing barefoot on damp earth) with a long insulated fence parallel to a heavily loaded transmission line can result in steady-state currents above threshold and even above let-go. This latter possibility is very unlikely because of the length of ungrounded fence required. Mitigation measures, such as grounding and breaking electrical continuity, that are implemented for electric-field induction will also mitigate magnetic-field induction effects.

Magnetically induced currents from power lines have been investigated for many years (IEEE 1974; Jaffa and Stewart 1981; Jaffa 1981; Taflove and Dabkowski 1979; Olsen and Jaffa 1984). Calculation methods and mitigating measures are available. A recent comprehensive study of gas pipelines near transmission lines developed prediction methods and mitigation techniques specifically for induced voltages on pipelines (Taflove and Dabkowski 1979; Dabkowski and Taflove 1979). Similar techniques and procedures are available for irrigation pipes and fences.

Induction effects in adjacent facilities such as pipelines and communication systems have been well studied and mitigation is handled with the affected parties on a case-by-case basis (Elek and Rokas 1977; Taflove et al. 1979).

The magnitude of magnetic field-induced currents for both pipes and fences is very dependent on the electrical unbalance (unequal currents) of the three phases of the line. Thus, a distribution line where a phase outage can go unnoticed for long lengths of time can represent a larger source than a transmission line where the loads are well balanced (Jaffa 1981).

Results from an investigation of electric shock due to magnetically coupled currents to fences during electrical fault conditions concluded that a hazardous

situation would be extremely unlikely to occur (Mohan et al. 1982). Although a 400-kV dc line in Minnesota was considered, the results apply to an ac line as well, because they were considering fault conditions.

Furthermore, standard grounding practices for fences are effective in reducing the energy available for shock well below that considered to be dangerous.

Knowledge of the phenomenon, grounding practices, and the availability of mitigation measures mean that magnetic induction effects from the line can be minimized. Therefore, it is unlikely that magnetically induced voltages and currents would have an adverse impact.

C.2 Biological Effects

C.2.1 Human Studies

The question of whether long-term, direct exposure to the EMFs from transmission lines causes biological or health effects in humans is a controversial topic. Much attention at present is focused on several recent reports suggesting that workers in certain electrical occupations and people living close to power lines have a small increased risk of leukemia and other cancers (Coleman and Beral 1988). An EPA draft report (EPA 1990) identifies 60-Hz fields and magnetic fields from power lines and perhaps other sources in the home as possible, but not proven causes of cancer in humans.

Over the past decade, research addressing the existence and implications of possible effects has been conducted with humans, animals, and cells and tissues. The results of this research and the question of possible health effects due to 60-Hz electric and magnetic fields have been analyzed and reviewed by numerous authors and scientific panels. Reviews of the literature and research related to possible health effects of 60-Hz electric and magnetic fields have been prepared by: World Health Organization (WHO 1984); American Institute of Biological Sciences (AIBS 1985); Florida Electric and Magnetic Fields Science Advisory Commission (FEMFSAC 1985); Bonneville Power Administration (BPA) 1979; (Lee et al. 1985); Western Energy Supply and Transmission Associates (WEST 1986); New York State Power Line Project (NYSPLP) (Ahlborn et al. 1987); Ontario Ministry of Health (Ontario 1987); and EPA 1990.

These reviews were prepared by groups of scientists familiar with the scientific literature. Each group evaluated, wholly or in part, the results of epidemiology studies, human laboratory studies, animal studies, and cell and tissue studies. The reviews addressed the electric and magnetic field bioeffects literature with varying degrees of thoroughness and with different emphases.

Both residential and occupational studies have examined associations between exposure to power frequency fields and cancer. The results of the residential studies have been very inconsistent: some report a possible increased risk of cancer, others find no evidence of an increased risk, and still another study shows that the risk of cancer decreased for individuals living in certain homes (where magnetic fields were greater than 4 milligauss) near power lines. The U.S. and several other countries are continuing research to obtain more definitive information on a possible association between power lines and other electrical devices and cancer.

1. Residential Studies

The possible association of childhood leukemia with magnetic fields was first raised by Wertheimer and Leeper (1979). They observed a positive association between the electrical distribution system wiring in Denver, Colorado, and the incidence of childhood leukemia. They found that cancer cases were more likely to live near high-current configurations (HCC), than near low-current configurations (LCC). HCCs are primary and secondary wiring configurations that, because of their location or wire size, are assumed to carry more electric current and, hence, to be stronger sources of magnetic fields than LCCs. These configurations are proxy measurements of magnetic fields and the study was not based upon measurements of actual magnetic field exposure. The researchers concluded from their observations that an association may exist between magnetic fields from residential distribution lines and childhood cancer. The cancer risk appeared to be two or three times greater for residences near HCCs. Wertheimer and Leeper (1982), in a second study in the Denver area, found association of the incidence of adult cancer with HCCs. Both studies have been criticized because of problems in the methodology and the analysis (e.g. Miller 1980; Roth 1985).

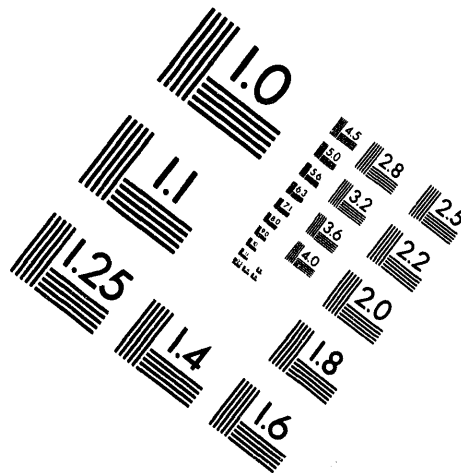
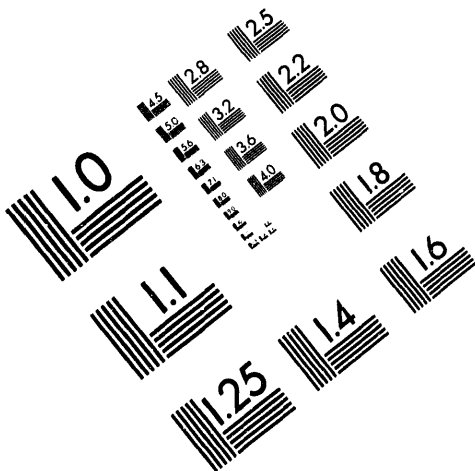
Fulton et al. (1980) performed a similar study in Rhode Island but did not observe an association between childhood cancer and wiring configuration. A more recent study in the Seattle area employing improved exposure characteristics found no association between measured magnetic fields or wiring codes and the incidence of adult leukemia (Stevens 1986). In the Seattle study, exposure in each of 43 houses was characterized by: 24-hour measurement of field, spot field measurements on a different day; and, the wiring coding classification according to the Wertheimer-Leeper code (Kaune et al. 1987). There was a weak correlation between the 24-hour measurements and wiring code. However, the best prediction of 24-hour residential magnetic fields was a formula developed through post-hoc regression analysis of the data. The three characteristics within 140 feet of a home that could be used to predict magnetic field were the presence of transmission lines, number of primary phase conductors, and number of service drops. This latter factor seemed to be the most important. Again, this improved study showed no association with adult cancer.



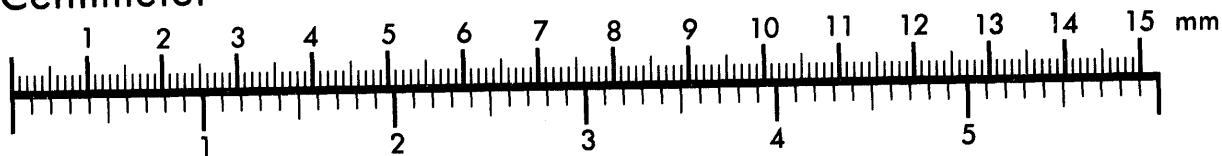
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Association for Information and Image Management

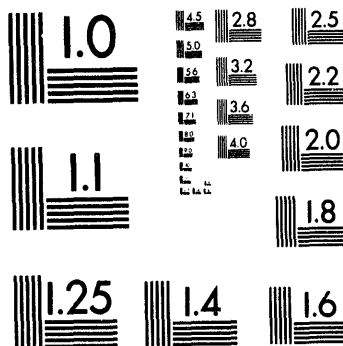
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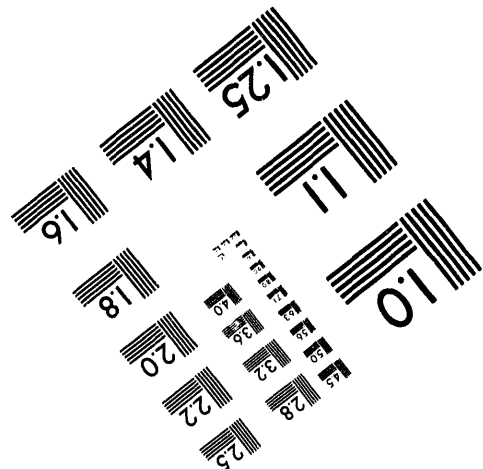
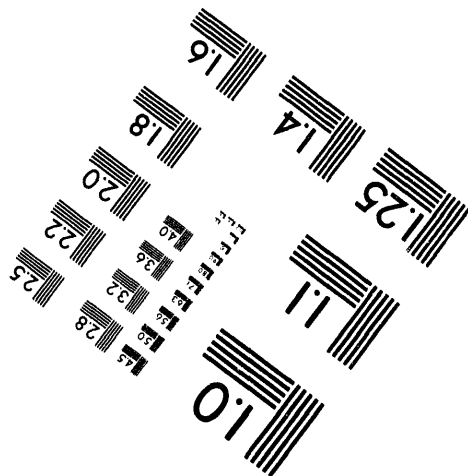
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Inches



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3 of 3

Tomenius et al. (1982) (Tomenius 1986) measured magnetic field levels at the front doors of residences of childhood tumor cases and matched controls in Stockholm, Sweden. The incidence of cancer was greater than expected in residences near 200-kV lines and with measured fields of 3 mG or greater. An approximate two-fold increase in tumor rate was reported for dwellings with visible 200-kV lines. However, the increased incidence of tumors was not apparent for residences with fields that exceeded 4 mG (Tenforde 1986), and the data show that the relative risk of cancer consistently decreases the nearer these homes are to power lines.

A childhood cancer study was performed in the Denver area by Savitz et al. (1987a; 1987b). This work was part of the NYSPLP and used both the Wertheimer-Leeper wiring codes and magnetic field measurements in the home as exposure indicators. Magnetic field measurements in residences were made in both a low power condition with the major appliance and lights off and with the same sources turned on. The childhood cases and controls in this study were different than those in the previous Denver study (Wertheimer and Leeper 1979). Savitz observed a slight association between cancer cases and proximity to HCCs: a risk ratio of 1.53 was observed relative to non-HCC homes; i.e., the increased risk associated with HCCs was about 50 percent. Because of the limited number of cases and other uncertainties, this did not vary significantly (statistically) from no increased risk. (A risk ratio of 1.0 represents no increased risk.) These results have been reinterpreted by Savitz in his recent publication.

In both epidemiologic studies done for the NYSPLP (Stevens 1986; Savitz 1987) a correlation between measured magnetic field and wire coding was found, giving some credence to the use of wire coding as a surrogate for historical exposure to magnetic fields. However, the association between magnetic fields and the incidence of cancer is very tenuous. One of the investigators in the recent Denver study has speculated that some factor other than magnetic fields, associated with wiring code, may be linked more strongly with cancer (Wachtel et al. 1987).

Finally, preliminary results of a study examining childhood leukemia risk from EMF exposure were released on February 7, 1991 by the Electric Power Research Institute (EPRI). The study, conducted by John M. Peters, M.D. of the University of Southern California, examined 232 cases of childhood leukemia which occurred in children ages 10 and younger between 1980 and 1987 in Los Angeles. Researchers interviewed parents of leukemia victims by telephone, measured electric and magnetic fields in their homes, conducted like examinations of a control group of 232 children who did not have leukemia, and evaluated power lines outside the childrens homes using wiring codes similar to previous studies (Peters 1991).

The preliminary findings are complex and somewhat contradictory and include:

- o no association between measured electric fields and leukemia;

- o a weak, statistically insignificant, correlation between magnetic field measurements in the children's bedroom and leukemia;
- o a statistically significant correlation between wiring codes and leukemia; and
- o a statistically significant association between the use of appliances (hair dryers and black and white televisions) and leukemia.

The Peters findings, though generally consistent with earlier studies such as the Savitz work, continued to present further research needs. Particularly of interest are the reasons why wiring configuration is again observed to correlate better with leukemia risk than measured exposure. The question of an apparent appliance use correlation with leukemia also bears further examination.

2. Occupational Studies

During the past several years, several epidemiologic reports have shown an association between the incidence of adult leukemia or cancer and occupations that involve exposure to electric and magnetic fields, the so-called "electrical worker" categories. Milham (1982) reported an elevated number of leukemia deaths (36 percent) for workers in 10 electrical occupations in the state of Washington. Numerous surveys of other occupational populations have subsequently appeared with varying results. Savitz and Calle (1987) compiled data from 11 studies in which incidence of leukemia was investigated as a function of possible occupational exposure. These data sets included the original Milham data. Their intent was to assess the consistency of the data that suggested an increased risk of leukemia among electrical workers. The summary relative risk across all studies and all jobs was a modest 1.2 for leukemia and a higher 20 to 50 percent increase in risk for acute leukemia. However, they noted that the available data were not adequate to conclude that electric and magnetic field exposures are the source of the increased risk.

