DRAFT
ENVIRONMENTAL IMPACT STATEMENT
FOR THE
BASIN ELECTRIC POWER COOPERATIVE
DRY FORK STATION AND HUGHES TRANSMISSION LINE

AUGUST 2007

Prepared For:

United States Department of Agriculture - Rural Utilities Service

USDA, RURAL DEVELOPMENT UTILITIES PROGRAMS
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COVER SHEET

Draft Environmental Impact Statement (EIS)
Basin Electric Power Cooperative, Inc. (BEPC)
Proposed Dry Fork Station and Hughes Transmission Line
Campbell and Sheridan Counties, Wyoming

Submitted by the U.S. Department of Agriculture, Rural Development (USDA/RD)

ABSTRACT: BEPC has applied for a loan from USDA/RD to construct electric generating facilities to meet its members' growing needs. The Proposed Action, which has been identified as the agency's Preferred Alternative, includes construction of a 385-megawatt net coal-fired power plant and related facilities. This Draft EIS considered 16 technology alternatives; several alternatives that did not include BEPC construction of a new baseload plant; adding capacity at an existing facility; and a number of siting alternatives as a means of responding to the project purpose and need. Alternatives were evaluated in terms of cost-effectiveness, technical feasibility, and environmental soundness. The Draft EIS analyzes in detail the Proposed Action (Dry Fork Station and related facilities) and an Alternative Action (Dry Fork Station and related facilities at a different location), the Proposed Action (corridor) and Alternative Action (corridor) for the Hughes Transmission Line, and the No Action Alternative. With design features and best management practices that would be incorporated into the Proposed Action to reduce or avoid impact, no significant adverse impacts are anticipated. Less than significant impacts of the Dry Fork Station Proposed Action include those on soils, water, air, vegetation, fisheries and wildlife, noise, transportation, wetlands, cultural and paleontological resources, solid and hazardous waste, land resources, vegetation, public health and safety, and socioeconomics. The Dry Fork Alternative Action would result in similar impacts, except for shorter duration transportation impacts and somewhat greater impacts to vegetation. The Hughes Transmission Line Proposed Action is expected to have less than significant impacts to soils, water, air, noise, vegetation, wetlands, fish and wildlife, land resources, recreation, visual resources, transportation, cultural and paleontological resources, solid and hazardous waste, public health and safety, and socioeconomics. Impacts are predicted to be similar for the Hughes Alternative Action, although the longer length of the alternative corridor would increase impacts slightly for air, land resources, and wildlife. Potential impacts to threatened, endangered, or sensitive species would be less than significant, but close consultation with the appropriate resource agencies will continue regarding these species. There would be no environmental justice impacts for any of the Dry Fork or Hughes alternatives.

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Comments must be received by October 15, 2007.

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ACRONYMS AND ABBREVIATIONS

ACC	Air Cooled Condenser
ACEC	Areas of Critical Environmental Concern
ADT	Average Daily Traffic
ANC	Acid Neutralization Capacity
APE	Areas of Potential Effect
APLIC	Avian Power Line Interaction Committee
AQ	Air Quality
AQRV	Air Quality Related Values
ATV	All-Terrain Vehicle
BA	Biological Assessment
BACT	Best Available Control Technology
BCF	Billion Cubic Feet
BFO	Buffalo Field Office
BFW	Boiler Feed Water
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BMP	Best Management Practice
BNSF	Burlington Northern Santa Fe Railway
BTS	Bureau of Transportation Statistics
Basin Electric	Basin Electric Power Cooperative
CAA	Clean Air Act
CAMR	Clean Air Mercury Rule
CAPS	Cooperative of Agricultural Pest Survey
CBM	Coal Bed Methane
CCB	Coal Combustion Byproducts
CCPW	Campbell County Public Works
CEMS	Continuous Emission Monitoring Systems
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFC	Chlorofluorocarbons
CDS	Circulating Dry Scrubber
CFB	Circulating Fluidized Bed
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CTG	Combustion Turbine Generator
CR	County Road
°C	Degree Centigrade
CWA	Clean Water Act
DOE	Department of Energy
Db	Decibel
Dba	Decibel A-Weighted
Dbμv/M	Decibel (Voltage Level) Referenced To 1 Microvolt per Meter
EC	Exposure Concentration

EIS	Environmental Impact Statement
EMF	Electromagnetic Field
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
ESA	Endangered Species Act
EU	European Union
°F	Degree Fahrenheit
FAA	Federal Aviation Administration
FGD	Flue Gas Desulphurization
FFB	Federal Financing Bank
Ft/Day	Feet per Day
Ft^2/Day	Square Feet per Day
FLM	Federal Land Managers
FLPMA	Federal Lands Policy and Management Act
FPPA	Farmland Protection Policy Act
GHG	Green House Gases
GIS	Geographic Information System
Gpm	Gallons per Minute
G&T	Generation and Transmission
GGS	Groton Generation Station
GPS	Global Positioning System
GRE	Green River Energy
HAP	Hazardous Air Pollutants
HCFC	Hydrochlorofluorocarbons
HRSG	Heat Recovery Steam Generation
HUD	U.S. Department Of Housing and Development
Hwy	Highway
I	Interstate
IGCC	Integrated Gasification Combined Cycle
IS	Integrated System
KOP	Key Observation Point
Kv	Kilovolt
Kw	Kilowatt
Kv/M	Kilovolt per Meter
Lbs	Pounds
Ldn	Day-Night Average Noise Level
Leq	Equivalent Noise Level
LQD	Land Quality Division
LOS	Level of Service
M/S^2	Meter per Square Second
M/S	Meter per Second
MACT	Maximum Achievable Control Technology
MAPP	Mid-Continent Area Power Pool
MBTA	Migratory Bird Treaty Act
Mg	Milligauss

MEC	Mid America Energy Company
MMBTU	Thousand British Thermal Units
MSW	Municipal Solid Waste
MLRA	Major Land Resource Area
Mph	Mile per Hour
MVA	Million Volt Amperes
MW	Megawatt
Mwh	Megawatt/Hour
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NDEX	North Dakota Export
NEPA	National Environmental Policy Act
NESC	National Electrical Safety Code
NESHAP	National Emissions Standard for Hazardous Pollutants
NG	Natural Gas
NGCC	Natural Gas Combined Cycle
NGSC	Natural Gas Simple Cycle
NHPA	National Historic Preservation Act
NOA	Notice of Availability
NOI	Notice of Intent
Nox	Nitrogen Oxide
NPDES	National Pollutant Discharge Elimination System
NPPD	Nebraska Public Power District
NPV	Net Present Value
NRCS	Natural Resources Conservation Service
NSP	Northern States Power Company
NSPS	New Source Performance Standard
NSS	Native Species Status
O_3	Ozone
O&M	Operations and Maintenance
OHGW	Overhead Ground Wire
OHV	Off-Highway Vehicle
OSHA	Occupational Safety and Health Administration
OTP	Otter Trail Power Company
Pb	Lead
PC	Pulverized Coal
PM	Particulate Matter
$PM_{2.5}$	PM Less than 2.5 Microns in Diameter
PM_{10}	PM Less than 10 Microns in Diameter
PRB	Powder River Basin
PSD	Prevention of Significant Deterioration
RFP	Request for Proposal
RICE	Reciprocating Internal Combustion Engine
RMP	Resource Management Plan / Risk Management Plan
ROD	Record of Decision
ROW	Right-Of-Way

RUS	Rural Utilities Service
SCR	Selective Catalytic Reduction
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SH	State Highway
SHPO	State Historic Preservation Office
SIL	Significant Impact Level
SMA	Special Management Area
SO_2	Sulfur Dioxide
SPCC	Spill Prevention, Control, and Countermeasures
SSS	Special Status Species
SSURGO	Soil Survey Geographic
STATSGO	State Soil Geographic
SWPPP	Storm Water Pollution Prevention Plan
TCP	Traditional Cultural Properties
TMDL	Total Maximum Daily Load
TPY	Tons per Year
UBC	Uniform Building Code
UN	United Nations
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	Volatile Organic Compound
VRM	Visual Resource Management
WAQS&R	Wyoming Air Quality Standard & Regulations
WDEQ	Wyoming Department of Environmental Quality
WEEC	Western Electricity Coordinating Council
WGFD	Wyoming Game and Fish Department
WNDD	Wyoming Natural Diversity Database
WS	Wyoming Statues
WSA	Wilderness Study Area
WSEO	Wyoming State Engineering Office
WSR	Wild and Scenic Rivers
WYDOT	Wyoming Department of Transportation
WYGAP	Wyoming Gap Analysis Project
WYGISC	Wyoming Geographic Information Science Center
YRB	Yellowstone River Basin

GLOSSARY

Abiotic: Non-living or non-biological; includes chemical and physical environments and processes.

Acoustic environment: The totality of noise within a given area.

Advisory Council on Historic Preservation (ACHP): An independent federal agency that promotes the preservation, enhancement, and productive use of our nation's historic resources, and advises the President and Congress on national historic preservation policy.

Aesthetic resources: See "Visual resources."

Airshed: A geographic area where air pollutants from sources "upstream," or within a discrete atmospheric area of flow, are present in the air. While watersheds are actual physical features of the landscape, airsheds are determined using mathematical models of atmospheric deposition.

Air quality: The characteristics of the ambient air (all locations accessible to the general public) as indicated by concentrations of the six air pollutants for which national standards have been established, and by measurement of visibility in mandatory Federal Class I areas.

Alluvium: Material transported and deposited on land by flowing water, such as clay, silt, and sand.

Alternatives analysis: What CEQ calls the "heart of the EIS;" the evaluation of the proposed action compared to all of the alternatives used to define the issues and provide a clear basis for choice among the options.

Alternative generation technologies: Technologies being developed to operate without the use of fossil fuels.

Ambient air: Any unconfined portion of the atmosphere: open air, surrounding air.

Annual load factor: The annual consumption divided by 365 days a year times 24 hours times the peak annual demand.

Anthropogenic: Of or caused by humans.

Aquifer: An underground layer of rock and sand that contains water.

Archaeology: The scientific study, interpretation, and reconstruction of past human cultures from an anthropological perspective based on the investigation of surviving physical evidence of human activity and the reconstruction of related past environments.

Archaeological resources: Any material of human life or activities that is at least 100 years old, and that is of archaeological interest.

Area of Potential Effect (APE): Geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist. The area of potential effects is influenced by the scale and nature of the undertaking and may be different for different kinds of effects caused by the undertaking.

Attainment area: An area considered to have air quality as good as or better than the National Ambient Air Quality Standards as defined in the Clean Air Act. An area may be an attainment area for one pollutant and a non-attainment area for others.

Average Daily Traffic (ADT): Daily number of vehicular movements (e.g., passenger vehicles, buses, and trucks) in both directions on a segment of roadway, averaged over a period less than a year.

Background zone: A term used in the Bureau of Land Management VRM; includes visible areas beyond the foreground-middleground zone but usually less than 15 miles (24 km) away.

Baghouse: An enclosed air pollution control technology structure in a power plant that uses filter bags to help remove sulfur dioxide, fly ash, and other particulates from flue and other exhaust gases

Base load: The minimum demands of electricity on a power station over a given period of time; the amount of electricity required to operate a plant continuously, day and night, all year long.

Berm: A curb, ledge, wall or mound used to contain water, separate materials, and/or prevent the spread of contaminants.

Best Available Control Technology (BACT): is an emission limitation based on the maximum degree of reduction for each regulated air pollutant emitted from or that results from any new or modified stationary source. BACT is the emission rates that are achievable for a source or modification, determined on a case-by-case basis and taking into account energy, environmental and economic impacts, and other costs.

Best management practices (BMPs): Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from non-point sources, including construction sites.

Binary cycle power plant: A system where the water or steam from the geothermal reservoir never comes into contact with the turbine or generator unit.

Bioaccumulation/biomagnification: The collection or amplification of a substance in a biological system; the increase in tissue concentration of bioaccumulated chemical as the chemical passes up through two or more trophic levels.

Biogas: Gas, typically rich in methane, that is produced by the fermentation of organic matter such as manure under anaerobic conditions.

Blowdown: Removal of liquids or solids from a process, a storage vessel, or an evaporative system by the use of pressure to reduce mineral concentration that can cause scaling.

Burlington Northern and Santa Fe (BNSF) Railway: Headquartered in Fort Worth, Texas, BNSF is one of the largest railroad networks in North America. It was formed in 1996 when the Atchison, Topeka and Santa Fe Railway was merged into the Burlington Northern Railroad.

CALPUFF: An advanced, integrated Gaussian puff modeling system for the simulation of atmospheric pollution dispersion distributed by the Atmospheric Studies Group at TRC Solutions.

Circulated fluidized-bed: Comprised of closed circuit or loop cooling system for the fluidized-bed combustor through which is circulated liquid metal.^The cooling system includes, in the bed of the fluidized-bed combustor, a first heat exchanger by which the liquid metal absorbs heat from the bed and a second heat exchanger by which heated liquid metal is passed in indirect heat exchange with compressed air to heat the latter, the heated compressed air being mixed with the combustion products discharged from the fluidized-bed combustor at a point upstream from the gas turbines.

Coal bed methane (CBM): The primary energy source of natural gas is a substance called methane (CH_4). Coal bed methane is simply methane found in coal seams. It is produced by non-traditional means, and therefore, while it is sold and used the same as traditional natural gas, its production is very different. CBM is generated either from a biological process as a result of microbial action or from a thermal process as a result of increasing heat with depth of the coal. Often a coal seam is saturated with water, with methane is held in the coal by water pressure. Currently, natural gas from coal beds accounts for approximately 7% of total natural gas production in the United States

Coal Combustion By-Products (CCBs): Generated when coal is used to generate electricity and power industrial processes. Tens of millions of tons of these materials are produced each year. Many uses of these byproducts are possible, but currently most of them wind up in landfills.

Coal Combustion Product (CCP): Large-volume, non-hazardous waste products resulting from combustion of coal at power plants; CCPs that are disposed of in landfills, surface impoundments, or used as mine backfill, are regulated under subtitle D of the Resource Conservation and Recovery Act, and are thus subject to significantly stricter federal regulation than reused CCPs.

Combustion: Burning. Many important pollutants, such as sulfur dioxide, nitrogen oxides, and particulates (PM-10) are combustion products, often products of the burning of fuels such as coal, oil, gas and wood.

Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS): Contains information on hazardous waste sites, potentially hazardous waste sites, and remedial activities across the nation, including existing and potential NPL sites.

Contamination: Introduction into water, air, and soil of microorganisms, chemicals, toxic substances, wastes, or wastewater in a concentration that makes the medium unfit for its next intended use.

Continental divide: The line of high ground that separates the oceanic drainage basins of a continent; the river systems of a continent on opposite sides of a continent divide flow toward different oceans.

Criteria air pollutants: A group of y common air pollutants regulated by EPA on the basis of criteria (information on health and/or environmental effects of pollution) and for which NAAQS have been established. In general, criteria air pollutants are widely distributed over the country. They are: particulate matter (PM), carbon monoxide (CO), sulfur dioxide (SO2), ozone (O), and lead (Pb).

Cultural resources: Any building, site, district, structure, object, data, or other material significant in history, architecture, archeology, or culture. Cultural resources include: historic properties as defined in the National Historic Preservation Act (NHPA), cultural items as defined in the Native American Graves Protection and Repatriation Act (NAGPRA), archeological resources as defined in the Archeological Resources Protection Act (ARPA), sacred sites as defined in Executive Order 13007, *Protection and Accommodation of Access To "Indian Sacred Sites,"* to which access is provided under the American Indian Religious Freedom Act (AIRFA), and collections.

Cumulative impacts: Impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Effects resulting from individually minor but collectively significant actions taking place over a period of time.

Decibel (dB): The unit of measurement of sound level calculated by taking ten times the common logarithm of the ratio of the magnitude of the particular sound pressure to the standard reference sound pressure of 20 micropascals and its derivatives.

dBA (A-weighted Decibel): The A-scale sound level is a quantity, in decibels, read from standard sound-level meter with A-weighting circuitry. The A-scale weighting discriminates against the lower frequencies according to a relationship approximating the auditory sensitivity of the human ear. The A-scale sound level measures approximately the relative "noisiness" or "annoyance" of many common sounds.

Dissolved Oxygen: An amount of oxygen dispersed in water, usually expressed as mg/L; DO sustains the lives of fish and other aquatic organisms; cold and flowing water usually contains more DO than warm, stagnant water.

Distribution cooperatives: Companies that provide retail electricity.

Dry-cooled system: Electrical systems that use air to cool them rather than by other means.

East transmission system: The Eastern Interconnected System**,** consisting of the eastern two-thirds of the United States.

EIS: Environmental Impact Statement.

Electric generation, **Gross generation:** The total amount of electric energy produced by generating units and measured at the generating terminal in kilowatt hours (kWh) or megawatt hours (MWh). And: **Net generation:** The amount of gross generation less the electrical energy consumed at the generating station(s) for station service or auxiliaries. *Note*: Electricity required for pumping at pumped-storage plants is regarded as electricity for station service and is deducted from gross generation

Electric load: The combined electrical needs of all units in a system.

Electrical Reliability Council: An oversight group in charge of regulating the use of electrical energy.

Endangered species: A species that is threatened with extinction throughout all or a significant portion of its range.

Environment: The total surroundings of an organism, including both non-living (abiotic) and living (biotic) components, that is, other plants and animals as well as those of its own kind.

Environmental Assessment: A concise public document which serves to briefly provide sufficient evidence and analysis for determining whether to prepare an EIS or a Finding of No Significant Impact (FONSI) in compliance with NEPA.

Environmental Site Assessment (ESA): Provides a good general indication of the past and existing conditions on a site that could indicate a recognized environment condition (i.e. contamination).

Farmland Protection Policy Act (FPPA): A federal law that aims to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to non-agricultural uses. It assures that, to the extent possible, federal programs are administered to be compatible with state, local, and private programs and policies to protect farmland.

Federal Aviation Administration (FAA): Federal agency primarily responsible for the advancement, safety and regulation of civil aviation in the United States.

Footprint (ecological): A measure of how much land and water is needed to produce the resources that humans consume and to dispose of the waste that humans produce.

Foreground-middleground zone: A term used in the Bureau of Land Management VRM; includes areas seen from highways, rivers, or other viewing locations which are less than 3-5 miles (5-8 km) away.

Flue gas: The air coming out of a chimney after combustion; it can include nitrogen oxides, carbon oxides, water vapor, sulfur oxides, particles and many chemical pollutants.

Flue gas desulfurization (FGD): Removes PM and SO_2 by producing contact between the exhaust gas and a scrubbing slurry (generally limestone). Mounted horizontal plates facilitate the transport of the slurry, whose contact with the exhaust gas forms a wet mixture of calcium sulfite and sulfate.

Fugitive dust: Particles lifted into the ambient air due to man-made and natural activities such as the movement of soil, vehicles, equipment, blasting, and wind. This excludes particulate matter emitted directly from the exhaust of motor vehicles and other internal combustion engines.

Fly ash: Non-combustible residual particles expelled by flue gas.

Fly Ash monofil: The finely divided residue that results from the combustion of ground or powdered coal and is removed from the stack gasses with various types of air quality control equipment. Fly ash is a pozzolan: a siliceous material which, in the presence of water, will chemically combine with lime (calcium oxide) to produce a cementitious material with excellent structural properties. Some fly ashes contain sufficient calcium compounds to be self- hardening, while others require the addition of calcium (usually in the form of cement or lime) to harden. There are two main types of fly ash: Class F (low lime) and Class C (high lime). Class F fly ash is typically associated with eastern and midwestern U.S. coals and Class C is associated with western U.S. coals. High quality conventional fly ash will contain very little sulfate compounds or unburned carbon.

Gasification: A method for exploiting poor-quality coal and thin coal seams by burning the coal in place to produce combustible gas that can be collected and burned to generate power or processed into chemicals and fuels.

Generating capacity: The total amount of electrical power that a utility can produce at any one time, usually measured in megawatts; three types generating capacity include a base load, an intermediate load, and a peaking capacity.

Geothermal resources: Internal heat of the earth when used as a source of energy, it is usually contained in underground reservoirs of steam, hot water, and hot dry rocks.

Groundwater: Water in the porous rocks and soils of the earth's crust; a gratuitous proportion of the total supply of fresh water.

Habitat: A place where particular plants or animals occur or could occur.

Hazardous substances: Solid or liquid materials, which may cause or contribute to mortality or serious illness by virtue of physical and chemical characteristics, or pose a hazard to human health or the environment when improperly managed, disposed of, treated, stored, or transported.

Hazardous waste: A waste or combination of wastes which, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may either cause, or significantly contribute to an increase in mortality or an increase in serious, irreversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Haze: An atmospheric aerosol of sufficient concentration to be visible. The particles are too small to see individually, but reduce visual range by scattering light

Heavy metals: Metallic elements like mercury, lead, cadmium, arsenic, copper and zinc that can be harmful pollutants when they enter air, soil, and water.

Historic Landmark: Significant historic places designated by federal, state, or local officials because they possess exceptional value or quality in illustrating or interpreting the heritage of the United States

Historic Property: As defined by the NHPA, a historic property or historic resource is any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP), including any artifacts, records, and remains that are related to and located in such properties. The term also includes properties of traditional religious and cultural importance (traditional cultural properties), which are eligible for inclusion in the NRHP because of their association with the cultural practices or beliefs of an Indian tribe or Native Hawaiian organization.

Hydroelectric: Related to electric energy produced by moving water (i.e. through a dam on a river that stores water in a reservoir).

Impairment: An adverse impact on a resource or a value (i.e. when a significant adverse impact reaches the level of impairing a national park, it is prohibited under the Organic Act of 1916).

Integrated Gasification Combined Cycle (IGCC): A power plant using synthetic gas (syngas) as a source of clean fuel. Syngas is produced in a gasification unit built for Combined Cycle purposes, hence name Integrated. Steam generated by waste heat boilers of the gasification process is utilized to help power steam turbines. Heavy petroleum residues and coal with high sulfur content and even biomass are possible feeds (raw material) for gasification process.

Intermediate capacity: The range from base load to a point between base load and peak. This point may be the midpoint, a percent of the peak load, or the load over a specified time period.

Jurisdictional Determination or Jurisdictional Delineation (JD) - A site survey performed by the U.S. Army Corps of Engineers to officially determine whether or not a given parcel of land is subject to wetlands regulations, and if so, the extent of the area.

Jurisdictional waters of the U.S.: Waters in and around the United States in which our laws can be enforced.

Labor Market Area (LMA): An economically integrated geographic area within which individuals can reside and find employment within a reasonable distance or can readily change employment without changing their place of residence.

Ldn: Day-night average noise level; a single number descriptor that represents theconstantly varying sound level during a continuous 24-hour period. The Ldn is typically calculated using 24 consecutive one-hour Leq noise levels. The Ldn includes a 10 dBA penalty that is added to noises which occur during the nighttime hours between 10:00 p.m. and 7:00 a.m. to account for people's higher sensitivity to noise at night when the background noise level is typically low.

Leq: A-weighted, equivalent noise level; uses a single number to describe the constantly fluctuating instantaneous ambient noise levels at a receptor location during a period of time, and accounts for all of the noises and quiet periods that occur during that time period.

L90: 90th percentile-exceeded noise level; this is a metric that indicates the single noise level that is exceeded during 90 percent of a measurement period, although the actual instantaneous noise levels fluctuate continuously. The L90noise level is typically considered the ambient noise level, and is often near the low end of the instantaneous noise levels during a measurement period.

Level-of-Service (LOS): Performance of a roadway segment. The LOS scale ranges from A to F, with each level defined by a range of traffic volume to capacity ratios. LOS criteria A, B, and C are considered good operating conditions, where motorists experience minor to tolerable delays. LOS criterion D represents below average conditions. LOS criterion E corresponds to the maximum capacity of the roadway. LOS criterion F represents a gridlock situation.

Levelized cost: The present value of the total cost of building and operating a generating plant over its economic life, converted to equal annual payments; costs are levelized (adjusted to remove the impact of inflation) in real dollars.

Life cycle cost means the value of research and development costs, investment costs, operation costs, maintenance costs, and termination costs over the life span of a facility or service.

Life cycle cost analysis: became popular in the 1960s when the concept was taken up by U.S. government agencies as an instrument to improve the cost effectiveness of equipment procurement. From that point, the concept has spread to the business sector, and is used there in new product development studies, project evaluations and management accounting. As there is high interest in life cycle cost analysis in maintenance, the International Electrotechnical Commission published a standard (IEC 60300) in 1996, which lies in the field of dependability management and gives recommendations how to carry out life cycle costing. This standard was renewed in July 2004

Load Forecast: An estimate or projection of the amount of energy that must be generated to meet load, including estimates of electricity use for each end-use sector as well as transmission and distribution losses.

Market based: Using an economic system in which goods and services are traded at an agreed upon price to improve the cost-effectiveness of a policy.

Maximum net generation capacity: The gross electrical output measured at the output terminals of the turbine generator(s) during the most restrictive seasonal conditions, less the station service load.

Mesic: Refers to sites or habitats characterized by intermediate moisture conditions.

Mine Mouth: The primary opening of a mine site**.**

Mitigation: A method or action to reduce or eliminate adverse program impacts.

Monitoring (monitor): Systematically observing, recording, or measuring some environmental attribute, such as air quality or water quality, or ascertaining compliance with a given law, regulation, or standard. For example, measurement of air pollution is referred to as monitoring. EPA, state and local agencies measure the types and amounts of pollutants in the ambient air. The 1990 Clean Air Act requires certain large polluters to perform enhanced monitoring to provide an accurate picture of how much pollution is being released into the air. The 1990 Clean Air Act requires states to monitor community air in polluted areas to check on whether the areas are being cleaned up according to schedules set out in the law.

National Environmental Policy Act (NEPA): Establishes procedures that Federal agencies must follow in making decisions on Federal actions that may impact the environment. Procedures include evaluation of environmental effects of proposed actions, and alternatives to proposed actions, involvement of the public and cooperating agencies.

National Ambient Air Quality Standards (NAAQS): Standards established on a state or Federal level that define the limits for airborne concentrations of designated "criteria" pollutants (e.g. nitrogen dioxide, sulfur dioxide, carbon monoxide, particulate matter, ozone, and lead) to protect public health with an adequate margin of safety (primary standards) and to protect public welfare, including plant and animal life, visibility, and materials (secondary standards).

National Institute for Occupational Safety and Health (NIOSH): Federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. NIOSH is part of the Centers for Disease Control and Prevention (CDC) in the Department of Health and Human Services.

National Register of Historic Places (NRHP): The nation's official list of cultural resources worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources. Properties listed in the Register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service.

Native vegetation: Plant life that occurs naturally in an area without agriculture or cultivation efforts.

Navigable waters: The waters of the United States, including the territorial seas; all waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide, as defined by 40 CFR 110.1.

NERC: Its mission is to improve the reliability and security of the bulk power system in North America. To achieve that, NERC develops and enforces reliability standards; monitors the bulk power system; assesses future adequacy; audits owners, operators, and users for preparedness; and educates and trains industry personnel. NERC is a self-regulatory organization that relies on the diverse and collective expertise of industry participants. As the Electric Reliability Organization, NERC is subject to audit by the U.S. Federal Energy Regulatory Commission.

Net Present Value – NPV: The difference between the present value of cash inflows and the present value of cash outflows. NPV is used in capital budgeting to analyze the profitability of an investment or project.NPV analysis is sensitive to the reliability of future cash inflows that an investment or project will yield.Formula:

$$NPV = \sum_{t=1}^{T} \frac{C_t}{(1+r)^t} - C_o$$

Noise: Sound that is perceived by humans as annoying and unwanted.

Non-attainment area: An area that has been designated by the U.S. Environmental Protection Agency and the appropriate state air quality agency as exceeding one or more National Ambient Air Quality Standards.

Palustrine emergent wetland: Classification of the U.S. Fish and Wildlife Service for non-tidal wetlands dominated by trees, shrubs, or persistent emergent vegetation. Palustrine emergent wetlands include vegetated wetlands traditionally called by such names as marsh, swamp, bog, fen, and prairie. They also include small, shallow, permanent or intermittent water bodies often called ponds.

Particulate matter: Solid or liquid matter suspended in the atmosphere.

Peaking capacity: Capacity of generating equipment normally reserved for operation during the hours of highest daily, weekly, or seasonal loads. Some generating equipment may be operated at certain times as peaking capacity and at other times to serve loads on an around-the-clock basis.

Plume: A continuous emission from a point source of contamination that has a starting point and a noticeable pathway.

Potable: A liquid, usually water, which is drinkable.

Powder River Basin: An area containing the world's largest single deposit of low-sulfur coal, located in southeastern Montana and northeastern Wyoming.

Power purchase agreement: The off-take contract from a large customer to buy the electricity generated by a power plant.

Prevention of significant deterioration: PSD program affects new, large sources of air emissions and changes at existing large facilities. PSD is a pre-construction permitting program designed to ensure that the National Ambient Air Quality Standards (NAAQS) are maintained as economic development occurs.

Pulverized coal: A coal that has been crushed to a fine dust in a grinding mill. It is blown into the combustion zone of a furnace and burns very rapidly and efficiently.

Reclamation/ remediation: The process of restoring an area to an acceptable pre-existing condition; an action to correct damage to the environment (i.e. after a power plant is decommissioned or shut down).

Runoff: The non-infiltrating water entering a stream or other conveyance channel shortly after a rainfall.

Scoping: Planning process that solicits people's and "stakeholders'" opinions on the value of a park, issues facing a park, and the future of a park. Also used in the NEPA process at the outset of preparing an EA or an EIS to help determine the scope of the study and the major issues that merit investigation and analysis.

Sediment: Particles derived from rock or biological sources that have been transported by water.

Seldom-seen zone: A term used in the Bureau of Land Management VRM; includes areas not seen as foreground-middleground or background (hidden from view).
Selective catalytic reduction: A non-combustion control technology that converts NOx into molecular nitrogen and water by injecting a reducing agent (i.e. ammonia) into the flue gas in the presence of a catalyst.

Sensitive receptor: Areas defined as those sensitive to noise, such as hospitals, residential areas, schools, outdoor theaters, and protected wildlife species.

Species: All organisms of a given kind; a group of plants or animals that breed together but are not bred successfully with organisms outside their group.

State Historic Preservation Officer (SHPO): Appointed under the authority of the National Historic Preservation Act of 1966, the State Historic Preservation Officer is the official in each state and territory charged with administering national and state historic preservation program at the state level.

Storm water: Runoff water resulting from precipitation.

Storm water prevention plan: a comprehensive plan for preventing contaminants in to the water coming from a site.

Subbituminous coal: A coal whose properties range from those of lignite to those of bituminous coal and used primarily as fuel for steam-electric power generation. It may be dull, dark brown to black, soft and crumbly, at the lower end of the range, to bright, jet black, hard, and relatively strong, at the upper end. Subbituminous coal contains 20 to 30 percent inherent moisture by weight. The heat content of subbituminous coal ranges from 17 to 24 million Btu per ton on a moist, mineral-matter-free basis. The heat content of subbituminous coal consumed in the United States averages 17 to 18 million Btu per ton, on the as-received basis (i.e., containing both inherent moisture and mineral matter).

Traditional Cultural Property (TCP): A property eligible for inclusion on the National Register of Historic Places because of its association with cultural practices or beliefs of a living community that are important in maintaining the continuing cultural identity of the community. Traditional Cultural Properties are essential to maintaining the cultural integrity of many Native American Indian nations and are critical to the cultural lives of many of their communities.

Transmission Constraints: Constraints occur when transfer on transmission lines into a region reaches the transmission limit. Any transmission grid will always have some form of constraints on generation transfer.

Transmission Interconnection: Two or more electric systems having a common transmission line that permits a flow of energy between them. The physical connection of the electric power transmission facilities allows for the sale or exchange of energy.

Transmission Line Constraints: When electricity transfer on a transmission line into a market reaches its limit the transmission line is said to be constrained. Transmission line constraints can signify an area of security concern, a need to better balance electricity flow into a market, or the need for additional transmission lines to serve a market. In the Eastern United States these constraints are termed "flowgates" by the North American Electric Reliability Council (NERC) and in the Western United States these constraints are termed "paths" by the Western Electric Coordinating Council (WECC).

Turbidity: A measure of water clarity; a measure of the amount of suspended solids (usually fine clay or silt particles) in water and thus the degree of scattering or absorption of light in the water.

Viewshed: Subunits of the landscape where the scene is contained by topography, similar to a watershed.

Visual resources: The quality of the environment as perceived through the visual sense; visual resources are evaluated by comparing project features with the major features in the existing landscape; denotes an interaction between a human observer and the landscape he or she is observing.

Visual resource inventory: As part of the visual resource management system developed by the Bureau of Land Management, consists of identifying the visual resources of an area and assigning them to inventory classes. The process involves rating the visual appeal of a tract of land, measuring public concern for scenic quality, and determining whether the tract of land is visible from travel routes or observation points. Based on these three factors, BLM-administered lands are placed into one of four visual resource inventory classes. These inventory classes represent the relative value of the visual resources. Classes I and II are the most valued, Class III represents a moderate value, and Class IV represents the least value.

Visual Resource Management (VRM): A system developed by the Bureau of Land Management for minimizing the visual impacts of surface-disturbing activities and maintaining scenic values for the future.

Visual resource contrast rating: The second step of the Bureau of Land Management's VRM process, used to determine the significance of aesthetic impacts. The contrast rating classifies changes in a landscape introduced by a project into one of four "dominance classes:" not noticeable, noticeable, distracting, and dominant.

Volatile Organic Compounds (VOCs): Any organic compound that participates in atmospheric photochemical reactions. Some compounds are specifically listed as exempt due to their having negligible photochemical reactivity. [See 40 CFR 51.100.] Photochemical reactions of VOCs with oxides of nitrogen and sulfur can produce $_{O3}$ and Particulte Matter (PM).

West System: the Western Interconnected System, consisting primarily of the Southwest and areas west of the Rocky Mountain.

Western Energy Coordinating Council: is one of the three U.S. bulk power networks. The major networks consist of extra-high-voltage connections between individual utilities designed to permit the transfer of electrical energy from one part of the network to another.
Western Systems Power Pool: An agreement that began among a group of utilities in the western states. The agreement, which was filed with the Federal Energy Regulatory Commission by Pacific Gas and Electric Company on behalf of the group, established a multi-state bulk power marketing experiment. The agreement was meant to test whether broader pricing flexibility for coordination and transmission services would promote increased efficiency, competition, and coordination.

Western Systems Power Pool Schedule C: A market-based transactions that take place under the Western Systems Power Pool (WSPP) Agreement, which defines three types of products: Schedules A, B, and C. Schedule C is for firm sales or exchanges.

Water rights: A body of law that determines water ownership; a legal right to take possession of water occurring in a natural waterway and to divert that water for beneficial use.

Western System Coordination Council (WSCC): The U.S. bulk power system has evolved into three major networks or power grids. The WSCC is one of these networks. The major networks consist of extra-high-voltage connections between individual utilities designed to permit the transfer of electrical energy from one part of the network to another. These transfers may be restricted by a lack of contractual arrangements or by inadequate transmission capability.

Wetlands: Areas that are inundated or saturated with surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil, including swamps, marshes, bogs, and other similar areas.

Zero-discharge facility: An Industrial User which meets the criteria of being a Categorical or Significant Industrial User, is a zero discharger from all regulated process lines (metal finishing core and ancillary operations), but has the "potential" to discharge industrial wastewater.