In assessing the significance of their results, Savitz and Calle (1987) noted the lack of specificity of risk for leukemia: that is, other cancers also showed increased risks when analyzed by job title, which would imply that magnetic fields were associated with multiple types of cancer. Identification of exposure through related occupation was also a weakness in the studies because of variation of exposure within a specific occupation, and the possible absence of exposure measurements for some of these occupations.

Six studies of human reproductive effects attributable to electric and magnetic field exposures have been reviewed by the Ontario Ministry of Health (1987). These studies included reproductive experience of the female spouses of high-voltage workers (Nordstrom et al. 1983)

and possible effects associated with the use of electric blankets and heated waterbeds. The conclusion reached by the Ontario Ministry of Health was that "none of the studies to date presents convincing evidence to support an association between adverse reproduction outcomes and electromagnetic field exposure."

Other reviews of the epidemiologic literature have not identified health hazards associated with electric and magnetic field exposure nor have they found support for a causal relationship between cancer and magnetic fields (WEST 1986; Ahlbom et al. 1987; Ontario 1987). These findings are consistent with numerous earlier reviews, which have been summarized in Lee et al. (1985) and WEST (1986). However, a draft EPA report (EPA 1990) concluded that several studies show a consistent pattern of response that suggests, but does not prove, a causal link between the occurrence of cancer and exposure to electric and magnetic fields.

C.2.2 Agricultural Studies

1. Honeybees. Effects of transmission line fields on honeybees have been studied extensively (Wallenstein 1973; Rogers et al. 1982; Greenberg et al. 1981; Greenberg and Bindokas 1980; Greenberg et al. 1984). When hives are placed in electric fields of 2 to 4 kV/m, behavioral effects can occur in honeybees. Fields of 7 to 12 kV/m can result in a variety of problems, including mortality. Intensive studies of the nature of the problem and its causation have demonstrated that bees are not harmed by electric fields per se of 10.50, or even 100 kV/m even when exposed for 800 hours. Hence, foraging and other activities are not likely to be affected. However, when honeybee hives are placed in strong electric fields, currents and voltages are induced in the hive which are dependent on field strength, hive characteristics, and moisture conditions. If the field is high enough, there is a significant voltage difference across the dimensions of a bee's body. This "step potential" results in a shock to the bee when it takes a step. These shocks, and not the electric field per se, are a source of irritation for bees and can cause physiological damage, including death (Greenberg et al. 1984). Not surprisingly, honey production falls off and other activities become erratic. Fortunately, there are two simple solutions to the problem. One is to avoid keeping bees in high field regions on transmission line rights-of-way, and the other is to place grounded metal cages or screens over the hives.

The fact that no behavioral effects have been seen in shielded hives under operating transmission lines indicates that 60-Hz magnetic fields are not sufficient to cause the shock conditions that exist from electric field induction.

Beekeepers with hives located on the final right-of-way of the proposed line will be advised of the possible adverse effects to bees and compensated fairly to assist in relocation of hives. The maximum fields beyond the right-of-way for the proposed line will

not exceed the threshold levels where effect on the bees has been observed. Therefore, there will be no impact beyond the right-of-way.

2. Crops. High electric fields (15 kV/m) have been observed to induce corona on the uppermost parts of plants (McKee et al. 1978; Rogers et al. 1982). The induced corona causes minor damage to leaf tips. Studies of the effects of electric fields on crops and other plants have been conducted under controlled greenhouse conditions and under transmission lines.

The most extensive analysis on effects of 60-Hz electric fields on living plants has been done by McKee and co-workers at the Pennsylvania State University (McKee et al. 1978). In initial studies, several thousand plants from 85 different species were exposed to fields from 0 to 50 kV/m in a very controlled greenhouse environment. "Damage" to plants was associated with sharp, or pointed, leaf tips and amounted to self-limiting corona damage to a few millimeters of these pointed plant parts. Tip damage began for some species at fields of 15 to 20 kV/m. According to McKee, the damage was less than that seen due to routine drying under normal field conditions and, even at 50 kV/m, never threatened the overall growth, viability, yield, or reproduction of exposed plants.

In follow-up studies, McKee (1985) exposed five types of plants - alfalfa, tall fescue, sweet corn, and two types of wheat - to 60-Hz electric fields for extended periods.

Plants were extensively analyzed for chemical element content and for an extremely wide species-specific array of size and mass parameters. There were "no statistically significant effects on seed germination, seedling growth, plant growth, phenology, flowering, seed set, biomass production, plant height, leaf area, plant survival, and nodulation." The only consistent effect that resulted from exposure was the expected occasional damage to a few millimeters of the terminal tip of plant parts exposed to fields of 30 kV/m or greater.

Studies of peas and barley conducted over several years under a BPA 1200-kV test line indicated no consistent adverse effects attributable to exposure to about 12 kV/m (Rogers et al. 1982). In this same study, conifers growing close to a 1200-kV test line exhibited corona at the tips of needles and corona damage to the growing tips of some trees closest to the line. Right-of-way management practices normally limit tree growth in the immediate vicinity of the conductors, and there is no suggestion that forest growth or timber production adjacent to power lines would be affected by electromagnetic fields.

Electric fields up to 12 kV/m under operating lines and up to 16 kV/m under a test line had no noticeable effects on growth or productivity of corn and other crops commonly grown

in Indiana (Hodges and Mitchell 1979; 1984). However, some crops growing in the maximum field area exhibited minor damage from induced leaf tip corona.

In summary, the effects of 60-Hz electric fields on plants is limited to corona damage at sharp, terminal plant parts. This effect is too limited to be noticeable under field conditions found under operating transmission lines and does not result in crop damage. The electric fields associated with the proposed line are well below levels where the leaf tip corona phenomenon has been observed. No damage or harm to crops will occur due to the fields under the proposed line.

3. Livestock. Numerous studies have investigated the performance of livestock in the electrical environment of high-voltage ac transmission lines. Over a 2-year period, Amstutz and Miller (1980) studied livestock, including beef and dairy cattle, on 11 farms located near a 765-kV ac transmission line in Indiana. Typical maximum electric fields were 8.5 kV/m with levels up to 12 kV/m. Magnetic flux densities of .056 G (56 mG) were measured with higher values expected during periods of higher current flow. Short-circuit currents for cows were 0.1 to 0.2 mA in a 6 to 8 kV/m field. Cows seemed to react to induced currents of about 0.7 - 0.8 mA from an insulated feed trough. The authors concluded that "neither health, behavior, nor performance were affected by the electric and magnetic fields created by the 765-kV line."

Williams and Beiler (1979) investigated 55 dairy farms located within 0.5 mile of 765-kV lines in Ohio. Herd performance was evaluated from milk production records, farm records, and interviews for a 6-year period - 3 years before line energization and 3 years after. Milk production did not appear to be affected by the presence of the 765-kV lines. After the lines had been constructed, the incidence of calf mortality and birth defects per farm increased. However, the investigators felt these changes may have been due to larger herd sizes after the line was constructed, to changes in farm management, and to bias in reporting. Farmers involved in the study did not believe there was any significant change in the performance of their herd following line energization. The study indicated that there were no obvious effects of the 765-kV transmission line. The data suggested that the largest factors in herd performance were farm management, quality of feed, and, on occasion, change in ownership.

A Swedish study of 106 farms, located under 400-kV ac transmission lines, found that herds exposed to 400-kV ac transmission lines for more than 15 days per year did not have decreased fertility relative to other herds (Hennichs 1982). There was also no relationship between exposure and the number of cows slaughtered on each farm because of reduced fertility.

All herds used artificial insemination. Exposure days for each herd were estimated from the percent of pasture occupied by the transmission line and the number of days animals were in the pasture. No field measurements were made in this study, but the maximum electric field strength measured under 400-kV lines on 11 farms in Sweden was 5kV/m (Algers, Ekesbo, and Hennichs 1981). Magnetic fields were not reported but would presumably be at least comparable with those of 230-kV lines in the USA: In one case, a maximum of 0.12 G, 120 mG, has been reported (Lee et al. 1985).

In a behavioral study conducted underneath the BPA 1200-kV prototype ac line in Oregon for 5 years, cattle showed no reluctance to graze or drink beneath the line (Rogers et al. 1982). The maximum electric field was 12 kV/m. There was no magnetic field associated with the prototype line. However, an adjacent 230-kV line would have resulted in magnetic fields above typical rural levels.

Exposure of swine to a 345-kV ac transmission line in Iowa resulted in no observable effects in exposed animals relative to control animals (Mahmoud, Zimmerman, and Cowan 1982; Mahmoud and Zimmerman 1984). Body weight, carcass quality, behavior, feed intake, pregnancy rate, frequency of birth defects, birth weight or weight gain of young were investigated. Electric field exposures ranged from 3.5 to 4.1 kV/m. Magnetic field was not measured. However, the magnetic flux density from the 345-kV line is presumably comparable with those of 230-kV lines: e.g., a maximum of 0.12 G, 120 mG (Lee et al. 1985).

There are no indications that exposures to the fields beneath operating transmission lines affect livestock behavior or productivity. However, both ac and dc currents can cause definite behavioral responses in dairy and beef cattle. For this reason metal water and feed troughs, like all conducting objects under the proposed line, should be grounded to eliminate the possibility of nuisance shocks.

Microshocks to animals from so-called "stray" or neutral-to-earth voltages have given rise to problems of animal health and production (Gustafson and Albertson 1982). Voltages between a grounded-neutral system and true earth can produce low-level current shocks in and around barns. These shocks can affect livestock, particularly dairy cows, which can apparently perceive a voltage as low as 0.75 to 1 V across parts of the body. The results of these low-level shocks can be a significant loss in production.

Neutral-to-earth voltages have been observed from both on-farm and off-farm sources. The sources are generally related to current flow in the primary distribution and farmstead neutral systems and not to field induction from transmission lines. Similarly, the mitigation of neutral-to-earth voltages involves modifications to the primary neutral system, the

farmstead neutral system, the farmstead electrical load, or the conducting surfaces in the affected area (Gustafson and Albertson 1982). Mitigation is done on a case-by-case basis. The effects of "stray" voltages are considered an electrical distribution system problem and not a transmission line problem.

C.3 Cardiac Pacemakers

Currents and voltages that are introduced internally to the body represent a possible source of interference to cardiac pacemakers. Internal currents can be caused by electric fields, by magnetic fields, or by direct contact. In the last case, the person might provide a path between a large vehicle under a transmission line and ground, or between an appliance with inadequate grounding and ground.

Recognition of and concern for the possible effects on pacemakers from transmission line electric and magnetic fields has led to considerable research on this topic in the last decade. A study at the University of Rochester will expose pacemaker patients to electric fields in a substation under medical supervision. Possible effects of transmission lines on pacemakers have been addressed in the reviews/hearings conducted in New York, Minnesota, Michigan, and California.

The conclusion drawn from the research and reviews is that the overall risk to pacemaker wearers from transmission lines is minimal. This is especially true of 115-kV transmission lines like the proposed Carter Mt.-Big George line, because of the relatively low electric fields when compared to 500 and 765-kV lines. The threshold for interference to the most sensitive pacemakers is estimated to be 3.4 kV/m. Reversion of pacemakers is the most substantial effect noted to wearers of pacemakers and is not considered a serious problem. To date, there is no evidence that a transmission line has caused a serious problem to the wearer of a pacemaker.

C.4 Hazards

The greatest hazard from a transmission line is direct electrical contact with the conductors. Therefore, extreme caution must be exercised when operating vehicles and equipment for any purpose in the vicinity of a transmission line.

In a high electric field, it is theoretically possible for a spark discharge from the induced voltage on a large vehicle to ignite gasoline vapor during refueling. However, the probability for exactly the right conditions to occur is extremely remote. For the proposed line, the maximum electric field is low enough that it is very doubtful the right conditions could ever be achieved (BPA 1979; Basin undated).

Because of the hazards associated with fires, Western prohibits storage of flammables, construction of flammable structures, and other activities that have the potential to cause or provide fuel for fires on ROWs.

Transmission line structures, wires, and other tall objects are likely points to be hit by lightning during a thunderstorm. Therefore, the area near structures and other tall objects should be avoided during thunderstorms. The proposed line is designed with overhead ground-wires and well-grounded structures to protect the system from lightning by routing a strike to the earth.