EXECUTIVE SUMMARY

Introduction

The Basin Electric Power Cooperative (Basin Electric) proposes to build a 385-megawatt (MW) coal-fired power plant and related facilities at a site near Gillette, Wyoming. This Draft Environmental Impact Statement (DEIS) discusses this Proposed Action and analyzes its potential effects on the environment.

Basin Electric is a regional wholesale electric generation and transmission (G&T) cooperative owned and controlled by the 124 member cooperatives it serves. As a G&T cooperative organized under the laws of the State of North Dakota, Basin Electric serves approximately 2.5 million customers. It is one of the largest G&T cooperatives in the nation in terms of land area served, covering 430,000 square miles in portions of nine states: Colorado, Iowa, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota, and Wyoming.

Under its charter, Basin Electric is obligated to provide all the electric power needs of the cooperative member systems it serves. Basin Electric has projected that it will not have the capacity to meet all of its members' power needs beyond about 2012. After considering various ways to meet those future needs, Basin Electric identified the construction of a new coal-fired power plant near Gillette, Wyoming, the proposed Dry Fork Station, as its best course of action. Basin Electric is also planning to construct the Hughes Transmission Line, a 230-kilovolt (kV) transmission line in Campbell and Sheridan Counties in northeastern Wyoming. The line would consist of approximately 136 miles of 230-kV transmission lines that would connect the Hughes Substation east of Gillette to the Carr Draw Substation west of Gillette and the proposed Beatty Gulch/Tongue River Substation north of Sheridan.

Based on system studies, which are discussed in detail in the DEIS, the Dry Fork Station would need to be connected to the transmission grid to meet current and forecasted demand when the Station becomes operational in 2012. The Station would interconnect with the Hughes Transmission Line, and Basin Electric is proposing to have the Hughes Transmission Line in service by 2009.

Basin Electric has applied for a loan to construct the Dry Fork Station from the Rural Utilities Service (RUS), an agency that administers the U. S. Department of Agriculture's Rural Development Utilities Programs (USDA Rural Development). Basin Electric is also in the process of applying for an air quality permit and other environmental permits from the Wyoming Department of Environmental Quality. Basin Electric will also be applying to the U.S Army Corps of Engineers (USACE) for permits under Section 404 of the Clean Water Act. The Proposed Action includes the construction and operation of a single maximum net 385 MW unit, along with other proposed pollution controls collectively known as Best Available Control Technology (BACT). In order to fulfill its obligations under the National Environmental Policy Act (NEPA), USDA Rural Development has prepared this Environmental Impact Statement (EIS).

Basin Electric is not requesting a loan guarantee from RUS to construct the Hughes Transmission Line. However, the Hughes Transmission Project is considered as a connected action for this EIS because the Dry Fork Station would interconnect with it if the Station is built. The DEIS analyzes the potential environmental impacts of Basin Electric's Proposed Action and alternatives to that action.

RUS has established procedures for determining if a proposed project for which a loan or loan guarantee is sought is feasible both from an engineering and financial perspective. Following RUS procedures, Basin Electric prepared several studies prior to this EIS, including an Alternatives Analysis, Site Selection Study, and Macro-Corridor Study, all of which were subject to RUS review and approval. These reports and RUS's notice of intent to prepare an EIS are available to the public on RUS's website at: http://www.usda.gov/rus/water/ees/eis.htm. The information and analyses from the reports and a number of other studies conducted by Basin Electric are incorporated into this DEIS.

Purpose of and Need for the Proposed Action

To determine its future energy requirements, and as part of its loan application, Basin Electric prepared detailed load forecasts in accordance with RUS guidance. The latest forecast, prepared in 2005 and summarized in this DEIS, predicts a 4.7 percent per year growth in energy sales for Basin Electric through 2019.

The Northeast portion of Wyoming is a major source of sub-bituminous coal and coal bed methane (CBM), both of which are extracted to meet regional and national energy demands. Extraction of these energy sources requires large motors and other electrically powered equipment, such as draglines, to remove overburden from the top of coal seams. These industrial operations require large amounts of electricity, delivered on a near-continuous basis. Increasing CBM development is expected to require increasing amounts of electricity, and the inability of the existing transmission system to serve this load by importing the required power drives the need for additional generating capacity in Northeast Wyoming.

The addition of the Dry Fork Station's 385 MW (net) of base load capacity in 2012 would allow Basin Electric to meet capacity and energy requirements in the western portion of its service area and allow for anticipated additional growth in the future.

Alternatives Considered but Eliminated from Detailed Consideration

Dry Fork Station

The following alternatives were considered but eliminated from detailed consideration:

- Energy Conservation and Efficiency – would not meet capacity requirements;
- Power Purchase Agreements – eliminated due to of lack of reliability associated with transmission constraints in northeastern Wyoming;
- Participation in Another Utility's Generation Project – eliminated because of limited amount of generation capacity available and cost considerations;
- Repowering/Uprating of Existing Units – eliminated due to lack of availability of Basin Electric resources in northeastern Wyoming and load serving and operating constraints of individual facilities party to transmission line agreement;
- Renewable Noncombustible Energy Sources:
  - *Wind Energy* – Incapable of providing base load due to intermittency;

  - *Solar Energ*y – Much higher overall cost and inability to serve as base load due to intermittency;
  - *Hydroelectricity* – Scarcity of resources available for hydropower development in northeastern Wyoming;
  - *Geothermal Energy* – Lack of availability of commercial geothermal resources in northeastern Wyoming;
- Renewable Combustible Energy Sources:
  - *Biomass* – Lack of available biomass resources in northeast Wyoming;
- Non-renewable Combustible Energy Sources:
  - *Natural Gas Simple Cycle* – Instability of natural gas prices;
  - *Natural Gas Combined Cycle*– Instability of natural gas prices;
  - *Microturbines* – High installed cost, large number needed for capacity requirements, and instability in cost of fuel;
  - *Circulated Fluidized-Bed Coal* – Lacks long-term commercial operation experience using Powder River Basin coal;
  - *Integrated Gasification Combined Cycle Coal* – Not currently cost-effective and requires further research to achieve an acceptable level of reliability;
- Other Generation Sources:
  - *Oil* – High costs and fluctuating fuel costs;
  - *Nuclear* – High costs, only feasible for large scale power generation needs, long construction time; and
  - *Combination of coal and natural gas technologies* – Lack of price stability and supply of natural gas.

Hughes Transmission Line
Basin Electric assessed the potential opportunities for various route alternatives and the associated physical (e.g., length of transmission line, right-of-way requirements), land use, engineering, environmental, regulatory, and social and economic considerations and constraints. Public and stakeholder input were also considered.

The preliminary comparative analysis (Phase 1) identified 25 individual segments that could be paired into a total of 54 possible alternative corridors. These alternative segment combinations were evaluated for achieving the purpose and need for the project, feasibility, proximity to residences, and the presence of large amounts of wetland/riparian habitat and raptor nests (Phase 2). This process resulted in sixteen alternative corridors. In Phase 3, four segment combinations were considered but eliminated due to lower rankings than comparative segments for the same region, or if they had significant constraints. Three segment combinations were eliminated because of the potential construction of double-circuit lines. Double circuit lines are not desirable because any event that risks failure of one line would likely also affect the other, thus threatening the stability of the regional power grid. One segment combination was eliminated because of alignment with the alternative proposed substation site.

The remaining twelve segment combinations are included in either the proposed or alternative alignments that are evaluated in detail in the DEIS.

Alternatives Assessed in Detail

No Action Alternative
This alternative means that RUS would not provide a loan guarantee to Basin Electric to construct the proposed Dry Fork Station. However, because it is a connected action and not financed by RUS, the Hughes Transmission Line would be built under the No Action Alternative. "No Action" forms the baseline against which impacts of other alternatives are evaluated. It is reasonable to assume that under the No Action Alternative, Basin Electric would seek other means to meet its projected generation requirements, although this possibility is not evaluated as part of the effects of the No Action Alternative.

Proposed Action: Dry Fork Station
Under this alternative, a 385 MW (net) coal-fired electric generation facility would be constructed and operated on a 353-acre parcel approximately 7 miles north of Gillette, Wyoming, in Campbell County. The entire site is privately owned by the Dry Fork Mine with a purchase option held by Basin Electric. Subsurface mineral rights on approximately 50 percent of the site are part of an active federal coal lease to Western Fuels Cooperative Dry Fork Mine. Active Wyoming oil and gas leases are on a portion of the site, but there are no known wells or planned CBM drilling activity on the site. Federal oil and gas leases are also present, but it is not known if these leases are active.

A 69-kV transmission line crosses the northern portion of the site. An easement for the right-of-way is held by Powder River Energy Corporation.

The proposed power plant would be sited adjacent to the fuel source at the Dry Fork Mine and would operate 24 hours a day except for maintenance downtime and unplanned outages. The total construction time would be up to 48 months. The major components of the Dry Fork Station include:

- Pulverized coal (PC) furnace, boiler, turbine, and condenser;
- Coal unloading, storage, and handling;
- Solid waste disposal system;
- Storm water system;
- Electric transmission interconnection;
- Water supply, treatment, and discharge;
- Access roads;
- Air emissions control system; and
- Offices, warehouse, and control room.

Alternative Action: Dry Fork Station Alternative Site
All major project components for the alternative power plant site would be the same as described for the proposed action. The alternative power plant site is a 205-acre parcel, approximately 6 miles north of the city of Gillette, Wyoming, in Campbell County, and approximately 1 mile southeast of the proposed power plant site. The property is bounded by the rail loop for the Dry Fork Mine to the north, coal mining operations to the west, future designated mining areas to the

south, and Garner Lake Road to the east. Surrounding land uses include coal mining operations, rural residential development, and ranches.

All operational and design aspects for the alternative power plant site would be the same as for the proposed action.

Proposed Action: Hughes Transmission Line Proposed Alignment
Regardless of the decision on the Dry Fork Station, construction and operation of the Hughes Transmission Line has been deemed necessary by Basin Electric to meet existing power demands of rural cooperatives in northeastern Wyoming and western South Dakota and to improve the regional stability of the transmission system or power grid.

The transmission line would consist of approximately 136 miles of 230-kV transmission line that will connect the Hughes Substation east of Gillette, Wyoming, to the Carr Draw Substation west of Gillette and a proposed substation northeast of Sheridan, Wyoming. The proposed schedule developed by Basin Electric would place the transmission line in operation by mid-2009.

The proposed transmission line would consist of the following segments:
<u>Hughes Substation to Dry Fork Station Switchyard</u> **–** a 17.3-mile transmission line connecting the proposed Dry Fork Station Switchyard to the Hughes Substation located east of Gillette.

<u>Dry Fork Station Switchyard to Carr Draw Substation</u> – a 23-mile transmission line running west from the proposed Dry Fork Station Switchyard to the existing Carr Draw Substation located west of Gillette.

<u>Dry Fork Station Switchyard to Sheridan</u> – a 95.6-mile transmission line from the Dry Fork Station Switchyard to Sheridan. This alignment would take a more direct northerly route to the proposed Tongue River Substation.

<u>Tongue River Substation</u> – The proposed substation would be located on a previously disturbed site with little sagebrush cover and low species diversity. The primary vegetation observed at this site during field surveys was a combination of invasive and noxious weed species. Vegetation would be permanently cleared within the 700-foot by 664-foot fenceline.

Alternative Action: Alternative Transmission Line Alignment
The alternative transmission line would consist of approximately 148 miles of 230-kV transmission line, approximately 12 miles longer than the proposed transmission line. The alternative transmission line consists of the following segments:

<u>Hughes Substation to Dry Fork Station Switchyard</u> – Between the Hughes Substation and the Dry Fork Station Switchyard the alternative transmission line would follow an easterly and more northerly route than the proposed route. As a result, this segment would be approximately 2.4 miles longer than the proposed transmission line corridor, for a total segment length of 19.7 miles.

Dry Fork Station Switchyard to Carr Draw Substation – This segment would be 2.8 miles longer than the proposed transmission line corridor, for a total segment length of 25.5 miles. The primary difference between the proposed and alternative routings in this segment is that the alternative would take a more southerly route as it proceeds west towards the Carr Draw Substation.

Dry Fork Station Switchyard to Sheridan – For this segment, the alternative transmission line route would be 6.7 miles longer than the proposed, for a total segment length of 102.3 miles. Differences between the proposed transmission line and the alternative transmission line include the following: one of the alternative segments would follow an existing 69-kV transmission line part of the way toward the Recluse Substation and then turn west toward Spotted Horse, while the proposed transmission route Segments N and P would follow a more direct northwesterly route; the alternative route would diverge from the proposed route north and west of Clear Creek, following a more southerly route and would tie into the existing 230-kV line at Site 3; and, one of the alternative segments would run north from the Sheridan Substation and tie in to the existing 230-kV line at Site 1.

Impact Analysis

Chapter 4 of the DEIS describes the potential direct and indirect environmental consequences of the alternatives examined in detail, including the No Action Alternative, while cumulative impacts are addressed in Chapter 5. Direct impacts are caused by the action and occur at the same time and place. Indirect impacts are caused by the action but take place later in time or removed in distance but are still reasonably foreseeable actions.

No Action Alternative

Under the No Action Alternative the Dry Fork Station would not be constructed, but the Hughes Transmission Line would still be constructed. Thus, under the No Action Alternative, impacts would be those described for the transmission line only. Analysis of effects of the No Action Alternative indicated that there would be no impact on any of the resources studied in relation to the Dry Fork Station; impacts from the Hughes Transmission Line would still occur.

Proposed Action and Alternative Action

Table ES-1 presents a summary comparison of the proposed and alternative power plant alternatives, and a summary of potential impacts. Tables ES-2 and ES-3 present a summary comparison of the proposed and alternative transmission lines, and a summary of potential impacts, respectively.

Table ES-1 - Comparison of Power Plant Alternatives

Power Plant	Proposed Action	Alternative Action
Generating capacity	385 MW (net) 422 MW (gross)	385 MW (net) 422 MW (gross)
Plant site area	353 acres	205 acres
Plant site footprint	120 acres	120 acres
Ash landfill site	67 acres	67 acres
Summary of Impacts from the Power Plant		
Soils, Geology, and Minerals	Impacts would be less than significant. BMPs[1] would reduce the potential for accidental releases, and result in timely cleanup should one occur. Coal underlying the power plant would be made unavailable, but impacts would be minor due to the economic feasibility of the coal. Potential oil and gas exploration would not be affected.	Same as proposed action.
Water Resources	Impacts would be less than significant. Erosion and sediment would be controlled, protecting surface water. BMPs for the use and handling of hazardous material and response to releases would minimize or eliminate potential impacts to surface and groundwater resources. Sufficient water supply is reportedly present at up to approximately twice the proposed usage amount.	Same as proposed action.
Air Quality	Impacts would be less than significant. State air quality permit requirements would be met. Construction and operation would result in additional PM and acid deposition in Class I and Class II areas and medium-term mercury and greenhouse gas impacts. Metals deposition would be minor. Greenhouse gas emissions would add incrementally to cumulative atmospheric effects of these gases.	Same as proposed action.
Acoustic Environment	Impacts would be less than significant. Offsite noise levels would be comparable to ambient noise levels.	Impacts would be less than significant but slightly greater than the proposed action due to the proximity to residences.
Vegetation, Invasive Species and Noxious Weeds	Impacts to vegetation cover, potential spread of invasive species and noxious weeds due to construction and operation actions, and reclamation associated with the proposed power plant would be less than significant.	The magnitude of vegetation loss of relatively undisturbed native sagebrush steppe would be more than the proposed action. The impacts due to construction and operation of the alternative power plant could be significant for vegetation, but would be less than the significant for invasive species and noxious weeds.
Wetlands and Riparian	Impacts to wetlands and riparian resources from construction and operation of the proposed power plant site and the associated features would be less than significant. BMP WT-M1 and design features including a 300-foot buffer zone, have been developed to protect wetlands from potential soil disturbances and sedimentation that could result from vegetation removal and grading during construction or impacts associated with operations.	Same as proposed action.

Table ES-1 - Comparison of Power Plant Alternatives (continued)

Power Plant	Proposed Action	Alternative Action
Summary of Impacts from the Power Plant (Continued)		
Wildlife and Fisheries	The design features and BMPs described would minimize the impact of construction and operation of the proposed power plant. Impacts resulting from operation of the proposed power plant would generally be less than significant. The risk of contamination and avian impacts would result in a moderate and insignificant impact. Regardless, discussions with USFWS would occur to address additional design features and BMPs to minimize this impact. Overall, the impact to all wildlife species would be less than significant for the proposed power plant. No impacts on fisheries or aquatic resources would occur as a result of the proposed power plant development because of avoidance of water bodies, buffer zones, and other BMPs to avoid indirect impacts. Impacts would be less than significant.	Effects would be the same as the proposed action with the exception of loss of 120 acres of undisturbed sagebrush habitat. The loss of sagebrush habitat important to several species of concern would result in an insignificant impact on habitat, though coordination with BLM and WGFD would be conducted to discuss ways to restore and enhance sagebrush-steppe habitat in the project area. For fisheries, impacts would be the same as for the proposed action.
Threatened, Endangered, BLM Sensitive Species, and Wyoming Species of Special Concern	Disturbance to foraging bald eagles and other special status raptors is possible to probable, however, overall impacts to these raptors from construction and operation of the proposed power plant would be moderate and less than significant. Impacts to golden eagles would be minor and less than significant. Because the proposed power plant site is an area of largely disturbed lands, minor impacts to greater sage-grouse habitat would be anticipated. The proposed construction would be unlikely to result in any impacts on lek or nesting habitat. Overall, impacts to greater sage-grouse from construction and operation at the proposed power plant site would be less than significant.	Same as proposed action, except that impacts to grouse may be slightly greater, because the alternative site has better sagebrush habitat and it is closer to an active lek (breeding site).
Land Resources	Impacts would be less than significant. Landownership patterns and residential, subdivisions and industrial development would not be affected, nor would the availability of existing corridors. Livestock grazing rights on the site would be terminated, but grazing in surrounding areas would not be affected.	Same as proposed action.

Table ES-1 - Comparison of Power Plant Alternatives (continued)

Power Plant	Proposed Action	Alternative Action
Summary of Impacts from the Power Plant (Continued)		
Recreation and Wilderness	There would be no impact on wilderness or Areas of Critical Environmental Concern (ACECs) (none exist near the project). Effects on recreation would be less than significant. Effects would be limited to a loss of public access to the site from fencing.	Same as proposed action.
Visual Resources	Impacts would be less than significant. Impacts would be from lighting, structures silhouetted against the sky, periodic emissions, and routine operations and maintenance activities.	Same as proposed action.
Transportation	Impacts would be less than significant. Level of service would decrease slightly, along with a slight increase in the potential for accidents, both caused by additional traffic.	Same as proposed action except that the level of service would return to current conditions when construction is complete.
Cultural Resource	Impacts would be less than significant. Cultural, historical, and Native American resources would be surveyed, protected and avoided.	Same as proposed action.
Paleontological Resources	Impacts would be less than significant. Paleontological resources would be surveyed, protected and avoided.	Same as proposed action.
Solid and Hazardous Waste	Impacts would be less than significant. There is potential that hazardous material would be spilled, but BMPs for quick cleanup would minimize potential for environmental damage. Emissions from the plant would be within regulated limits. Runoff controls and the landfill cover would prevent sediment from the landfill from entering surface water or wetlands in the vicinity	Same as proposed action.
Public Health and Safety	Impacts would be less than significant. Occupational injuries or fatalities may occur during construction. Radioactive materials would not increase exposure beyond background levels. Air quality standards would be met. Modeling for the potential for arsenic reaching groundwater showed the risk to be very low.	Same as proposed action.
Socioeconomics	Effects would be less than significant. There would be an increase in demand for housing during construction and operation which could exceed the housing available. Employment would increase, as would government revenue, and the demand for services. Property values would not be affected.	Same as proposed action.
Environmental Justice	There would be no impact on environmental justice populations or Indian Tribes.	Same as proposed action.

[1] **Best Management Practices**

Table ES-2 - Comparison of Transmission Line Alternatives

Transmission Line	Proposed Action	Alternative Action
Line Capacity	230-kV	230-kV
Hughes Substation to Dry Fork Station Switchyard	Segment: A	Segments: B & C
Corridor Length	17.3 miles	19.7 miles
Dry Fork Station Switchyard to Carr Draw Substation	Segments: D, E, F, & H	Segments: D ,E, G, & H
Corridor Length	23.0 miles	25.5 miles
Dry Fork Station Switchyard to Sheridan	Segments: C, J, L N, P, Q, S, T, W, X, AA	Segments: C, J, L, O, Q, R, T, U, Y, AA
Corridor Length	95.6 miles	102.3 miles
Substation (terminus)	Tongue River Substation	Tie-in to existing 230-kV line
Total Transmission Line Length	135.9 miles	147.5 miles
Total area of ROW (125 feet-wide)	2,057 acres	2,251 acres
Length adjacent to existing transmission lines	5 miles	31 miles
Length adjacent to existing roads for construction, operation, and maintenance	4 miles	10 miles
Average number of structures (per mile)	6-7	6-7
Number of H-pole transmission structures required	896	981
Estimated permanent structure aerial disturbance for transmission poles (assuming 75 sq. feet disturbance per structure)	1.6 acres	1.7 acres

Table ES-3 - Summary of Transmission Line Alternative Impacts

	Proposed Action	Alternative Action
Soils, Geology, and Minerals	Impacts would be less than significant. Soil disturbance would occur from improvement of access roads, support structures and staging areas. BMPs would minimize impacts, including the potential for accidental spills, and ensure timely clean-up should one occur. Active mining would not be affected. In the event additional mineral resources underlying the transmission line are discovered, the transmission line could be relocated. Exploration and development of oil and gas resources would not be precluded.	Same as proposed action.
Water Resources	Impacts would be less than significant. Erosion and sediment would be controlled, protecting surface water. BMPs for the use and handling of hazardous material and response to releases would minimize or eliminate potential impacts to surface and groundwater resources.	Same as proposed action.
Air Quality	Impacts would be less than significant. Minor, short-term impacts over a small extent from construction, operation and maintenance due to fugitive dust.	Impacts would be less than significant, although slightly greater than the proposed action due to the additional length of the alternative alignment.
Acoustic Environment	Impacts would be less than significant. Offsite noise levels would be comparable to ambient noise levels. Noise (corona) impacts would diminish to levels close to ambient levels.	Same as proposed action.

Table ES-3 - Summary of Transmission Line Alternative Impacts (continued)

	Proposed Action	Alternative Action
Vegetation	Impacts from construction, operation and maintenance of the proposed transmission line would be less than significant. BMPs, design features, and reclamation would minimize impacts to vegetation cover and potential spread of invasive species and noxious weeds.	Same as proposed action.
Wetlands and Riparian	Impacts to wetlands and riparian areas associated with the construction, operation and maintenance of the proposed transmission line would be less than significant. Design features and BMP WT-M1 provide for avoidance of wetlands and riparian habitat wherever possible.. Riparian habitat, in particular trees greater than 20 feet high, within the proposed transmission line corridors would need to be removed for safety and maintenance purposes. As the exact route within the proposed transmission line corridor has not been determined, the number of trees and area of impact, and thus the magnitude of impact can not be determined. The low density of trees in the project area, coupled with the avoidance measures, and the flexibility of routing options would minimize impacts to a minor level.	Same as proposed action.
Wildlife and Fisheries	The impact to all wildlife species would be less than significant for the proposed transmission line. Raptors and waterfowl are the primary common wildlife species of concern in the project area. Implementing BMPs for wildlife, vegetation, and wetlands avoid or minimize the magnitude of most impacts. No impacts on fisheries or aquatic resources would occur as a result of construction, operation and maintenance of the proposed transmission line because of avoidance of water bodies, buffer zones, and other BMPs to avoid indirect impacts. Impacts would be less than significant.	Same as proposed action for both wildlife and fisheries.
Threatened, Endangered, BLM Sensitive Species, and Wyoming Species of Special Concern	With the implementation of best management practices (BMPs), minor but not significant impact on bald eagles and other special status raptors would be expected as a result of constructing and operating the proposed transmission line alignment. The construction and operation in the proposed alignment is highly likely to result in habitat fragmentation, long-term displacement of grouse, and potential abandonment of lek sites. These would be long-term effects that would be moderate to major in magnitude and large extent. With implementation of mitigation measures and BMPs, overall impacts to greater sage-grouse may be reduced to less than significant. The proposed alignment would have probable but minor effects on neotropical and short-distance migrants within and adjacent to the proposed transmission line and associated features. The impact to neotropicals and short-distance migrants from construction and operation of the proposed	Impacts on the bald eagle and other special status raptors would be similar to those described for the proposed action. Impacts on greater sage-grouse would be similar to those described for the proposed action, with the exception that active leks would not be directly affected by construction of the alternate alignment. Impact on neotropical and short-distance migrants would be similar to that described for the proposed action.

Table ES-3 - Summary of Transmission Line Alternative Impacts (continued)

	Proposed Action	Alternative Action
	transmission line and associated features would be less than significant. Based on the rarity of occurrence of Columbian sharp-tailed grouse, with implementation of mitigation measures and BMPs, any impact to this species would be minor and less than significant.	A previously undocumented lek located within the alternative transmission line corridor in Segment Y could be directly adversely impacted by construction. Potential impacts to Columbian sharp-tailed grouse are similar to those described for greater sage-grouse.
Land Resources	Impacts from construction, operations and maintenance would be less than significant. The transmission line may be in view of residences or residents may hear and see activity associated with construction, operation, and maintenance. An exceedingly small area (.02 acres) of prime farmland would be removed from production.	Effects would be the same as the proposed action, with the following exception: .04 acres of prime farmland would be removed from production.
Recreation, Wilderness and ACEC	There would be no impact on wilderness or ACECs (none exists near the project). Effects on recreation would be less than significant. There would be a temporary increase in public access, which would return to previous conditions when construction is complete.	Same as proposed action.
Visual Resources	Impacts would be less than significant. Impacts would be from structures silhouetted against the sky, linear features, and activity.	Same as proposed action.
Transportation	Impacts would be less than significant. More traffic would occur during construction. There would be no change in the level of service or accidents.	Same as proposed action.
Cultural Resource	Impacts would be less than significant. Cultural, historical, and Native American resources would be surveyed, protected and avoided.	Same as proposed action.
Paleontological Resources	Impacts would be less than significant. Paleontological resources would be surveyed, protected and avoided.	Same as proposed action.
Solid and Hazardous Waste	Impacts would be less than significant. There is potential that hazardous material would be spilled, but BMPs for quick cleanup would minimize potential for environmental damage.	Same as proposed action.
Public Health and Safety	Impacts would be less than significant. EMF would be at background levels at residences near the transmission line. Adequate ground clearance to minimize the risk of discharge shocks.	Same as proposed action.
Socioeconomics	Effects would be less than significant. There would be a slight increase in demand for housing during construction and operation. Employment would increase, as would government revenue through sales tax, and the demand for services. Property values would not be affected.	Same as proposed action.
Environmental Justice	There would be no impact on environmental justice populations or Indian Tribes.	Same as proposed action.

1.0 INTRODUCTION AND PURPOSE AND NEED

1.1 INTRODUCTION

1.1.1 Actions Analyzed in this EIS

This Environmental Impact Statement (EIS) analyzes a proposal from Basin Electric Power Cooperative (Basin Electric), which has submitted an application to the United States Department of Agriculture (USDA) Rural Utilities Service (RUS) for a loan to finance the construction and operation of the Dry Fork Station, a coal-fired power plant generating a net 385 megawatts (MW). RUS's approval of the loan application would constitute a major Federal action that could significantly affect the quality of the human environment, and therefore triggered the requirement for the preparation of this EIS in accordance with the National Environmental Policy Act (NEPA). This EIS also analyzes the Hughes Transmission Line, a 136-mile long, 230-kilovolt (kV) transmission line in northeastern Wyoming, as a connected action although its construction and operation is not being considered for RUS funding.

1.1.2 Organization of this EIS

Chapter 1 provides an overview of the project background and development process for the proposed action and alternatives that are analyzed in this EIS. This chapter also presents the purpose of and need for RUS action and Basin Electric's purpose and need for the Dry Fork Station. The authorizing actions, public participation process, and issue development process are also explained.

Chapter 2 describes the proposed action and the alternatives considered for meeting the identified purpose and need. Chapter 2 begins with introductory information that describes the process used to develop the alternatives for the EIS, followed by a narrative description of the components of the alternatives. The chapter continues with a discussion of the alternatives considered but eliminated from further detailed analysis. Chapter 2 also presents the design features and best management practices (BMPs) that will be implemented to reduce impacts from the project.

Chapter 3 presents the affected environment by describing the current conditions of the resources that could be affected by the proposed action and alternatives.

Chapter 4 presents the potential environmental consequences (impacts) of no action, the proposed action, and alternatives on each resource described in Chapter 3. Impact significance ratings and threshold criteria were established for each resource to determine whether project actions would result in significant environmental impacts.

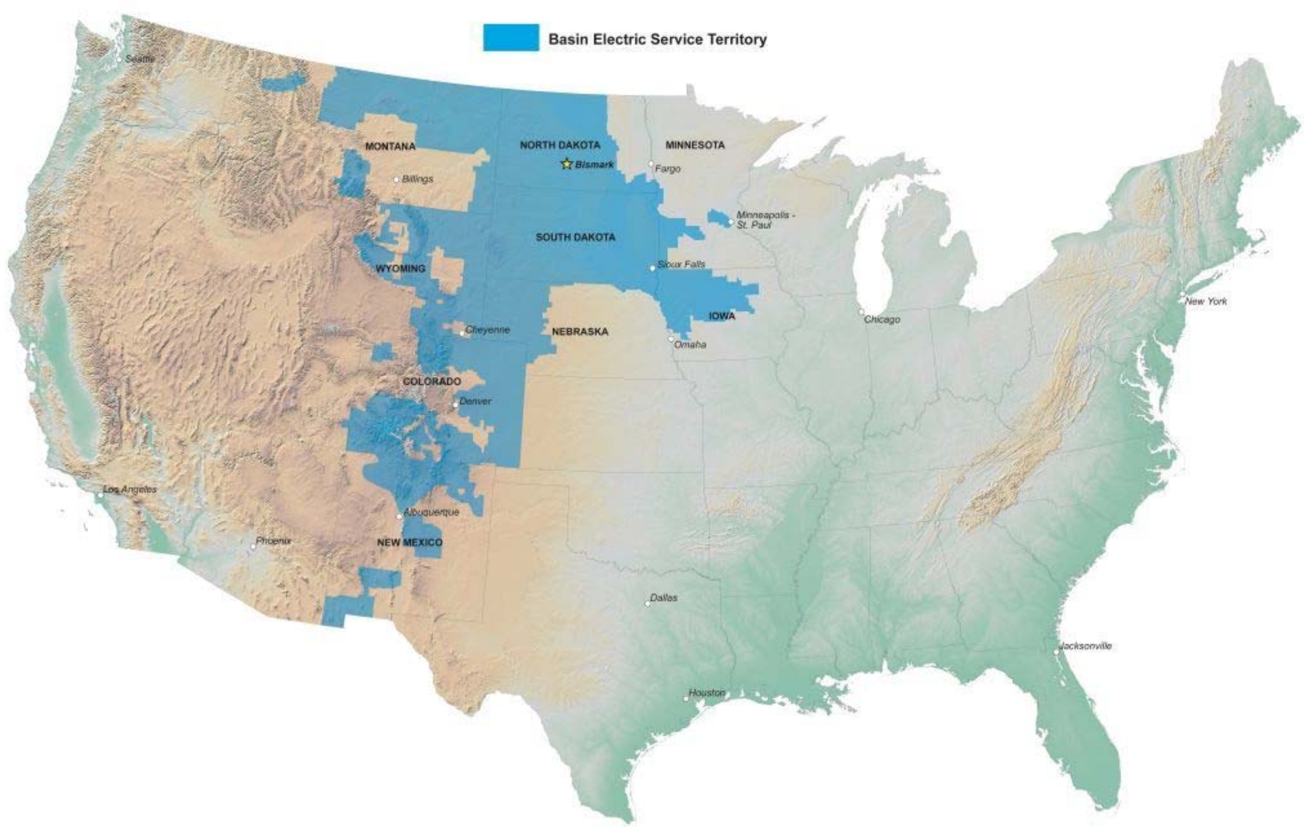
Chapter 5 considers the possible contribution of the proposed project to cumulative impacts in relation to other past, present, and reasonably foreseeable projects and activities in the project area and greater Powder River Basin (PRB).

Chapter 6 lists the individuals involved in preparing this document, and Chapter 7 is a list of references used to prepare the document. This EIS also includes several appendices that provide detailed supporting information on particular aspects of the project; these appendices are referenced in Chapters 1 through 5, as appropriate.

1.1.3 Background Information

Basin Electric Service Territory and Control Areas

Basin Electric is a regional wholesale electric generation and transmission (G&T) cooperative owned and controlled by the member cooperatives it serves. As a G&T cooperative organized under the laws of the State of North Dakota, Basin Electric serves approximately 2.5 million customers and is one of the largest G&T cooperative in the nation in terms of land area served, covering 430,000 square miles in portions of nine states: Colorado, Iowa, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota, and Wyoming. Figure 1.1-1 shows Basin Electric's service territory.

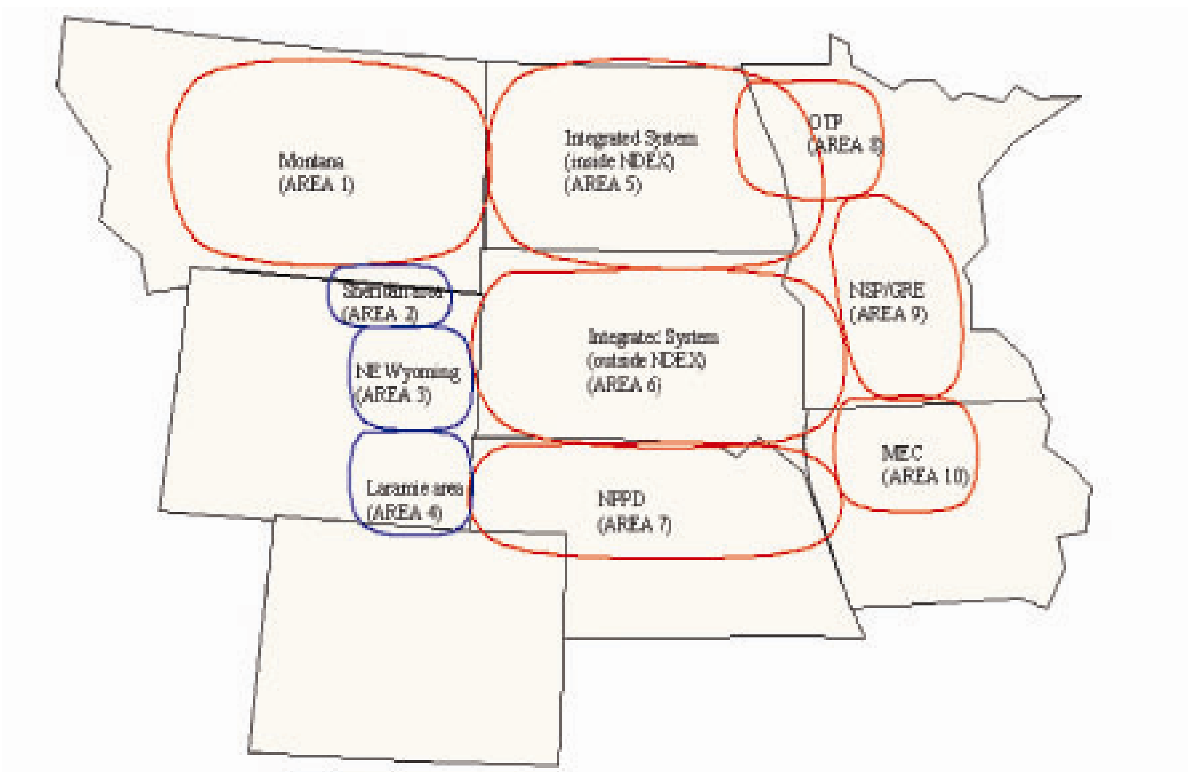


(Source: Basin Electric 2006a)

Figure 1.1-1 – Basin Electric Service Territory

Figure 1.1-2 shows the different Basin Electric control areas that are constrained by the existing transmission system. Control area operators are responsible for controlling generation to maintain a balance between loads and resources within their control area, to coordinate operations and interchanges with other control areas, and to assist in maintaining the frequency regulation of the interconnected electrical grid. Control areas typically approximate the service territories of the various utilities which own both generation and transmission facilities. In many instances, control areas may include the service territories of several utilities. Control area operators have historically performed the transmission monitoring function described above and the dispatch of generating units.

Resources within the Mid-Continent Area Power Pool (MAPP), or Basin Electric's Eastern system, serve the areas shown in red. Resources within the Western Electricity Coordinating Council (WECC), or Basin Electric's Western system, serve the areas shown in blue. Additional detail on the existing power supply, both generating and transmission systems, is provided in Section 1.2.3.



(Source: Basin Electric 2005a)

Figure 1.1-2 – Basin Electric Control Areas

Proposed Dry Fork Station and Hughes Transmission Line

Basin Electric is proposing to construct and operate the Dry Fork Station, a base load coal-fired power plant with a maximum net generation capacity of 385 MW (422 MW maximum gross) and a 230-kV transmission interconnection to meet member peak energy demand and forecasted load growth in northeastern Wyoming and western South Dakota. A base load power plant is one that provides a steady flow of power regardless of total power demand by the grid. These plants run at all times through the year except in the case of repairs or scheduled maintenance.

Basin Electric is also planning to construct the Hughes Transmission Line, a 230-kV transmission line in Campbell and Sheridan Counties in northeastern Wyoming. The line would consist of approximately 136 miles of 230-kV transmission lines that would connect the Hughes

Substation east of Gillette to the Carr Draw Substation west of Gillette and the proposed Beatty Gulch/Tongue River Substation north of Sheridan.

Based on system studies, which are discussed in detail in Chapter 2, the Dry Fork Station would need to be connected to the transmission grid to meet current and forecasted demand when the Station becomes operational in 2012. Although the Station would interconnect with the Hughes Transmission Line, the line would be constructed prior to and whether or not the Station is constructed. Therefore, for the purposes of this EIS the proposed Hughes Transmission Line is considered to be a connected action to the proposed Dry Fork Station and both are analyzed in this EIS. Basin is proposing to have the Hughes Transmission Line in service by 2009 (Basin Electric 2006b).

Figure 1.1-3 presents the Siting Study Area evaluated for the location of the Dry Fork Station. As a result of the Site Selection Study (Basin Electric 2005b), both a proposed and alternative location for the Dry Fork Station were identified approximately 7 miles north of Gillette, Wyoming (Figure 1.1-4). Figure 1.1-4 also shows the areas immediately surrounding the proposed and alternative sites designated for this EIS as the EIS Study Area. This area applies to most resource areas as the area of potential impact from construction and operation of the proposed Dry Fork Station. Resource categories such as air, socioeconomics, and environmental justice that are evaluated on larger scales are discussed as appropriate in Chapters 3 and 4.

ELECTRICAL UNITS

Watt: A watt is a measure of power, or the rate at which work is done. One watt equals one joule (a unit of energy) per second. Another measure of power is horsepower, with 1 horsepower theoretically equal to 746 watts.

Kilowatt (KW): 1 thousand watts

Megawatt (MW): 1 million watts

Megawatt-hour (MWh): A megawatt-hour is a measure of the total amount of energy delivered, or used. One megawatt hour is a power of one megawatt used for one hour.

Volt: A volt is a unit of potential equal to the potential difference between two points on a conductor carrying a current of 1 ampere when the power dissipated between the two points is 1 watt

Kilovolt (kV): 1 thousand volts

Figure 1.1-5 presents the Study Area for the Hughes Transmission Line and the resultant proposed and alternative alignments for siting the Hughes Transmission Line analyzed in this EIS.

1.2 PURPOSE AND NEED

1.2.1 Purpose of and Need for RUS Action

The applicant, Basin Electric, is seeking financing from RUS for the proposed Dry Fork Station. RUS's action is to decide whether or not to extend a loan guarantee to Basin Electric to finance the Station. RUS's action does not include the Hughes Transmission Line because it would move forward regardless of RUS's decision. However, the Hughes Transmission Line is being analyzed along with the Dry Fork Station in this EIS as a connected action under NEPA.

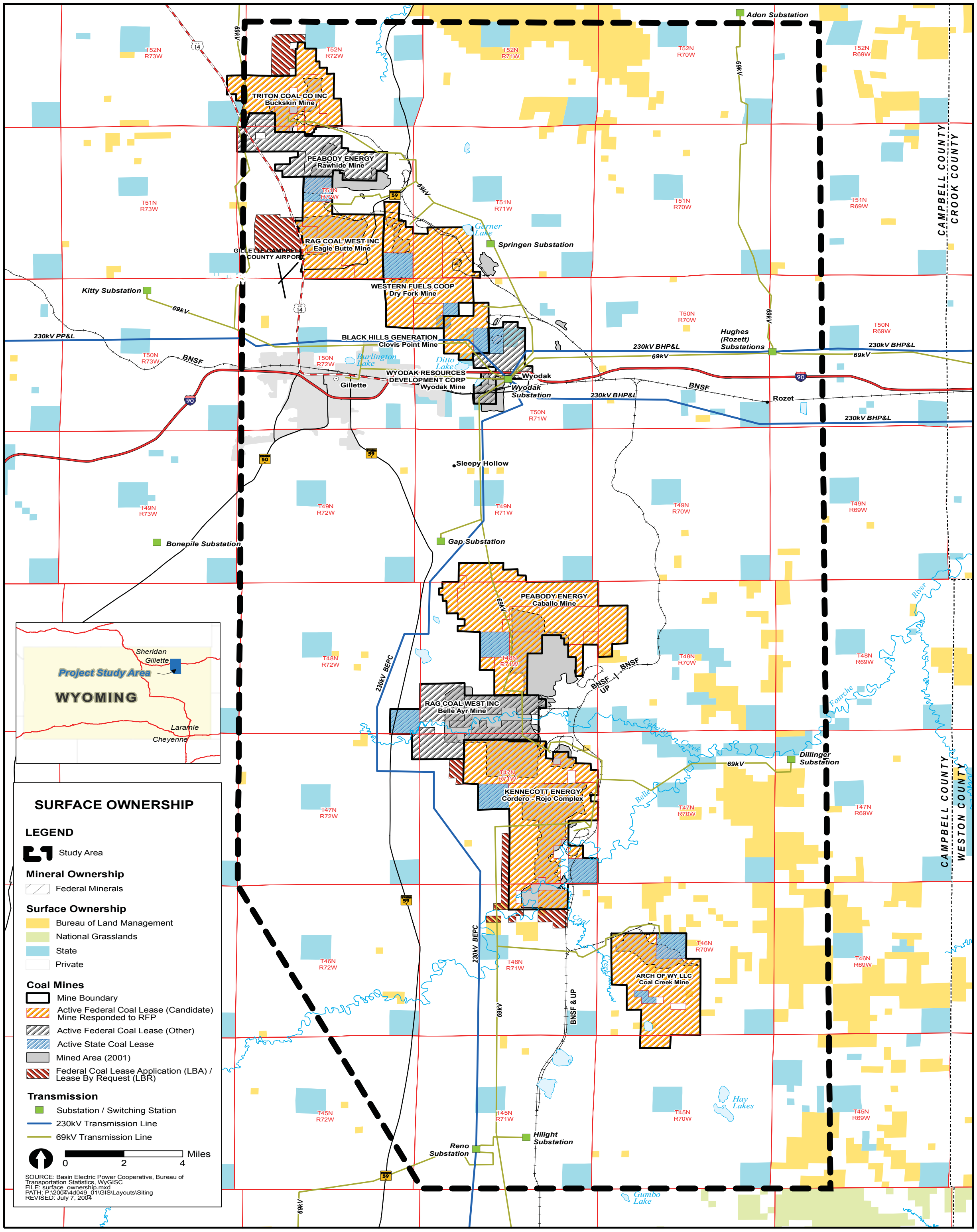


Figure 1.1-3 – Dry Fork Station Siting Study Area

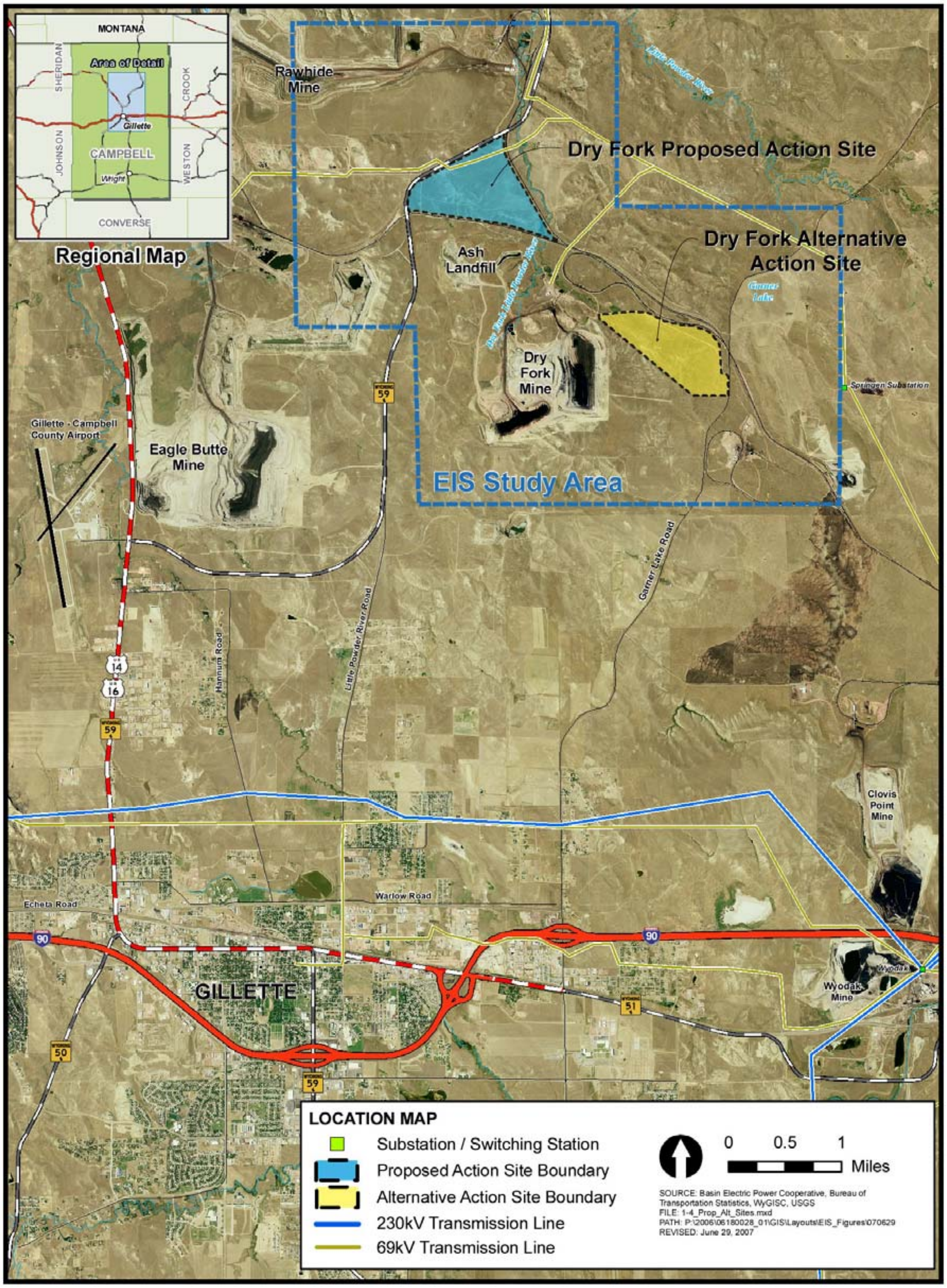


Figure 1.1-4 – Dry Fork Station Proposed and Alternative Location

Figure 1.1-5 – Hughes Transmission Line Study Area

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In making its decision, RUS must meet its obligations under applicable laws and regulations, including complying with the provisions of NEPA. RUS determined that the decision to approve a loan to provide financing for the Dry Fork Station would constitute a major Federal action that could significantly affect the quality of the human environment; therefore, an EIS would have to be prepared prior to financing. Major federal actions are defined in the Council on Environmental Quality's (CEQ) Regulations for Implementing NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508) as actions "with effects that may be major and which are potentially subject to Federal control and responsibility" (40 CFR 1508.18).

1.2.2 Applicant's Purpose and Need

Basin Electric's purpose and need for the proposed Dry Fork Station is to meet increased demand for electric power in the western portion (northeastern Wyoming and western South Dakota) of its nine-state service area and to improve regional power grid stability. Basin Electric has forecast that the demand on its system will grow between 2006 and 2019 by 49 MW per year, on average, in the eastern portion of its service territory and 21 MW per year in the western portion (Basin Electric 2005a).

The addition of the Dry Fork Station's 385 MW (net) of base load capacity in 2012 would allow Basin Electric to meet capacity and energy requirements in the western portion of the service area and allow for anticipated additional growth in following years. The proposed Hughes Transmission Line is necessary to meet system reliability requirements and current and forecasted demand. The transmission line would also provide an interconnection for the Dry Fork Station to Basin Electric's existing transmission system. The rest of this section provides details on Basin Electric's current generation and transmission resources and the current total forecasted future system demand that underlies the purpose and need for the proposal.

Load Factor and Capacity Factor

Load factor is the ratio of the average load, supplied during a designated period, to the peak load occurring in that period, in kilowatts. Simply, the load factor is the actual amount of kilowatt-hours delivered on a system in a designated period as opposed to the total possible kilowatt-hours that could be delivered on a system in a designated period.

A high load factor indicates high usage of the system and is a measure of efficiency. Load factor is calculated by dividing the average load by the peak load over a certain period. Using a year as the designated period, the load factor is calculated by dividing the kilowatt-hours delivered during the year by the peak load for the year multiplied by the total number of hours during the year.

If the residential load at a utility averaged 5,000 MW over the course of a year and the peak load was 10,000 MW, then the residential customers would be said to have a load factor of 50 percent (5,000 MW average divided by 10,000 MW peak).

Knowing the peak and average demand of a power system is critical to proper planning. The power system must be designed to serve the peak load. But the actual load will vary. Using the example above, the load might be 10,000 MW at noon but only 4,000 MW at midnight, when fewer appliances are operating.

Load factor gives utility planners a sense of this variation. A 40 percent load factor would indicate large variations occur in load, while a 90 percent load factor would indicate little variation. Residential homes tend to have low load factors because people are home and using appliances only during certain hours of the day, while certain industrial customers will have very high load factors because they operate 24 hours a day, 7 days a week.

Capacity factor is the ratio of a power plant's average production to its rated capability. For example, a wind farm could have a 30 percent capacity factor (30 MW average productions divided by 100 MW rated capability) and a coal plant could have a 75 percent capacity factor (750 MW average divided by 1,000 MW rated capability).

1.2.3 Power Supply

Generating-Capacity Mix

The most economical means of supplying power to a load that varies every hour on an electric power system is to have the following three types of generation capacity available:

- Base load capacity;
- Intermediate capacity; and
- Peaking capacity.

Base load capacity runs at almost full capacity continuously throughout the day and night, all year round. Base load units are designed to optimize the balance between high capital/installation cost and low fuel cost that will give the lowest overall production cost under the assumption that the unit will be heavily loaded for most of its life. Typically, base load capacity units are operated at an 80 percent capacity factor or more.

Intermediate capacity units are designed to be “cycled” at low-load periods, such as evening and weekends. The units are loaded up and down rapidly to handle the load swings of the system while the unit is online. Typically, intermediate capacity units are operated in the 40-60 percent capacity factor range, or between base load and peaking.

Peaking capacity is only operated during peak load periods and during emergencies. Very low capital and installation costs are very important because these units are typically not operated often. Typically, peaking capacity is operated under a 20 percent capacity factor.

Existing and new generation and transmission resources that Basin Electric utilizes or will utilize to supply power are discussed below.

Existing Generation Resources

Table 1.2-1 lists the existing Basin Electric generation resources, including purchases from sources not owned by Basin Electric. Currently, Basin Electric’s total net generation capacity is 3,244 MW in winter and 2,880 MW in summer. These electric generation resources include the coal-fired Antelope Valley and Leland Olds Stations in North Dakota and the Laramie River Station in Wyoming; the Spirit Mound Station oil-fired peaking station in South Dakota; the Hartzog, Arvada, and Barber Creek natural gas combustion turbines in northeastern Wyoming; the Earl F. Wisdom natural gas/fuel oil combustion turbine in Iowa; and two wind farms in North and South Dakota.

Basin Electric also supplements peak power needs through purchases of wind generated power from Florida Power and Light Facilities; the sub-bituminous coal generated power from the George Neal Unit IV owned by Northwest Iowa Power Cooperative; and the Madison Diesel Generators from the City of Madison, South Dakota.

Basin Electric has also committed to purchase the electric power output of four waste heat generator sites from the Northern Border Pipeline. Each generator can produce approximately 5.5 MW for a total of 22 MW (Table 1.2-1). One generator is in North Dakota, while the other three are in South Dakota. These generators began commercial operation in the summer of 2006 (Basin Electric 2007a).

Table 1.2-1 – Existing Basin Electric Power Generation Resources

Station/Facility Name	Location	Percentage of Ownership	Date of Operation	Capacity (MW)	Power/Fuel Type
Antelope Valley	Mercer County, ND	100	Unit 1: 1984 Unit 2: 1986	Unit 1: 450 Unit 2: 450	Steam electric/lignite
Laramie River	Platte County, WY	42	Unit 1: 1980 Unit 2: 1981 Unit 3: 1982	697 Total	Steam electric/PRB sub-bituminous coal
Leland Olds	Stanton, ND	100	Unit 1: 1966 Unit 2: 1975	Unit 1: 222 Unit 2: 447	Steam electric/ lignite
Spirit Mound	Vermillion, SD	100	Unit 1: 1978 Unit 2: 1978	120 (net winter) 104 (net summer)	Combustion turbine/oil
George Neal[1]	Sioux City, IA	0	1979	33 (purchased)	Steam electric/ sub-bituminous coal
Hartzog	Campbell County, WY	100	2003	23 (net winter) 15 (net summer)	Combustion turbine/natural gas
Arvada	Campbell County, WY	100	2003	23 (net winter) 15 (net summer)	Combustion turbine/natural gas
Barber Creek	Campbell County, WY	100	2003	23 (net winter) 15 (net summer)	Combustion turbine/natural gas
Groton	Groton, SD	100	2006	95	Combustion turbine/natural gas
Earl F. Wisdom II	Spencer, IA	50	2004	80	Combustion turbine/natural gas and fuel oil
Prairie Winds	Minot, ND	100	2003	2.6	Wind turbine/wind
Prairie Winds	Chamberlain, SD	100	2002	2.6	Wind turbine/wind
Florida Power and Light Energy Wind Farms[1]	Edgeley, ND Wilton, ND Highmore, SD	0	Various	130	Wind turbine/wind
Western Area Power Administration[1]	Various locations	0	Various	279 (winter purchase)	Various
Madison[1]	South Dakota	0	Various	10	Combustion turbine/diesel
Northern Border Pipeline[1]	North Dakota (1) & South Dakota (3)	0	2006	22	Recovered energy (heat exhaust)
Total Generation Capacity (Winter)				**3,244**	
Total Generation Capacity (Summer)				**2,880**	

[1]Sources not owned by Basin Electric; power obtained through power purchase agreements to meet peaking needs.
Source: Basin Electric 2007a.

New Generation Projects

Basin Electric is currently processing permit applications to gain approval to construct the Groton Generating Station 2 (GGS2), a General Electric LMS100 turbine with an expected net summer capacity of 95 MW. GGS2 would provide additional peaking capacity, be fueled by natural gas, be co-located with the GGS1 near Groton, South Dakota, and would become operational in 2009.

Existing Transmission System

Figures 1.1-1 and 1.1-2 show Basin Electric's service territory and control areas, respectively. A discussion of the organization of, and connections among, Basin Electric's ten Control Areas is presented below.

Basin Electric serves its members in Area 1 (Montana) by transferring power across the Miles City Direct Current Tie from its resources in its Eastern system. Basin Electric has transfer rights across the Miles City Direct Current Tie in the east to west direction from Area 5 to Area 1 but not in the opposite direction. Area 2 (Sheridan area) is also served across the Miles City Direct Current Tie and then transmitted through PacifiCorp's system. Area 3 (Northeast Wyoming) is served from Area 4 (Laramie area) and is transmitted across a 240 MW path from south to north; the transfer capacity of this path is currently at its maximum. Larger power transfers exceeding 240 MW come across the Rapid City Direct Current Tie. Area 3 also has some peaking resources at Hartzog, Arvada, and Barber Creek that it can utilize. Area 4 is served by the Laramie River Station West side resources. Area 5 (Integrated System [IS], within the North Dakota export [NDEX] constraint), Area 6 (IS, outside NDEX constraint), Area 7 (Nebraska Public Power District [NPPD] control area), Area 8 (Otter Tail Power Company [OTP] control area), Area 9 (Northern States Power Company [NSP]/Green River Energy [GRE] control area), and Area 10 (Mid-America Energy Company [MEC] control area) are served with Basin Electric's resources in the Eastern system. Currently, there is no capability for moving power from Area 3 north to Area 2. This constraint is called the TOT4b constraint and is the reason Area 2 is served by the Eastern system across the Miles City Direct Current Tie.

The Miles City Direct Current Tie connects the Eastern and Western transmission grid near Miles City, Montana. Basin Electric owns 40 percent of the facility, and Western Area Power Administration (Western) owns the remaining 60 percent. Basin Electric has all of the transmission rights across the 200 MW tie in the east-to-west direction, with a portion needing to be held for reserve response in the MAPP region. Western has all of the transmission rights in the west-to-east direction.

The Stegall Direct Current Tie is owned by Tri-State Generation and Transmission Association, Inc., a Basin Electric member located in Thornton, Colorado; however, Basin Electric has all of the contractual rights across the tie. The tie has 110 MW of transfer capability in both directions.

The Rapid City Direct Current Tie was placed in commercial operation on October 21, 2003. The tie is jointly owned by Basin Electric and Black Hills Power & Light. It connects the eastern and western transmission grids together just south of Rapid City, South Dakota. It was built to serve load growth of member cooperatives and to ensure system reliability. The tie is capable of transferring 200 MW in either direction; Basin Electric owns 65 percent of the facility and therefore can transfer up to 130 MW in either direction.

The Carr Draw Substation is an existing 230-kV substation in northeastern Wyoming built by Basin Electric to help Powder River Energy Corporation (PreCorp) serve new coal bed methane (CBM) load in the region. The substation was energized in 2005. The Carr Draw-Teckla Transmission Line is an existing 230-kV line in northeastern Wyoming also built by Basin Electric to serve new PreCorp CBM load in the region. The line was completed in 2005.

New Transmission Projects

The Hughes Transmission Line is a 230-kV line proposed by Basin Electric in northeastern Wyoming to ensure system reliability and load-serving capability. With this new line, the TOT4b constraint could potentially be moved further north and help serve additional member load in the region, resulting in fewer transfers across the Miles City Tie. The Hughes Transmission Line is scheduled to be completed by January 2009.

1.2.4 Estimated Electric Loads of Cooperative Member Systems

This section discusses Basin Electric's recent member sales (Table 1.2-2) and Basin Electric's RUS-approved load forecast for its system (Table 1.2-3). This forecast was submitted to RUS in May 2005 and was approved in June 2005 (Basin Electric 2005a).

Recent Basin Electric Member Sales and Load Growth Factors
Basin Electric must provide power to its member cooperatives, many of which have no power supplies other than what they obtain from Basin Electric. In the next several decades, Basin Electric projects that demands for electricity will grow due to increased numbers of residential (includes both urban and farm) and commercial/industrial customers (Basin Electric 2006a; Basin Electric 2006b). There are also several minor contributors to system load, including irrigation and various municipal users. Basin Electric used recent historic usage as the primary tool for load forecasting (Basin Electric 2005a).

Table 1.2-2 shows Basin Electric's Class A and D member energy sales and peak member demand from 1999 through 2004. Class A members are G&T cooperatives and distribution cooperatives that have long-term wholesale power contracts with Basin Electric. Eight wholesale G&T cooperatives and ten distribution cooperatives are Class A members of Basin Electric. The G&T systems, in turn, provide wholesale power to electric retail distribution systems. Class D members purchase power from Basin Electric on different base rates than the full Class A members' rate.

Table 1.2-2 – Recent Member Sales

Year	Peak(MW)	Class A(MWh)	Class D(MWh)	Total(MWh)
1999	1,195	6,500,460	37,852	6,538,312
2000	1,271	7,316,974	52,227	7,369,201
2001	1,380	7,735,256	48,754	7,784,010
2002	1,480	8,614,601	74,901	8,689,502
2003	1,526	9,007,853	146,728	9,154,581
2004	1,554	9,516,762	122,192	9,638,954
Average Annual Increase	**72**			**620,128**

Source: Basin Electric 2005a

From 1999 to 2004, system peak demand increased an average of 72 MW annually, with annual energy sales increasing an average of 620,128 MWh. The average increase in system energy sales obtained a 99 percent load factor from the average increase in peak demand, indicating that base load generation resources are needed.

Between 1999 and 2005, Basin Electric's system peak demand increased 44 percent, from 1,195 MW to 1,722 MW. The need for additional generation capacity is driven by the increasing use of electricity in Basin's Western system. This load growth is the result of several factors, including industrial growth, energy-sector (coal, oil, and gas) development, and new rural development in northeastern Wyoming and western South Dakota.

Increasing CBM development is also expected to require increasing amounts of electricity. According to the U.S. Department of the Interior, Bureau of Land Management (BLM) Powder River Basin Coal Review, coal production in the PRB is projected to increase by as much as 140 million tons per year by 2020 (lower production level) (Basin Electric 2006b). In addition, more than 30,000 new CBM wells are expected in the PRB in the next 10 years. The increase in coal production and CBM well development will spur an increase in industrial growth, thus creating additional demands for electric power (Basin Electric 2006b).

Growth is also being experienced in the residential sector. The latest load forecast projects an increase of 2,138,000 MWh in annual requirements between 2003 and 2019, an average annual increase of 4.7 percent. In the short term, an average annual increase of 11.1 percent was projected for the years 2003 to 2008. Significant load growth has also been realized in Black Hills Corporation's service territory in northeastern Wyoming and western South Dakota (Basin Electric 2006b).

Additional transmission support in the region is essential to maintaining the reliability of the Basin Electric member system and to accommodate projected load growth (Basin Electric 2006b). Basin Electric's modified load forecast was submitted to RUS in May 2005 and approved in June 2005 with the following adjustments (Basin Electric 2005a):

- Increased Minnesota Valley Electric Cooperative and Wright-Hennepin Cooperative Electric Association's new load forecasts, which were completed and submitted to Basin Electric after the approval of the 2004 Load Forecast; and
- Inclusion of 50 percent of the potential load forecast that was not included in the 2004 Load Forecast. The inclusion of 50 percent of the potential load forecast came about after contacting the membership about announced ethanol plants, energy legislation that will promote more ethanol plants, continued high energy prices that have promoted more oil- and gas-related development in the Williston Oil Basin in Montana and North Dakota and the PRB in Wyoming, and other miscellaneous probable commercial loads.

These adjustments were used in conducting the energy technology and economic analyses to determine the most feasible energy generation capable of meeting projected future growth and demand.

Basin Electric Load Forecast

Table 1.2-3 shows the demand and energy components of the summer load forecast in Basin Electric's Western and Eastern systems through 2019. For analysis purposes, load projections based on an annual compound growth rate from 2015 to 2019 were used to calculate the expected loads from 2020 to 2030.

In the Western system, the average expected increase in energy sales would result in an 84 percent load factor based on the average expected increase in peak demand. In the Eastern System, the average expected increase in energy sales would result in a 61 percent load factor based on the average expected increase in peak demand. Basin Electric's total system would, therefore, have an average expected increase in energy sales resulting in a 68 percent load factor based on the average expected increase in peak demand (Basin Electric 2005a). These electric system studies indicate that Basin Electric's member cooperatives will need additional electric generation by 2011.

Table 1.2-3 – Basin Electric Load Forecast (summer), 2006-2019

Year	Western Demand (MW)	Western Energy (MWh)	Eastern Demand (MW)	Eastern Energy (MWh)	Total Demand (MW)	Total Energy (MWh)
2006	625	4,470,614	1,366	7,398,348	1,991	11,868,962
2007	660	4,742,331	1,469	7,873,537	2,129	12,615,868
2008	698	5,014,067	1507	8,158,872	2,205	13,172,939
2009	713	5,115,313	1,557	8,454,106	2,270	13,569,419
2010	694	5,038,448	1,598	8,673,881	2,292	13,712,329
2011	793	5,689,796	1,648	8,951,843	2,441	14,641,639
2012	816	5,862,369	1,702	9,240,754	2,518	15,103,123
2013	831	5,969,998	1,741	9,449,357	2,572	15,419,355
2014	844	6,067,438	1,784	9,669,302	2,628	15,736,740
2015	864	6,208,967	1,825	9,885,956	2,689	16,094,923
2016	874	6,286,597	1,870	10,128,742	2,744	16,415,339
2017	879	6,329,697	1,911	10,339,469	2,790	16,669,166
2018	884	6,365,129	1,952	10,553,330	2,836	16,918,459
2019	892	6,425,929	1,998	10,770,460	2,890	17,196,389
Average Annual Increase	**21**	**150,409**	**49**	**259,393**	**69**	**409,802**

Source: Basin Electric 2005a

Basin Electric Capacity and Need

As presented in Table 1.2-3, Basin Electric forecasts demand on its system to grow on average 49 MW in the Eastern system and 21 MW in the Western system per year and forecasts the energy demands on its system to grow by approximately 260,000 MWh in the Eastern system and 150,000 MWh in the Western system per year between 2006 and 2019 (Basin Electric 2005a).

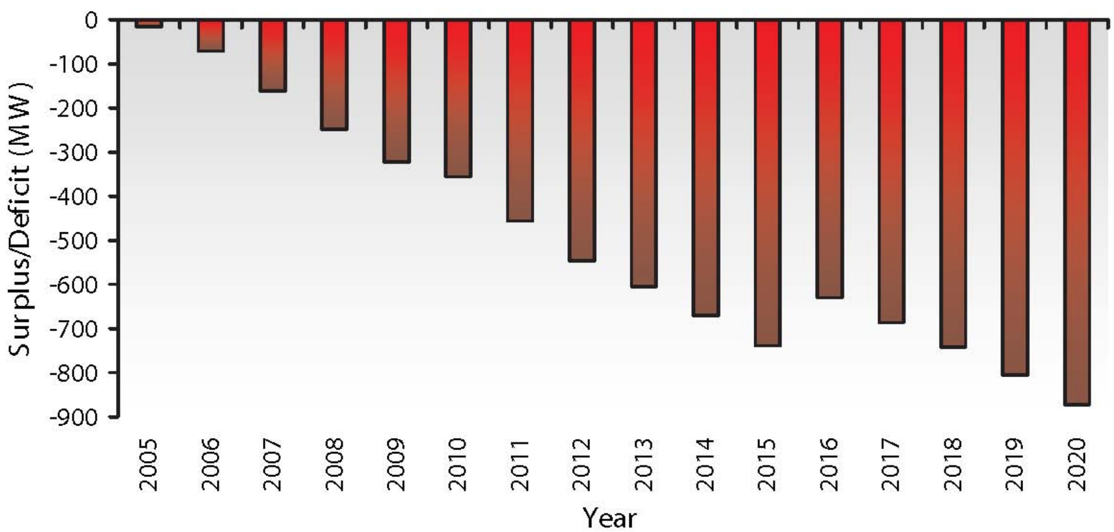
Northeastern Wyoming is a major source of sub-bituminous coal and CBM, both of which are extracted to meet energy demands in other states. The companies involved in the extraction of these energy sources use large motors and other electrically powered equipment such as draglines. These industrial-type consumptive uses require large amounts of electricity delivered on a near-continuous basis. The forecasted Western system load factor of 84 percent is indicative of the type of electrical loads served in northeastern Wyoming (Basin Electric 2005a).

Basin Electric System Projected Deficits

Figures 1.2-1, 1.2-2, and 1.2-3 depict Basin Electric's projected wholesale deficit through the year 2020 (Basin Electric 2005a). While this deficit would have to be made up in the next few years, Basin Electric seeks a low-cost solution for the long term that would ensure its ability to provide affordable, reliable, quality electric energy and related services to its member systems.

If the total system is evaluated, Basin Electric would average a growth of 69 MW and 410,000 MWh per year between 2006 and 2019, which would equate to approximately 70 percent annual load factor (Basin Electric 2005a). Figure 1.2-1 shows Basin Electric's total system load and projected capability deficit through 2020. These projections include a five percent contingency of Basin Electric's member load above the load forecast, which was approximately 115 MW in

2005. Assuming no additional generation resources are available beyond Basin's existing resources (Table 1.2-1), the system capability deficit would increase 240 percent between 2008 and 2020.



(Source: Basin Electric 2005a)

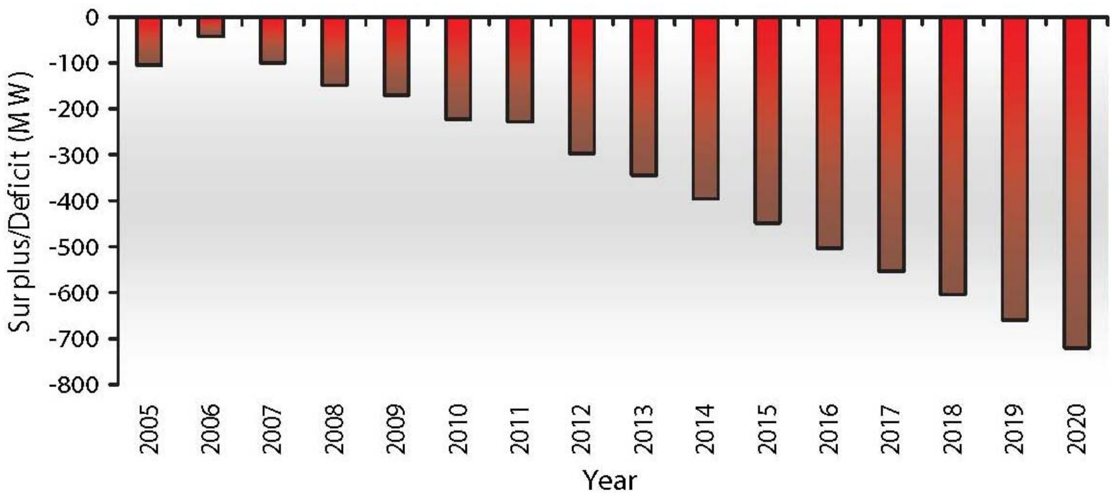
Figure 1.2-1 – Total Basin Electric System Load and Capability Deficit

Figure 1.2-2 shows Basin Electric's Eastern system load and capability deficit through the year 2020. These projections do not include potential transfers from the east to the west across the Rapid City Tie (see Section 1.2.3), but do include a five percent contingency of Basin Electric's member load above the load forecast, which was approximately 85 MW in 2005 (Basin Electric 2005a). Assuming no additional generation resources are available beyond Basin's existing resources (Table 1.2-1), the Eastern system capability deficit is projected to increase 367 percent between 2008 and 2020. Accordingly, the Eastern system would not have surplus to transfer to the Western system during periods of peak demand.