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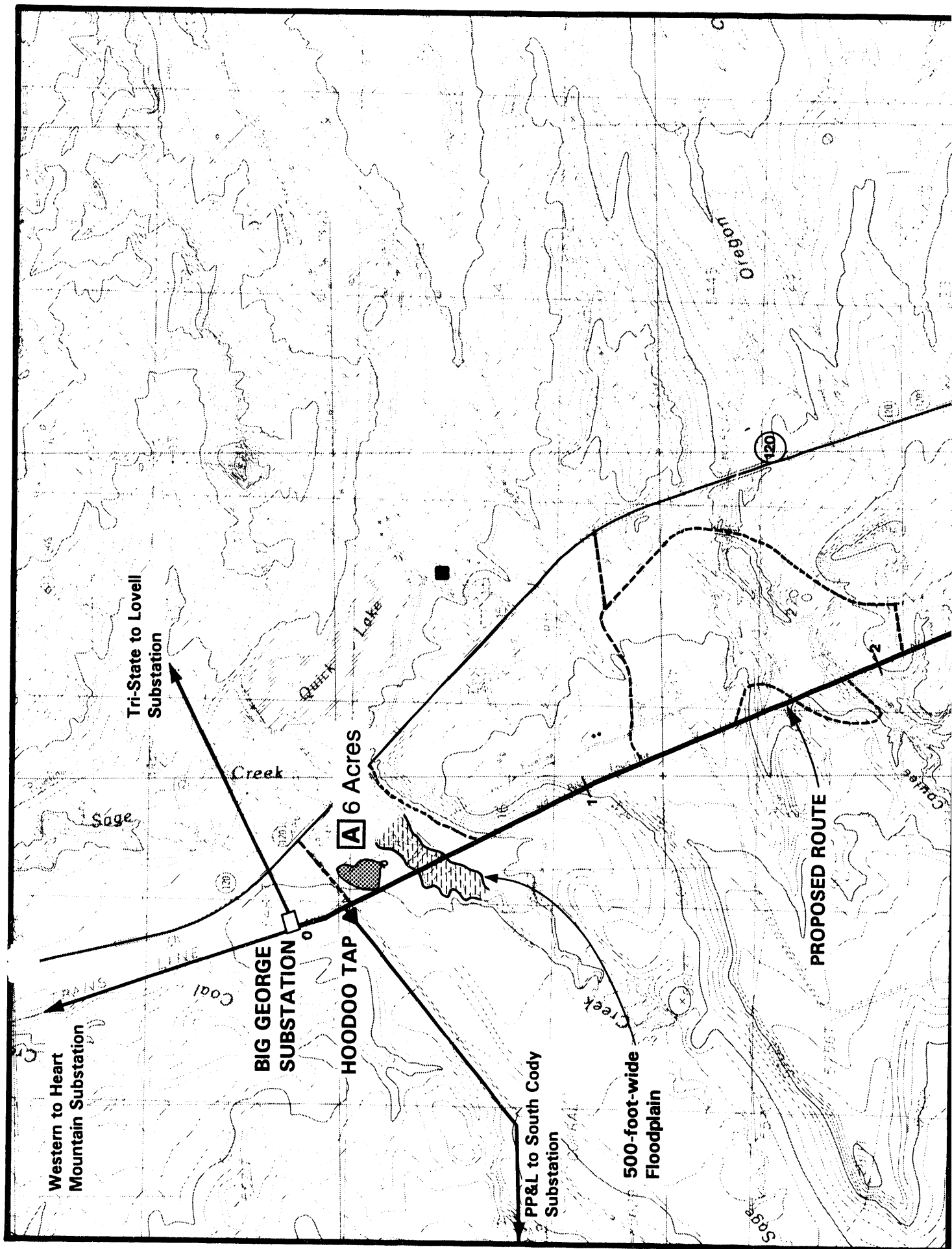
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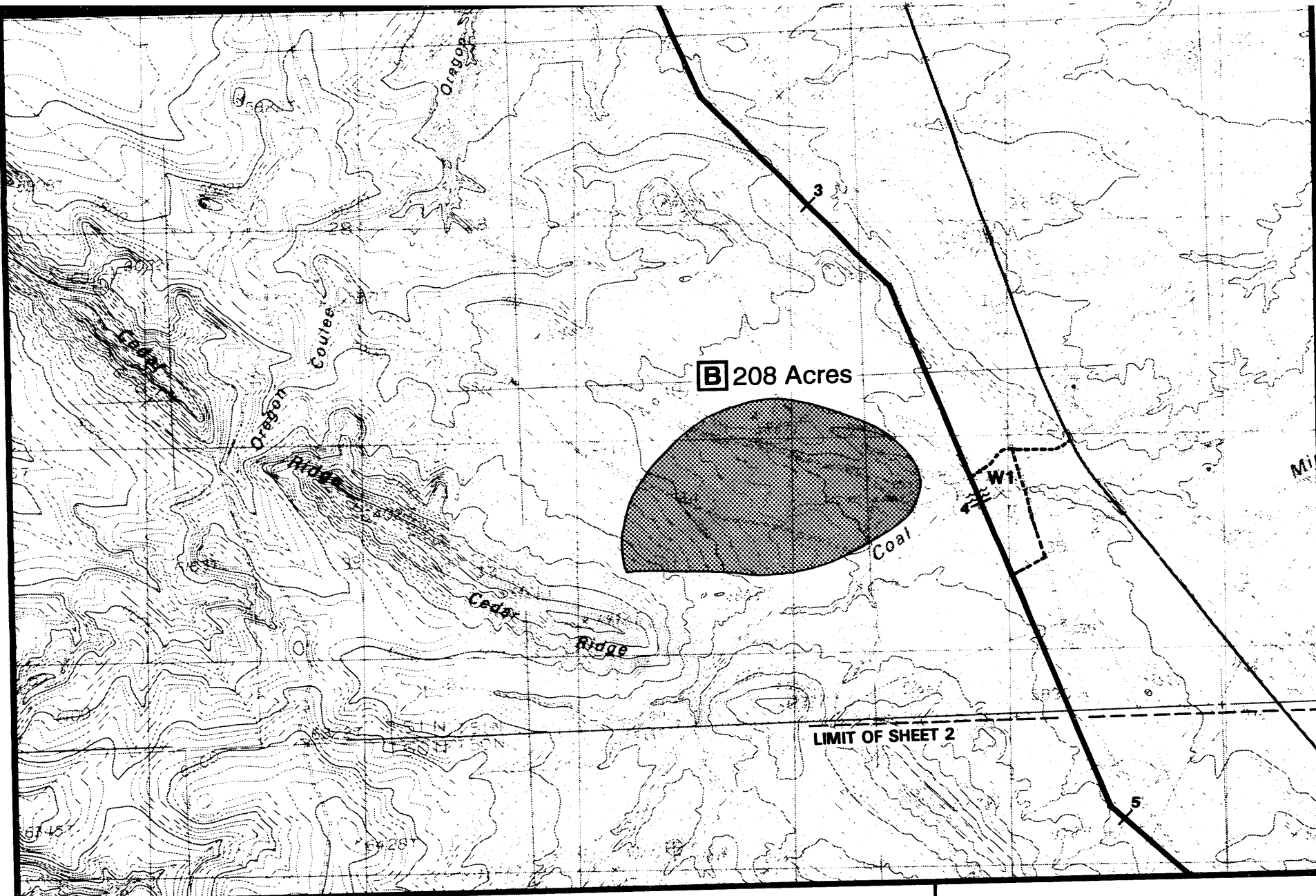
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LEGEND

—+— Proposed Route
5 Milepost

■ Residences

W1 Wetlands

Improved Pasture

Irrigated Cropland

■ Prairie Dog Colony

0 1000' 5000'
One Mile

----- Off-ROW Access Trails

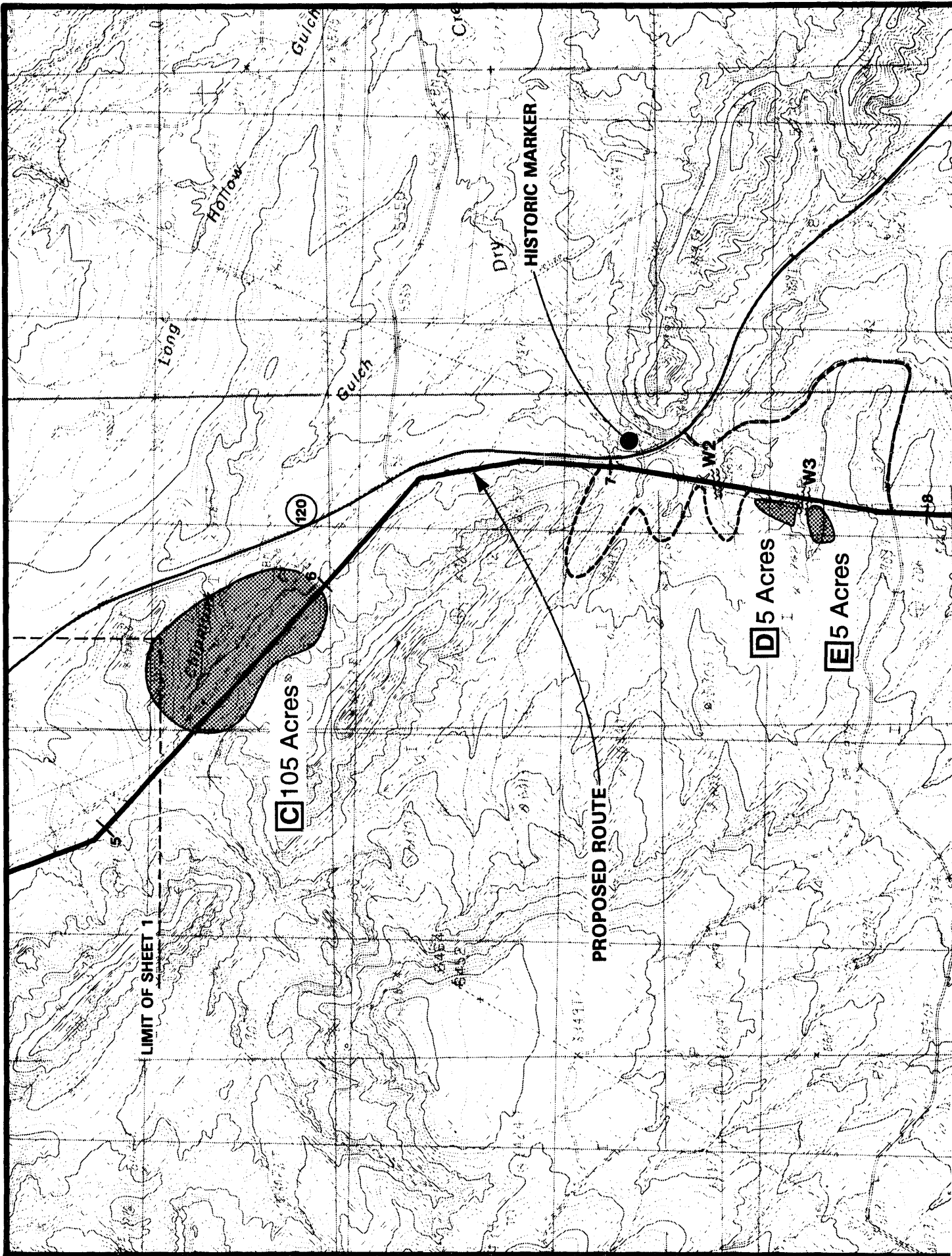
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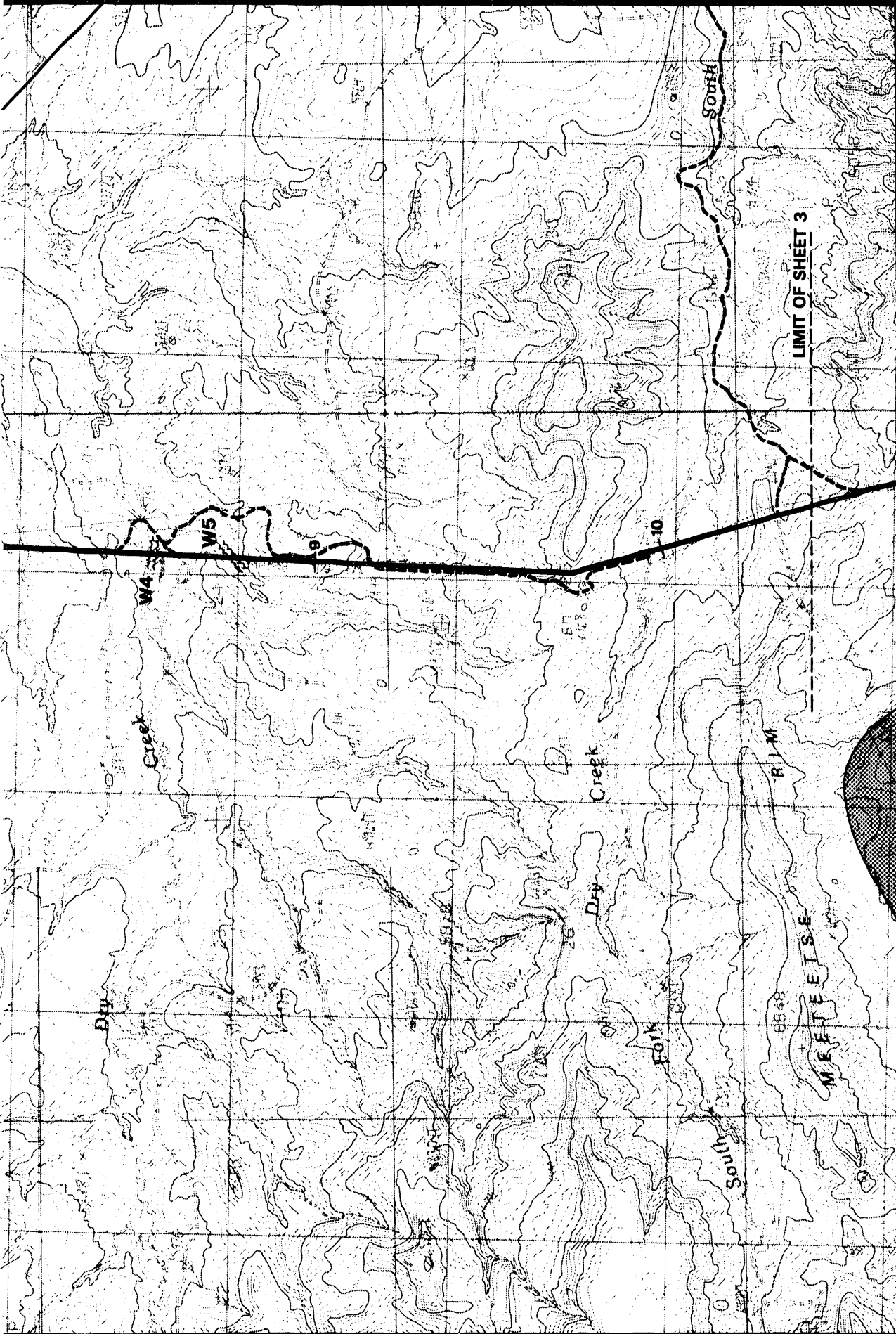