Basin Electric System Projections in Northeastern Wyoming and Laramie Area

Increasing CBM development is expected to require increasing amounts of electricity in northeast Wyoming. As discussed above, power for northeast Wyoming is currently transferred from the Laramie area and this path is at its maximum capacity.

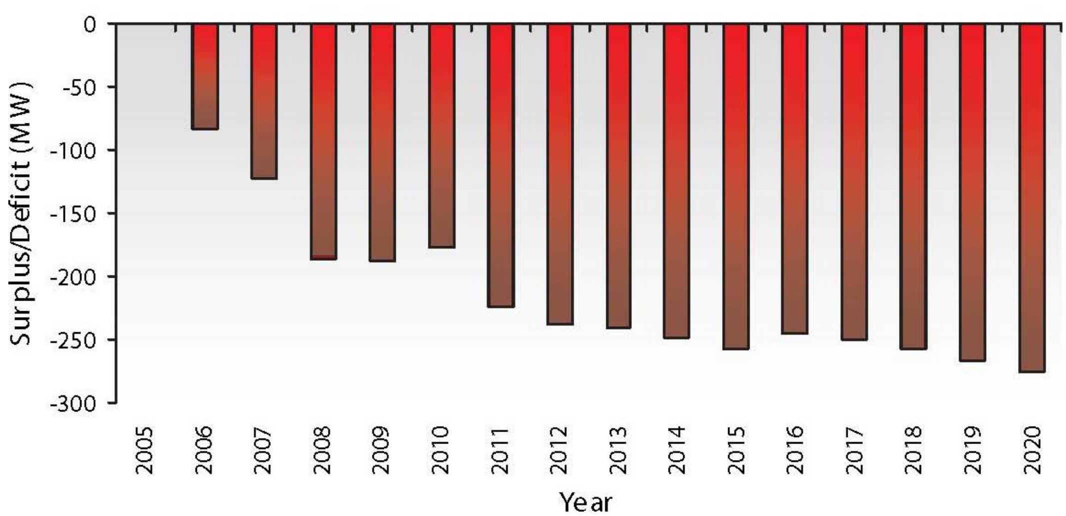
Figure 1.2-3 presents the load and capability deficit projection for northeastern Wyoming, which includes a five percent load contingency above the load forecast for Basin Electric's members. In 2005, the contingency was 16 MW, but it is projected to grow to 25 MW in 2011. Overall, Basin Electric projects that northeastern Wyoming will have a deficit in generation capacity of approximately 131 MW by 2008 and 231 MW by 2011, without considering the availability of transferring power into the Western system from the Eastern. While Basin Electric has 130 MW of rights to transfer from the Eastern system to Western, there is currently no power available to transfer (Basin Electric 2005a). Assuming no additional generation resources are available beyond Basin's existing resources (Table 1.2-1), the capability deficit would increase from approximately 130 MW in 2008 to about 280 MW in 2020.



(Source: Basin Electric 2005a)

Figure 1.2-2 – Basin Electric Eastern System Load and Capability Deficit

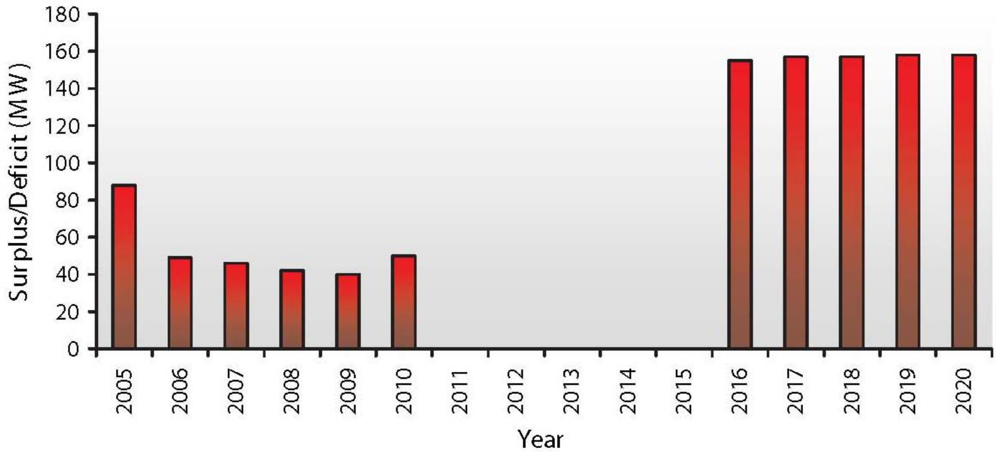
As indicated in Figure 1.2-3, approximately 150 MW of additional capacity will be needed to meet the electrical power needs in northeastern Wyoming between 2008 and 2020. Basin Electric also considered that some surpluses could be transferred to northeastern Wyoming; however, given the transmission line constraints, power would first need to be transferred from Western system to the Eastern (Basin Electric 2005a).



(Source: Basin Electric, 2005a)

Figure 1.2-3 – Basin Electric Northeastern Wyoming Load and Capability Deficit

Figure 1.2-4 shows that Basin Electric is projecting load and capability surpluses in the Laramie control area (Area 4, Figure 1.1-2) through 2020. However, Basin predicts that little or no surplus would be available between 2011 and 2015 (Basin Electric 2005a). In addition, limited transmission line capability would only allow 110 MW to be transferred at any time, which could be problematic during peak demand periods.



(Source: Basin Electric, 2005a)

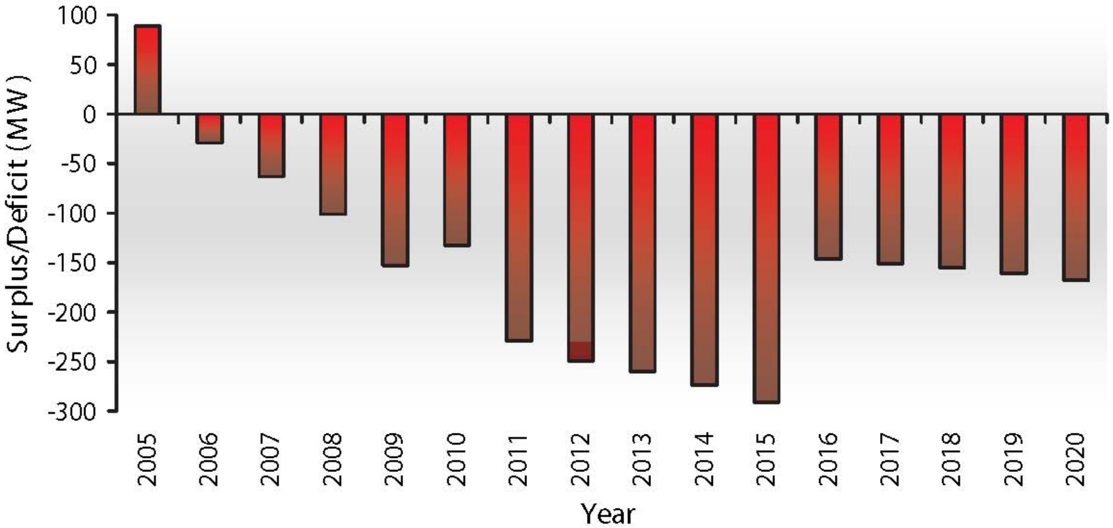
Figure 1.2-4 – Basin Electric's Laramie Area (Area 4) Load and Capability Surplus

Figure 1.2-5 shows that surpluses provided by the Laramie area would reduce the deficit loads in the short term (2005-2010), and loads would be similar to current projections in the interim years (2011-2015). While the long-term (2016-2020) load deficit is predicted to decrease by approximately 50 percent, the transfer of power from the Laramie area would not provide sufficient capacity to solve Basin Electric members' long-term power demands and needs (Figure 1.2-5) (Basin Electric 2005a).

Given the deficits forecast, Basin Electric would need to add approximately 300 MW base load capacity in 2012 to meet long-term capacity and energy supply requirements in northeastern Wyoming.

Potential Contracted Sales and Purchases

The WECC is one of ten electric reliability councils in North America, encompassing a geographic area equivalent to over half the United States. WECC is responsible for promoting electric system reliability, supporting competitive electricity markets, assuring access to the transmission grid, and providing a forum for coordinating the operating and planning activities of the western interconnected power grid. WECC's 160 members, representing all segments of the electric industry, provide electricity to 71 million people in 14 western states, two Canadian provinces, and portions of one Mexican state. The WECC region encompasses a vast area of nearly 1.8 million square miles. It is the largest and most diverse of the ten regional councils of the North American Electric Reliability Council.



(Source: Basin Electric 2005a)

Figure 1.2-5 – Basin Electric Northeastern Wyoming Load and Capability Deficit with Transfer from the Laramie Area

The Rocky Mountain Power Area is a subregion of the WECC, which consists of Colorado, eastern Wyoming, and portions of western Nebraska and South Dakota. Basin Electric would typically issue a request for proposal (RFP) to solicit bids for power purchase agreements that could be secured from an existing source of generation within the WECC. An RFP determines what options in the power supply marketplace would be available as a suitable source of electrical energy to meet its member system requirements. However, the lack of affordable generation capacity in the WECC, combined with increasing transmission constraints, has cast doubt on the future viability of purchasing capacity from existing sources of wholesale supply (Basin Electric 2005a). The WECC, of which Basin Electric is a member, has relied completely on very expensive natural gas-fired generation to meet future regional supply requirements.

Western Electricity Coordinating Council (WECC)

The U.S. bulk power system has evolved into three major networks or power grids. The WECC is one of these networks. The major networks consist of extra-high-voltage connections between individual utilities designed to permit the transfer of electrical energy from one part of the network to another. These transfers may be restricted by a lack of contractual arrangements or by inadequate transmission capability. The three networks are:

- the Eastern Interconnected System;
- the Western Interconnected System; and
- the Texas Interconnected System.

Virtually all U.S. utilities in the contiguous 48 states are interconnected with at least one other utility by these three major grids. The interconnected utilities within each power grid coordinate operations and buy and sell power among them. The bulk power system makes it possible for utilities to engage in wholesale (for resale) electric power trade. Wholesale trade has historically played an important role, allowing utilities to reduce power costs, increase power supply options, and improve reliability.

– Energy Information Administration

Fifty RFP packages were sent by Basin Electric on May 2, 2005 requesting bids for up to 200 MW of Western Systems Power Pool Schedule C Firm Capacity and Energy for the period January 1, 2007, through December 31, 2012 (Basin Electric 2005a). The RFP requested that the energy be available for 100 percent on-peak hours (assuming on-peak is six days per week for 16 hours per day) and 75 percent off-peak hours and that point of delivery be any point connecting with the Common Use System (Basin Electric 2005a). The point of receipt/point of delivery included the Wyodak, Antelope, RC West, Carr Draw, or SGW substations.

Basin Electric received nine proposals from five entities for power purchases ranging from 25 MW to 200 MW for periods between winter seasons and over three to six years. As described in the following sections, Basin Electric determined that the cost of purchasing power was more expensive than building a coal-based facility (Basin Electric 2005a).

Potential Natural Gas Power Purchase

As in much of the country, consumption of natural gas in the western U.S. has increased since the 1970s. Not only has gas continued its traditional role as the fuel of choice for residential and commercial heating, it also became the premier fuel for new electric generation. Virtually all new generation built in the region was combined- or simple-cycle gas turbines, which were easy to locate, economical, and considered "environmentally friendly."

In recent winters, the increased supply burden placed on natural gas has produced an unintended consequence. The price of natural gas is increasing, affecting not only the price of electricity produced by gas-fired generation, but also the cost to heat homes and businesses.

In general terms, rising natural gas prices are due to a number of factors, including the following:

- Strong growth in demand;
- Competing government policies that encourage use of natural gas on one hand but discourage new supplies by restricting access and development of domestic natural gas resources on the other;
- Lack of infrastructure needed to transport more natural gas to market; and
- Declining productivity of older fields. Natural gas well productivity peaked at 435 thousand cubic feet (mcf) per day in 1971 and had declined to 126 mcf per day by 2004 (GAO 2006; EIA 2007).

By 2025, nationwide demand for natural gas is expected to increase by about 40 percent (GAO 2006; EIA 2007). Prices are expected to continue to climb and stay volatile. The average residential price of natural gas rose to $14.46/mcf by 2006; the Wyoming average was $11.94/mcf (EIA 2007).

The forward price of a power purchase agreement would closely track the forward price of natural gas. In the near term, the forecast from the market is that prices will probably remain near current levels and then trend higher through summer 2007 as the electric power load picks up. The relatively low price for winter 2006 reflects high gas storage inventories resulting from warm weather. Forward prices for winter 2007 were forecast 30 percent to 40 percent higher than current prices. In future years, forward prices anticipate slightly lower prices each year, with recurring peaks in the winter. With the price volatility of natural gas, plus the fact that the increasing cost of natural gas-fired generation constitutes the future marginal cost for wholesale electric energy and related supply services, the price Basin Electric would pay for power supply might be nearly double its current costs. Given this much greater cost and the difficult or intractable related transmission issues, negotiating an acceptable natural gas power purchase agreement does not appear to be a viable option.

Generation Alternatives Evaluated to Serve Load Base

As detailed in Section 1.2.3 and Table 1.2-1, Basin Electric owns no base load generation in northeastern Wyoming or western South Dakota and meets its wholesale power requirements through the generation of electricity outside of the region.

> In May 2005, based on a revised load forecast for Basin Electric's member cooperatives, the net plant output for the new coal unit was increased to a range of approximately 350 MW or slightly larger. The technology and economic comparison at the increased rating was found to be virtually identical to the 250 MW case design (Basin Electric 2005a).

Per RUS requirements, Basin Electric conducted an Alternative Evaluation Study to determine the most appropriate way to meet its projected need for additional generation capacity. The study focused on current progress in alternative renewable and fossil fuel-based technologies. This study also evaluated the different generation technologies and the alternatives to constructing a new generation facility, including energy conservation, demand-side management, and purchasing power from other utilities.

Table 1.2-4 compares alternative generation technologies examined in the Alternative Evaluation Study. As shown in Table 1.2-4, a number of alternative generation technologies were eliminated from detailed analysis because they did not meet Basin Electric's purpose of and need for the project. Discussions of the alternative generation technologies eliminated from further detailed analysis are presented in Chapter 2 and Appendix A.

The analysis concluded that, of the alternatives considered, a new coal-fired power plant using either pulverized coal (PC) or circulating fluidized bed (CFB) technology would be the best alternative to meet the purpose and need. Integrated gasification combined cycle (IGCC), a third coal-based technology, was evaluated but did not meet all aspects of the purpose and need for the project, as discussed below. None of the other alternatives provided the required base load generation that was as economically and technically feasible as coal-fired generation.

Electric generation from coal is more cost effective than the other alternatives evaluated because of its stability and reliability as a fuel source and because it is cheaper to use. While a power plant fueled by natural gas would be less expensive to construct, the cost volatility over time makes the natural gas option less attractive when evaluated against the proven coal-based technologies such as PC and CFB boilers, and the demonstration IGCC power plants (Basin Electric 2005a).

Key Considerations for Selecting a Coal Technology

The basis for this evaluation is a base load, mine-mouth, coal-fired power plant using collocated PC, CFB, or IGCC technology. The facility would operate with a minimum 85 percent capacity factor and 90 percent availability. The generation technology chosen for this project must be capable of meeting these criteria. Coal-based power generation technology selected for this project must be capable of meeting the following desired characteristics:

- Provide sufficient base load capacity;
- Meets social and environmental compliance and/or statutory requirements;
- Have high reliability and availability;
- Be a commercially available and proven technology; and
- Be cost effective.

A summary of each of these characteristics is provided below.

Table 1.2-4 – Comparison of Alternative Power Generation Technologies

	Capacity Needs	Base Load Operation	Cost Effective	Fuel Cost Stability	Reliable Technology	Available in Northeast Wyoming	Meets All Criteria
Energy Conservation & Efficiency	No	No	No	Yes	Yes	No	No
Wind	Yes	No	Yes	Yes	Yes	No	No
Solar	No	No	No	Yes	Yes	No	No
Hydroelectric	No	No	Yes	Yes	Yes	No	No
Geothermal (Electric Generation)	No	Yes	No	Yes	Yes	No	No
Biomass	No	Yes	No	Yes	Yes	No	No
NG Simple Cycle	Yes	Yes	No	No	Yes	Yes	No
NG Combined Cycle	Yes	Yes	Yes	No	Yes	Yes	No
Microturbine	No	Yes	No	No	Yes	Yes	No
Nuclear	Yes	Yes	No	Yes	Yes	No	No
Oil	No	No	No	No	Yes	Yes	No
Coal	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Repowering/Uprating Existing Resource	No	No	NA	NA	Yes	No	No
Participation in Another Utility's Generation Project	No	Yes	Yes	Yes	Yes	No	No
Purchased Power	No	Yes	No	No	Yes	No	No
Transmission Capacity*	No	Yes	No	NA	Yes	No	No

*For import of power from outside service area
NG: Natural gas
Source: Basin Electric 2005a

Baseload Capacity Generation

PC and CFB technologies are capable of achieving an 85 percent annual capacity factor and are suitable for base load capacity. The IGCC technology is capable of achieving an 85 percent annual capacity factor for a base load unit only by adding redundant backup systems or using natural gas as a backup fuel for the combustion turbine combined-cycle part of the plant.

Social and Environmental Compliance and Statutory Requirements

Siting for a plant regardless of the technology used requires identifying the characteristics of the natural and human environment that could potentially be affected by plant construction, operation, and maintenance. The siting process requires identifying opportunities and constraints with the fewest overall social and environmental impacts. Using this approach minimizes the cost of implementing and constructing a new power plant and associated infrastructure (Basin Electric 2005b). Some of the key considerations include the relationship of the site to floodplains and other surface water drainages, ecologically sensitive areas (e.g., wildlife habitat, erosive soils, wetlands), visual sensitivity, compatibility with current and adjacent land use, and socioeconomic impacts (e.g., worker housing, tax revenue).

PC and CFB technology generate more air emissions and wastewater than IGCC technology. However, all three technologies use dry cooling and zero discharge (i.e. reuse of waste water) to reduce overall water consumption and discharge. Permitting requirements would also be similar to reduce storm water and contain accidental spills. All other effects on the human and natural environment, including the physical location of the plant, change in land use, potential displacement of wildlife, and socioeconomic impacts would be similar.

Commercially Available and Proven Technology
PC technology is commercially available and proven for PRB coal. The CFB technology has been commercially demonstrated for bituminous, low-sodium lignite, and anthracite waste coals; however, long-term commercial operation with PRB coal has not been demonstrated.

IGCC technology is still under development and is not expected to be developed for full commercial use before 2015.

High Reliability
Both PC and CFB technologies have demonstrated high reliability.

IGCC technology has demonstrated very low reliability in the early years of plant operation. Improved reliability has been demonstrated recently after design and operation changes were made to the facilities. However, the availability of IGCC units is still much lower than PC and CFB units.

Cost-Effectiveness
PC technology is the most cost-effective technology for a new 385 MW (net) PRB coal power plant in northeastern Wyoming. A PC unit will have the lowest capital and operation and maintenance (O&M) costs of all three technologies evaluated.

Compared to a PC unit, the CFB technology would have a slightly higher capital cost but lower O&M costs.

The IGCC technology would have much higher capital and O&M costs compared to both the PC and CFB technologies.

Economic Comparison

Economic Criteria
The major economic criteria used for the cost evaluation of the PC, CFB, conventional IGCC, and ultra-low emission IGCC cases are listed in Table 1.2-5.

Table 1.2-5 – Coal Plant Economic Evaluation Criteria[1]

Criteria	PC	CFB	Conventional IGCC	Ultra-Low Emission IGCC
Net Plant Output (MW)[2]	273 MW	273 MW	273 MW	273 MW
Net Plant Heat Rate (British thermal unit per kilowatt hour [kWh])	10,500	10,800	10,500	10,500
Annual Plant Capacity Factor (%)	85% Coal	85% Coal	15% Natural Gas, 70% Coal	15% Natural Gas, 70% Coal
Interest Rate	6.0%	6.0%	8.0%[3]	8.0%[3]
Discount Rate	6.0%	6.0%	6.0%	6.0%
Capital Cost Recovery Period	42 years	42 years	42 years	42 years
Plant Economic Life	42 years	42 years	42 years	42 years
Fixed O&M Cost (dollar per kW year)	38.33	34.50	50.00	52.50
Non-Fuel Variable O&M Costs (dollar per kWh)	0.0027	0.0025	0.0020	0.0021
Coal Cost ($/MMBtu)	0.35	0.35	0.35	0.35
Natural Gas Cost ($/MMBtu)	7.50	7.50	7.50	7.50

Source: Basin Electric 2005a
[1]Equivalent to a 350 MW plant; [2]Annual Average; [3]Higher rate for IGCC due to risk

Economic Analysis Summary

The overnight capital costs and life-cycle economic analysis for the PC, CFB, conventional IGCC, and ultra-low emission IGCC cases are shown in Table 1.2-6. The net present value (NPV) for the PC, CFB, conventional IGCC, and ultra-low emission IGCC cases was calculated based on the 6.0 percent discount rate and annual cash flows for a plant economic life of 42 years.

The total first-year costs for the PC case is $55.6 million versus $55.3 million for the CFB case. The higher CFB unit annual debt service is offset to a greater degree by the lower annual fixed O&M and non-fuel variable cost compared to a PC unit. The total first-year costs for the conventional IGCC and ultra-low emission IGCC cases are $97.5 million and $100.4 million, respectively.

The NPV for the PC case is $961 million, versus $950 million for the CFB case over the 42 year economic life of the plant. The NPV for the conventional IGCC and ultra-low emission IGCC cases are $1.80 billion and $1.85 billion, respectively.

The largest life-cycle cost driver for all of the four cases is the debt service for the capital cost of the plant. The annual debt service cost was calculated based on financing 100 percent of the plant capital cost for 42 years at an annual interest rate of 6.0 percent for the PC and CFB cases and at 8.0 percent for the IGCC cases. The interest rate for the IGCC cases is higher due to the greater project risk for an IGCC plant.

In addition to capital cost and annual debt service, the other large cost differential between the PC and CFB cases and the two IGCC cases is the natural gas usage. Both PC and CFB are mature technologies that can meet the 85 percent annual capacity factor for the project. IGCC technology has not demonstrated annual capacity factors over 70 percent and must use natural gas as a secondary fuel for the turbines to make up the additional 15 percent necessary for the proposed project.

Table 1.2-6 – Economic Analysis Summary for Combustion Technology Options

Costs	Cost ($ Million)			
	PC	CFB	Conventional IGCC	Ultra-Low Emission IGCC
Capital Cost	482	497	578	602
Fixed O&M Cost	10.7	9.6	13.9	14.6
Non-Fuel Variable Cost	5.6	5.2	4.1	4.4
Coal Cost	7.6	7.8	6.5	6.5
Natural Gas Cost	0.0	0.0	24.7	24.7
Total First Year Operating Cost	23.9	22.6	49.3	50.2
First Year Debt Service	31.7	32.6	48.2	50.2
Total First Year Cost	55.6	55.3	97.5	100.4
Net Present Value (NPV)	961	950	1,803	1,851
Total Pollutant Emissions (Tons per year)*	3,657	3,981	1,491	804
Incremental Pollutants Removed (Tons)	Base	-324	2,166	2,853
Incremental First-Year Control Cost (dollar per Ton Pollutants Removed)	Base	987	19,323	15,692

*Based on sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compound (VOC), and particulate matter less than 10 microns in diameter (PM_{10}) pollutants removed.
Source: Basin Electric 2005a; Basin Electric 2005b; Basin Electric 2006a; Basin Electric 2006b

As a result of this analysis, it was determined that the technology best suited to meet the project need is a facility utilizing the latest generation of air pollution control (APC) technology with a PC boiler. A PC unit with state-of-the-art emission control equipment offers performance that exceeds the proven capabilities of CFB or IGCC systems.

Summary and Conclusions

This technology evaluation was conducted to address the advantages and limitations of PC, CFB, and IGCC coal-based power generation technologies for the new Dry Fork Station. The evaluation addressed the capability of each technology to fulfill the need of the project based on technical, reliability, commercial, and economic evaluation criteria.

Pulverized coal technology would best meet Basin Electric’s purpose and need, based on its ability to achieve the necessary base load capacity using a commercially available and proven technology for PRB coal. PC technology also has a high level of reliability and would be the most cost-effective technology for northeastern Wyoming. Implementing present-day power plant design features, using best management practices, and implementing mitigation measures during construction, operation, and maintenance would eliminate or reduce the significant effects on the human and natural environment.

Circulating fluidized bed technology meets Basin Electric’s purpose and need but lacks demonstrated long-term operating experience on PRB coal and, in the final analysis, would be more costly.

Current IGCC technology does not meet the requirement for a high level of reliability and long-term, cost-effective, and competitive generation of power identified Basin Electric’s purpose and need. In addition to higher capital costs, there are the issues of unacceptable availability and reliability. Current approaches to improving reliability in these areas result in less-efficient facilities, negatively impacting cost-effectiveness. DOE has a Clean Coal Technology program that aims at providing clean coal power generation alternatives, including improving the cost competitiveness of IGCC, however, the current DOE timeframe of 2015 for constructing and operating IGCC plants does not support Basin Electric's needs.

1.3 AUTHORIZING ACTIONS

This section lists applicable statutes, regulations, and Executive Orders (EO) that would be applicable to the Dry Fork Station and Hughes Transmission Line; permits and approvals that would be needed for the project to proceed; and consultations that have been conducted with other governments, agencies, companies, and organizations through development and analysis of the proposed project.

1.3.1 Applicable Statutes, Regulations, and Executive Orders

The following statutes, regulations, and EOs would be applicable to the proposed Dry Fork Station and Hughes Transmission Line, based on a review of the proposed project and RUS regulations.

Laws

- National Environmental Policy Act of 1969 (NEPA), as amended;
- Endangered Species Act of 1973 (ESA), as amended;
- Migratory Bird Treaty Act of 1918 (MBTA), as amended;
- Bald and Golden Eagle Protection Act of 1940 (BGEPA);
- National Historic Preservation Act (NHPA), as amended;
- Clean Air Act (CAA), as amended;
- Clean Water Act (CWA), as amended;
- Farmland Protection Policy Act (FPPA), as amended;
- Federal Lands Policy and Management Act (FLPMA) of 1976, as amended; and
- Native American Graves Protection and Repatriation Act (NAGPRA).

Regulations

- Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508);
- USDA RUS Environmental Policies and Procedures (7 CFR Part 1794);
- Interagency Cooperation, Endangered Species Act of 1973, as amended (50 CFR 402);
- Protection of Historic Properties (36 CFR Part 800);
- CAA and implementing regulations;
- National Pollutant Discharge Elimination System (NPDES) permitting requirements; and
- Wetlands and Waters of the U.S. permitting under Section 404 of the CWA.

Executive Orders

- EO 11514, Protection and Enhancement of Environmental Quality;
- EO 11593, Protection and Enhancement of the Cultural Environment;
- EO 11988, Floodplain Management;
- EO 11990, Protection of Wetlands;
- EO 13112, Invasive Species;

- EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations;
- EO 13045, Protection of Children; and
- EO 13175, Consultation and Coordination with Indian Tribal Governments.

1.3.2 Land Use Planning and Plan Conformance

Although the proposed Dry Fork Station would be sited on private land, the mineral interests are located within the area managed by BLM's Buffalo Field Office (BFO). BLM's principal authority for managing public lands is the FLPMA. BLM approved the Buffalo Resource Management Plan (RMP) in April 2001, and the RMP provides the management guidance for the BFO. Portions of the Federal minerals under the proposed Station site are subject to current coal leases held by Western Fuels Corporation as part of their Dry Fork Mine holdings, but no mineral development is currently proposed at the site.

The Station would be constructed in an unincorporated part of Campbell County. Because the Station would conform to the Campbell County 1994 Comprehensive Plan it would not require any additional County review other than notifying the Campbell County Planning Department.

The proposed Hughes Transmission Line would cross seven isolated parcels totaling 1.22 miles of public land in Sheridan and Campbell Counties, Wyoming, administered by the BLM BFO. The transmission line would also be subject to the management guidance contained in the BLM Buffalo RMP.

The transmission line would be constructed within the unincorporated areas of Sheridan and Campbell Counties. The transmission line conforms to the 2000 Sheridan County Growth Management Plan, the 1985 Sheridan County Zoning Resolution, and the Campbell County Comprehensive Plan. Notification to the Sheridan County Planning Department has been undertaken as part of the sitting process.

1.3.3 Permits and Approvals (Federal, State, County, Local, and Tribal)

Table 1.3-1 summarizes the permits and approvals that would be applicable to the Dry Fork Station and Hughes Transmission Line. The applicable permits and approvals and the actions that will be taken to comply with them are discussed in detail in the appropriate resource sections in Chapters 3 and 4.

1.3.4 Key Agencies, Roles, Responsibilities, and Decisions

USDA Rural Utilities Service
Basin Electric has applied to RUS for a loan guarantee for G&T borrowers' lending to construct this facility. The Federal Financing Bank (FFB) provides the actual loan dollars, and RUS guarantees the repayment of the money to FFB.

Table 1.3-1 – Summary of Federal, State, County, Local, and Tribal Permits and Approvals for the Basin Electric Dry Fork Station and Hughes Transmission Project

Jurisdiction	Permit/Decision/Action	Dry Fork Station	Hughes Transmission Line
Federal			
Rural Utilities Service (RUS)	Title 7 CFR Part 1794 and NEPA	X	X
US Department of the Interior, BLM	BLM Standard Form 299, Application For Transportation and Utility Systems and Facilities on Federal Lands	X	X
	Federal Land Policy and Management Act (FLPMA)	X	X
US Environmental Protection Agency (USEPA)	Clear Air Act	X	
Federal Aviation Administration (FAA)	Title 14 CFR, Part 77, Objects Affecting Navigable Airspace Application	X	
US Army Corps of Engineers (USACE)	Section 404 of the Clean Water Act / Nationwide Permit 12	X	X
US Fish and Wildlife Service (USFWS)	Section 7 (of the Endangered Species Act) Consultation	X	X
	Migratory Bird Treaty Act	X	X
	Bald and Golden Eagle Protection Act	X	X
Nuclear Regulatory Commission	Licensing for instrumentation and gauges used during operations containing radioactive materials	X	
Wyoming			
Wyoming Department of Environmental Quality (WDEQ)	Wyoming Industrial Development Information and Siting Act (Industrial Siting Council) Permit	X	
	Prevention of Significant Deterioration for Criteria Pollutants, Wyoming Air Quality Standards and Regulations	X	
	National Pollution Discharge Elimination System (NPDES) Temporary Construction Permit, Wyoming Water Quality Act	X	X
	Large Construction General Storm Water Permit (WYR10-0000) and Storm Water Pollution Prevention Plan, Wyoming Water Quality Act	X	X
	Clean Water Act Section 401 Water Quality Certification, Wyoming Water Quality Act	X	X
	Title IV of the Clean Air Act Acid Rain Permit, Wyoming Air Quality Standards and Regulations	X	
	Title V of the Clean Air Act Operating Permit, Wyoming Air Quality Standards and Regulations	X	
	Industrial Landfill Permit, Wyoming Solid Waste Management Act	X	
	Industrial Wastewater Permit, Wyoming Water Quality Act	X	
	Sanitary Wastewater Permit, Wyoming Water Quality Act	X	

Table 1.3-1 – Summary of Federal, State, County, Local, and Tribal Permits and Approvals for the Basin Electric Dry Fork Station and Hughes Transmission Project (continued)

Jurisdiction	Permit/Decision/Action	Dry Fork Station	Hughes Transmission Line
Wyoming (continued)			
	Construction Storm Water Discharge Permit, Wyoming Water Quality Act	X	
Wyoming State Engineer	Water Supply Appropriation	X	
	Well Permit	X	
Wyoming Department of Transportation (WYDOT)	Access Permit	X	X
Wyoming State Historic Preservation Office (SHPO)	Determination of Compliance with the National Historic Preservation Act (NHPA) Section 106	X	X
County, Local, and Tribal			
Campbell County Planning Department	1994 Campbell County Comprehensive Plan	X	X
Sheridan County Planning Department	2000 Sheridan County Growth Management Plan and 1985 Sheridan County Zoning Resolution		X

Source: Basin Electric 2006a, 2006b

Under the authority of the Rural Electrification Act of 1936, RUS makes direct loans and loan guarantees to electric utilities to serve customers in rural areas. Among other things, these loans and loan guarantees finance the construction of electric distribution, transmission, and generation facilities, as well as demand side management, energy conservation programs, and on-grid and off-grid renewable energy systems. Loans are made to corporations, states, territories and subdivisions, and agencies such as municipalities, citizen utility districts, and cooperatives, and nonprofit, limited-dividend, or mutual associations that provide retail electric service needs to rural areas or that supply the power needs of distribution borrowers in rural areas.

RUS has established procedures for determining if proposed projects for which loans are sought are feasible from an engineering and financial perspective. Funding is contingent upon the completion of all environmental review and loan requirements; RUS's action is the decision whether or not to finance the proposal. As part of the loan application process and prior to preparing this EIS, Basin Electric was required to prepare three studies: an Alternative Evaluation Study, a Site Selection Study, and a Macro-Corridor Study (7 CFR 1794.51(c)). These three studies form the foundation of a prospective RUS borrower's proposal and in turn provide a large portion of the information used in preparation of this EIS. These studies were available to the public prior to the scoping meetings held in Sheridan and Gillette, Wyoming.

U.S. Army Corps of Engineers

The proposal identified 1.53 acres of wetlands within the 353-acre project area. The U.S. Army Corps of Engineers (USACE) is the permitting authority for the removal and fill of wetlands. Basin Electric conducted a wetland delineation indicating that the Dry Fork Station would not impact wetlands within the proposed project area. The USACE approved the jurisdictional delineation, and Basin Electric received concurrence on September 9, 2005.

Wetlands occur within the Hughes Transmission Line right-of-way (ROW). Based on field investigations, these wetlands could be spanned and avoided during project construction. If structures would need to be placed in wetlands, formal delineation of these areas would occur, and the necessary permits would be obtained from the USACE.

Bureau of Land Management
The project study area includes public lands administered by the BLM BFO in Sheridan and Campbell Counties, Wyoming. The reference centerline for the proposed Hughes Transmission Line would cross seven isolated parcels of BLM land for a total of 1.22 miles. The BLM BFO developed the Buffalo RMP, completed in October 1985 and amended it in April 2001, to implement FLPMA. The Buffalo RMP encompasses BLM-administered lands and minerals in Sheridan, Johnson, and Campbell Counties in northeastern Wyoming.

Wyoming Department of Environmental Quality
The Wyoming legislature has passed statutes and regulations defining the agency's authority under the Wyoming Environmental Quality Act, Wyoming Statutes (WS) 35-11-101 through 35-11-1507 and The Industrial Siting Act, WS 35-12-101 through 34-12-119. The Wyoming Department of Environmental Quality (WDEQ) is charged with administering the policy and purpose of these acts, including air quality, water quality, solid and hazardous wastes, and the siting of industrial facilities. The WDEQ is required to evaluate the permits, certificates, and license applications submitted by Basin Electric under the following major laws and regulations:

- **Wyoming Air Quality Standards and Regulations** are promulgated through Chapter 11, Article 2 of the Wyoming Environmental Quality Act. The regulations focus on the ambient standards, general emission standards, national emission standards, permitting requirements, monitoring regulations, visibility impairment/particulate matter (PM) control, National Acid Rain Program, and emission controls to comply with state air quality standards and regulations. Basin Electric must demonstrate that the proposed action would meet these compliance standards and regulations before receiving an operation permit for the Dry Fork Station. The construction permit application is currently under review;
- **Wyoming Water Quality Act** (75-5-101 *et seq.,* MCA) regulates the discharge of pollutants into state waters through the adoption of water quality standards and the permit application process. Water quality standards specify what changes in water quality are allowed during the use of state waters and establish a basis for wastewater and storm water discharge permitting. This Act also includes the provisions for short-term waivers for turbidity during construction and Section 401 Certification; and
- **Wyoming Solid Waste Management Act** (75-10-201 *et seq.*, MCA) regulates the disposal of solid wastes. Basin Electric has applied to the WDEQ Solid Waste Division for the disposal of coal combustion by-products.

1.4 PUBLIC PARTICIPATION

This section summarizes the scoping and other public participation activities conducted for the Dry Fork Station and Hughes Transmission Line. More detailed information on scoping and interactions with the public can be found in the Scoping Document (Basin Electric 2006c and Appendix A).

Basin Electric began public participation activities for the Hughes Transmission Line in June 2005. Formal RUS scoping for the transmission line was combined with scoping for the Proposed Dry Fork Station in November 2005, when the two projects were determined to be connected actions under NEPA.

1.4.1 Public Scoping Process

Public scoping for the proposed project included the following objectives:

- Ensure that the community is fully informed of the proposed projects, site selection, and subsequent permitting processes; and
- Solicit public input and identify any important issues for analysis in the EIS.

A Notice of Intent (NOI) to Prepare an EIS for both the proposed Dry Fork Station and Hughes Transmission Line was published in the Federal Register on November 9, 2005 (Appendix A). The NOI included information on public scoping meetings which were held on December 6 and 7, 2005, in Sheridan and Gillette, Wyoming, respectively, from 4 pm to 7 pm.

A list of approximately 40 stakeholders, including agencies, government representatives, Indian Tribal leaders, and other interested parties was developed. These stakeholders were individually notified of the dates and locations of the scoping meetings through an invitation mailed approximately ten days prior to the meetings.

Landowners were invited to the scoping meetings through mass media and postings in local public libraries. A press release was distributed to local newspapers and broadcast media before publication of any advertisements. Scoping meetings were announced using advertisements in local newspapers (The Gillette News-Record and The Sheridan Press) and on local radio stations (KROE-AM, KYTI-FM, and KGWY-FM).

The meetings were conducted in an open house format that enabled stakeholders to talk one-on-one with project representatives about particular issues or concerns associated with specific alternatives. Comment forms were available at the meetings to record input, and a public website was established to allow for electronic comments and posting of public meeting materials.

Ninety-three people signed in at these public scoping meetings. Landowners with agricultural or residential land were the primary attendees. Twenty-five comment forms, letters, or website comment submittals were received from the public. An additional ten letters or website comment submittals were received from agencies or government entities.

1.4.2 Agency and Government Coordination

Over 60 government and agency representatives were notified before formal announcement of the proposed project (Table 1.4-1). Representatives from Basin Electric participated in numerous informative meetings and presentations, served on committees, and actively sought out potentially affected municipalities, counties, state agencies, and other stakeholders to ensure they were informed and had the opportunity to offer their input into the projects and their processes. Basin Electric conducted 84 meetings with 59 governmental agencies and other organizations as part of this effort.

Table 1.4-1 – Coordination with Federal and Wyoming State Agencies, Tribes, Municipalities and Local Governmental Agencies, Private Individuals, Organizations, and Companies

Federal Agencies	
US Army Corps of Engineers, Wyoming Regulatory Office, Omaha District	
US Bureau of Land Management, Buffalo Field Office	
US Bureau of Land Management, Wyoming State Office	
US Environmental Protection Agency, Region 8	
US Fish and Wildlife Service, Cheyenne Field Office	
US Forest Service, Thunder Basin National Grassland	
US National Park Service, Intermountain Region Office	
US Natural Resource Conservation Service	
Wyoming State Agencies	
Wyoming Department of Health	Wyoming Public Service Commission
Wyoming Department of Revenue	Wyoming Rural Electric Association
Wyoming Department of Transportation	Wyoming State Emergency Response Commission
Wyoming Department of Workforce Services	Wyoming State Engineer's Office
Wyoming Game and Fish Department	Wyoming State Geological Survey
Wyoming Industrial Siting Council	Wyoming State Historic Preservation Office
Wyoming Office of Consumer Advocate	Wyoming State Legislature
Wyoming Office of the Governor	Wyoming Workforce Services
Wyoming Partnership Office of Fannie Mae	
Tribes	
Northern Cheyenne Tribal Council	
Ogallala Lakota Tribal Council	
Shoshone and Arapahoe Joint Tribal Business Council	
Municipalities and Local Governmental Agencies	
City of Gillette Planning Commission	Town of Buffalo
City of Sheridan	Town of Douglas
Converse Area New Development Organization	Town of Glenrock
Converse County Commissioners	Town of Hulett
Crook County Commissioners	Town of Moorcroft
Gillette CAM-PLEX	Town of Newcastle
Johnson County Commissioners	Town of Pine Haven
Johnson County Economic Development Group	Town of Sundance
Sheridan County Commissioners	Town of Upton
Sheridan County Planning Commission	Town of Wright
	Weston County
Private Individuals, Organizations, and Companies	
KFx, Inc.	Wallick and Volk (mortgage company)
Powder River Energy Corporation	Wyoming Rural Electric Association
Union Representatives	

An agency scoping meeting was held on December 7, 2005, in Gillette, Wyoming. This meeting was designed to address the specific issues and concerns of each Federal, state, and local agency potentially affected by the proposed projects. Details regarding the content and outcome of this meeting can be found in the Scoping Document (Basin Electric 2006c and Appendix A).

1.4.3 Tribal Consultation

Although there are no tribal lands in the project study area, neighboring Indian Tribal leaders from the Wind River Reservation in Wyoming (Shoshone and Arapahoe Joint Tribal Business Council), the Northern Cheyenne Reservation in Montana (Northern Cheyenne Tribal Council), and the Pine Ridge Reservation in South Dakota (Ogallala Lakota Tribal Council) were provided with copies of all scoping documents and materials. These Indian Tribal leaders were included in the list of agencies and governments contacted for the proposed projects and were invited to the agency and public scoping meetings.

1.4.4 Upcoming Opportunities for Stakeholder Involvement

Stakeholders in the project include agencies, tribes, landowners, and the general public. RUS will provide opportunities for additional stakeholder involvement throughout the decision-making process. There will be a 45-day (minimum) public comment period that will commence with the publication of the Draft EIS. RUS will notify agencies, tribes, and the public by publishing in the Federal Register a Notice of Availability (NOA) for the Draft EIS. The NOA will identify the methods by which stakeholders can provide RUS with comments on the Draft EIS and will identify the time, date, and location of public hearings to be held in northeastern Wyoming to collect input and allow stakeholders to comment on the Draft EIS. Notification of the availability of the Draft EIS and information on the public hearings will also be provided through local media.

Following the 45-day public comment period on the Draft EIS, RUS will catalog and analyze the comments and will prepare a report summarizing how RUS intends to address key issues before publishing a Final EIS and its Record of Decision (ROD) that identifies a preferred alternative.

Stakeholders will be provided an opportunity to comment on the Final EIS during a 30-day public comment period that will follow the release of an NOA in the Federal Register for the Final EIS. RUS will issue a ROD shortly after the end of this comment period.

1.5 ISSUE DEVELOPMENT

Potential issues to be considered in the EIS were initially identified through internal and interagency discussions conducted during proposal development. Many potential issues were identified during development of the site selection and alternatives evaluation studies, and these issues in turn generated opportunity and constraint criteria used in the siting process. NEPA requires consideration of some of these issue areas, such as air quality, cultural resources, threatened and endangered species, wetlands, and environmental justice, while other issues such as generation management and disposal of coal combustion by-products are specific to projects similar to the Proposed Action.

Comments received through the scoping process identified additional issues or areas of concern. An essential requirement of NEPA is to determine the relevance of issues raised to the decision to be made. The issue areas identified through scoping have been placed into one of the following three categories:

- **Key Issues -** These issues are important to the EIS process as they may cause significant effects to resources within the proposed project site. All key issues will be analyzed in detail in the EIS;
- **Other Issues -** These issues relate to resources that would be minimally affected by the proposed project. Often, proposed mitigation measures would reduce the level of potential effects to imperceptible levels. In other cases, the resources in question do not coincide with proposed project activities, so these resources would not be affected. These issues will be discussed in the EIS but not analyzed in detail; and
- **Out-of-Scope Issues -** These issues concern factors that would not be affected by the proposed project. These issues will be mentioned briefly in the EIS but not analyzed.

Each issue identified was placed into one of these three categories based on the potential for a resource to be affected by the proposed project and the relative level of interest shown in the issue by various stakeholders and the general public. When consideration of an issue was required by law, regulation, or other factor, the category selection process also considered the required level of analysis. The order in which key issues are listed in Section 1.5.1 below is not intended to imply the relative importance or level of interest on the part of agencies or the general public.

1.5.1 Key Issues

Fifteen key issues were identified during the scoping process. These issues included air quality, geology, groundwater, surface water, soils, vegetation, wildlife, fisheries, special status species, land use, cultural and paleontological resources, visual quality, transportation, socioeconomics, environmental justice, and public health and safety. Each of these issues is analyzed in detail in this EIS. In Chapter 4, at the beginning of each discussion of the environmental resource, the specific evaluation factors regarding each key issue identified during scoping are listed in a table along with the environmental impact significance criteria.

1.5.2 Other Issues

Issues that were identified during scoping as not relevant to the decision on the proposed project are discussed in this section. The basis for these decisions and the anticipated level of analysis in this EIS are also discussed.

Alternatives

Dry Fork Station
The Dry Fork Station Project Overview and Environmental Evaluation (Basin Electric 2006a) described one proposed and one alternative site for the proposed Station, which are analyzed in detail in this EIS. Comments were received on general alternatives and specific components of the proposed project.

The following alternatives to the proposed action were identified:

- Wind energy;
- A combination approach—Meet 10 percent of the need with wind power combined with

Basin Electric's existing intermediate-load gas turbines and construct a smaller Dry Fork Station for base load; and
- Partner with state and Federal agencies to develop IGCC technology.

A combination approach was not specifically examined, but along with wind and IGCC, it is discussed in Chapter 2 of this EIS.

Hughes Transmission Line
Comments were received during public scoping on general transmission line alternatives and specific components of the proposed Hughes Transmission Line. Several comments made general recommendations for the selection of alternative corridors for the proposed action. These recommendations include the following:

- Use existing corridors;
- Public lands preferred to reduce effects to private lands;
- Less inhabited areas preferred to reduce the number of individuals affected; and
- Shortest corridor preferred to reduce effects.

The Hughes Transmission Project Overview and Environmental Evaluation (Basin Electric 2006b) identified transmission line corridors and segments based on many factors, including further refinement of these factors based on the input from scoping identified above. The route refinement process resulted in the two corridors discussed in Chapter 2 and analyzed in detail in Chapter 4 of this EIS.

Out-of-Scope of Issues

Dry Fork Station
The following concerns relating to the project's purpose and need were raised:

- The proposed project is too large relative to the apparent local need;
- The proposed project would be used to move power out-of-state to different markets and would not support local needs; and
- The proposed project would benefit primarily large private corporations and not the general public, especially those directly affected.

The purpose of the proposed Dry Fork Station is to meet increased demand for electric power in the western portion of Basin Electric's nine-state service area, which includes Wyoming, Montana, Colorado, New Mexico, Nebraska, North Dakota, South Dakota, Minnesota, and Iowa. The proposed action may produce more power than is needed when it would initially come online in 2012, as discussed in the Alternative Evaluation Study. This power would be exported from the region to the east or south. This additional power would be available for future growth in the region. Re-examination of the purpose of and need for the proposed project is outside of the scope of this EIS.

Hughes Transmission Line

Three issues pertaining to the proposed Hughes Transmission Line were identified as being outside of the scope of the EIS. The issues included additional analysis of the project purpose and need; property rights and ROWs; and concerns of different treatment between landowners. The basis for each of these issues and the anticipated level of analysis in this EIS are discussed below.

Purpose and Need – As previously discussed, the proposed Hughes Transmission Line is needed to meet increasing demand for power in northeastern Wyoming and western South Dakota and to improve regional power grid stability. The purpose and need is described in detail in this EIS, and further analysis of purpose and need is outside the scope of this EIS.

Rights-of-Way and Easements – Numerous comments were made during public scoping on property rights, ROWs, easements, types of payments for access, condemnation, and similar issues related to the proposed transmission line. These issues are clearly important to many individuals but will not be specifically addressed because acquisition of ROWs and easements are land rights and not environmental issues; therefore, they are outside the scope of this EIS.

General Comments Regarding Treatment of Different Landowners – Several individuals commented during public scoping that different individuals, and particularly different landowners, appeared to be getting different treatment and information based on their perceived power, wealth, or other factors. This issue will not be addressed because it is outside the scope of this EIS. However, the EIS process will in all regards provide equal information and consideration to all interested parties.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

Chapter 2 presents a description of the proposed action and a discussion of the alternatives to be addressed in detail. Two power plant alternatives are evaluated in this environmental impact statement (EIS). These alternatives are the most viable alternatives to meet the purpose and need; that is, obtain the power needed to meet the growing system demand for low-cost, reliable electricity supplies for Basin Electric and their respective industrial and rural consumers/members in northeastern Wyoming and western South Dakota. In addition, because the Hughes Transmission Line is considered a connected action, two transmission line alternatives are also evaluated in detail in this EIS. This transmission line would enable Basin Electric's member, Powder River Energy Corporation, to serve the additional power requirements of new rural housing and commercial development and production of coal bed methane (CBM) resources, as well as other load growth in the region. The Hughes Transmission Line would also enhance the regional transmission system.

The alternatives eliminated from detailed evaluation in this EIS are also discussed, as well as design features and best management practices (BMPs) that Basin Electric would implement should the project be implemented. Finally, a comparison of alternatives is provided.

2.1 DEVELOPMENT OF ALTERNATIVES

As discussed in Chapter 1, in 2003-2004 Basin Electric identified a need for additional power generation in Northeast Wyoming. Transmission constraints in this area were also threatening the stability of the regional transmission system. Following Rural Utilities Service (RUS) guidance, Basin Electric began the process by preparing the Alternative Evaluation Study to identify alternatives for meeting capacity requirements, and also prepared the Hughes Transmission Project Macro-Corridor Study to begin the process of identifying a preferred alignment.

The Alternative Evaluation Study examined several alternatives, including energy conservation and efficiency, renewable energy sources (wind, solar, hydroelectric, geothermal, and biomass), fossil-fueled generation (natural gas simple-cycle combustion turbine, natural gas combined-cycle combustion turbine, microturbines, and coal), repowering/uprating of existing generating units, participation in another utility's generation project, purchased power, and new transmission capacity. In addition to these possible alternatives, RUS considered oil combustion, nuclear power, and combination alternatives (see Section 2.3.1.8). An economic analysis was performed using a Production Cost Model, and the alternatives that met the capacity needs and were commercially/technically available in northeastern Wyoming were used to determine the most economical alternative for Basin Electric. It was initially concluded, based on the technical and economic analyses, that a new 250-megawatt (MW) coal-fired power plant would best meet Basin Electric's requirements. In May 2005, based on a revised load forecast for Basin Electric's member cooperatives, the net plant output for the new coal unit was increased to a range of approximately 350MW or slightly larger. The technology and economic comparison at the increased rating was found to be virtually identical to the 250MW case design (Basin Electric 2005a).

Planning then focused on site selection for the power plant and transmission line. Basin Electric prepared the Northeast Wyoming Generation Project Site Selection Study, and the Hughes Transmission Project Macro-Corridor Study for the proposed 230-kilovolt (kV) transmission line. During these studies, the sites and routes were further defined based on criteria related to engineering, environmental and social impacts, electrical system planning, permitting/legal requirements, and land rights. Federal and state agency and public involvement was critical to the identification and selection process that occurred during these sitting studies. These studies are summarized below.

Site Selection Study – Northeast Wyoming Generation Project

The approach to the site selection study was developed to identify site opportunities with the least overall land use and environmental impacts. During the Alternatives Evaluation Study it was determined that due to transmission constraints, generation needed to be located in northeastern Wyoming. Therefore, the site selection study began with the delineation of a study area that included the northern and central Powder River Basin (PRB) coal mines located to the northeast and southeast of Gillette. The site selection study was conducted in three phases:

Phase 1- Resource data collection and identification of opportunities and constraints;
Phase 2- Suitability analysis to identify candidate sites; and
Phase 3- Comparative analysis and site selection.

The primary objective of Phase 1 was to reduce the 883-square mile siting study area to potential opportunity areas that would provide the highest level of compatibility with a comprehensive set of criteria concerning electric system planning, economics, environmental factors, public involvement, legal aspects/permits, power plant and transmission engineering, and acquisition of land rights.

In Phase 2, the highest opportunity areas from Phase 1 were analyzed in more detail. The objectives of Phase 2 were to identify specific sites for the generation facility, compare the general site characteristics, conduct field reconnaissance of the alternative sites in order to "ground truth" the data used in the analysis, and develop a short-list of candidate sites to further analyze in Phase 3. Thirty-three sites were identified prior to field reconnaissance; three additional sites were added during field reconnaissance. Field activities focused on:

- Land area within a floodplain;
- Surface water or drainage precluding a larger area of use;
- Ecological sensitivities;
- Potential for hazardous contamination;
- Visual sensitivity based on elevation, topography, and/or viewpoints;
- Current and adjacent land use compatibility, including structures within ½ mile;
- Overall feasibility of a transmission interconnection, conveyor for fuel delivery, solid waste disposal (primarily fly ash), road access, and rail access; and
- Sites that can accommodate plant facilities without unreasonable engineering.

Based on the site reconnaissance evaluations, eight sites were identified for more detailed analysis in Phase 3.

The eight sites underwent a detailed comparative analysis in Phase 3 that resulted in a narrowing of the list to three sites. These sites were then subjected to additional evaluation that included the quantification of land use, environmental, site layout, cost, and operational consideration criteria. Each of the final alternative candidate sites was determined to be technically feasible. Basin Electric chose the proposed and alternative sites analyzed in this EIS primarily due to the relatively lower level of environmental, land use and economic impacts as compared to the other two finalists. The proposed site was preferred over the alternative site due to its proximity to the Dry Fork mine.

Transmission Line Siting Studies

The Hughes Transmission Project Macro-Corridor Study identified preliminary alternative transmission line corridors that would connect the Hughes Substation, Carr Draw Substation, and a proposed substation north of Sheridan, Wyoming. The study assessed the potential opportunities for the various route alternatives and the associated physical (e.g., length of transmission line, right-of-way [ROW] requirements), land use, engineering, environmental, regulatory, and social and economic considerations and constraints.

The Hughes Transmission Project Siting Study followed the macro-corridor study. This was a three-phase analysis that included the following:

Phase 1: Identification and Analysis of Opportunities and Constraints. This phase required the use of available land use and environmental data to identify suitable areas and areas to avoid. These areas are identified in Figure 2.1-1. Identification of these areas led to the identification of corridors in Phase 2.

Phase 2: Identification of Alternative Corridors. This phase involved significant public input, and also required the use of more refined criteria and data to identify 16 preliminary alternative transmission corridors in six regions within the study area as shown on Figure 2.1-2. The factors considered include legal/permitting issues, engineering feasibility, environmental impacts, electric system planning, and economics. Preliminary alternative corridors were eliminated from further analysis if they failed to meet the project purpose and need; were unlikely to be selected because of potential impacts to sensitive resources; or were uneconomical because of multiple angled crossings and the creation of many small parcels of land between public ROW. The six regions identified were:

- Hughes-Dry Fork: From the Hughes Substation to Dry Fork Station Switchyard (two alternatives);
- Dry Fork-Carr Draw Substation: From Dry Fork Station Switchyard to the Carr Draw Substation (two alternatives);
- Dry Fork-Spotted Horse: From the Dry Fork Station Switchyard northwesterly to a point near Spotted Horse (five alternatives);
- Spotted Horse-Clear Creek: From a point near Spotted Horse to a point slightly north and west of the Clear Creek Crossing (two alternatives);
- Clear Creek-Beatty Gulch/Tongue River: From the point north and west of Clear Creek to the termination point. The proposed transmission line would terminate at a new substation east of the Tongue River (proposed Substation Site 2). The alternative

transmission line would interconnect with the existing 230-kV transmission line at Site 1 and would not require the construction of a new substation; and

- Beatty Gulch-Sheridan: The existing 230-kV line would be double-circuited, realigned, or removed from between the interconnection point and the Sheridan Substation (two alternatives).

Agency and public involvement during Phase 2 was an integral component of the alternative development process because it provided Basin Electric with the necessary feedback from stakeholders about the project components and the potential beneficial and adverse human and environmental impacts. Basin Electric initially received public input on the Hughes Transmission Project during three meetings held June 21-23, 2005, in Gillette, Clearmont, and Sheridan, Wyoming, respectively.

RUS conducted an agency scoping meeting on December 7, 2005, in Gillette, Wyoming, to address the specific concerns of federal, state, and local agencies. Public scoping meetings were held December 6 and 7, 2005, in Sheridan and Gillette, Wyoming, respectively. RUS conducted additional scoping in February 2006 to address the concerns of landowners potentially impacted by an additional alternative to the proposed transmission line project identified during the public scoping meeting held on December 6, 2005. This alternative is identified as the Badger Creek Alternative.

Phase 3: Comparative Analysis and Corridor Selection. This phase required a quantitative comparative analysis of the alternative corridors (Table 2.1-1; Figure 2.1-3) and the use of engineering, natural environment, and human environment criteria to select a preferred corridor. The comparative evaluation included the quantification of the following site evaluation criteria for the 16 preliminary alternative corridors and the six regions identified in Phase 2:

- Transmission and Substation Engineering;
- Environmental Impacts to the following resource areas:
  - Geology and Soils;
  - Water Resources;
  - Vegetation;
  - Threatened, Endangered, and/or Special Status Species and Big Game;
  - Land Use; and
  - Visual (Aesthetic).

Subcriteria for each of the major comparative evaluation criteria identified above were developed and are defined in Table 2.1-1 (Basin Electric 2006d). For example, under the engineering criteria, subcriteria such as length adjacent to existing transmission line and area of total ROW were evaluated. These criteria were ranked based upon identified impacts, and the total rank score of each alternative gave a relative indication of the overall impact it would have on the surrounding environment (Table 2.1-2).

Based on a lower (indicating fewer impacts) total score for each Phase 3 criterion, Segments A, DEFH, CJLNP, QST, WX, and AA were selected as the preferred corridor primarily due to the lower level of environmental, land use, and economic impacts compared with other corridors (Table 2.1-2, Figure 2.1-3, and Basin Electric 2006d).

Segments BC, DEGH, CJLO, QRT, UY, and AA comprise the alternative corridor. Segment Z was eliminated during the route refinement process. The proposed Tongue River Substation (Site 2) is the preferred location for construction of a new substation for the project because of the location of the preferred transmission line (Table 2.1-2, Figure 2.1-3, and Basin Electric 2006d).

Table 2.1-1 – Key Criteria and Description Subcriteria Used to Rank Proposed and Alternative Transmission Line Routes

Subcriteria	Description
Engineering	
Area of Total ROW	The area of total ROW for the transmission line was quantified and ranked based on the premise that the lower the acreage, the lower the potential for environmental impacts and assumed lower cost.
Length of Route Adjacent to Existing Transmission Line	The siting process sought to maximize the length of the corridor adjacent to existing 69-kV transmission line ROWs. Thus, those corridors that followed existing transmission line ROWs for greater distances were ranked as more suitable. The siting process sought to minimize the length of the reference centerline adjacent to the existing 230-kV transmission line ROWs because any event that could cause failure of one line would likely also affect the other, thus threatening the stability of the regional power grid.
Length Adjacent to Existing Roads for Construction, Operation, and Maintenance	Those corridors with the greatest length of the reference centerline adjacent to existing roads for construction and operation and maintenance access were ranked as most favorable.
Number of New Transmission Structures	The corridors with the fewest estimated transmission structures were ranked as most suitable. The number of structures was calculated by using the estimate of 6.6 structures per mile (averaging an 800-foot span). Therefore, for a given segment, the total miles of the segment multiplied by 6.6 structures per mile produced the total number of new transmission structures for that segment.
Geology and Soils	
Length of Centerline Crossing Area with 15+ Percent Slope and Difficult Access	Transmission line segments having fewer miles spanning slopes over 15 percent or with difficult access were ranked as more favorable.
Water Resources	
Number of Overland Access Crossings of Ephemeral Creeks and Drainages	Transmission line corridors with the fewest overland access crossings of ephemeral creeks or drainages were ranked as most suitable.
Number of Structures in 100-Year Floodplain	The route refinement process sought to minimize development in the 100-year floodplain; therefore, those corridors with fewer miles located in the floodplain received a higher ranking. Floodplain data did not exist for all segments.
Vegetation	
Length Using Overland Access for Construction, Operation, and Maintenance	The siting process sought to minimize effects to vegetation in areas of overland access; therefore, segments with the lowest amount of overland access received a favorable ranking.
Threatened, Endangered, and/or Special Status Species and Big Game	
Number of Sage-Grouse Leks within 0.25 Mile of Overland Access	The corridors with the fewest sage-grouse leks within 0.25 mile of overland access were ranked as most suitable.
Number of Sage-Grouse Leks within 0.25 Mile of Transmission Line	The corridors with the fewest sage-grouse leks within 0.25 mile of the transmission centerline were ranked as most suitable.
Number of Sharp-Tailed Grouse Leks within 750 Feet of Overland Access	The corridors with the fewest sharp-tailed grouse-leks within 750 feet of overland access were ranked as most suitable.
Number of Sharp-Tailed Grouse Leks within 750 Feet of Transmission Line	The corridors with the fewest sharp-tailed grouse-leks within 750 feet of the transmission centerline were ranked as most suitable.

Table 2.1-1 – Key Criteria and Description Subcriteria Used to Rank Proposed and Alternative Transmission Line Routes (Continued)

Subcriteria	Description
Threatened, Endangered, and/or Special Status Species and Big Game (continued)	
Number of Raptor Nests within 0.5 Mile of Transmission Line ROW	The corridors with the fewest raptor nests within 0.5 mile of the transmission line ROW were ranked as most suitable.
Length Crossed by Overland Access of Prairie Dog Colonies greater than 40 Hectares	The corridors with the shortest overland access crossing large prairie dog colonies were ranked as most suitable.
Length Crossed by New Transmission Line of Prairie Dog Colonies greater than 40 Hectares	The corridors with the least distance of the reference centerline crossing large prairie dog colonies were ranked as most suitable.
Land Use	
Length of Overland Access within 2 Miles of a Wilderness Study Area (WSA)	The corridors with the least distance of overland access within 2 miles of a WSA were ranked as most suitable.
Length of Transmission Line within 2 Miles of a Wilderness Study Area	The corridors with the least distance of the reference centerline within 2 miles of a WSA were ranked as most suitable.
Number of Radio and Communication Towers with 0.25 Mile of Transmission Line	The corridors with the fewest radio and communication towers within 0.25 mile of the reference centerline were ranked as most suitable.
Length of Transmission Line Crossing Rangeland	Corridors with greater lengths of the reference centerline crossing rangelands were ranked as more favorable.
Length of Transmission Line Crossing Prime Farmlands when Irrigated	Those corridors with the fewest number of miles of the reference centerline crossing prime farmlands when irrigated were ranked as more favorable.
CBM Wells within 250 Feet of Transmission Line	The corridors with the fewest CBM wells within 250 feet of the reference centerline were ranked as most favorable.
Visual Resources	
Number of Residences within 500 Feet and 0.5 Mile of Transmission Line	As residences are the primary viewing points in the project area, the number of residences within 500 feet and 0.5 mile of the reference centerline was used to evaluate effects to visual resources and aesthetics. Segments with the fewest residences nearby ranked the highest.

Source: Basin Electric, 2006d

Regardless of the decision on the Dry Fork Station, construction and operation of the Hughes Transmission Line has been deemed necessary by Basin Electric to meet existing power demands of rural cooperatives in northeastern Wyoming and western South Dakota and to improve the regional stability of the transmission system or power grid.

2.2 ALTERNATIVES ADDRESSED IN DETAIL

This section describes the alternatives that are considered reasonable and are analyzed in detail in this EIS. For an alternative to be judged reasonable, it must meet the purpose and need and be within the scope of the EIS as described in Chapter 1. Reasonable alternatives must also be affordable, reliable, and stable sources of wholesale electric energy, and they cannot pose unacceptable environmental risks.

Figure 2.1-1 – Opportunities and Constraints Analysis for Transmission Line Corridors within the Project Area

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Figure 2.1-2 – Preliminary Transmission Line Corridors Identified in the Project Area

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Table 2.1-2 – Comparative Matrix for Transmission Line Corridors and Route Alternatives

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Figure 2.1-3 – Comparative Analysis of Proposed and Alternative Transmission Line Corridors and Alignments

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2.2.1 No Action Alternative

Council on Environmental Quality (CEQ) regulations require consideration of the "No Action Alternative." This alternative means that RUS would not provide a loan guarantee to Basin Electric to construct the proposed Dry Fork Station. However, because it is a connected action and not financed by RUS, the Hughes Transmission Line would be built under the No Action Alternative. "No Action" forms the baseline against which impacts of other alternatives are evaluated. It is reasonable to assume that under the No Action Alternative, Basin Electric would seek other means to meet its projected generation requirements, although this possibility is not evaluated as part of the effects of the No Action Alternative.

2.2.2 Proposed Action

2.2.2.1 *Power Plant*

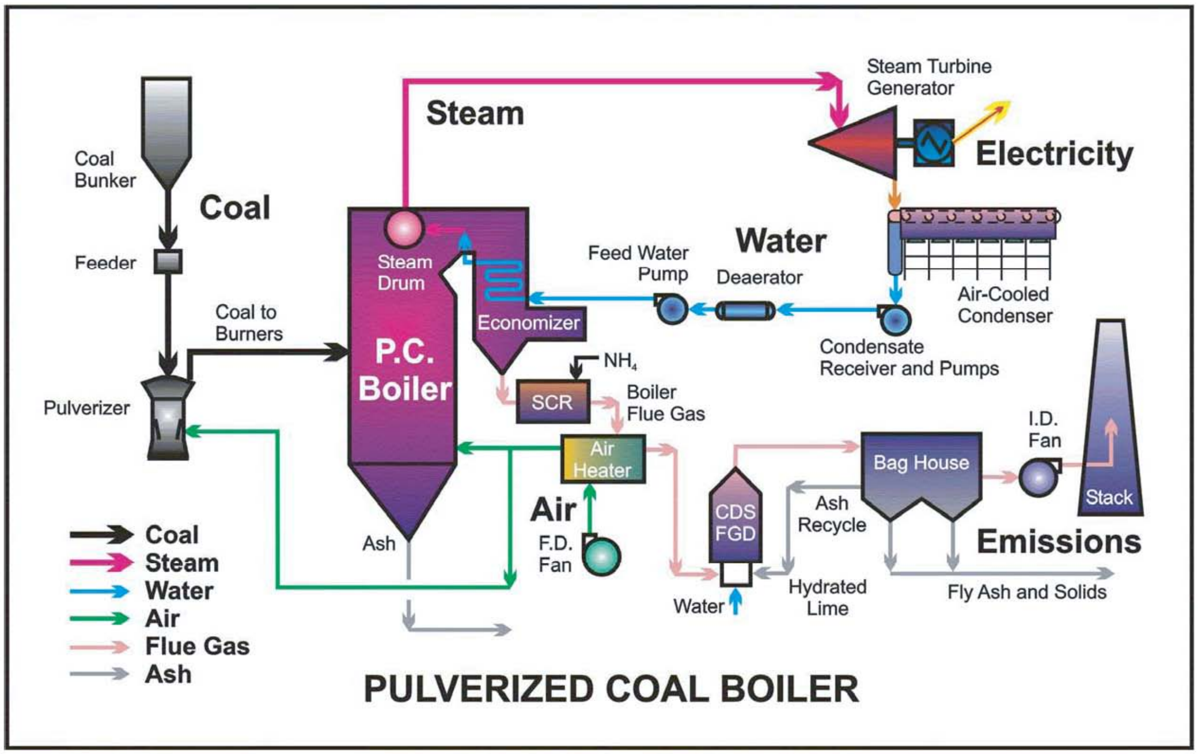
The power plant component of the proposed action consists of a single-unit, 422-gross MW (maximum net rating 385 MW) coal-fired electric generation facility constructed on a 353-acre parcel in northeastern Wyoming, approximately 7 miles north of Gillette, in Campbell County (Township 51N, Range 72W, S ½ of SW ¼ Section 13, N ½ Section 24, NE ¼ Section 23) (Figure 1.1-4).

The proposed power plant would be sited adjacent to the fuel source at the Dry Fork Mine and would operate 24 hours a day except for maintenance downtime and unplanned outages. The total construction time would be up to 48 months. The major components of the Dry Fork Station include:

- Pulverized coal (PC) furnace, boiler, turbine, and condenser;
- Coal unloading, storage, and handling;
- Solid waste disposal system;
- Storm water system;
- Electric transmission interconnection;
- Water supply, treatment, and discharge;
- Access roads;
- Air emissions control system; and
- Offices, warehouse, and control room.

General Power Plant Electrical Generation Process

Figure 2.2-1 diagrams the power plant electrical generation process. The power plant produces electricity by combusting coal in a boiler to produce heat to convert water to steam. The steam powers a turbine that turns an attached electric generator, producing electricity. In the coal-fired boiler, tubes containing water line the inside of the furnace walls. The coal that enters the furnace (or burner) is ignited and burned. The burning coal releases thermal energy, which is absorbed by the water in the tubes. The temperature of the water rises and the water boils, producing steam that is piped from the boiler to the steam turbine. The steam turbine has both stationary and rotary blades attached to a rotating shaft. As the high-pressure steam from the boiler passes through the turbine blades, the pressure and thermal energy of the steam would be converted to mechanical energy, causing the rotating set of blades to turn the shaft of the turbine. The steam turbine shaft would be coupled to the shaft of an electrical generator, which converts the mechanical energy of the rotating shaft into electric energy. After the steam passes through the turbine, it flows into the air-cooled condenser (ACC). In the ACC, the steam is cooled and condensed back into water. The water is then pumped back to the boiler through a series of low-pressure and several high-pressure heaters, a de-aerator, and then into the tubes of the boiler to be made again into steam. The heaters increase the efficiency of the overall process.