**Proposed Transmission Line
and Environmental Constraints**

Map 2-2

Sheet 1





LEGEND

- Proposed Route
- Milepost
- Residences

- W1 Wetlands
- Improved Pasture
- Irrigated Cropland
- Prairie Dog Colony

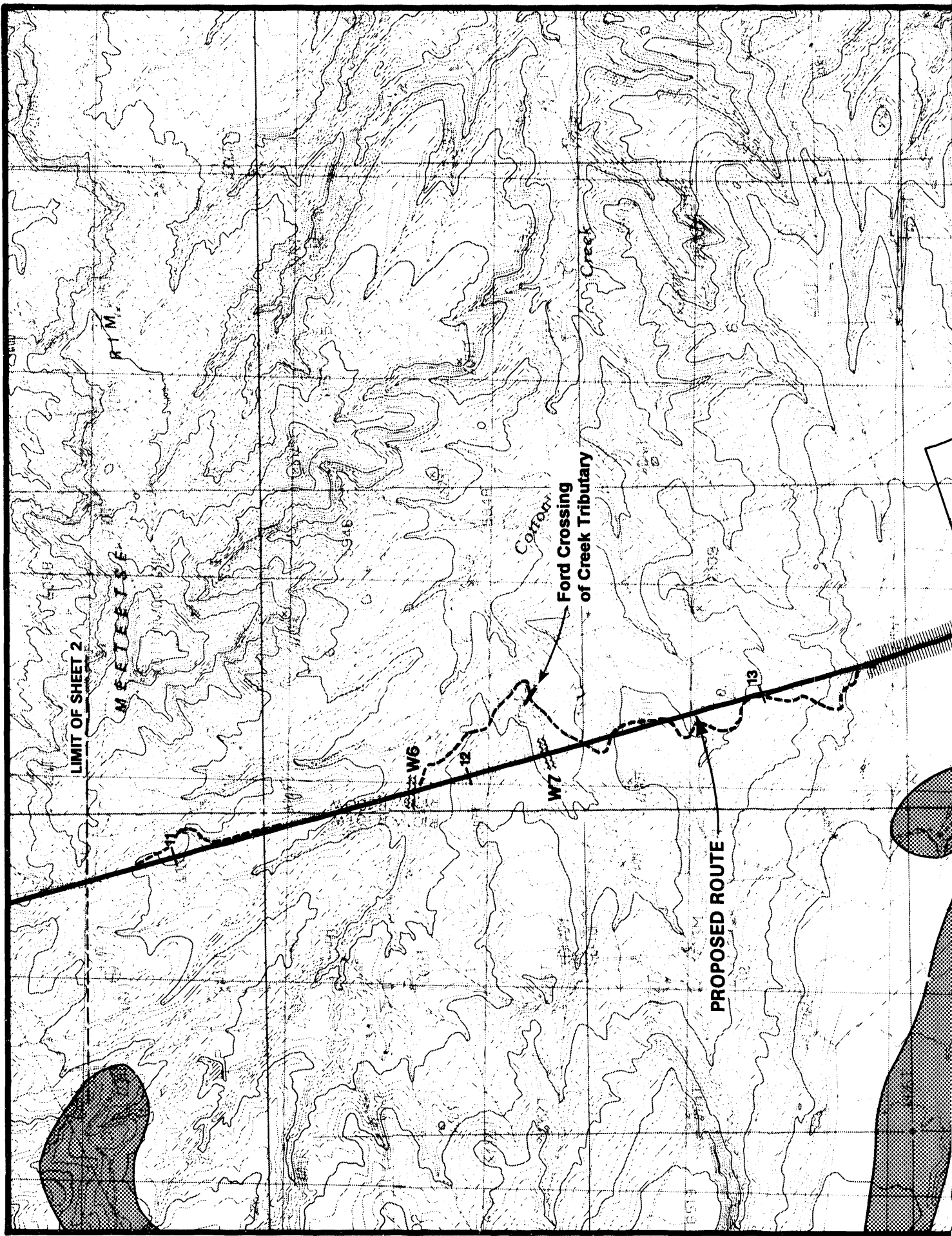


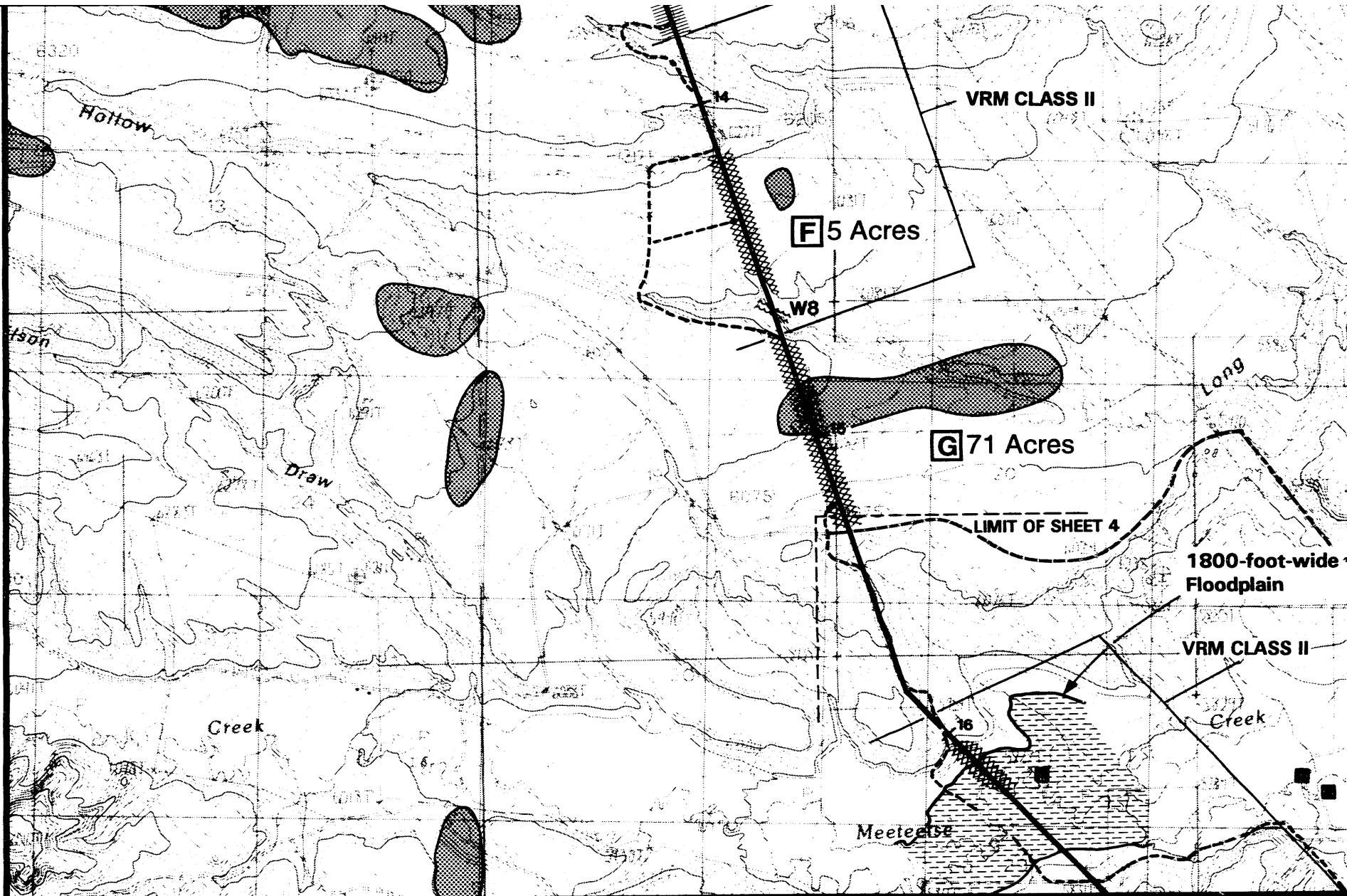
- Off-ROW Access Trails
- New Access Trail



**Proposed Transmission Line
and Environmental Constraints**

Map 2-2 Sheet 2





LEGEND

- Proposed Route
- Milepost
- Residences

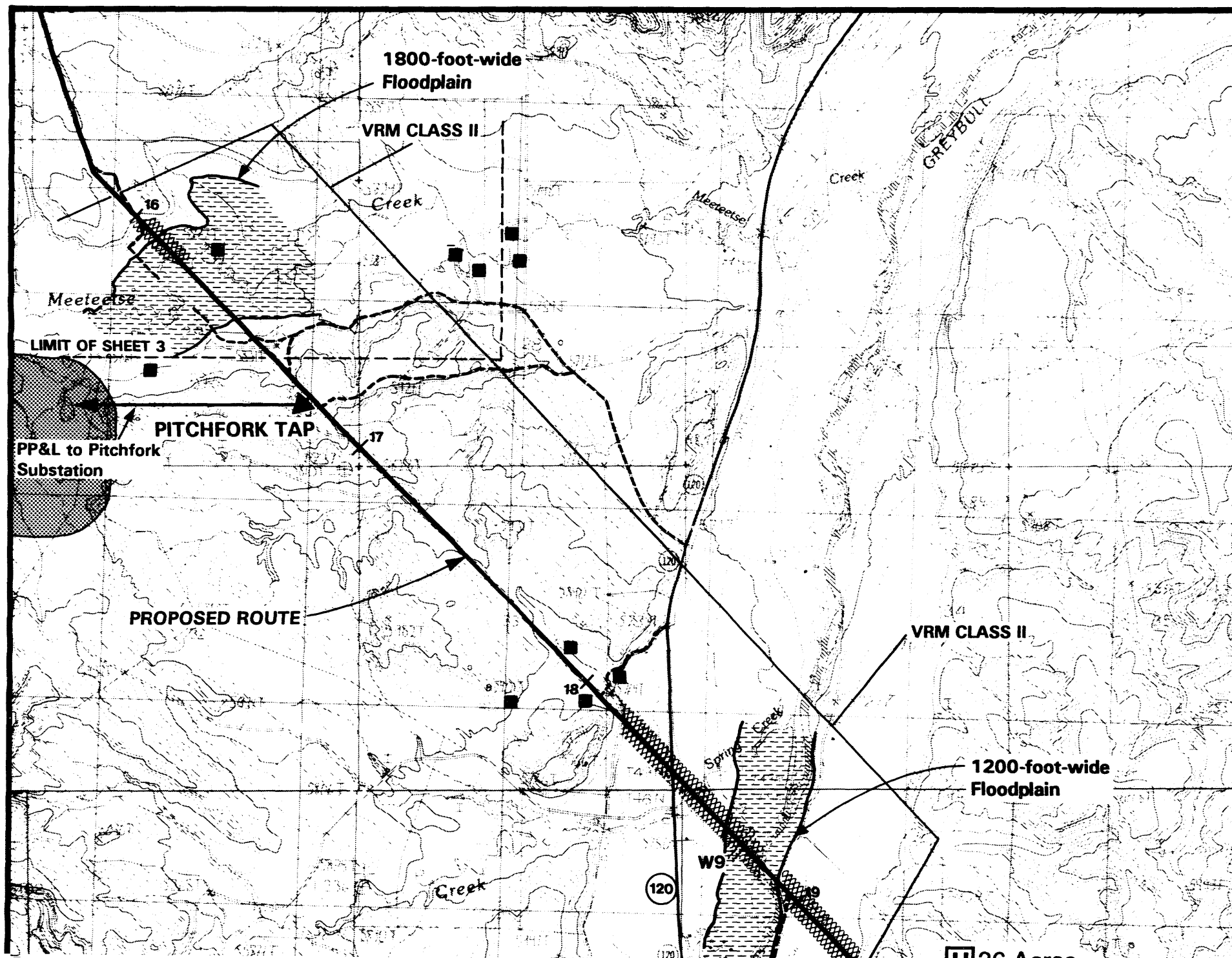
- W1 Wetlands
- Improved Pasture
- Irrigated Cropland
- Prairie Dog Colony

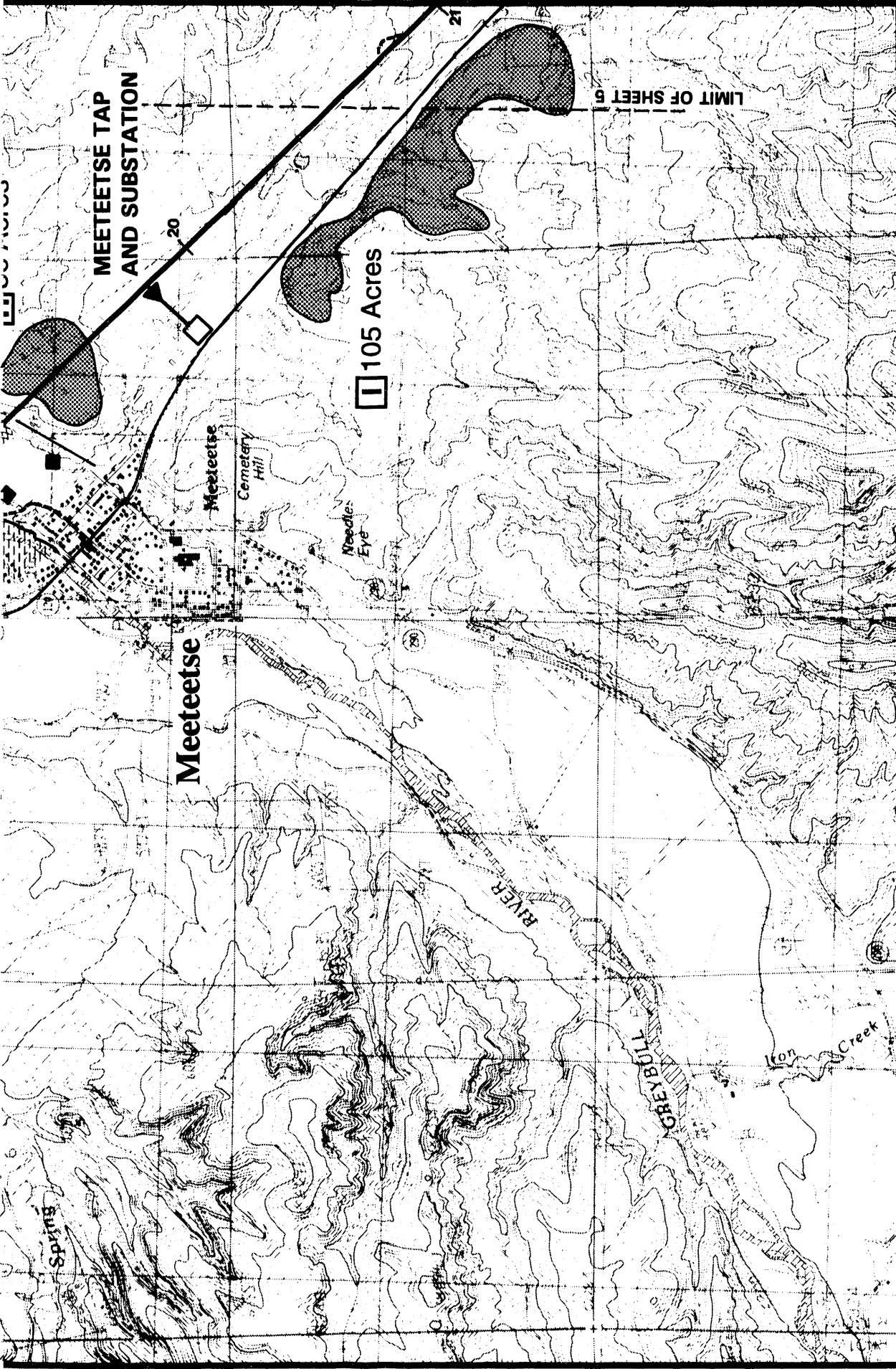
- Off-ROW Access Trails
 - New Access Trail
- 0 1000' 5000'
One Mile
- N