(Source: Basin Electric, 2005a)

Figure 2.2-1 – Pulverized Coal Unit Process Flow Diagram

Pulverized coal (PC) technologies are capable of achieving an 85 percent annual capacity factor, are suitable for base load capacity, and are highly reliable. PC technology is commercially available and proven for PRB coal, having been used for large utility units for more than 50 years.

Figure 2.2-2 is a photo simulation of the proposed power plant. Figures 2.2-3 and 2.2-4 show the general arrangement and site layout for the power plant.

The power plant includes a transmission interconnection to transport electricity from the generation facility to the transmission grid for distribution to consumers. Based on recent system studies conducted by Basin Electric, the power plant is anticipated to interconnect with the 230-kV Hughes Transmission Line at the proposed Dry Fork Substation Switchyard.

Fuel Source and Emission Controls
The primary fuel would be a sub-bituminous coal with natural gas used for light off, startup, and flame stabilization. Coal from the adjacent Dry Fork Mine would be delivered to the power plant by means of a covered overland conveyor belt and would be stored in silos on the power plant site.

For proposed major new stationary sources of air pollutants such as the Dry Fork Station, the U.S. Environmental Protection Agency (EPA) requires an analysis of the best available control technology (BACT) to be certain that the new emissions would be minimized to the extent practicable while ensuring that these emissions would not cause a violation of air quality standards. EPA has developed a 5-step process for conducting BACT analyses:

1. Identify All Control Technologies
2. Eliminate Technically Infeasible Options
3. Rank Remaining Control Technologies by Control Effectiveness
4. Evaluate Most Effective Controls and Document Results
5. Select BACT

Basin Electric completed this process in the Dry Fork Station Alternative Evaluation Study and determined that a PC-based plant design with the air pollution controls discussed below represents BACT for the proposed new unit (Basin Electric 2005a). The Wyoming Department of Environmental Quality (WDEQ) is currently reviewing this analysis as part of Basin Electric's air permit application.

A PC unit for the Dry Fork Station would use low nitrogen oxide (NO_x) burners and selective catalytic reduction (SCR) for NO_x control, circulating dry scrubber (CDS) and flue gas desulphurization (FGD) for sulfur dioxide (SO_2) control, and fabric filter for particulate control. Particulate matter (PM) emissions would result from coal, ash, and lime material handling operations; other air emissions would result from miscellaneous support equipment such as diesel or natural gas-fired emergency generators, fire pumps, and the installation of a natural gas-fired auxiliary boiler.

No coal pile for additional storage is anticipated. A rail siding off an existing rail spur would be built to deliver construction materials and equipment to the site.

Appendix B describes the detailed air pollution control system that would be installed to reduce emissions from operation. Primary emissions associated with the PC boiler would include PM, carbon monoxide (CO), SO_2 and NO_x. The flue gas from the boiler would pass through a three-tier emission control system and then through the induced-draft fans to be exhausted through a stack to the atmosphere. The stack would be 500 feet tall and would consist of an outer concrete wind shell and an inner flue. A continuous emission monitoring system (CEMS) would monitor emissions. Steam would be cooled to a condensate using proven engineered systems that conserve water.

Solid and Hazardous Waste Management

The Dry Fork Station would generate non-hazardous industrial and municipal solid waste, and hazardous solid and liquid wastes. Non-hazardous industrial waste (e.g., janitorial supplies) and municipal solid waste generated during plant operations would be transferred to the Campbell County Landfill.

Other solid wastes generated would include bottom ash from the boiler and combined dry FGD, and fly ash from the fabric filter. These coal combustion by-products would be handled in a dry form, with dust abatement, and prepared for final disposition. Basin Electric has proposed an on-site ash disposal site (landfill) to be located immediately south of the Dry Fork Station on a reclaimed portion of the Dry Fork Mine (Figure 2.2-4). The design and permitting of this landfill is currently in process.

Because the ash waste would be disposed of in a previously mined area, the WDEQ Land Quality Division (LQD) issues the landfill permit. However, because the LQD does not have regulations or standards for landfills, the Solid and Hazardous Waste Division guidelines are applicable to the landfill permitting for the project.

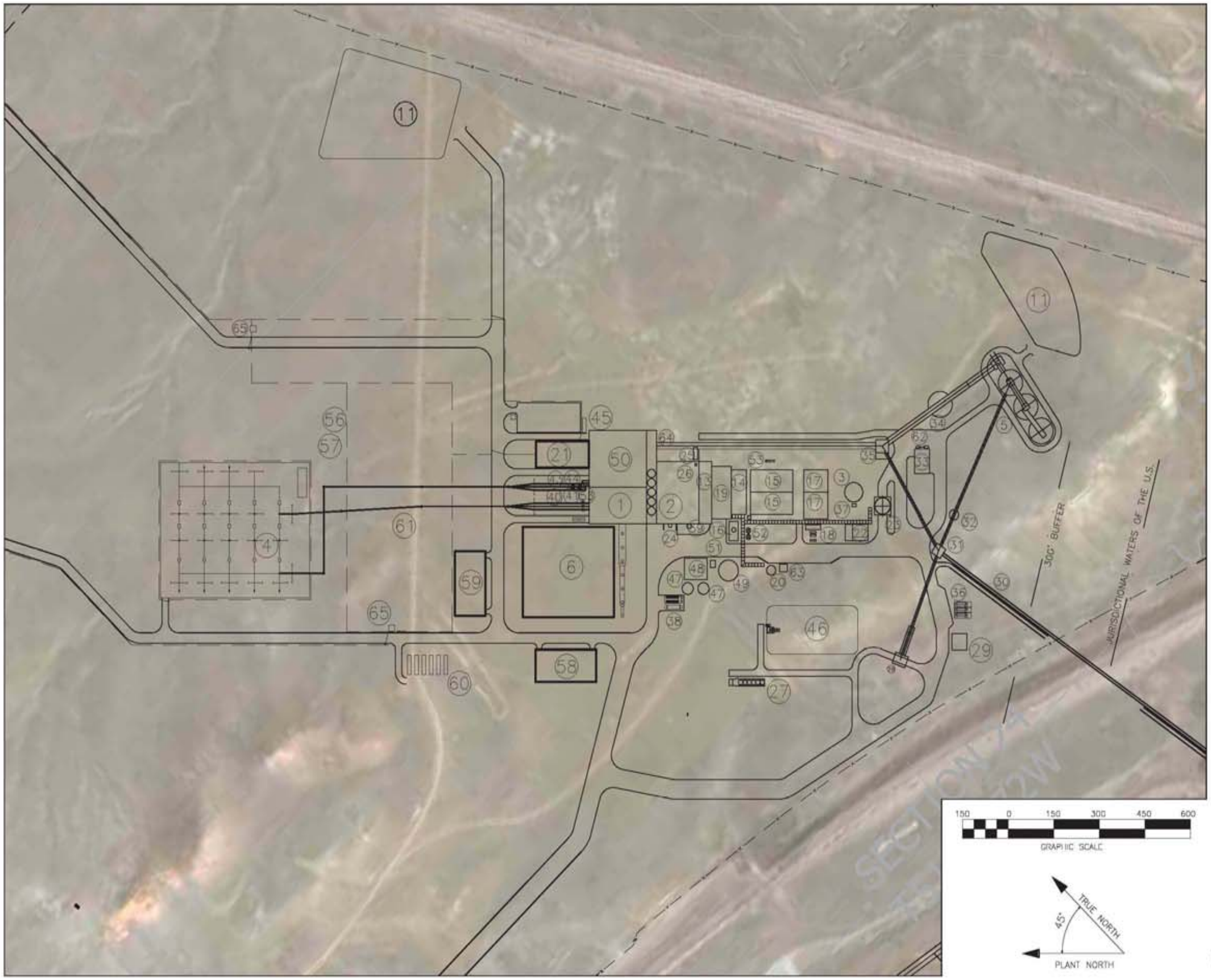
The ash landfill is currently estimated to cover approximately 63 acres, have a total capacity of 5.4 million cubic yards, and the design life is 60 years. To protect groundwater, ten monitoring wells have been installed in and around the proposed landfill area, and the landfill design allows for a minimum of 5 feet of separation between the base of the landfill and the groundwater table. Basin Electric has conducted leaching tests and computer modeling of the potential leaching of metals or other contaminants from the landfill. These studies indicate that no effects to the shallow groundwater are expected; this is consistent with observations made at other ash landfills where no effects to shallow groundwater have been observed over extended monitoring periods (Basin Electric 2007a). Basin Electric proposes to sample the monitoring wells annually for water quality testing, and quarterly for groundwater table elevation and flow data. Final monitoring requirements will be specified in the permit issued by the WDEQ LQD.

The Dry Fork Station would likely be considered a small quantity generator of hazardous waste (generating between 220 and 2,200 pounds [lbs] per month). As such, the facility would require an EPA identification number for monitoring and tracking hazardous material activities.

Hazardous materials would be segregated from other waste and subject to an onsite storage limitation of 13,230 lbs of waste for up to 180 days. Hazardous materials storage areas would require spill protection measures and would also be subject to regular inspections. Generation and storage of hazardous materials would require employee training in the handling and management of hazardous materials, developing a contingency plan for responding to accidents, developing a waste minimization program, and selecting a regulated transporter and disposal facility. Specific U.S. Department of Transportation (USDOT) requirements related to packaging and labeling of waste for shipment would apply.

Proposed Dry Fork Station Photo Simulation
(Source: Basin Electric 2006a)

Figure 2.2-2 - Proposed Power Plant Photo Simulation



	LEGEND	EMISSION LOCATION
1	TURBINE BUILDING	—
2	BOILER BUILDING	X
3	CHIMNEY	X
4	SWITCHYARD	—
5	COAL STORAGE SILOS	X
6	AIR-COOLED CONDENSER	—
7	NOT USED	—
8	NOT USED	—
9	NOT USED	—
11	STORM WATER POND	—
12	OVERPASS	—
13	FD FANS	—
14	FLUE GAS DESULFURIZATION SYSTEM	X
15	BAGHOUSE	X
16	LIME HYDRATOR BUILDING	X
17	ID FANS	—
18	ID FANS VFD	—
19	SCR	—
20	LIME SILO	X
21	ADMINISTRATION BUILDING	—
22	BLOWER BLDG/ELECT. BLDG	X
23	FGD WASTE/FLY ASH SILO	X
24	BOTTOM ASH STORAGE	X
25	AUX BOILER	—
26	AUX BOILER CHIMNEY	X
27	AUXILIARY COOLING TOWER	X
28	TRUCK HOPPER	—
29	GAS METERING/GAS HEATER	X
30	OVERLAND CONVEYOR	—
31	TRANSFER HOUSE	X
32	EMERGENCY OVERLAND CONVEYOR COAL PILE	X
33	COAL HANDING OFFICE	—
34	EMERGENCY SILO UNLOADING PILE	X
35	CRUSHER HOUSE	X
36	AMMONIA STORAGE	—
37	CEMS	—
38	N2/H2 STORAGE	—
39	CO2 TANK	—
40	GENERATOR STEP-UP TRANS. (GSUT)	—
41	UNIT AUX.TRANSFORMER (UAT)	—
42	SPARE	—
43	RESERVE AUX. TRANSFORMER (RAT)	—
44	SUBSTATION TRANSFORMER (SST)	—
45	DIESEL GENERATOR	X
46	WASTE WATER POND	—
47	CONDENSATE TANK	—
48	SERVICE WATER PUMP HOUSE	—
49	SERVICE WATER/F.P. TANK	—
50	SERVICE/ELECTRICAL/ MAINTENANCE/ADMIN BUILDING	—
51	FIRE PROTECTION PUMP HOUSE	X
52	CARBON INJECTION SILO	X
53	OIL/WATER SEPARATOR	—
54	STRMWTR RUNOFF POND (EXIST)	—
55	LEACHATE COLLECTION POND	—
56	GENERATOR STEP-UP TRANS. (SPARE)	—
57	UNIT AUX.TRANSFORMER (SPARE)	—
58	PLANT WAREHOUSE	—
59	CONSTRUCTION WAREHOUSE	—
60	CONSTRUCTION TRAILERS	—
61	CONSTRUCTION PARKING	—
62	DIESEL AND GAS TANK/FILLING STATION	—
63	TRUCK LIME UNLOADING BUILDING	X
64	MECHANICAL SHOP	—
65	GUARD HOUSE	—

Sargent & Lundy LLC

Proposed Power Plant Arrangement
(Source: Basin Electric 2006a)

Figure 2.2-3 - Proposed Power Plant General Arrangement

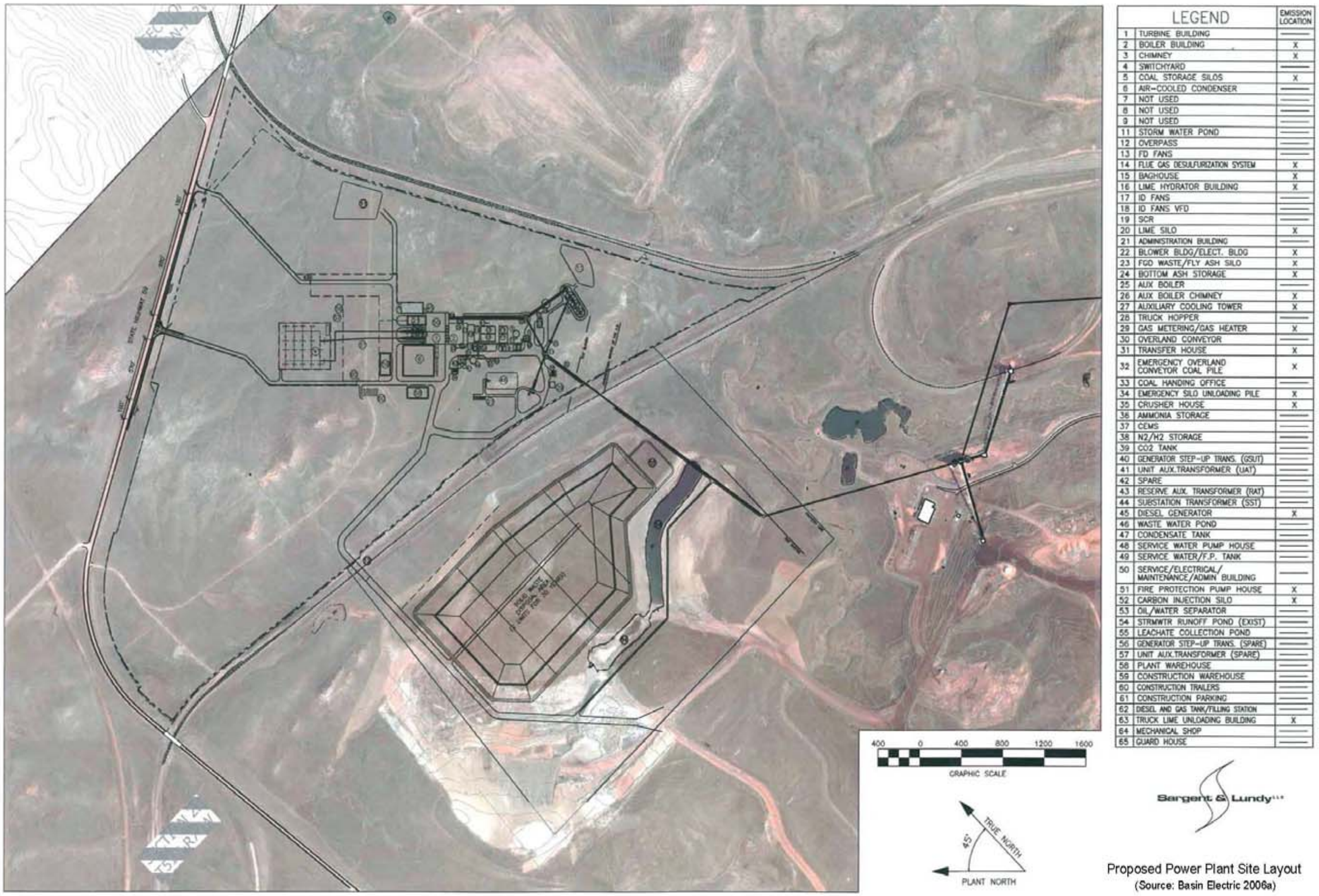


Figure 2.2-4 - Proposed Power Plant Site Layout

A Spill Prevention, Control, and Countermeasures (SPCC) plan would be developed to provide procedures for implementing spill prevention and control measures for oil products. The SPCC plan is required for facilities that store oils in containers greater than 55-gallon capacity with a cumulative onsite storage capacity of greater than 1,320 gallons. The SPCC plan would address: (1) operating procedures to prevent oil spills; (2) control measures installed to prevent a spill from reaching navigable waters; and (3) countermeasures to contain, clean up, and mitigate the effects of an oil spill that reaches navigable waters.

The facility may also be subject to the Risk Management Plan (RMP) requirements of section 112(r) of the Clean Air Act (CAA) due to the storage of anhydrous ammonia.

Water Supply, Treatment, and Discharge

A well field for water would be constructed as part of the power plant. The well field would consist of three wells, piping, and pumps, and would be located in proximity to the power plant site. Water would be obtained from the Lance-Fox Hills aquifer system at a depth of approximately 3,700 feet.

Dry cooling and "zero" liquid discharge systems would be used for the Dry Fork Station to reduce overall water consumption and discharge. The annual average water use for the power plant would be approximately 571 gallons per minute (gpm) for the lifetime of the project (60 years), with an annual water demand of approximately 300 million gallons. Maximum water use is anticipated at approximately 850 gpm on a short-term peak use basis. Short-term peak water use would occur during periods when the load factor is elevated and demand for energy is high. During these short-term periods, additional water would be necessary to supply the PC boiler to produce the necessary steam to generate electricity. The generating facility would be equipped with a 1- to 2-million-gallon surge tank to supplement supply water for short-term peak use and for fire protection. Water treatment for the facility would consist of filtration, reverses osmosis and deionization for condensate-quality water.

Process wastewater would include boiler feed water (BFW) blowdown, auxiliary cooling tower blowdown, filter backwash, reverse osmosis brine, and several other minor wastewater streams. The volume of process wastewater generated is estimated at 134 gpm (Basin Electric 2007b). This wastewater would be discharged to and collected in an evaporation pond with a surface area of about 1 acre. The pond would have a clay base and a substantial liner to prevent infiltration to shallow groundwater. Water from this pond would be used in the FGD system (119 gpm) and also used for dust control at the ash landfill (15 gpm). Because the water balance is essentially equal (input equals output), the water level in the pond is expected to be fairly constant, not allowing for evaporation. An oil-water separator would be used, as appropriate, to treat wastewater with the potential to contain oil and grease before discharge to the evaporation pond. An onsite leach field system is anticipated for disposal of sanitary wastes. During operation, non-contact storm water runoff would be collected in two onsite retention ponds, where the runoff would be allowed to evaporate.

During construction, storm water would be collected in a series of retention ponds. Post-construction runoff would not exceed pre-construction conditions. A series of BMPs have been developed to address the overall management of storm water runoff for the facility. These are discussed in Section 2.4.

Since a wastewater evaporation pond is included in the plant design, a groundwater protection permit would be required. Storm water discharge permits and Stormwater Pollution Prevention Plans (SWPPP) would be required during construction and throughout the operating life of the plant to protect surface water quality. SPCC plans would also be required to reduce the likelihood of spills of hazardous materials and also to minimize any adverse impacts should a spill occur.

Construction Activities
Construction would begin in 2008, with completion by 2012.

Construction activities include the following phases:

- Site clearing and preparation;
- Foundation construction;
- Building and equipment installation; and
- Site cleanup and facility startup.

Construction Workforce and Schedule
Basin Electric would recruit the following types of skilled workers:

- Bricklayers/cement workers;
- Carpenters;
- Ironworkers;
- Millwrights;
- Painters;
- Sheet metal workers;
- Boilermakers;
- Electricians;
- Laborers;
- Operating engineers;
- Pipe fitters; and
- Truck drivers.

The total construction workforce is expected to peak at 1,019 workers. While Basin Electric would seek to hire as many local workers as possible to complete the construction phase of the project, a socioeconomic impact analysis has revealed a shortage of skilled craftspersons and specialized workers in the area; therefore, the majority of the necessary workforce may be imported from neighboring communities and may need to be imported from other states. Figure 2.2-5 shows the projected construction timetable (approximately 42 to 48 months) and the range and number of construction workers anticipated to complete the project. Basin Electric is currently working with local authorities and private companies to secure and develop housing options for the estimated 795 workers that could comprise the import workforce.

Site Clearing and Preparation
As with any large construction project, site clearing and preparation would be accomplished using heavy diesel-powered earthmoving equipment, including bulldozers, scrapers, dump trucks, and front-end loaders. Site clearing and preparation would occur at all locations where equipment would be constructed or installed. The amount of cut and fill, and the area used for borrow material, would be estimated during detailed final design.

Foundation Construction

Foundation construction involves concrete handling equipment, such as concrete trucks, mixers, vibrators, and pumps. Some earthmoving equipment also would be required to backfill the foundations. Although blasting is unlikely, it may be required. Should blasting activities be necessary, they will be for as short duration as possible and limited to daytime only (Basin Electric, 2006a).

Building and Equipment Installation

Building and equipment installation would involve the use of mobile cranes, equipment delivery, impact wrenches, grinders, and air compressors. Activities involving the use of this machinery and equipment would be restricted to the power plant site.

During construction, up to 125,000 gallons (0.4 acre-feet) of water would be used daily for dust control, concrete curing, and hydrostatic testing of completed pipelines. This water would be either acquired from the permanent water system for the project, if completed first, or would be trucked in daily. Only bottled water would be used for human consumption.

Diesel-powered generators would produce the required electricity during construction. Generators would be connected to an onsite transformer for distribution to electrically powered construction tools and equipment.

Site Cleanup and Facility Startup

Site cleanup and power plant startup would require minimum amounts of heavy machinery, primarily for flushing pipes and blowing out steam lines.

Operation, Maintenance, and Abandonment

Power Plant Operation and Maintenance

The power plant would be operated as a base load facility with a life expectancy of approximately 60 years. With the exception of planned and unplanned outages, the power plant would operate 24 hours per day, 7 days per week. It is anticipated that the power plant would achieve, at minimum, an 85 percent capacity factor, with the ability to achieve a capacity factor of 90 percent or greater.

Upon completion of construction, approximately 75 full-time employees would be required to fill the following positions:

- Plant manager;
- Planner/analyst;
- Maintenance manager
- Operations shift leaders;
- Plant operators and trainees;
- Maintenance foremen;
- Electricians;
- Supervisors;
- Operations manager;
- Control systems specialists;
- Plant engineers;
- Lab/instrument/equipment technicians;
- Mechanics; and
- Coal handlers.

Similar to the construction phase, Basin Electric intends to hire as many local workers as possible to meet its operational needs.

Access and Traffic
Direct vehicular access to the plant site is available from State Highway (SH) 59. Highway modification, including acceleration and deceleration lanes, would be constructed prior to the start of operations. Onsite parking would be provided during operation of the facility.

Fencing and Signage
The property boundary would be fenced, with a guarded access gate. Appropriate signage would be provided throughout the facility addressing security areas, emergency evacuation routes, and safety issues.

Abandonment
At the end of its useful life, the power plant would be decommissioned or renovated. If the plant is decommissioned, all structures and equipment at the site would be dismantled and removed. The plant site would be revegetated with native plant species.

2.2.2.2 *Transmission Line*

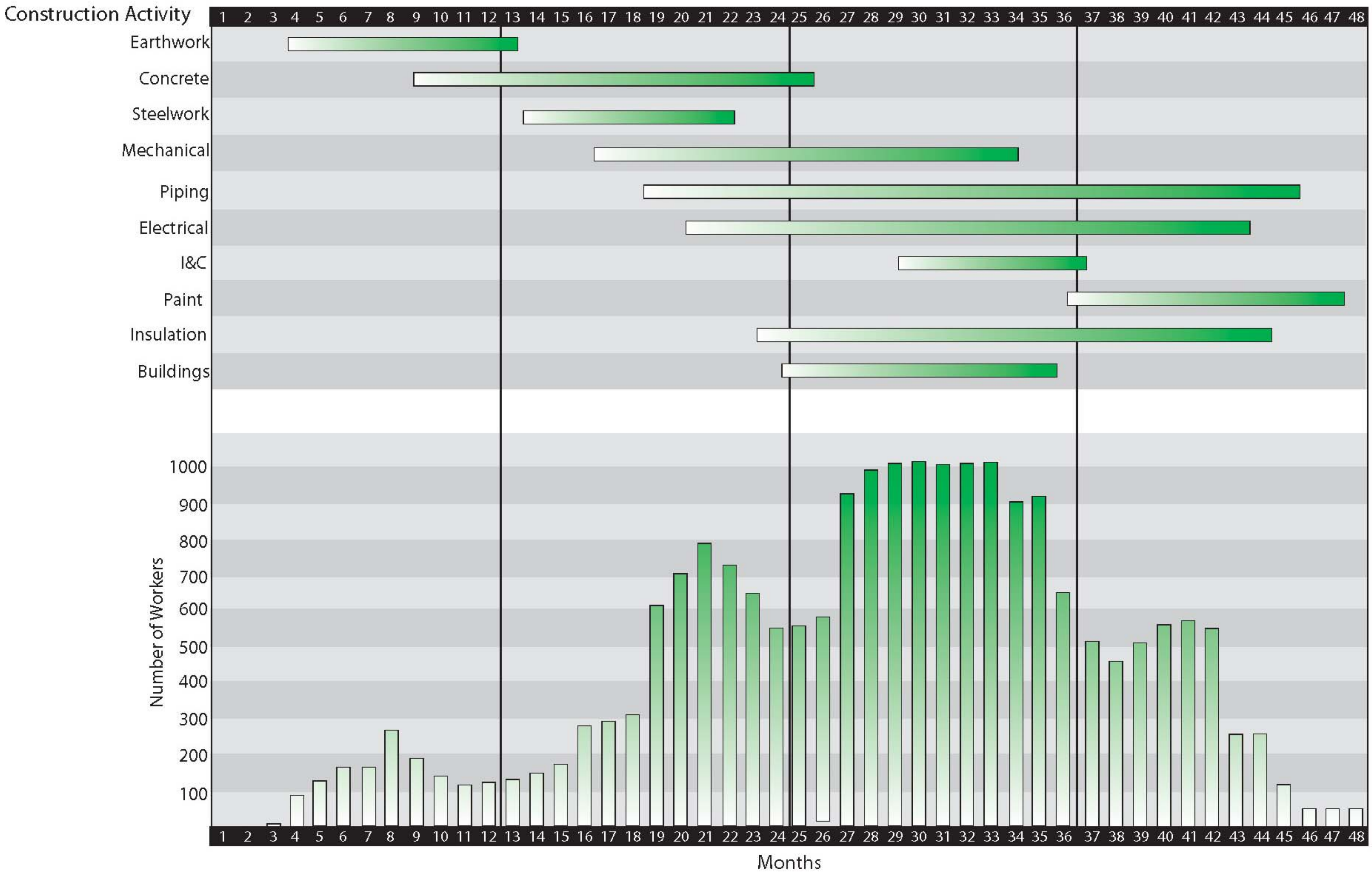
Section 2.1 describes the transmission corridor and line segment selection process used to determine the possible transmission routes. Table 2.2-1 summarizes the proposed and alternative route segments and their respective segment lengths for the three major transmission line corridors identified in the Hughes Transmission Project Macro-Corridor Study (Basin Electric 2005e). Route alternatives were analyzed using a matrix developed to assess the segment-by-segment impacts based on criteria presented in Table 2.1-2. Criteria were developed for each of these resources from stakeholder comments identified during the alternative development scoping process (Basin Electric 2006d).

The total length of the Hughes Transmission Line would be approximately 136 miles. Figure 1.1-5 shows the location of all proposed and alternative transmission line segments for each of three transmission line corridors. Details of the proposed route are described by corridor below.

Table 2.2-1 – Proposed Transmission Line Corridors, Segments, and Lengths

Corridor	Segments	Length of Corridor (miles)
Hughes Substation to Dry Fork Station Switchyard	A	17.3
Dry Fork Station Switchyard to Carr Draw Substation	D, E, F, H	23.0
Dry Fork Station Switchyard to Sheridan	C, J, L, N, P, Q, S, T, W, X, AA	95.6
Tongue River Substation 2 (terminus)		N/A
	TOTAL	135.9

Source: Basin Electric 2005e, 2006b, 2006d



(Source: Basin Electric, 2006a)

Figure 2.2-5 – Proposed Dry Fork Station Construction Activities and Schedule

Hughes Substation to Dry Fork Station Switchyard
This corridor would involve constructing a 17.3-mile transmission line connecting the proposed Dry Fork Station Switchyard to the Hughes Substation located east of Gillette (Segment A).

Dry Fork Station Switchyard to Carr Draw Substation
This transmission line corridor would be 23 miles long and run west from the proposed Dry Fork Station Switchyard to the existing Carr Draw Substation located west of Gillette (Segment D, E, F, and H).

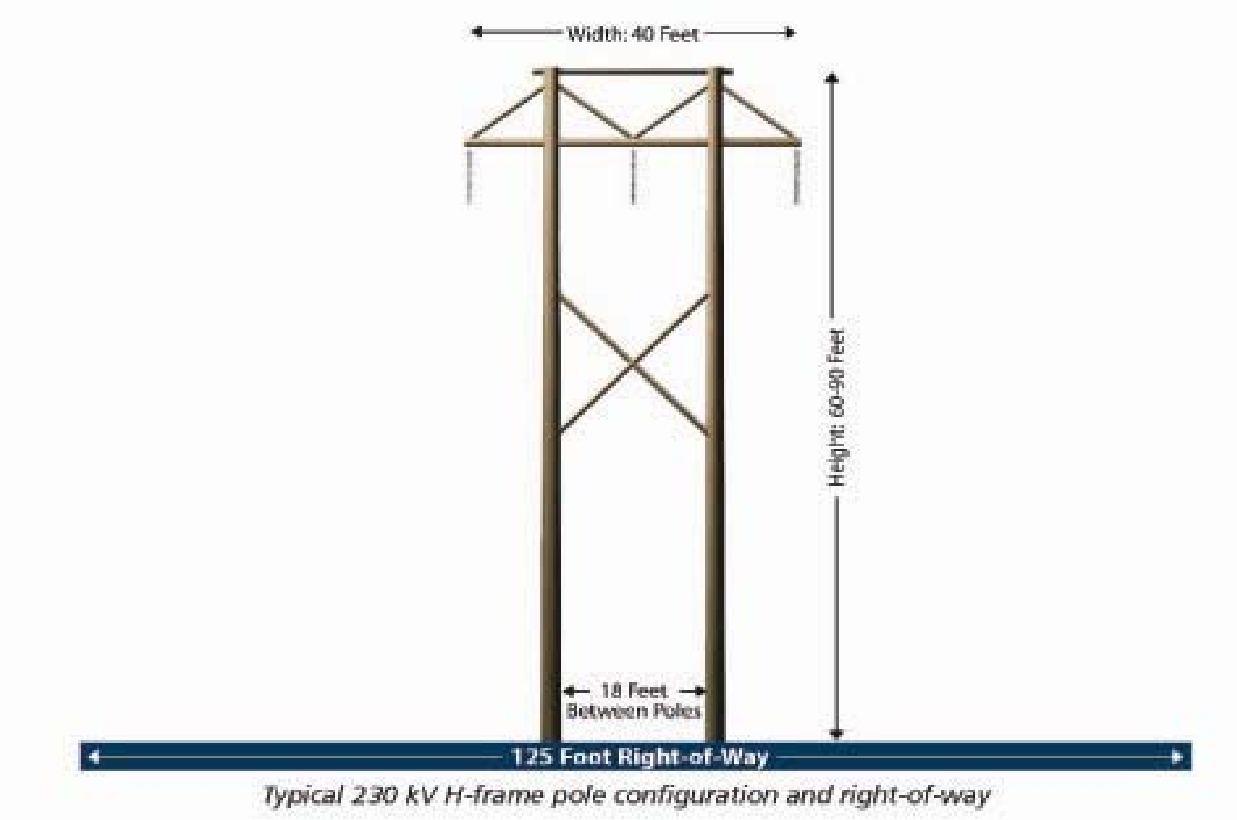
Dry Fork Station Switchyard to Sheridan
The transmission line corridor from the Dry Fork Station Switchyard to Sheridan would be composed of Segments C, J, L, N, P, Q, S, T, W, X, and AA, and would be 95.6 miles long. This alignment would take a more direct northerly route to the proposed Tongue River Substation. The transmission line corridor would be located east of US Highway (US) 14 until crossing US 14 twice east-northeast of Arvada. It would then remain to the north of US 14. The proposed transmission line Segment X would terminate at the proposed Tongue River Substation located at Site 2. Segments AA would run north from the existing Sheridan Substation and would interconnect with the existing 230-kV line at Site 1.

Tongue River Substation
The proposed substation would be located on a previously disturbed site with little sagebrush cover and low species diversity. The primary vegetation observed at this site during field surveys was a combination of invasive and noxious weed species. Vegetation would be permanently cleared within the 700-foot by 664-foot fenceline.

Project Design
Basin Electric engineers used environmental resource survey information to determine the specific centerline alignment within corridors and associated ROW requirements. Basin Electric engineers have yet to fully complete the engineering design for suitable pole locations, pole heights, span distances, and foundation and guy wire specifications. In addition, negotiations with landowners concerning easements are ongoing. It is Basin Electric’s goal to negotiate long-term easements to be purchased from landowners for the ROW. Basin Electric has an established process for conducting these negotiations that includes substantial interaction with landowners if an agreement cannot be reached expeditiously. In the event that an agreement cannot be established and landowners are unwilling to grant an easement, condemnation of lands could occur and landowners would be compensated for fair market value as determined by a court of law.

The transmission line would be constructed using wood pole structures within a 125-foot ROW. Pole structures would be H-frame and would typically range in height from approximately 60 to 90 feet, depending on the span between structures and the local topography (Figure 2.2-6). The span between structures typically ranges from approximately 650 feet to 1,100 feet, depending on soils, geology, topography, vegetation, and the presence of wetlands. Taller structures are generally used for crossing utility/transmission lines or where unusual terrain exists. The H-frame structure is designed to support three conductors and two overhead groundwires (OHGW).

One OHGW could be substituted with an optical groundwire (OPGW) for communication purposes. Three-pole wood structures with guy wires are often used at angle points.



(Source: Basin Electric 2006b)

Figure 2.2-6 – Typical H-Frame Structure

The transmission line would meet the necessary National Electrical Safety Code (NESC) design requirements for transmission lines to withstand extreme winds. The transmission line would be protected from lightning by two overhead shield wires placed at the top of the H-frame structures. Table 2.2-2 describes the typical physical design characteristics for the transmission poles.

Table 2.2-2 – Transmission Line H-Frame Pole Characteristics

Description of Design Component	Quantity
Voltage (kV)	230
Right-of-Way (ROW) Width (feet)	125
Average Span (feet)	800
Average Height of Structures (feet)	60–90
Average Number of Structures per Mile	6–7
Temporary Structure Disturbance (square feet)	2,425
Permanent Structure Disturbance (square feet)	75
Minimum Ground Clearance Beneath Conductor (feet)	26
Maximum Height of Machinery That Can Be Operated Safely Under Line (feet)	14
Circuit Configuration	Horizontal

Source: Basin Electric 2006b

Construction Activities
The tension method is the conventional method for constructing transmission lines of this size. Using this method, the conductor is kept under tension during the stringing process. The tension method of stringing is applicable where it is desired to keep the conductor off the ground to minimize surface damage, in areas where frequent crossings are encountered, or to reduce the amount of travel by heavy equipment. The tension method is used to keep the conductor clear of energized circuits, the ground, and obstacles that might cause conductor surface damage. A helicopter or ground vehicle can be used to pull or lay out pilot line or pulling line. The use of a helicopter is advantageous in rugged or poorly accessible terrain.

During construction, temporary material staging and equipment laydown areas averaging approximately 5 to 10 acres would be used. The locations for these areas are not yet known. Appropriate resource surveys would be conducted when the final locations of the staging areas are determined. Potential locations of these areas include:

- North of Gillette, near Highway 14;
- Spotted Horse, near Highway 14;
- East edge of Sheridan County, near Highway 14;
- North of Leiter, near Buffalo Creek Road;
- Near the proposed Tongue River Substation;
- Near the existing Hughes Substation; and
- Near the existing Sheridan Substation.

Construction Schedule, Workforce, and Equipment
Construction by means of overland, and/or helicopter access generally would follow a sequential set of activities performed by crews proceeding along the length of the line. The transmission line is estimated to take approximately 18 months to construct. Construction activities would begin in the fall of 2007 and the transmission line and substation would be in service by January 2009. Table 2.2-3 lists the tasks, personnel, equipment and duration of each task. A general discussion of major tasks follows Table 2.2-3.

Structure Site Clearing
Site clearing is often accomplished using brush hogs and mowers to the extent feasible. When necessary, the sites are leveled to facilitate structure assembly. Disposal of cut trees and brush is done in a manner that is acceptable to the county or landowner. Tree removal is anticipated to be minimal due to the nature of the vegetation communities in the project area and the method of construction.

Hole Excavation
Each structure site requires boring pole holes. Additional excavations/borings may be required for installing anchors at structures that require guy wires. Screw anchors are used at most guyed structure locations. The amount of disturbance for each structure type depends on the access available to each site. Temporary disturbance can vary from approximately 2,425 square feet for typical H-frame structures to 10,000 square feet for some three-pole, angle structures. A line truck or other special tracked vehicle equipped with a power auger would be used to excavate holes.

Table 2.2-3 – Conventional Personnel, Equipment, and Time Requirements to Complete Construction of the Hughes Transmission Line

Task	Number of Personnel	Equipment	Duration[1]
Access Layout	2	D-6 caterpillars, motor graders, 10-wheel dump trucks, water trucks	2–3 months
Construction Yards and Material Staging	3–4	Pickup trucks, flatbed trucks with cranes, pole delivery trucks, rubber-tire digging equipment, all terrain vehicles (ATVs), portable compressors	Continuous during construction period
Vegetation Management and Structure Site Clearing	4–6	Pickups, brush hog, mower, and ATVs	3–4 months
Gate Installation	3	Flatbed and pickup trucks	2–3 months
Structure Assembly	6–8	Carryalls, cranes, material trucks, rubber-tired crane, pickups	5–6 months
Hole Excavation	2–3	Rotary drilling rigs, backhoes, pickups, rubber-tired digging equipment, ATVs, portable compressors	5–6 months
Structure Erection	6–8	Rubber-tired cranes and boom trucks	4–5 months
Ground Wire and Conductor Stringing	16–20	Pickups, manlifts/boom trucks, hydraulic tensioning machines, reel trailers	10 months
Cleanup	4	Pickups, dump trucks, and flatbed trucks	Continuous during construction period
Landscape Rehabilitation	4	Pickups, flatbed trucks, backhoe, D-6 caterpillar, seeding equipment, rubber-tired seeding equipment, hand-seeding equipment	3 months

[1] Some construction tasks occur simultaneously; total estimated length of construction is approximately 18 months.
Source: Basin Electric 2006b

Structure Assembly and Erection

Erection crews assemble structures at the structure sites and place them in the foundation holes using cranes or large boom trucks. The crossarms, braces, insulators, and other appurtenances would be attached to the poles while on the ground. The structure would then be plumbed and the hole backfilled.

Ground Wire and Conductor Stringing

Reels of conductor would be delivered to wire pulling sites spaced every four miles along the transmission line corridor. These locations require sufficiently level areas of approximately 50 feet by 250 feet (12,500 square feet). Reasonable efforts would be made to select locations that do not require grading or removal of vegetation. All ground disturbances would be repaired to the satisfaction of the appropriate landowner. The wire would be retrieved by wire-pulling equipment from these locations. A helicopter may be used at the discretion of the contractor or if access cannot be obtained. Pulling sites would be selected where access is possible or where access is approved.

Construction Waste Management

Waste from construction materials and rubbish from all construction areas would be collected and hauled to a disposal facility. Because these wastes are anticipated to be non-hazardous, they would likely be disposed of in a permitted local municipal solid waste (MSW) disposal facility.

No hazardous waste would be stored or located near the ROW at any time before, during, or after construction.

Standard construction and operating procedures that reduce the likelihood of spills or other incidents involving hazardous materials have been incorporated into the proposed transmission line. Hazardous materials storage areas would require spill protection measures and would also be subject to regular inspections. Employees involved in the handling of hazardous materials would receive training in the proper handling and management of hazardous materials. In addition, a spill response plan and a contingency plan for responding to accidents or spills would be developed prior to initiating construction. Specific USDOT requirements related to packaging and labeling of waste for shipment would also apply.

If any of the material staging areas would include vehicle and equipment refueling, or other storage of petroleum products in excess of 1,320 gallons, an SPCC plan would be developed. The SPCC plan would address: 1) operating procedures to prevent oil spills; 2) control measures installed to prevent a spill from reaching navigable waters; and 3) countermeasures to contain, clean up, and mitigate the effects of an oil spill that reaches navigable waters.

Existing Access Roads
Existing access roads would be maintained in their original condition to the extent possible or with minor road blading or other improvements as agreed upon by the landowner. If vehicular access along existing roads is obstructed by brush, access would be established by driving over the brush and not by clearing the brush. No new access roads are planned as part of the project.

Temporary Overland Access
In areas where there are no existing roads, and the terrain is relatively flat, temporary overland access may be used. Overland access would be used only where vegetation is not sensitive and consists of grasses and shrubs. Temporary access routes would result in a 12-foot-wide temporary disturbance and compaction of vegetation and soil. Because no grading or other access improvement is proposed, the vegetation along these temporary access routes would be expected to recover quickly. Temporary overland access routes would be identified prior to the beginning of construction.

Reclamation
Following construction, all disturbed areas would be graded and/or resloped to their original contours to minimize erosion and visual alteration. All disturbed areas would also be reseeded as needed. Fences and gates damaged as a result of the project would be repaired and access roads or trails identified by the landowner, county, or the U.S. Bureau of Land Management (BLM) would be blocked or reclaimed, if requested, to prevent future access by the public.

All areas from which the vegetation has been removed or otherwise destroyed or damaged would be reclaimed and revegetated. Reclamation activities, weather permitting, would be ongoing throughout construction and would be undertaken as soon as construction activities are completed in a particular area. Disturbed areas would be regraded to approximately the preconstruction contours, and the excavated material would be compacted using hand or mechanical tampers, as appropriate. Drainage structures and similar improvements would be removed from areas to be reclaimed, where appropriate, and the area would then be fertilized and revegetated. Ruts and scars from overland travel would be filled to the original contours and reseeded.

The optimal timing for successful revegetation would be mid-July into mid-August to coincide with seasonal rains. Mulching or netting may be required to protect seeded areas from erosion. Mulching, if used, would consist of native hay that is free of noxious or troublesome weeds and would be applied at the rate specified by the affected private landowner or by BLM on public lands. Other erosion control devices such as water bars or terracing of water diversion structures may be required in specific locations.

The reclamation procedures described above would be applied to all disturbed areas, which include temporary access, road cut and fill slopes, staging areas, removal of portions of the existing line, the new transmission line corridor, and any other areas that result in disturbed vegetation.

Operation, Maintenance, and Abandonment

The following Operational and Maintenance (O&M) activities would be performed throughout the life of the project.

Transmission Line Operation and Maintenance

Basin Electric's preventive maintenance program for the transmission line involves aerial and ground inspections. Aerial inspections would be conducted at least three times each year. Ground patrols would be conducted annually for the first three or four years. Climbing inspections of structures would be conducted on a five-year cycle, with every fifth structure inspected each year. Inspections and patrols would use vehicles in areas where there are roads and foot patrols in areas where roads either do not exist or are not accessible.

Maintenance activities may include repairing damaged conductors, inspecting and repairing structures, and replacing damaged and broken insulators.

Basin Electric would maintain any gates it installs or uses for access.

Vegetation Management

Basin Electric trims trees that pose a clearance or safety problem to the operation of the transmission line. This activity is performed in coordination with the affected landowners or land-managing agencies to ensure that it balances the objectives of minimizing the risk of fire, maintaining vegetative screening, and meeting electrical clearance requirements.

Treatment of vegetation within the ROW includes the selective removal or trimming of trees to prevent their contact with the transmission line conductors. Some trees must be removed if they are classified as "danger trees" (that is, trees that are 20 feet in height or taller which upon falling would come within 10 feet of the structure or conductors). Disposal of cut trees and brush would be in a manner acceptable to Sheridan and Campbell Counties or the affected landowner. Tree removal is anticipated to be minimal due to the nature of the vegetation communities in the project area.

Abandonment
Future abandonment would result in removal of transmission line poles. The existing roads in the area would be used for access to the existing poles, so no new access roads would be required for pole removal. Under the direction and at the discretion of the landowner, transmission line and road ROWs would be fully reclaimed using the most current techniques available at the time of abandonment.

2.2.3 Alternative Power Plant Site and Transmission Line Alignment

The alternative power plant site and alternative transmission line routes would be similar to the proposed power plant and proposed transmission routes in that the alternatives exhibit relatively similar environmental and land use conditions.

2.2.3.1 *Alternative Power Plant Site*

All major project components for the alternative power plant site would be the same as described for the proposed action. The alternative power plant site is a 205-acre parcel, approximately 6 miles north of the city of Gillette, Wyoming, in Campbell County, and approximately 1 mile southeast of the proposed power plant site (Township 51N, Range 71W, N ½ of Section 30, N ½ Section 24, W ½ of N ½ of Section 29) (see Figure 1.1-4). The property is bounded by the rail loop for the Dry Fork Mine to the north, coal mining operations to the west, future designated mining areas to the south, and Garner Lake Road to the east. Surrounding land uses include coal mining operations, rural residential development, and ranches.

All operational and design aspects for the alternative power plant site would be the same as for the proposed action, including implementation of BMPs. A photo simulation of the alternative power plant site is presented in Figure 2.2-7. The general arrangement and site layout for the alternative power plant are shown in Figures 2.2-8 and 2.2-9. The fuel source, emission controls, and overall general arrangement for the alternative power plant site are the same as described for the proposed power plant site. The ash landfill described for the proposed action would also be used for the alternative power plant site.

Description of Alternative Power Plant Components
The alternative power plant would include the same components as the proposed power plant, with the exception of access, as described below.

Access Roads
Garner Lake Road would provide access to the alternative power plant site. Onsite parking would be provided during both construction and operation of the facility.

Construction Activities
Construction of the alternative power plant would essentially follow the same schedule as the preferred site and would be completed by 2012. Employment would range from a high of 1,019 workers during construction to 75 workers during operations. Construction activities for the alternative power plant would be the same as for the proposed power plant site.

Construction Schedule, Workforce, and Equipment

The construction schedule, workforce, and equipment for the alternative power plant site would be the same as described for the proposed power plant.

Operation, Maintenance, and Abandonment

Operation, maintenance, and abandonment of the alternative site would be the same as for the proposed power plant, with the exception of access.

Access and Traffic

Access during operations would be from Garner Lake Road. Onsite parking would be provided during operation of the facility.

Fencing and Signage

The property boundary would be fenced with a guarded access gate. Appropriate signage would be provided throughout the facility and would address security areas, emergency evacuation routes, and safety issues.

Abandonment

The alternative site would have a life expectancy of approximately 60 years. At the end of its useful life, the power plant would be decommissioned or renovated. Similar to the proposed plant site, if the alternative plant site is decommissioned, all structures and equipment at the site would be dismantled and removed.

2.2.3.2 *Alternative Transmission Line*

Hughes Substation to Dry Fork Station Switchyard

The alternative transmission line would consist of Segments B and C and follow an easterly and more northerly route between the Hughes Substation and the Dry Fork Station Switchyard (Figure 1.1-5 and Table 2.2-3) than the proposed route. As a result, the alternative corridor would be approximately 2.4 miles longer than the proposed transmission line corridor, for a total segment length of 19.7 miles (Table 2.2-6).

Table 2.2-6 – Alternative Transmission Line Corridors, Segments, and Lengths

Corridor	Segments	Length of Corridor (miles)
Hughes Substation to Dry Fork Station Switchyard	B,C	19.7
Dry Fork Station Switchyard to Carr Draw Substation	D,E,G,H	25.5
Dry Fork Station Switchyard to Sheridan	C, J, L, O, Q, R, T, U, Y, AA	102.3
Sheridan Substation (terminus)		N/A
	TOTAL	147.5

Dry Fork Station Switchyard to Carr Draw Substation

The alternative transmission line corridor comprises Segments D, E, G, and H (Figure 1.1-5 and Table 2.2-3). The alternative transmission line corridor would be 2.8 miles longer than the proposed transmission line corridor, for a total segment length of 25.5 miles. The primary difference between the proposed transmission line route and the alternative transmission line route is that Segment G would take a more southerly route as it proceeds west towards the Carr Draw Substation.

Dry Fork Station Switchyard to Sheridan
The alternative transmission line route would be composed of Segments C, J, L, O, Q, R, T, U, Y, and AA (Figure 1.1-5 and Table 2.2-3). The alternative transmission line route would be 6.7 miles longer than the proposed transmission line segment, for a total segment length of 102.3 miles. Differences between the proposed transmission line and the alternative transmission line include the following:

- Alternative Segment O would follow an existing 69-kV transmission line part of the way toward the Recluse Substation and then turn west toward Spotted Horse, while the proposed transmission route Segments N and P would follow a more direct northwesterly route;
- The alternative route would diverge from the proposed route north and west of Clear Creek, following a more southerly route composed of Segments U and Y, and would tie into the existing 230-kV line at Site 3 (Figure 1.1-5); and
- Segment AA would run north from the Sheridan Substation and tie in to the existing 230-kV line at Site 1.

Project Design
Project design would be the same as described for the proposed action including implementation of design features and BMPs (see Section 2.4).

Construction Activities
Construction activities would be the same as described for the proposed action (see Section 2.2.2.2), except for some slight changes in schedule, workforce, and equipment due to the additional length of the alternative transmission line. Disturbance would be expected to be slightly greater than the proposed transmission line due to the number of staging areas necessary to serve 12 additional route miles and the need for approximately 85 more tower structures (981 total).

Alternative Power Plant Station Site Photo Simulation
(Source: Basin Electric 2006a)

Figure 2.2-7 – Alternative Power Plant Site Photo Simulation

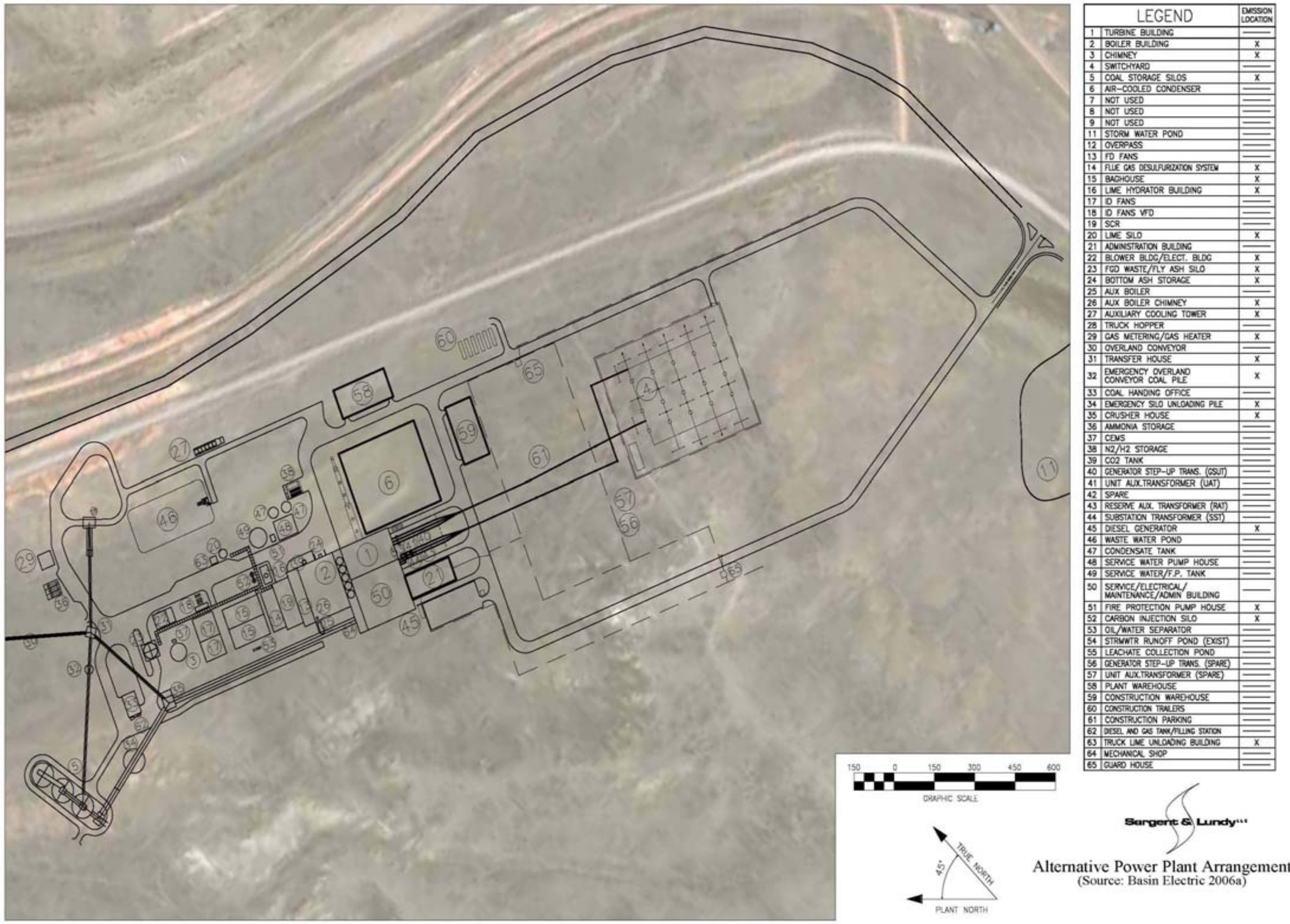


Figure 2.2-8 – Alternative Power Plant Arrangement

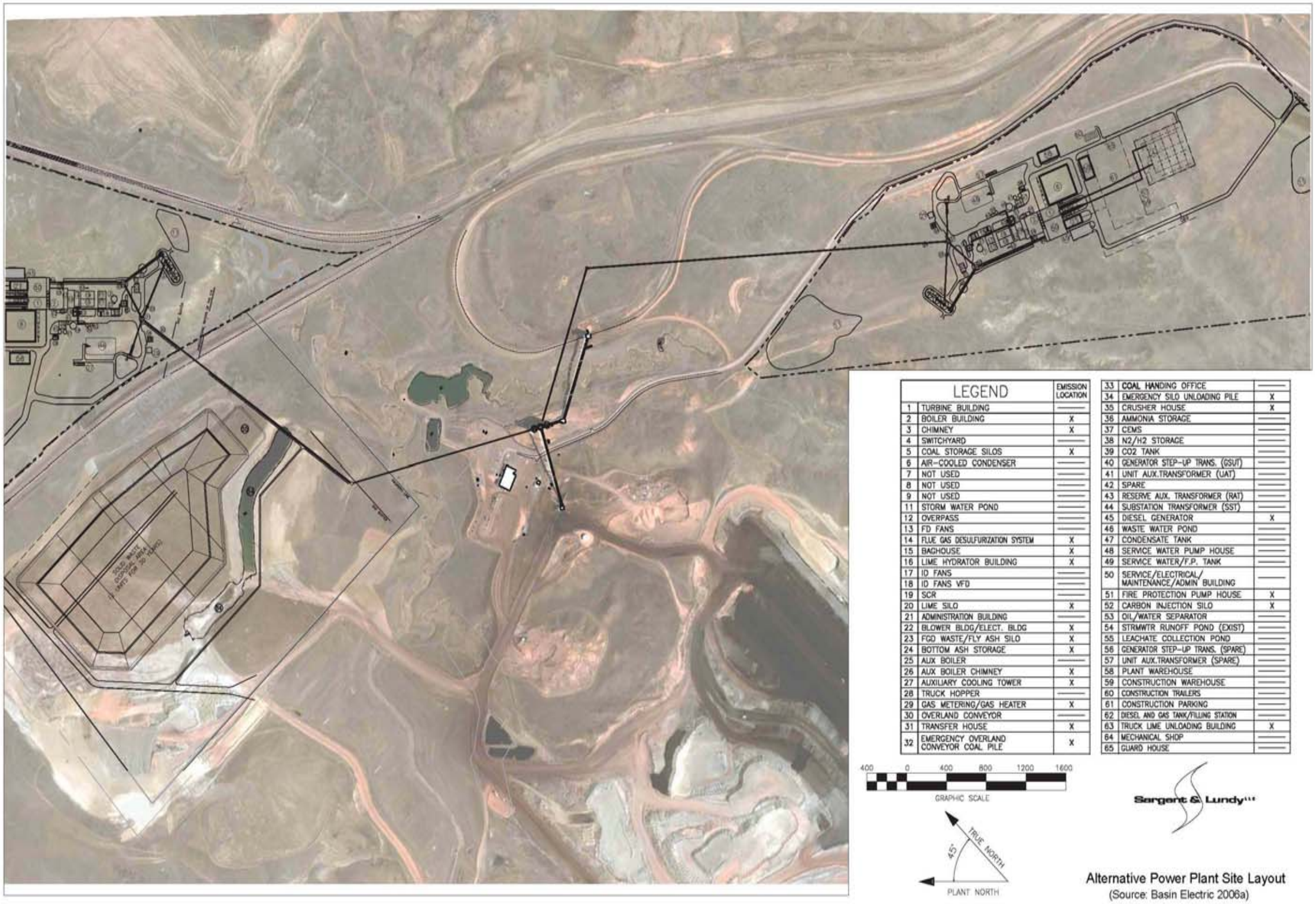


Figure 2.2-9 – Alternative Power Plant Site Layout

Operation, Maintenance, and Abandonment

Operation, maintenance, and abandonment would be the same as described for the proposed action (see Section 2.2.2.2).

2.3 ALTERNATIVES ELIMINATED FROM DETAILED CONSIDERATION

2.3.1 Power Plant

As discussed in Section 2.1, Basin Electric conducted an Alternatives Evaluation Study to determine the best alternative to serve growing member load in northeastern Wyoming. The Alternative Evaluation Study was a comparative technical and economic analysis that evaluated the possible alternatives for providing a 250 MW generating capacity expansion, based on the forecasted load growth at the study's initiation in 2004. Then, in May 2005, a revised load forecast determined that a 350 MW facility would be needed due in part to increased demand from CBM and coal mining industries. Basin Electric and RUS determined that since the unit size increase was not sufficient to justify additional technology options, the technical analysis originally conducted did not need to be reevaluated. The economic analysis was reevaluated in 2005 and it showed that a coal-based resource was still the preferred alternative.

Alternatives to the proposed power plant were evaluated in terms of cost-effectiveness, technical feasibility and reliability, and environmental soundness. Alternatives were eliminated from detailed analysis in this EIS if they did not meet the purpose and need for the project. The alternatives considered included the following:

- **Energy conservation and efficiency –** Demand-side management and the ability of increased energy efficiency to offset the projected increases in energy demand;
- **Power Purchase Agreements –** Power purchases from existing regional suppliers of wholesale electric energy and related services;
- **Noncombustible renewable energy sources –** Renewable energy technologies including wind, photovoltaic (solar), hydroelectric, and geothermal;
- **Combustible renewable energy sources –** Renewable combustible technologies including biomass, biogas, landfill gas, and municipal solid waste; and
- **Nonrenewable combustible energy sources –** Traditional combustible technologies including oil; natural gas-fired boilers, and combustion turbines (both simple- and combined-cycle configurations); and other carbon-based fuel-burning technologies such as circulating fluidized-bed combustion and integrated gasification combined cycle (IGCC) technology.

2.3.1.1 *Energy Conservation and Efficiency*

Energy efficiency means doing the same work (or more) with less energy. Energy efficiency can free up existing energy supply; therefore, energy efficiency can be considered part of an entity's energy resource portfolio.

Energy conservation and efficiency programs can reduce electrical demand and help to decrease the amount of additional generation capacity. These programs can be considered to be in parallel to, or replace a portion of future capacity requirements.

Basin Electric and its members are engaged in a variety of conservation and energy efficiency programs to reduce the energy load within the Basin Electric service area. The programs and activities were developed to promote, support, and market dual heat, water heaters, heat pumps, air conditioning, storage heating, grain drying, irrigation, photovoltaic, energy audits, and numerous other programs.

Basin Electric's members that currently promote energy conservation and efficiency in their load management systems include the following:

- East River Electric Power Cooperative;
- Central Power Electric Cooperative;
- Northwest Iowa Power Cooperative; and
- L & O Power Cooperative.

Energy efficiency technology would only reduce load by a relatively small amount. The cost effectiveness of energy efficiency and incentive programs would be quite variable and highly dependent on the effectiveness of the program approach. A larger amount of base load would be required than can be realized through energy conservation and efficiency efforts. Therefore, RUS determined that this alternative would not meet the purpose and need for the project.

2.3.1.2 *Power Purchase Agreements*

In order for a power purchase proposal to be feasible, a suitable transmission path must be available from the generation source to the load control area in which Basin Electric's member systems are located. Transmission constraints in northeastern Wyoming prevent additional firm deliveries without considerable investments in transmission infrastructure (Basin Electric 2005a). Because purchased power would be delivered over non-firm transmission paths that are not guaranteed and thus do not meet the reliability requirement, RUS determined that purchased power does not meet the purpose and need for the project.

2.3.1.3 *Participation in another Utility's Generation Project*

Basin Electric has worked with other entities to partner in a generating project in northeastern Wyoming. One discussion was for a partnership with Black Hills Power to build about 180MW of new generation. At the time of discussions, it was believed that Basin Electric could build and operate a coal resource cheaper than the option discussed with Black Hills.

Due to the limited amount of new generation capacity available through the partnership and the cost considerations, RUS determined that this alternative does not meet the purpose and need for the project.

2.3.1.4 *Repowering/Uprating of Existing Units*

Repowering or uprating an existing unit at a fossil-fueled generating station in order to improve the efficiency, capacity, or energy output of the facility occurs across the electric utility industry. Repowering or uprating may result, in some cases, in increased fuel consumption or the substitution of one fuel combustion technology with another. Repowering or increasing the current rating of an existing resource is not feasible in northeastern Wyoming because Basin Electric does not have a resource in the area to repower or uprate. It is not considered feasible to uprate facilities not owned by Basin Electric. Basin Electric does not own the transmission feed lines used by the other facilities in the area. The lines are operated under a joint facilities agreement among the participating entities. Uprating by one entity is not feasible due to the load serving and operating constraints of the individual partners. Due to these constraints, RUS determined that this alternative is not a feasible alternative for meeting the purpose and need for the project.

2.3.1.5 *Renewable Noncombustible Energy Sources*

The renewable, noncombustible energy sources evaluated included wind, solar (photovoltaic and thermal), hydroelectric, and geothermal energy. Appendix B describes these technologies in detail. Although renewable noncombustible energy technologies would meet Basin Electric's environmental criterion, they cannot fulfill the need for a long-term, reliable, cost-effective, and competitive source for generating 385 MW.

Wind power cannot fulfill the need for long-term, cost-effective, and competitive generation of base load capacity in Northeast Wyoming for Basin Electric due to fact that the wind power generation is intermittent, with average annual capacity factors of 30 to 40 percent. Similarly, solar power cannot fulfill the need due to the fact that the power is intermittent and would probably have an average capacity factor in the range of 20 to 35 percent, and also be very costly for that capacity factor (Basin Electric 2005a).

Resource limitations in Northeast Wyoming hinder hydropower and geothermal electric power generation. Limited resources available for development of hydropower in this area make it unlikely that this technology could fulfill Basin Electric's need for a long-term, cost-effective, and competitive generation of base load capacity. Hydroelectric power production is seasonal with an average annual capacity factor of 40 to 50 percent, depending on year-to-year rainfall levels. Geothermal electric power cannot meet Basin Electric's needs due to fact that commercial geothermal resources for generation of electric power are not available in Northeast Wyoming (Basin Electric 2005a).

For these reasons, RUS has determined that this alternative does not meet the purpose and need for the project.

2.3.1.6 *Renewable Combustible Energy Sources*

The renewable combustible energy source evaluated for this project was biomass. Biomass power is the generation of electric power from burning urban waste wood, and crop and forest residues. The average biomass facility produces 20 MW with a low efficiency. In order for biomass to be economical as a fuel for electricity, the source of biomass must be located close to where it is used for power generation. This reduces transportation costs. The most economical conditions exist when the energy used is located at the site where the biomass fuel is generated (Basin Electric 2005a).

Sufficient biomass resources are not available in northeast Wyoming. Therefore, Biomass cannot fulfill the need for long-term, cost-effective, and competitive generation of baseload capacity in Northeast Wyoming for Basin Electric due to the higher levelized cost compared to a conventional coal-fired power plant. For this reason, RUS has determined that this alternative does not meet the purpose and need for the project.

2.3.1.7 *Nonrenewable Combustible Energy Sources*

The nonrenewable combustible energy resources evaluated were Natural Gas Simple Cycle (NGSC), natural gas combined cycle (NGCC), microturbines, PC, circulated fluidized-bed (CFB) coal, and IGCC coal. The electric power cost projections for these energy technologies are documented in Tables 1.2-5 and 1.2-6 in Chapter 1. Appendix B describes these technologies in greater detail.

NGSC is a type of combustion turbine generator (CTG) application. In simple cycle operation, gas turbines are operated alone, without any recovery of the energy in the hot exhaust gases. Simple cycle gas turbine generators are typically used for peaking or reserve utility power application, which primarily are operated during the peak summer month at less than a total of 2,000 hours per year. Simple cycle applications are rarely used in base load applications because of the lower heat rate efficiencies. However, CTGs could be used in base load operation if it was economical to do so. If a NGSC were operated at 80 percent annual capacity factor, the levelized cost of power would be about $74/MWh, assuming the cost of fuel is about $5.50/per thousand British thermal units (MMBtu). Natural gas cost is highly variable and strongly affected by the economy, production and supply, demand, weather, and storage levels. Weather and demand are large factors that affect gas prices and are very unpredictable (Basin Electric 2005a).

NGCC operation consists of one or more CTGs exhausting to one or more heat recovery steam generators (HRSG). The resulting steam generated by the HRSG is then used to power a steam turbine generator (STG). If a NGCC were operated at 80 percent annual capacity factor, the levelized cost of power would be about $55/MWh, assuming the cost of fuel is about $5.50/MMBtu (Basin Electric 2005a).

> The **levelized cost** quantifies the unitary cost of the electricity (the kWh) generated during the lifetime of the power plant. This allows accurate comparisons with the cost of other technologies.

NGSC and NGCC cannot meet Basin Electric's need for long-term, cost-effective, and competitive energy generation due to the instability in the fuel cost and higher levelized cost compared to coal's levelized cost of $38/MWh (at 80 percent annual capacity factor and assuming a fuel cost of $0.35/MMBtu) (Basin Electric 2005a). For these reasons, RUS has determined that these alternatives will not be evaluated in detail.

Microturbines are small gas turbines that burn gaseous and liquid fuels to power an electrical generator. Microturbines entered field-testing around 1997 and began initial commercial service in 2000. The size range for microturbines available and under development is from 30-350 kW, compared to conventional gas turbine sizes that range from approximately 1 MW to 500 MW. They are able to operate on a variety of fuels, including natural gas, sour gas (high sulfur, low Btu content), and liquid fuels such as gasoline, kerosene and diesel fuel/heating oil. The design life of microturbines is estimated to be in the 40,000 to 80,000 hour range. While units have demonstrated reliability, they have not been in commercial service long enough to provide definitive life-cycle data (Basin Electric 2005a).

Microturbines cannot fulfill the needs of Basin Electric members due to high installed cost, the large number of microturbines that would be needed to fulfill the capacity requirement, and the instability in the cost of fuel (Basin Electric 2005a). For these reasons, RUS has determined that this alternative will not be evaluated in detail.

Coal plants have an advantage over other fossil-fueled energy source technologies due to the relatively low and stable cost of coal and the ability to secure a long-term contract for coal. Given the PRB coal supplies available, RUS determined that a coal-based resource is the preferred choice for fulfilling Basin Electric's need for new generation in northeastern Wyoming in 2011 and beyond.

The key factors for consideration of the different coal combustion technologies include capability to provide sufficient base load capacity, ability to meet current and likely future environmental compliance and statutory requirements, and use of commercially available and proven technology, while meeting Basin Electric's mandate to provide power to its members in a cost-effective manner. The cost effectiveness of the different coal combustion technologies was discussed in detail in Section 1.2.4.

A significant environmental issue for these nonrenewable combustible technologies is air emissions. Table 2.3-1 compares projected emissions of key air pollutants from hypothetical 250 MW PC, CFB, and IGCC power plants. A general discussion of the PC process was provided in Section 2.2.2. A general discussion of CFB and IGCC process follows Table 2.3-1. Appendix B describes these three technologies in greater detail.

Table 2.3-1 – Comparison of Coal Combustion Technology Emission Rates

Pollutant	Emission Rates for Coal Combustion Technologies (lb/MMBtu)		
	PC (Proposed Power Plant)	CFB (Existing US Commercial Plants)	IGCC (Existing US Demonstration Plants)*
SO_2	0.10	0.10	0.17
NO_x	0.07	0.09	0.09
PM_{10}**	0.017	0.019	0.011
CO	0.15	0.15	0.045
VOC	0.0037	0.0037	0.0021

Source: Basin Electric 2005a

Notes:

*Public Service Company of Indiana (PSI), Energy Wabash River Station and Tampa Electric Company, Polk Power Station existing IGCC Demonstration Plants.

**PM_{10} includes filterable and condensable portions.

Circulating Fluidized Bed

CFB technologies are capable of achieving an 85 percent annual capacity factor, are suitable for base load capacity, and are highly reliable. Combustion takes place at 1,500°F to 1,600°F, resulting in reduced NO_x formation compared to a PC unit. While the air emissions from a CFB boiler (especially NO_x, SO_2, and CO) are lower than a conventional PC boiler, the final stack emissions would be comparable based on the use of add-on control equipment. Current BACT would require selective noncatalytic reduction or SCR for NO_x control, limestone injection in the furnace for SO_2 control, and a fabric filter for particulate control. A polishing CDS FGD system would also be required for additional SO_2 control.