Proposed Transmission Line and Environmental Constraints

Map 2-2

Sheet 3





LEGEND

- Proposed Route
- Milepost
- Residences

- W1 Wetlands
- Improved Pasture
- Irrigated Cropland
- Prairie Dog Colony



- Off-ROW Access Trails
- New Access Trail

**Proposed Transmission Line
and Environmental Constraints**

Map 2-2 Sheet 4

LIMIT OF SHEET 5

1 105 Acres

MEETEETSE TAP
AND SUBSTATION

Meeteetse

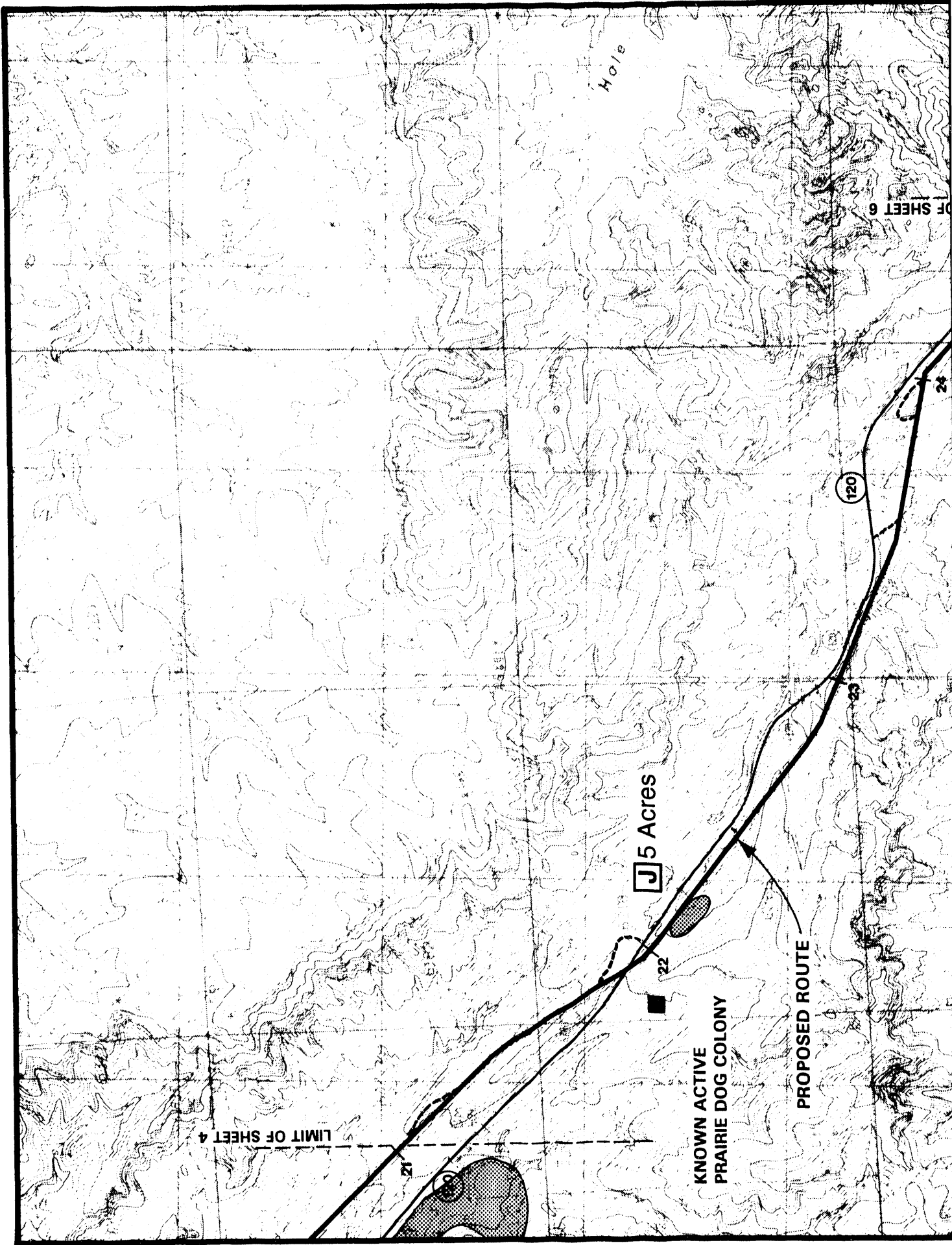
Meeteetse
Cemetery Hill

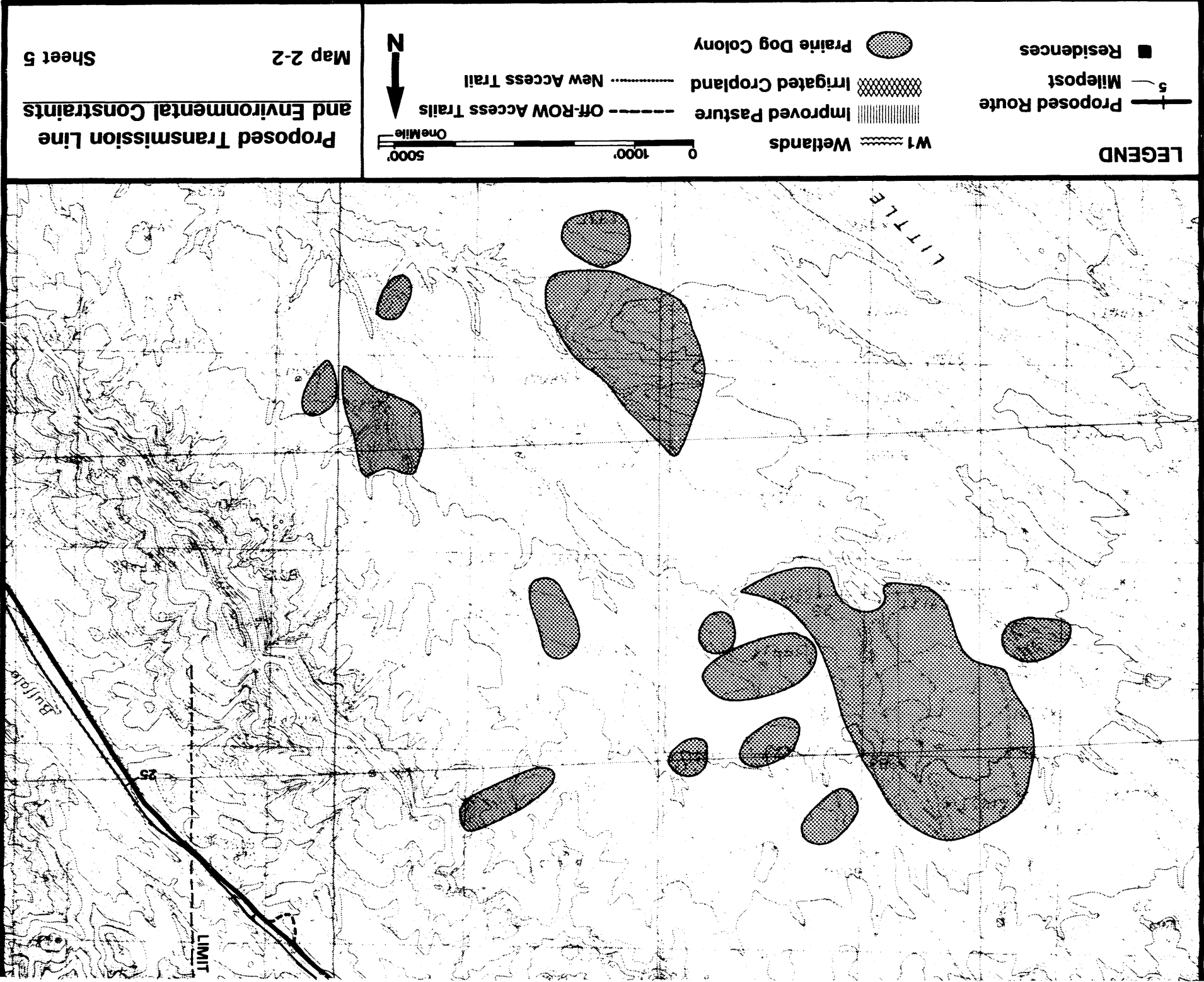
Needle
Eye

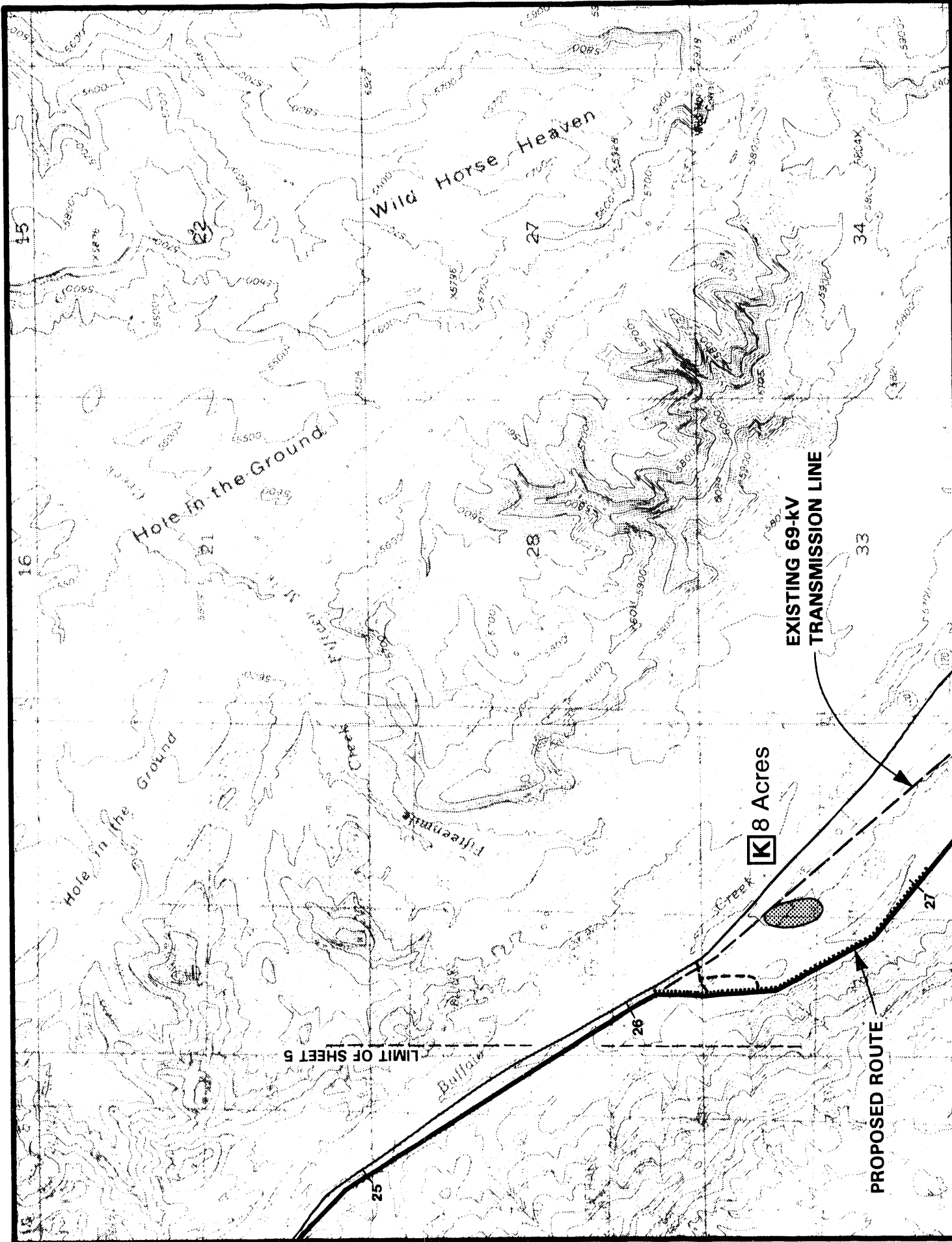
Spring

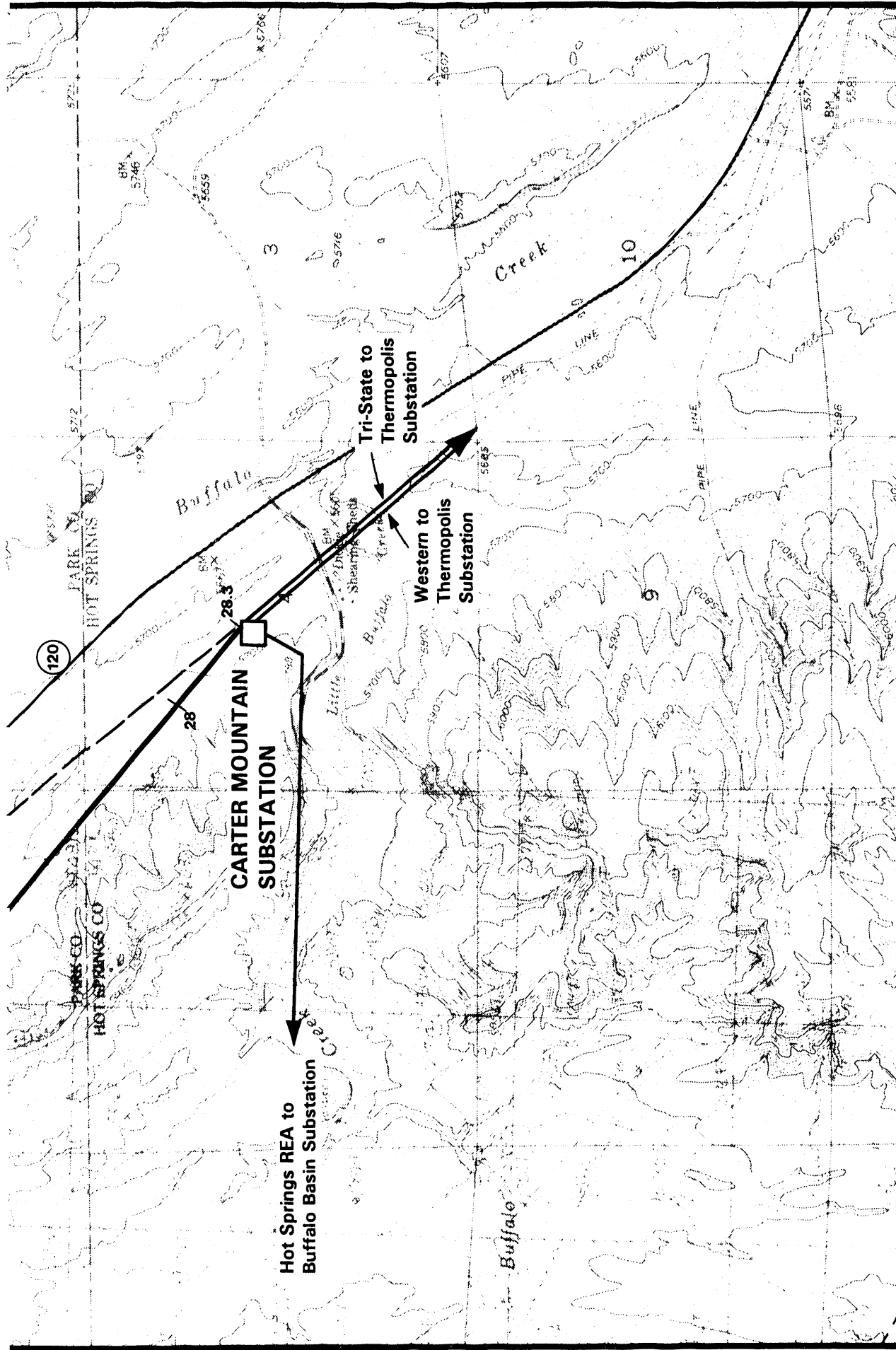
IRON
CREEK

IRON
CREEK









LEGEND

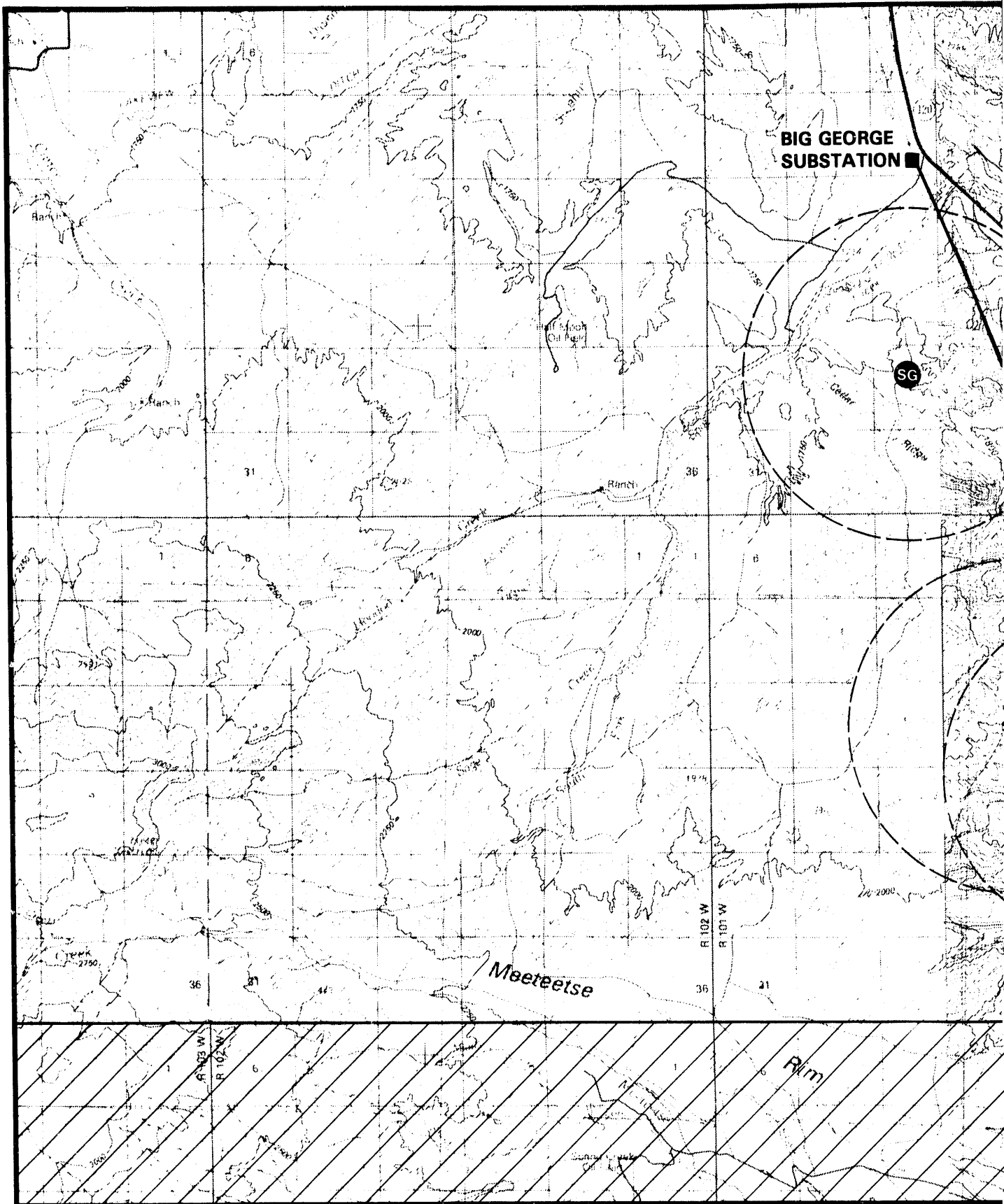
- Proposed Route
- Milepost
- Residences

- Wetlands
- Improved Pasture
- Irrigated Cropland
- Prairie Dog Colony
- Off-ROW Access Trails
- New Access Trail

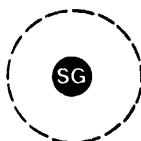


**Proposed Transmission Line
and Environmental Constraints**

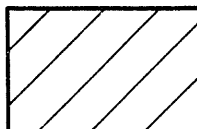
Map 2-2 Sheet 6



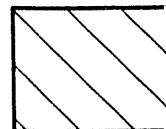
LEGEND

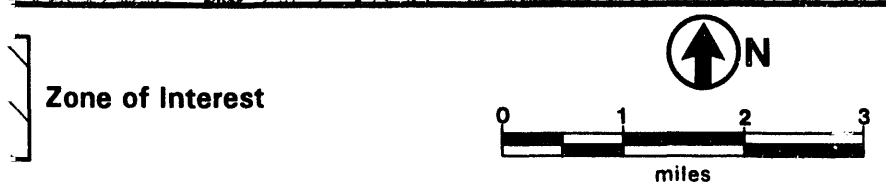
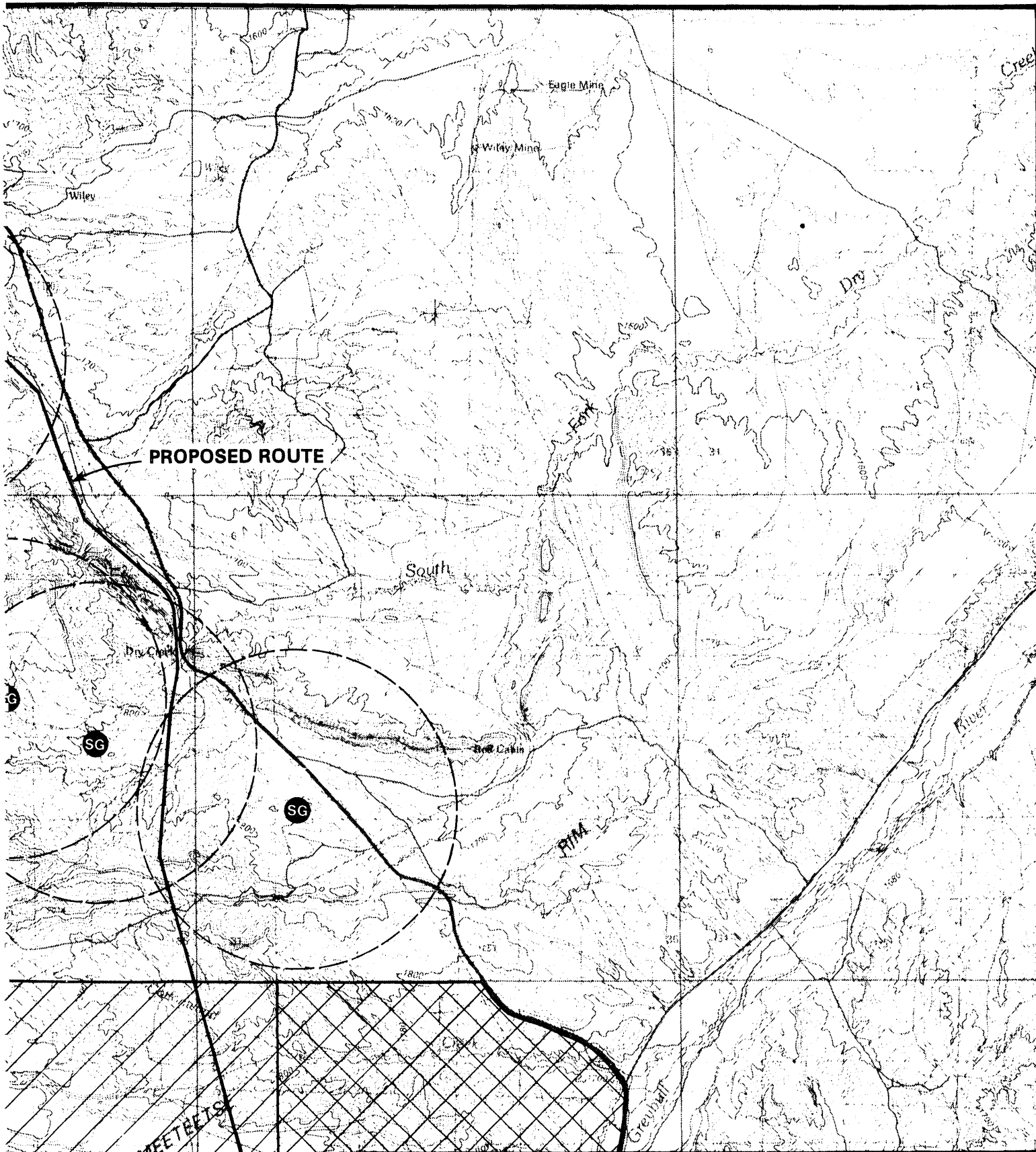


**Sage Grouse Lek and
Nest Area (2-mile radius)**



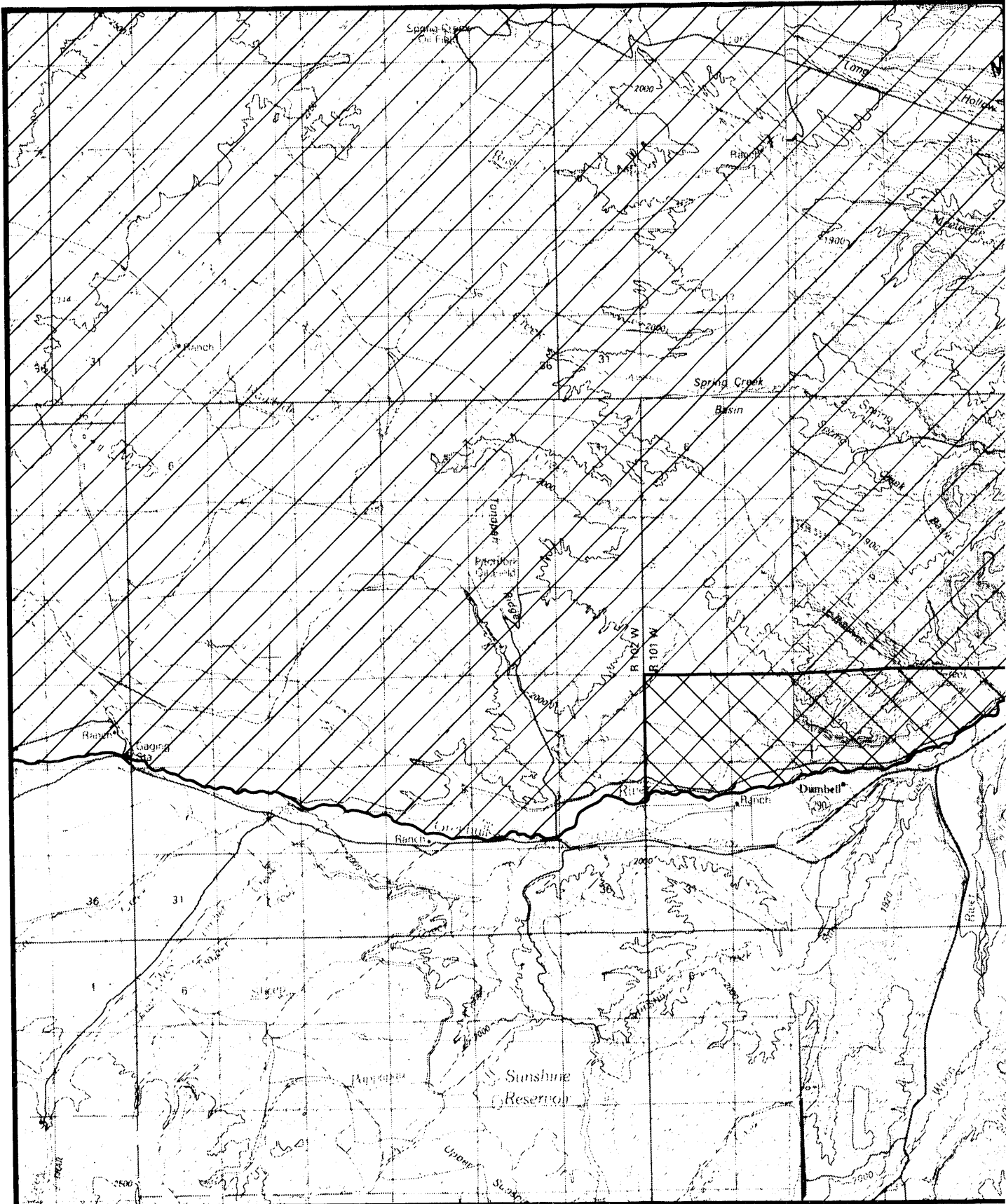
**Meeteetse Black-Footed
Ferret Management Area**



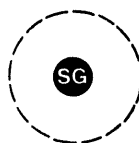


**Sage Grouse Leks and
Meeteetse Black-Footed
Ferret Management Area**

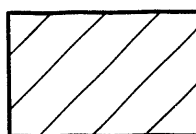
Map 3-2 **Sheet 1**



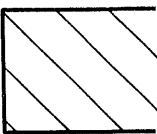
LEGEND

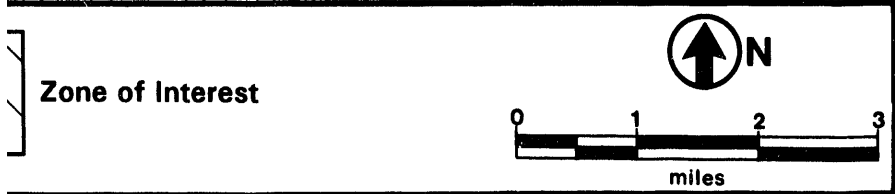
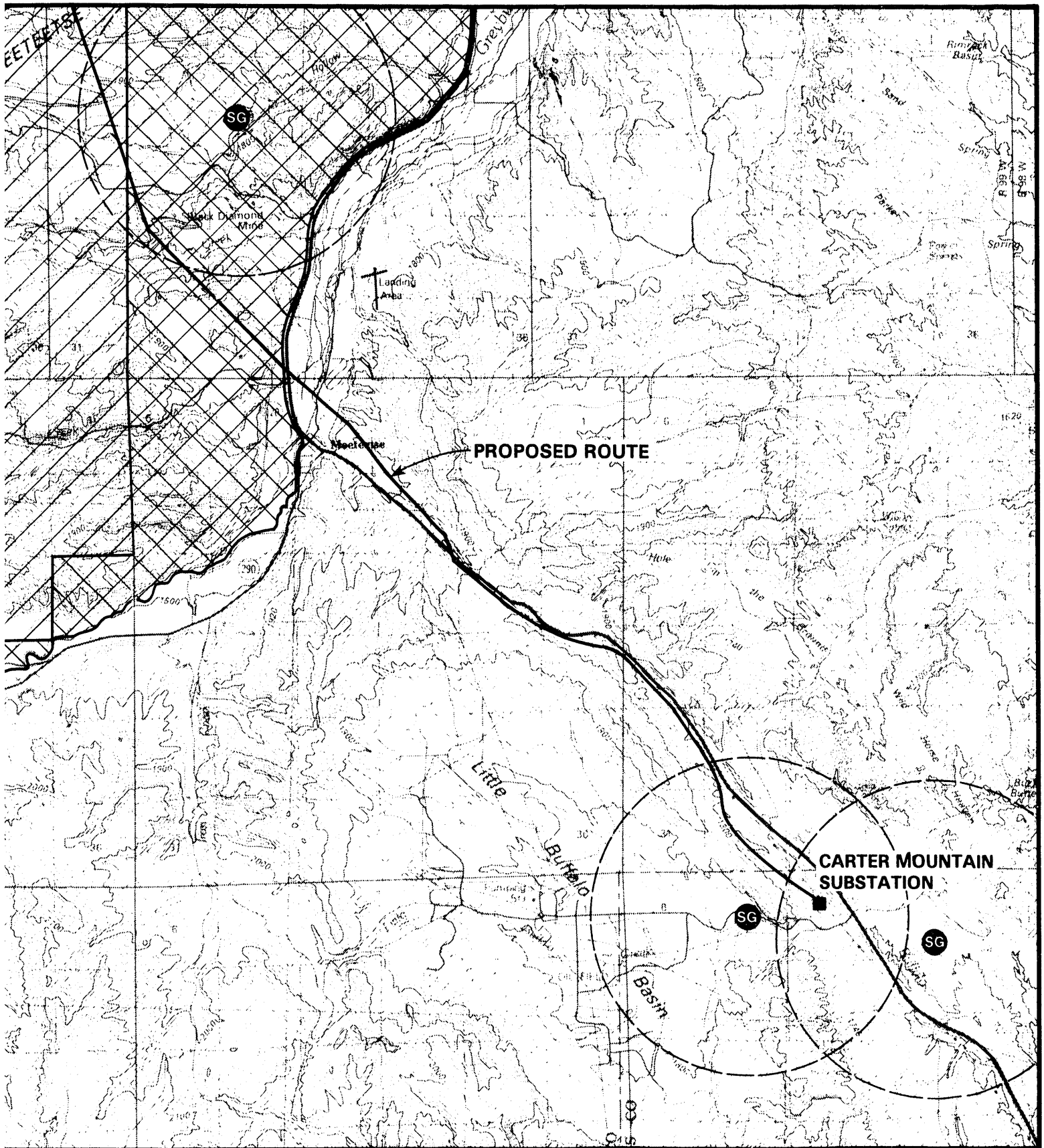


**Sage Grouse Lek and
Nest Area (2-mile radius)**



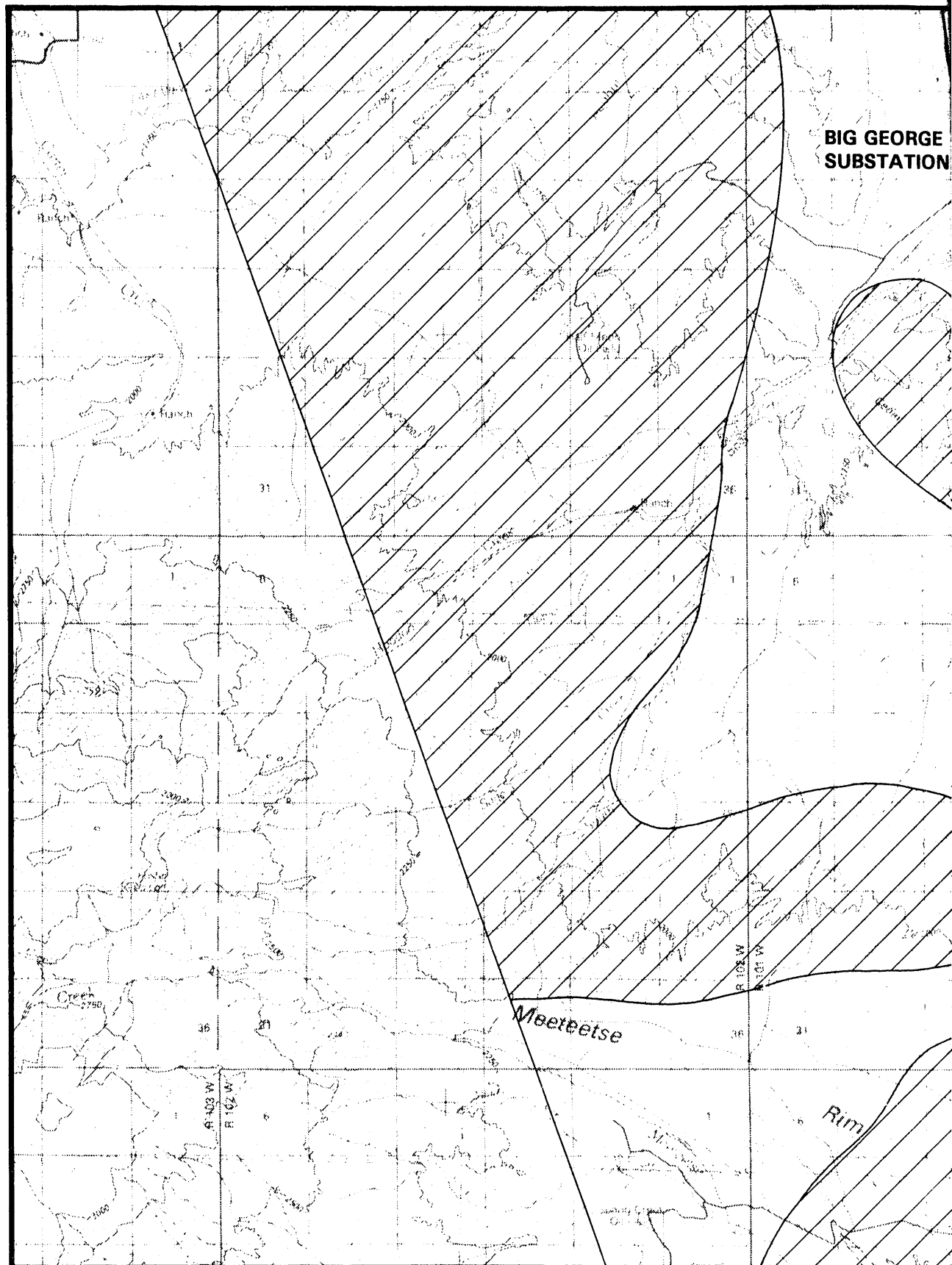
**Meeteetse Black-Footed
Ferret Management Area**