Particulate emissions would result from coal, ash, and lime material handling operations; other air emissions would result from miscellaneous support equipment, such as diesel or natural gas-fired emergency generators, fire pumps, and the installation of a natural gas-fired auxiliary boiler. New coal-fired boilers are subject to the Clean Air Mercury Rule (CAMR) but under federal regulation are not required to prepare a case-by-case maximum achievable control technology (MACT) evaluation (40 CFR Parts 60, 62, 72, and 78).

Similar to a PC plant, CFB plant liquid wastes would include BFW blowdown, auxiliary cooling tower blowdown, and chemicals associated with water treatment. Dry cooling and zero liquid discharge systems can be used to reduce overall water consumption and discharge.

Solid wastes include boiler bed ash and combined dry FGD and fly ash solid waste from the fabric filter. Since limestone is injected into the CFB boiler for SO_2 removal, there would be additional calcium compounds present in the bed and fly ash. There may be a high free lime content, and leachates would be strongly alkaline. Carbon-in-ash levels are higher in CFB residues than in those from PC units. As with PC-fired units, disposal of these wastes is a major factor in plant design and cost considerations.

While the CFB technology has been commercially demonstrated for bituminous, low-sodium lignite, and anthracite waste coals, long-term commercial operation with PRB coal has not been demonstrated. CFB technology meets Basin Electric’s purpose and need for new generation but lacks demonstrated long-term operating experience on PRB coal and, in the final analysis, would not meet Basin Electric’s need to provide power to its members in the most cost-effective manner. Thus, RUS determined that this alternative does not meet the purpose and need for the project.

Integrated Gasification Combined Cycle

The IGCC technology is an established, but still developing technology; it is not expected to be developed for full commercial use before 2015. Currently, two IGCC plants are in operation in the U.S. with the aid of Department of Energy funding. These plants operate at capacity factors of 70 and 38 percent, and benefit from improved reliability compared to the early years of operation.

There are six companies considered to be the leaders in providing this technology, which is capable of providing base load power in conjunction with reduced emissions of several criteria pollutants. Basin Electric, in February 2005, solicited proposals from the six IGCC technology leaders in order to evaluate the current state of technology and its potential for application as the Dry Fork Station. Basin Electric received proposals from only three of these companies, and all three of the proposals received were deemed unresponsive primarily due to a lack of required guarantees and warranties on the reliability of the technology.

Because current IGCC technology does not meet the requirement for a high level of reliability and long-term, cost-effective, and competitive generation of power identified in the purpose and need for this new generation project, RUS determined that this alternative does not meet the purpose and need for the project.

2.3.1.8 *Other Generation Sources*

Basin Electric considered other potential generation methods to satisfy the purpose and need for the project, including combustion of oil, nuclear power, and a combination of generation methodologies. Base load oil-fired power generation facilities have much greater costs per megawatt than coal and suffer from much greater fluctuations in fuel costs. The cost of constructing nuclear power plants makes it feasible only for large-scale power generation needs. Furthermore, the long construction time associated with nuclear power plants would not meet the purpose and need for more immediate power generation capacity. For these reasons, RUS determined that oil-fired and nuclear generated electricity were not feasible alternatives to meet the purpose and need.

Various combinations of coal (PC and CFB technologies) and natural gas power generation were considered and evaluated for northeastern Wyoming. Basin Electric continually evaluates all alternative methods for power generation for future needs based on location, overall demand, baseload versus peak load requirements, and best service to their members. Power supply modeling conducted for this project suggested that electrical generation sources using coal alone would best meet Basin Electric's purpose and need for new generation, because natural gas lacks demonstrated long-term price stability and supply. In the final analysis, a combination of sources would not meet Basin's need to provide power to its members in the most cost effective manner (Basin Electric 2005a). For these reasons, RUS has determined that a combination of alternatives does not meet the purpose and need for the project.

2.3.2 Transmission Line

Section 2.1 discusses the process used to select the proposed and alternative transmission corridors and associated routes in the project area. Detailed discussions are contained in Basin Electric's Hughes Transmission Project Macro-Corridor Study (Basin Electric 2005e) and Hughes Transmission Project Siting Study (Basin Electric 2006d). Basin Electric assessed the potential opportunities for the various route alternatives and the associated physical (e.g., length of transmission line, right-of-way requirements), land use, engineering, environmental, regulatory, and social and economic considerations and constraints. Public and stakeholder input were also considered.

The preliminary comparative analysis (Phase 1) identified 25 individual segments that could be paired into a total of 54 possible alternative corridors. These alternative segment combinations were evaluated for achieving the purpose and need for the project, feasibility, proximity to residences, and the presence of large amounts of wetland/riparian habitat and raptor nests (Phase 2). This process resulted in sixteen alternative corridors. In Phase 3, four segment combinations were considered but eliminated due to lower rankings than comparative segments for the same region or contained significant constraints to the project. Three segment combinations were eliminated because of the potential construction of double-circuit lines. Double circuit lines are not desirable because any event that could cause the failure of one line would likely also affect the other, thus threatening the stability of the regional power grid. One segment combination was eliminated because of alignment with the alternative proposed substation site.

The remaining twelve segment combinations are included in either the proposed or alternative alignments to be evaluated in detail in the EIS.

2.4 DESIGN FEATURES AND BEST MANAGEMENT PRACTICES

Design features were developed as part of the proposed action and alternative actions, and generally incorporate state-of-the art technologies including air emissions control technology, air-cooled condensers (ACC), and zero liquid wastewater discharge. BMPs were established to ensure the safe and effective construction, operation, and maintenance of the power plant and transmission line. BMPs generally focus on storm water management, wastewater management, operation of the well field, and coal-handling operations. The tables below list the facility design features (Table 2.4-1) and BMPs (Table 2.4-2) that were developed based on industry standard construction practices, regulatory procedural requirements, and Basin experience operating coal-fired power plants and transmission lines. Many of the design criteria and BMPs were developed in consultation with the various federal and state agencies who would issue permits for the operation of the proposed power plant and transmission line.

Mitigation is any step taken to reduce the likelihood of a significant impact occurring or, in the event an impact cannot be prevented, lessening its impact. Mitigation measures are specific commitments made during the environmental evaluation and impact study process that serve to moderate or lessen the significance of impacts resulting from the proposed action. These measures may include commitments to specific environmental protection measures for wildlife, habitat improvements, and agreements with resource or other agencies. Mitigation measures, where deemed necessary, are listed and discussed at the end of each impact analysis for each resource category.

Table 2.4-1 - General Design Features for the Proposed and Alternative Power Plant and Transmission Line

DESIGN FEATURES

- The power plant footprint would include a 300-foot-wide buffer zone to protect wetlands from potential soil disturbances and sedimentation.
- The power plant would use a zero liquid discharge system.
- To protect wildlife, final design of the power plant evaporation ponds would consider:
  - Minimizing the size of the ponds as feasible;
  - Using vegetation control to prevent nesting; disease control; and hazing waterfowl and other migratory species to discourage use of ponds;
  - Monitoring the water quality of the ponds for avian use and possible adverse effects; and
  - Creating an adaptive management plan in case adverse impacts occur.
- Fencing the ash landfill to keep wildlife out of this area.
- A groundwater monitoring system consisting of 10 wells in and around the ash landfill has been installed to conduct groundwater quality and elevation/flow data.
- Construct the plant site and all associated facilities to avoid direct and indirect impacts to wetlands and surface waters.
- If necessary, arrangements to transport oversize loads would be coordinated with and approved by Wyoming Department of Transportation (WYDOT).
- Acceleration and deceleration lanes would be constructed in the northbound direction. Because two southbound lanes exist beyond the proposed access locations, additional acceleration and deceleration lanes are not required for southbound traffic.
- Two new accesses would connect the power plant site with the adjacent highway. Based on WYDOT requirements the two power plant site access points would be approximately 0.25 mile apart.
- Hazardous materials would be segregated from other waste and subject to an onsite storage limitation of 13,230 lbs of waste for up to 180 days.
- Hazardous materials storage areas at the Dry Fork Station would require spill protection measures and would also be subject to regular inspections.
- The transmission line would span all wetlands, drainages, creeks, rivers, ponds, lakes, and associated riparian communities.
- The transmission line alignment would be routed through areas with a low density of forested riparian species whenever feasible.
- Line markers and flight diverters would be installed as agreed to in consultations with the U.S. Fish and Wildlife Service (USFWS) and the Wyoming Game and Fish Department (WGFD).
- Substation lighting would be limited to areas required for safety and security.

Table 2.4-2 – Best Management Practices for the Proposed and Alternative Power Plant and Transmission Line

BEST MANAGEMENT PRACTICES

Geology: Soils and Minerals

GS-M1: Site-specific conditions of soils and geological features will dictate the types of measures best suited to reduce erosion and runoff and to stabilize disturbed areas during and after construction.

Standard measures that would commonly be used to minimize soil disturbance and reduce erosion, surface runoff, and sedimentation that result from transmission line construction and existing access road improvements (no new access roads would be constructed for the transmission line) include:

- Preserve existing vegetation whenever feasible.
- Stabilize disturbed portions of the site as soon as practicable where construction activities have temporarily or permanently ceased.
- Seed disturbed sites at the appropriate times to minimize the invasion of non-native species, as recommended by agencies and landowners.
- Use barriers to prevent sediment from moving offsite and into water bodies.
- Place transmission structures to span drainages.
- Design substation facilities to meet regional seismic criteria.
- Properly identify and select suitable areas to be used as staging areas.

Water Resources

Groundwater

WR-M1: BMPs would be employed during construction, operation, and maintenance to prevent or minimize potential adverse impacts to groundwater resources by the proposed action. These measures include:

- Ten groundwater monitoring wells present at the ash landfill that will be used to monitor the water quality annually in the shallow aquifer. Water table elevations will be measured quarterly.
- Development of an SPCC plan prior to the start of construction to provide procedures for implementing spill prevention and control measures for hazardous substances to prevent and minimize impact to streams and drainages. The plan would include a procedure for storage of hazardous materials and refueling of construction equipment outside of riparian zones, spill containment and recovery plan, and notification and activation protocols.
- Inspections and spill prevention measures to prevent contact between chemical products and wastes and groundwater.
- If herbicides are used to control noxious weeds, they would be applied in accordance with label instructions.

Surface Water

WR-M2: The following measures would avoid, minimize, and/or reduce the potential for adverse impacts to surface water resources. These measures include the following:

- Establishment of buffer zones around wetlands. Both the proposed and alternative Dry Fork Station sites have enough land to allow for buffer zones to be established around the wetlands.
- Storm water monitoring at the Dry Fork Station would be conducted periodically to comply with the legal requirements of the stormwater permit.
- Inspections, secondary containment, and spill prevention measures would be implemented to prevent contact between chemical products and wastes and surface water
- Erosion and sediment controls would be established prior to construction, then maintained and controlled through the use of standard BMPs itemized in GS-M1.
- Staging areas and refueling areas, if onsite fuel storage is needed for refueling. Would be located away from surface water bodies to prevent accident spills and potential contamination of water resources.

Table 2.4-2 – Best Management Practices for the Proposed and Alternative Power Plant and Transmission Line (Continued)

Air Quality

Engineering design standards would be followed, and BMPs would be employed during project construction, operation, and maintenance to comply with regulatory requirements for air quality.

AQ-M1: The construction contractor would apply standard environmental protection measures including:

- The contractor shall use such practicable methods and devices as are reasonably available to control, prevent, and otherwise minimize atmospheric emissions or discharges of air contaminants.
- Due to the length of the corridor, extensive application of water to reduce dust is probably not feasible. However, the contractor would apply water to unpaved roads, as needed, in areas experiencing heavy construction-related traffic or in areas where dust generation is problematic.
- Vehicles and equipment showing excessive emission of exhaust gases due to poor engine adjustments or other inefficient operating conditions shall not be operated until corrective adjustments or repairs are made.

The speed of vehicles traveling on unpaved roads shall be limited to the extent practicable to reduce the generation of fugitive dust.

Noise

To meet established noise standards, no equipment-specific requirements are indicated by the analysis, other than those resulting from standard manufacturer's design and maintenance of mufflers or similar equipment components. Thus, no BMPs have been identified for noise.

Vegetation and Noxious Weeds

VG-M1: To limit potential impacts to native vegetation communities and to minimize spread of noxious and invasive species, the following measures would be implemented:

- Coordinate with the County Weed and Pest Districts concerning their noxious weed policies.
- Re-seed disturbed areas using native vegetation.
- Avoid removing large patches of big sagebrush wherever feasible.
- Replant disturbed areas with native species (or non-native species as directed by the appropriate agency/landowner).

Implement a weed management plan prior to construction to avoid spread of noxious weeds.

Wetlands and Riparian Areas

WT-M1: The following measures would be implemented to minimize impacts to wetland and riparian communities:

- Place the transmission line in areas with a low density of forested riparian species whenever feasible. This would reduce the number of trees that need to be removed within the ROW.
- Implement standard measures to minimize indirect impacts to surface waters and riparian and wetland resources, such as erosion and sedimentation controls.
- Place transmission structures in upland communities, and buffer riparian and wetland communities by at least 100 feet whenever feasible.

Wildlife and Fisheries Resources

WF-M1: The following measures would be implemented to minimize/avoid impacts to wildlife and fisheries resources:

- Conduct pre-construction surveys to locate active bird nests for species protected under the Migratory Bird Treaty Act of 1918 (MBTA) and establish buffers (if necessary) until nesting season is complete.
- Construct plant site and all associated facilities to avoid direct and indirect impacts to wetlands and surface waters.

WF-M2: The project would follow Avian Power Line Interaction Committee (APLIC) guidelines for avian protection. The following are potential measures to minimize impacts to wildlife species within the project area:

- Perch deterrents would be installed on pole structures near active raptor nests and areas with heavy raptor concentrations in accordance with the Biological Resources Conservation Plan.
- Route the line away from individual standing trees within the chosen ROW, whenever feasible, to avoid removal of trees within the project area and the taking of nests protected under the MBTA.
- Provide a 100-foot buffer for wetlands, riparian areas, and aquatic habitats whenever feasible.
  Install line markers at all crossings of significant water bodies where waterfowl and raptors may be concentrated or other known flight paths.

Table 2.4-2 – Best Management Practices for the Proposed and Alternative Power Plant and Transmission Line (Continued)

Special Status Species: Threatened and Endangered Species and Species of Special Concern

SS-M1: Pre-construction bird surveys would be conducted if construction is to occur during the nesting season to comply with the MBTA. Nest disturbance would be avoided as required under the MBTA.

SS-M2: Coordinate with the USFWS and the WGFD and comply with the terms and conditions of any mitigation plan for threatened, endangered, and special status species that would be developed and approved by those agencies prior to construction.

- Restrict construction and development in mountain plover habitat during the peak breeding season (April to July) if mountain plovers are found within the ROW during pre-construction surveys.
- Minimize the use of pesticides or herbicides during the Columbian sharp-tailed grouse brood-rearing season of May 15 to July 15 (applicable to the Alternate Transmission Line Alignment only).
- Retain large deciduous trees in open sagebrush shrubland and grassland habitats since they provide nesting habitat for sensitive raptor species.
- Place perch deterrents within greater sage-grouse concentration areas, particularly near active lek sites, nesting and other concentration areas (e.g., brood rearing habitat; wintering habitat).
- Place flight diverters in areas that span riparian and wetland communities, large drainages, and reservoirs.
- Adhere to avian species-specific construction constraint windows as established through coordination with USFWS and WGFD to mitigate impacts during breeding season.
- Consultation with WGFD will be conducted to determine appropriate and feasible buffers for this project.

SS-M3: Measures to Protect Bald Eagle:

- The area within one mile of the proposed centerline would be surveyed immediately before construction begins to ensure that any new bald eagle activity areas are detected.
- If new bald eagle nests are found within one mile of the proposed line, additional consultation would be conducted with the USFWS to develop new conservation measures for this site based on the National Bald Eagle Management Guidelines before construction begins.
- A seasonal (February 1 through August 15) disturbance-free buffer zone of one mile would be established for all bald eagle nest sites (both active and alternate next sites). An alternative nest is a nest that is not used for breeding by eagles during a given breeding season.
- A seasonal (November 1 through April 1) disturbance-free buffer zone of one mile would be established for all roost sites. This zone applies specifically to the known roost sites along segment N, as well as any other roost sites in the project area. This buffer zone and timing may be adjusted based on site-specific information through coordination with USFWS.
- The project would follow APLIC guidelines for avian protection (APLIC 1994; Basin Electric 2006b).
- Bird flight diverters would be installed near the bald eagle roost site along Segment N and along segments of the line which span Clear Creek, Prairie Dog Creek, and the Powder River.
- Basin Electric would avoid removing single standing trees in the project area during construction to the extent possible. Basin Electric would select routes through riparian corridors that would cause minimal removal of mature cottonwood and other riparian tree species.
- Non-emergency maintenance activities within one mile of bald eagle roost sites would be scheduled outside of the winter period (November 1 through April 1) whenever feasible, and between 9:00 a.m. and 3:00 p.m. whenever bald eagles are present at the roost site.
- In the event that a dead or injured bald eagle is located during construction or maintenance, the USFWS' Wyoming Field Office (tel.: 307-772-2374) and the USFWS' Law Enforcement Office (tel.: 307-261-6365) would be notified within 24 hours.
- In addition to monitoring avian use of the wastewater pond, the water quality would also be periodically monitored to assess sodium concentrations in the water. If sodium concentrations are elevated above the USFWS maximum tolerance level of 17,000 mg/L, Basin Electric would work with USFWS to identify the method and type of exclusionary systems that can be implemented to prevent avian species from accessing the pond.

SS-M4:Measures to Protect Ute Ladies'-Tresses Orchid:

Where ground disturbance is planned in areas identified as potential habitat for the Ute Ladies'-Tresses Orchid, surveys for this species would be conducted by a qualified botanist during the appropriate season before project implementation. Should the species be located, it will be marked so that construction activities will not affect the orchid. Additional consultation would be conducted with USFWS to ensure that the species is not adversely affected.

Table 2.4-2 – Best Management Practices for the Proposed and Alternative Power Plant and Transmission Line (Continued)

Land Resources
Residential, Commercial, and Industrial Land Uses **LR-M1:** Where residences occur within 500 feet of the transmission line, topography would be used where possible to screen the line from direct view. **LR-M2:** The transmission line would be sited to avoid directly crossing CBM wells to the extent feasible. **Prime and Unique Farmlands/Farmlands of Statewide Importance** **LR-M3:** The transmission line would be routed along the edges of irrigated fields, or would span fields to the extent feasible. **Agriculture/Grazing:** No measures have been identified.
Visual Resources
VR-M1: Locating structures on BLM VRM Class II lands would be avoided to the extent feasible. Where this is not feasible, impacts would be minimized through the following means: (1) strategically placing structures in more obscure locations relative to view opportunities on BLM-managed land; and (2) minimizing skylining of structures and conductors from view opportunities.
Transportation and Traffic
No measures have been identified.
Cultural and Historic Resources
CR-M1: Cultural resource surveys would be conducted prior to construction. A Class III cultural resources report and finding will be prepared and sent to the Wyoming State Historic Preservation Officer (SHPO) for review and concurrence. **CR-M2:** Any unknown cultural resources or human remains discovered during the course of construction would be protected, evaluated, and treated in compliance with the Native American Graves Protection and Repatriation Act (NAGPRA) and Section 106 of the National Historic Preservation Act (NHPA). **CR-M3:** Cultural resources discovered during surveys would be fenced to avoid any further impact and transmission line structure locations would be adjusted along the ROW to prevent impacts on the cultural resources.
Paleontological Resources
PR–M1: Prior to construction, a field survey would be conducted within the ROW to determine if any significant paleontological resources exist. To be time and cost effective, the field survey would be conducted only in areas where there are outcrops of the Fort Union or the Wasatch Formations, which are known to be fossiliferous. **PR–M2:** A report describing the results of the field survey would be prepared. Based on the results of the field survey, a decision would be made as to whether or not a paleontologist would need to be retained. If no fossils are discovered during the field survey, there would be no need for additional involvement by a paleontologist. **PR-M3:** Paleontological resources discovered during surveys would be fenced to avoid any further impact and transmission line structure locations would be adjusted along the ROW to prevent impacts on the paleontological resources.
Hazardous Materials and Solid Waste
HM-M1: The Dry Fork Station project would likely be subject to the requirements associated with hazardous materials management as a small quantity generator as described in 40 CFR 262. Hazardous materials would be segregated from other waste and subject to an onsite storage limitation of 13,230 lbs of waste for up to 180 days. Hazardous materials storage areas would require spill protection measures and would also be subject to regular inspections. Generation and storage of hazardous materials would require employee training in the handling and management of hazardous materials, developing a contingency plan for responding to accidents, developing a waste minimization program, and selecting a regulated transporter and disposal facility. Specific USDOT requirements related to packaging and labeling of waste for shipment would apply. **HM-M2:** An SPCC plan would be developed to provide procedures for implementing spill prevention and control measures for oil products. The SPCC plan would address: • Operating procedures to prevent oil spills; • Control measures installed to prevent a spill from reaching navigable waters; and • Countermeasures to contain, clean up, and minimize the effects of an oil spill that reaches navigable waters. **HM-M3:** The facility may also be subject to the Risk Management Plan (RMP) requirements of section 112(r) of the CAA due to the storage of anhydrous ammonia.
Public Health and Safety
PH–M1: Where feasible, the transmission line would be routed away from houses and other inhabited structures.
Socioeconomics
Potential impacts on population and housing will be reduced through the terms and conditions of the Wyoming Industrial Siting Permit issued by the WDEQ.

2.5 COMPARISON OF ALTERNATIVES

Tables 2.5-1, 2.5-2, and 2.5-3 present a summary comparison of the proposed and alternative power plant and proposed and alternative transmission lines, including a summary of potential impacts.

Analysis of effects of the No Action Alternative indicated that there would be no impact on any of the resources studied in relation to the Dry Fork Station; impacts from the Hughes Transmission Line would still occur.

Table 2.5-1 - Comparison of Power Plant Alternatives

Power Plant	Proposed Action	Alternative Action
Generating capacity	385MW (net) 422MW (gross)	385 MW (net) 422 MW (gross)
Plant site area	353 acres	205 acres
Plant site footprint	120 acres	120 acres
Ash landfill site	67 acres	67 acres
Summary of Impacts from the Power Plant		
Soils, Geology, and Minerals	Impacts would be less than significant. BMPs would reduce the potential for accidental releases, and result in timely cleanup should one occur. Coal underlying the power plant would be made unavailable, but impacts would be minor due to the economic feasibility of the coal. Potential oil and gas exploration would not be affected.	Same as proposed action.
Water Resources	Impacts would be less than significant. Erosion and sediment would be controlled, protecting surface water. BMPs for the use and handling of hazardous material and response to releases would minimize or eliminate potential impacts to surface and groundwater resources. Sufficient water supply is reportedly present at up to approximately twice the proposed usage amount.	Same as proposed action.
Air Quality	Impacts would be less than significant. Construction and operation would result in additional PM and acid deposition in Class I and Class II areas and medium-term mercury and greenhouse gas impacts. Greenhouse gas emission and metal deposition would be minor.	Same as proposed action.
Acoustic Environment	Impacts would be less than significant. Offsite noise levels would be comparable to ambient noise levels.	Impacts would be less than significant but slightly greater than the proposed action due to the proximity to residences.
Vegetation, Invasive Species and Noxious Weeds	Impacts to vegetation cover, potential spread of invasive species and noxious weeds due to construction and operation actions, and reclamation associated with the proposed power plant would be less than significant.	The magnitude of vegetation loss of relatively undisturbed native sagebrush steppe would be more than that associated with the siting of the proposed power plant. The impacts due to construction and operation actions associated with the alternative power plant could be significant for vegetation, but would be less than the significant for invasive species and noxious weeds.

Table 2.5-1 - Comparison of Power Plant Alternatives (Continued)

Power Plant	Proposed Action	Alternative Action
Summary of Impacts from the Power Plant (Continued)		
Wetlands and Riparian	Impacts to wetlands and riparian resources from construction and operation of the proposed power plant site and the associated features would be less than significant. BMP WT-M1 and design features including a 300-foot buffer zone, have been developed to protect wetlands from potential soil disturbances and sedimentation that could result from vegetation removal and grading during construction or impacts associated with operations.	Same as proposed action.
Wildlife and Fisheries	The design features and BMPs described would minimize the impact of construction and operation of the proposed and alternative power plants and transmission lines. Impacts resulting from operation of the proposed power plant would generally be less than significant. The risk of contamination and avian impacts would result in a moderate and insignificant impact. Regardless, discussions with USFWS in regards to this impact would occur to address additional design features and BMPs to minimize this impact. Overall, the impact to all wildlife species would be less than significant for the proposed power plant. No impacts on fisheries or aquatic resources would occur as a result of the proposed power plant development because of avoidance of water bodies, buffer zones, and other BMPs to avoid indirect impacts. Impacts would be less than significant.	Effects would be the same as the proposed action with the exception of loss of 120 acres of undisturbed sagebrush habitat. The loss of sagebrush habitat important to several species of concern would result in an insignificant impact on habitat, though coordination with BLM and WGFD would be conducted to discuss ways to restore and enhance sagebrush-steppe habitat in the project area. Impacts to fisheries would be the same as for the proposed action.
Threatened, Endangered, BLM Sensitive Species, and Wyoming Species of Special Concern	Disturbance to foraging bald eagles and other special status raptors is possible to probable, however, overall impacts to these raptors from construction and operation of the proposed power plant would be moderate and less than significant. Impacts to golden eagles would be minor and less than significant. Because the proposed power plant site is an area of largely disturbed lands, minor impacts to greater sage-grouse habitat would be anticipated. The proposed construction would be unlikely to result in any impacts on lek or nesting habitat. Overall, impacts to greater sage-grouse from construction and operation at the proposed power plant site would be less than significant.	Same as proposed action, except that impacts to grouse may be slightly greater, because the alternative site has better sagebrush habitat and it is closer to an active lek (breeding site).
Land Resources	Impacts would be less than significant. Landownership patterns and residential, subdivisions and industrial development would not be affected, nor would the availability of existing corridors. Livestock grazing rights on the site would be terminated, but grazing in surrounding areas would not be affected.	Same as proposed action.

Table 2.5-1 - Comparison of Power Plant Alternatives (Continued)

Power Plant	Proposed Action	Alternative Action
Summary of Impacts from the Power Plant (Continued)		
Recreation and Wilderness	There would be no impact on wilderness or Areas of Critical Environmental Concern (ACECs) (none exist near the project). Effects on recreation would be less than significant. Effects would be limited to a loss of public access to the site from fencing.	Same as proposed action.
Visual Resources	Impacts would be less than significant. Impacts would be from lighting, structures silhouetted against the sky, periodic emissions, and activity.	Same as proposed action.
Transportation	Impacts would be less than significant. Level of service would decrease slightly, along with a slight increase in the potential for accidents, both caused by additional traffic.	Same as proposed action except that the level of service would return to current conditions when construction is complete.
Cultural Resource	Impacts would be less than significant. Cultural, historical, and Native American resources would be surveyed, protected and avoided.	Same as proposed action.
Paleontological Resources	Impacts would be less than significant. Paleontological resources would be surveyed, protected and avoided.	Same as proposed action.
Solid and Hazardous Waste	Impacts would be less than significant. There is potential that hazardous material would be spilled, but BMPs for quick cleanup would minimize potential for environmental damage. Emissions from the plant would be within regulated limits. Runoff controls and the landfill cover would prevent sediment from the landfill from entering surface water or wetlands in the vicinity	Same as proposed action.
Public Health and Safety	Impacts would be less than significant. Occupational injuries or fatalities may occur during construction. Radioactive materials would not increase exposure beyond background levels. Air quality standards would be met. Modeling for the potential for arsenic reaching groundwater showed the risk to be very low.	Same as proposed action.
Socioeconomics	Effects would be less than significant. There would be an increase in demand for housing during construction and operation which could exceed the housing available. Employment would increase, as would government revenue, and the demand for services. Property values would not be affected.	Same as proposed action.
Environmental Justice	There would be no impact on environmental justice populations or Indian Tribes.	Same as proposed action.

Table 2.5-2 - Comparison of Transmission Line Alternatives

Transmission Line	Proposed Action	Alternative Action
Line Capacity	230-kV	230-kV
Hughes Substation to Dry Fork Station Switchyard	Segment: A	Segments: B & C
Corridor Length	17.3 miles	19.7 miles
Dry Fork Station Switchyard to Carr Draw Substation	Segments: D, E, F, & H	Segments: D ,E, G, & H
Corridor Length	23.0 miles	25.5 miles

Table 2.5-2 - Comparison of Transmission Line Alternatives (Continued)

Transmission Line	Proposed Action	Alternative Action
Dry Fork Station Switchyard to Sheridan	Segments: C, J, L N, P, Q, S, T, W, X, AA	Segments: C, J, L, O, Q, R, T, U, Y, AA
Corridor Length	95.6 miles	102.3 miles
Substation (terminus)	Tongue River Substation	Tie-in to existing 230-kV line
Total Transmission Line Length	135.9 miles	147.5 miles
Total area of ROW (125 feet-wide)	2,057 acres	2,251 acres
Length adjacent to existing transmission lines	5 miles	31 miles
Length adjacent to existing roads for construction, operation, and maintenance	4 miles	10 miles
Average number of structures (per mile)	6-7	6-7
Number of H-pole transmission structures required	896	981
Estimated permanent structure aerial disturbance for transmission poles (assuming 75 sq. feet disturbance per structure)	1.6 acres	1.7 acres

Table 2.5-3 - Summary of Transmission Line Alternative Impacts

	Proposed Action	Alternative Action
Soils, Geology, and Minerals	Impacts would be less than significant. Soil disturbance would occur from improvement of access roads, support structures and staging areas. BMP would minimize impacts. BMPs would minimize the potential for accidental spill and ensure timely clean up should one occur. Active mining would not be affected. In the event additional mineral resources underlying the transmission line are discovered, the transmission line could be relocated. Exploration and development of oil and gas resources would not be precluded.	Same as proposed action.
Water Resources	Impacts would be less than significant. Erosion and sediment would be controlled, protecting surface water. BMPs for the use and handling of hazardous material and response to releases would minimize or eliminate potential impacts to surface and groundwater resources.	Same as proposed action.
Air Quality	Impacts would be less than significant. Minor, short-term impacts over a small extent from construction, operation and maintenance due to fugitive dust.	Impacts would be less than significant, although slightly greater than the proposed action due to additional length of the transmission line during construction, operation and maintenance activities.
Acoustic Environment	Impacts would be less than significant. Offsite noise levels would be comparable to ambient noise levels. Noise (corona) impacts would diminish to levels close to ambient levels.	Same as proposed action.
Vegetation	Impacts from construction, operation and maintenance of the proposed transmission line would be less than significant. BMPs and design features would minimize possible impacts to vegetation cover, potential spread of invasive species and noxious weeds, and reclamation	Same as proposed action.

Table 2.5-3 - Summary of Transmission Line Alternative Impacts (Continued)

	Proposed Action	Alternative Action
Wetlands and Riparian	Impacts to wetlands and riparian areas associated with the construction, operation and maintenance of the proposed transmission line would be less than significant. Design features and BMP WT-M1 would preclude structures in wetlands or avoid them all-together. Riparian habitat, in particular trees greater than 20 feet high, within the proposed transmission line corridors would need to be removed for safety and maintenance purposes. As the exact route within the proposed transmission line corridor has not been determined, the number of trees and area of impact, and thus the magnitude of impact can not be determined. The low density of trees in the project area, coupled with the avoidance measures, and the flexibility of routing options would minimize impacts to a possible minor level.	Same as proposed action.
Wildlife and Fisheries	The impact to all wildlife species would be less than significant for the proposed transmission line. Raptors and waterfowl are the primary common wildlife species of concern in the project area. Implementing BMPs for wildlife, vegetation, and wetlands avoid or minimize the magnitude of most impacts. No impacts on fisheries or aquatic resources would occur as a result of construction, operation and maintenance of the proposed transmission line because of avoidance of water bodies, buffer zones, and other BMPs to avoid indirect impacts. Impacts would be less than significant.	Same as proposed action for both wildlife and fisheries.
Threatened, Endangered, BLM Sensitive Species, and Wyoming Species of Special Concern	With the implementation of best management practices (BMPs), minor but not significant impact on bald eagles and other special status raptors would be expected as a result of constructing and operating the proposed transmission line alignment. The construction and operation in the proposed alignment is highly likely to result in habitat fragmentation, long-term displacement of grouse, and potential abandonment of lek sites. These would be long-term effects that would be moderate to major in magnitude and large extent. With implementation of mitigation measures and BMPs, overall impacts to greater sage-grouse may be reduced to less than significant. The proposed alignment would have probable but minor effects on neotropical and short-distance migrants within and adjacent to the proposed transmission line and associated features. The impact to neotropicals and short-distance migrants from construction and operation of the proposed transmission line and associated features would be less than significant.	Impacts on the bald eagle and other special status raptors would be similar to those described for the proposed action. Impacts on greater sage-grouse would be similar to those described for the proposed action, with the exception that active leks would not be directly affected by construction of the alternate alignment. Impact on neotropical and short-distance migrants would be similar to that described for the proposed action.

Table 2.5-3 - Summary of Transmission Line Alternative Impacts (Continued)

	Proposed Action	Alternative Action
Threatened, Endangered, BLM Sensitive Species, and Wyoming Species of Special Concern (continued)	Based on the rarity of occurrence of Columbian sharp-tailed grouse, with implementation of mitigation measures and BMPs, any impact to this species would be minor and less than significant.	A previously undocumented lek located within the alternative transmission line corridor in Segment Y could be directly adversely impacted by construction. Potential impacts to Columbian sharp-tailed grouse are similar to those described for greater sage-grouse.
Land Resources	Impacts from construction, operations and maintenance would be less than significant. The transmission line may be in view of residences or residents may hear and see activity associated with construction, operation, and maintenance. An exceedingly small area (.02 acres) of prime farmland would be removed from production.	Effects would be the same as the proposed action, with the following exception: .04 acres of prime farmland would be removed from production.
Recreation, Wilderness and ACEC	There would be no impact on wilderness or ACECs (none exists near the project). Effects on recreation would be less than significant. There would be a temporary increase in public access, which would return to previous conditions when construction is complete.	Same as proposed action.
Visual Resources	Impacts would be less than significant. Impacts would be from structures silhouetted against the sky, linear features, and activity.	Same as proposed action.
Transportation	Impacts would be less than significant. More traffic would occur during construction. There would be no change in the level of service or accidents.	Same as proposed action.
Cultural Resource	Impacts would be less than significant. Cultural, historical, and Native American resources would be surveyed, protected and avoided.	Same as proposed action.
Paleontological Resources	Impacts would be less than significant. Paleontological resources would be surveyed, protected and avoided.	Same as proposed action.
Solid and Hazardous Waste	Impacts would be less than significant. There is potential that hazardous material would be spilled, but BMPs for quick cleanup would minimize potential for environmental damage.	Same as proposed action.
Public Health and Safety	Impacts would be less than significant. EMF would be at background levels at residences near the transmission line. Adequate ground clearance to minimize the risk of discharge shocks.	Same as proposed action.
Socioeconomics	Effects would be less than significant. There would be a slight increase in demand for housing during construction and operation. Employment would increase, as would government revenue through sales tax, and the demand for services. Property values would not be affected.	Same as proposed action.
Environmental Justice	There would be no impact on environmental justice populations or Indian Tribes.	Same as proposed action.