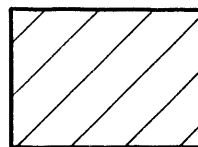


**Sage Grouse Leks and
Meeteetse Black-Footed
Ferret Management Area**

Map 3-2 **Sheet 2**



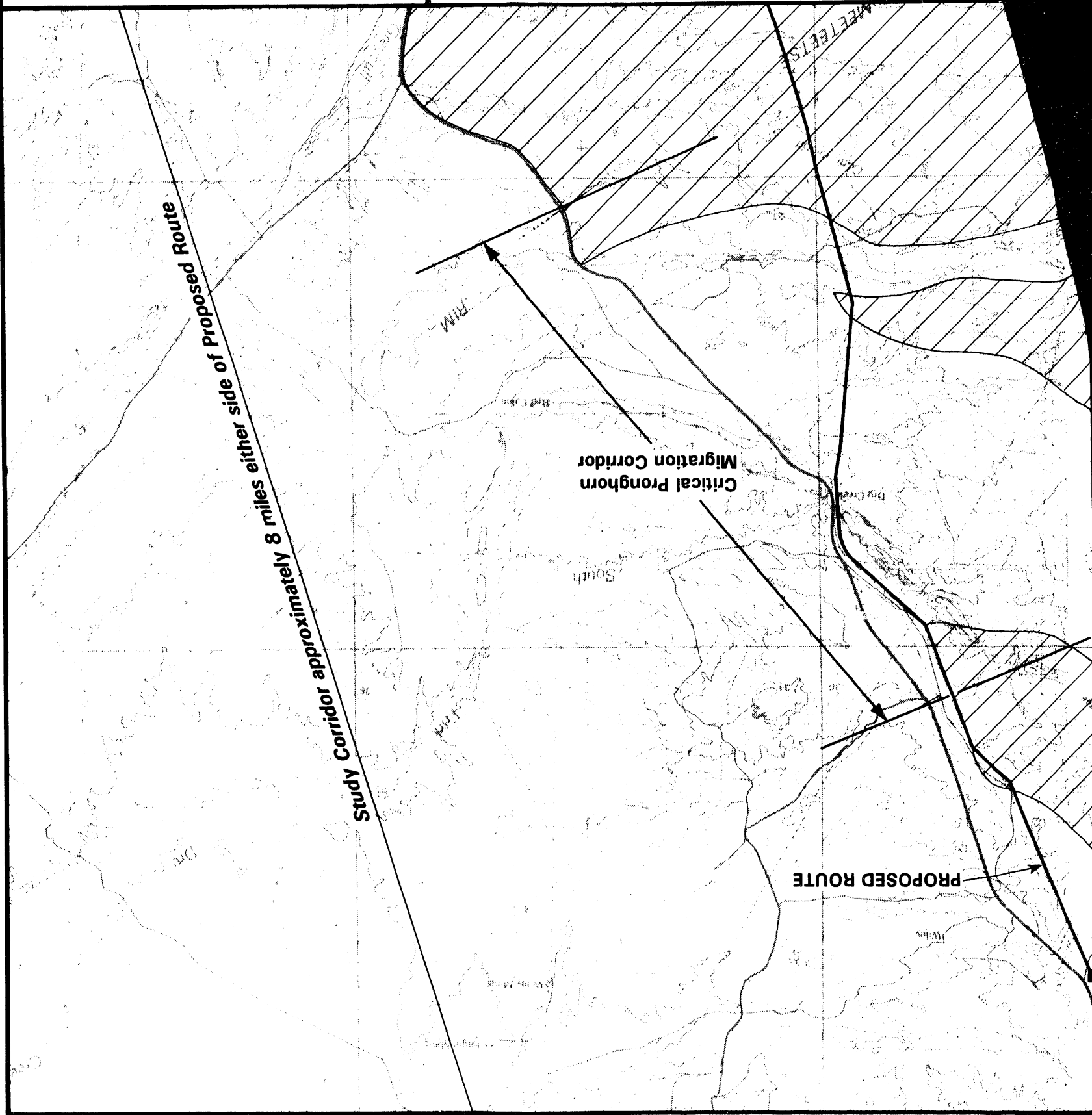
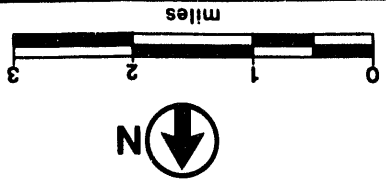
LEGEND

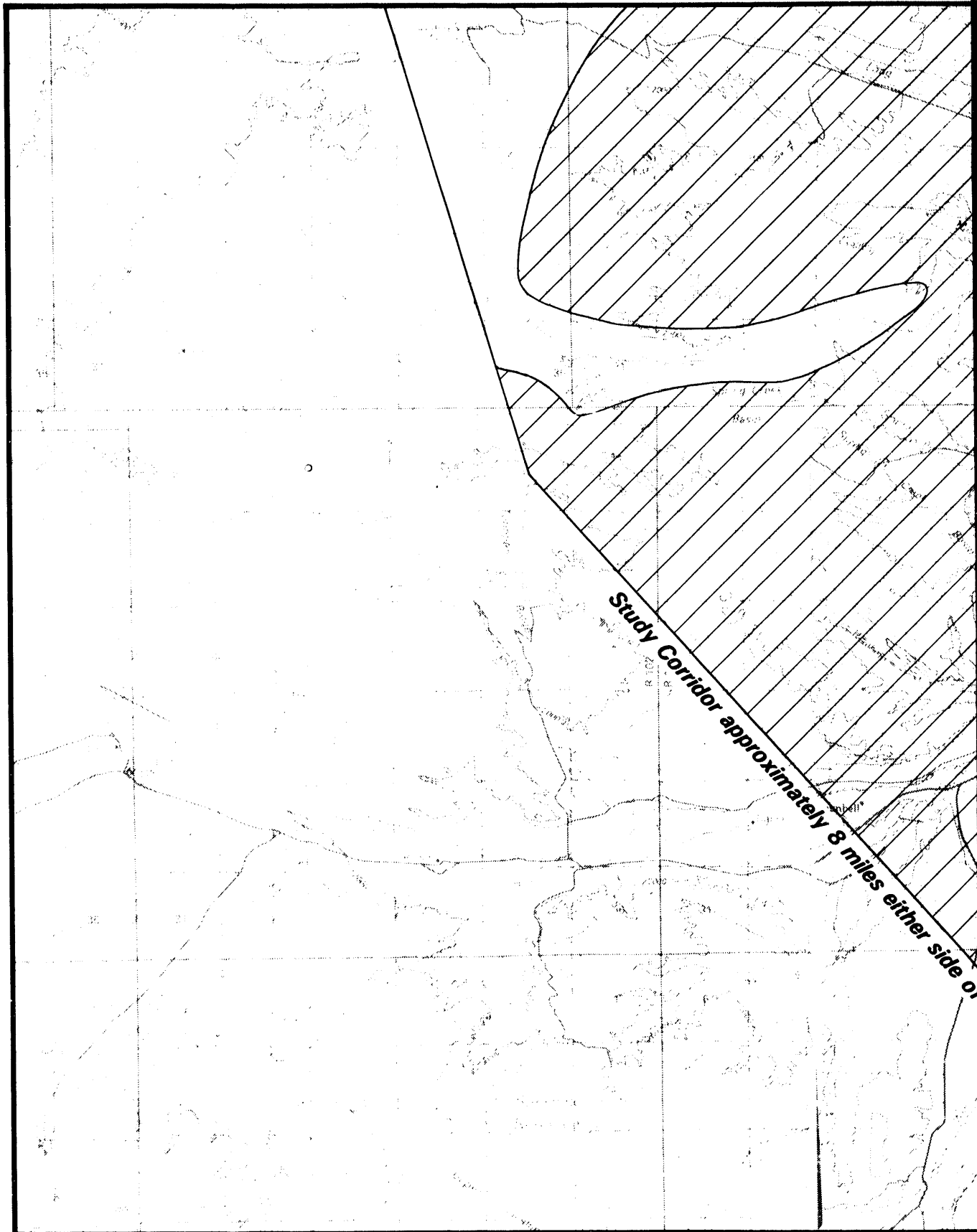


**Mule Deer Crucial
Winter-Yearlong Range**

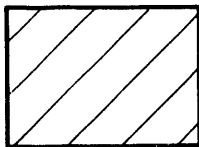


**Pronghorn Crucial
Winter Range**

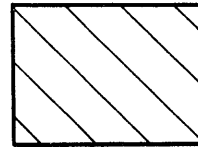




LEGEND

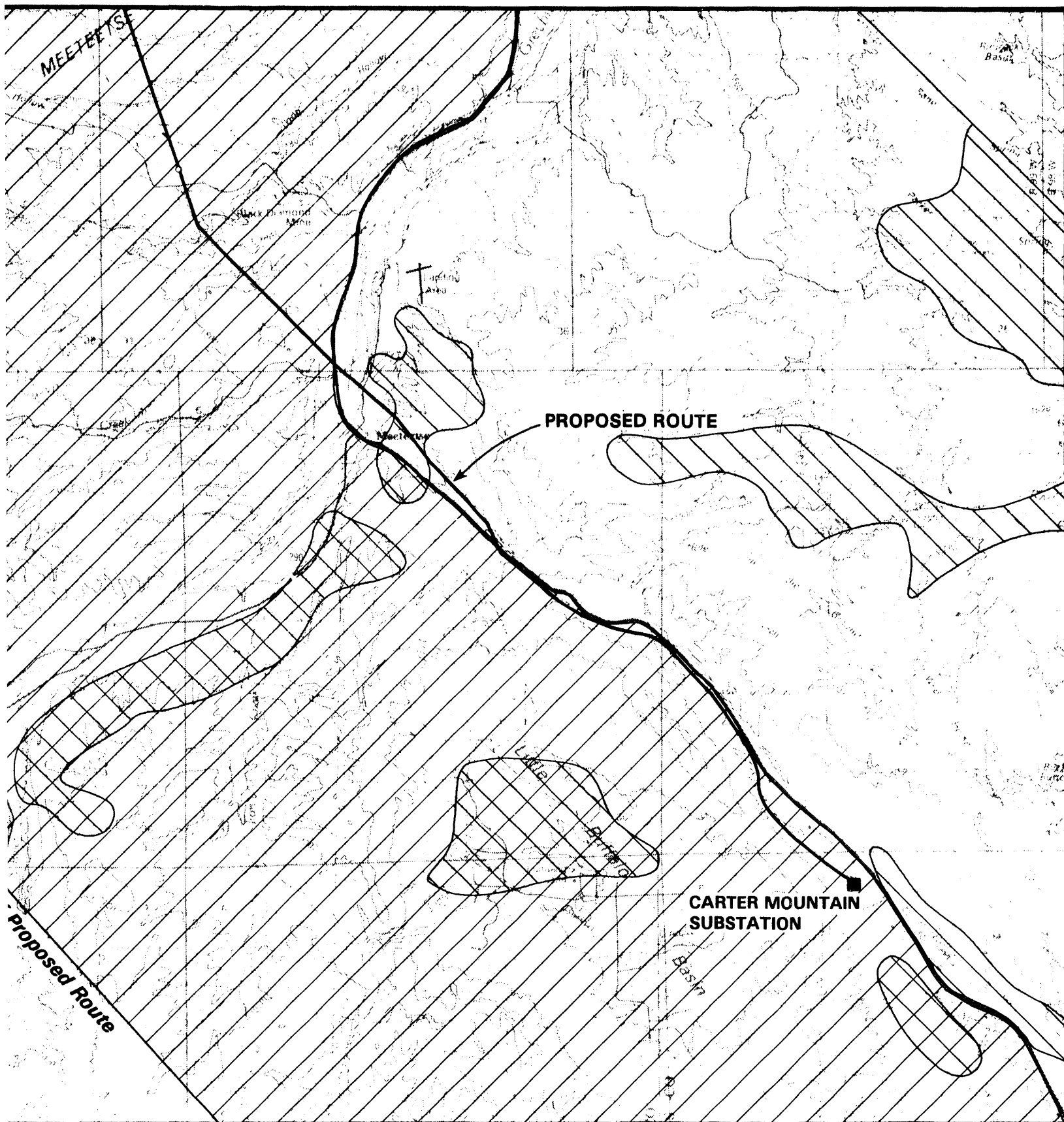


**Mule Deer Crucial
Winter-Yearlong Range**



**Pronghorn Crucial
Winter Range**





**Big Game Crucial Ranges and
Dry Creek Migration Corridor**

Map 3-3

Sheet 2

DATE

FILMED

8/23/94

END

