Stanley Consultants INC.

A Stanley Group Company
Engineering, Environmental and Construction Services - Worldwide

Southern Montana Electric
Generation & Transmission Cooperative, Inc.
Billings, MT

Site Screening Study

October 2004

Site-Screening Study

New Coal Fired Power Plant

SOUTHERN MONTANA ELECTRIC GENERATION & TRANSMISSION COOPERATIVE, INC.

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SME
Southern Montana Electric
Generation & Transmission Cooperative, Inc.

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ABBREVIATIONS

SME	Southern Montana Electric Generation & Transmission Coop., Inc.
mW	Megawatt
RUS	Rural Utility Service
NEPA	National Environmental Policy Act
EIS	Environmental Impart Statement
kW	Kilowatt
$Wh/m^2/day$	Watt-hours per square meter per day
LFG	Landfill biogas
RDF	Refuse Derived Fuel
MSW	Municipal Solid Waste
CTG	Combustion Turbine Generator
HRSG	Heat Recovery Steam Generator
STG	Steam Turbine Generator
Btu	British Thermal Units
CFB	Circulating Fluidized Bed
PC	Pulverized Coal
GIS	Geographic Information Systems
DEM	Digital Elevation Model
SHPO	State Historic Preservation Office
HV	High Voltage
NWE	NorthWestern Energy
PTDF	Power Transfer Distribution Factor
NLCD	National Land Cover Data
USGS	United States Geological Survey
WWTP	Wastewater Treatment Plants
FEMA	Federal Emergency Management Agency
T&E	Threatened and Endangered
PRB	Powder River Basin
O&M	Operating and Maintenance
NO_x	Nitrogen Oxides
ZLD	Zero Liquid Discharge
NPV	Net Present Value
BNSF	Burlington Northern Santa Fe

Section 1

Introduction

Southern Montana Electric Generation & Transmission Cooperative, Inc. (SME) proposes to construct a 250 megawatt (mW) coal-fired power plant to address an anticipated shortfall in electricity generation. A Site-Selection Study for the new plant was conducted between March and June, 2004, which identified two primary alternative sites. This report documents that siting study.

As the Rural Utilities Service (RUS) will provide financing to SME for the project, the RUS will be the approval authority under the National Environmental Policy Act (NEPA). This report addresses Rural Utilities Service bulletin 1794A-603, section 3.2.2, which requires the preparation of a Site-Selection Study document prior to the start of the scoping process for generation projects where an Environmental Impact Statement (EIS) is to be prepared. The project will also involve transmission connections into NorthWestern Energy's power grid, and the report also addresses section 3.1.2 of RUS bulletin 1794A-603 which requires the preparation of a Macro-Corridor Study for transmission projects, evaluating potential routes for the necessary transmission line connections.

Section 2

SOUTHERN MONTANA ELECTRIC GENERATION AND TRANSMISSION COOPERATIVE, INC.

General Description

Southern Montana Electric G&T, located in Billings, Montana, is an “all requirements” provider of wholesale electricity and related services to five electric distribution cooperatives and one municipal utility. The member systems of Southern Montana have provided affordable, reliable and quality electrical energy and related services to their member owners in central and south central Montana for over 60 years.

Southern Montana Electric Generation & Transmission Cooperative, Inc. (SME) is a recently formed generation and transmission cooperative which includes the following members:

- Beartooth Electric Cooperative, Inc. with its headquarters located at Red Lodge, Montana
- Fergus Electric Cooperative, Inc. with its headquarters located at Lewiston, Montana
- Mid-Yellowstone Electric Cooperative, Inc. with its headquarters located at Hysham, Montana
- Tongue River Electric Cooperative, Inc. with its headquarters located at Ashland, Montana
- Yellowstone Valley Electric Cooperative, Inc. with its headquarters located at Huntley, Montana
- City of Great Falls, Montana.

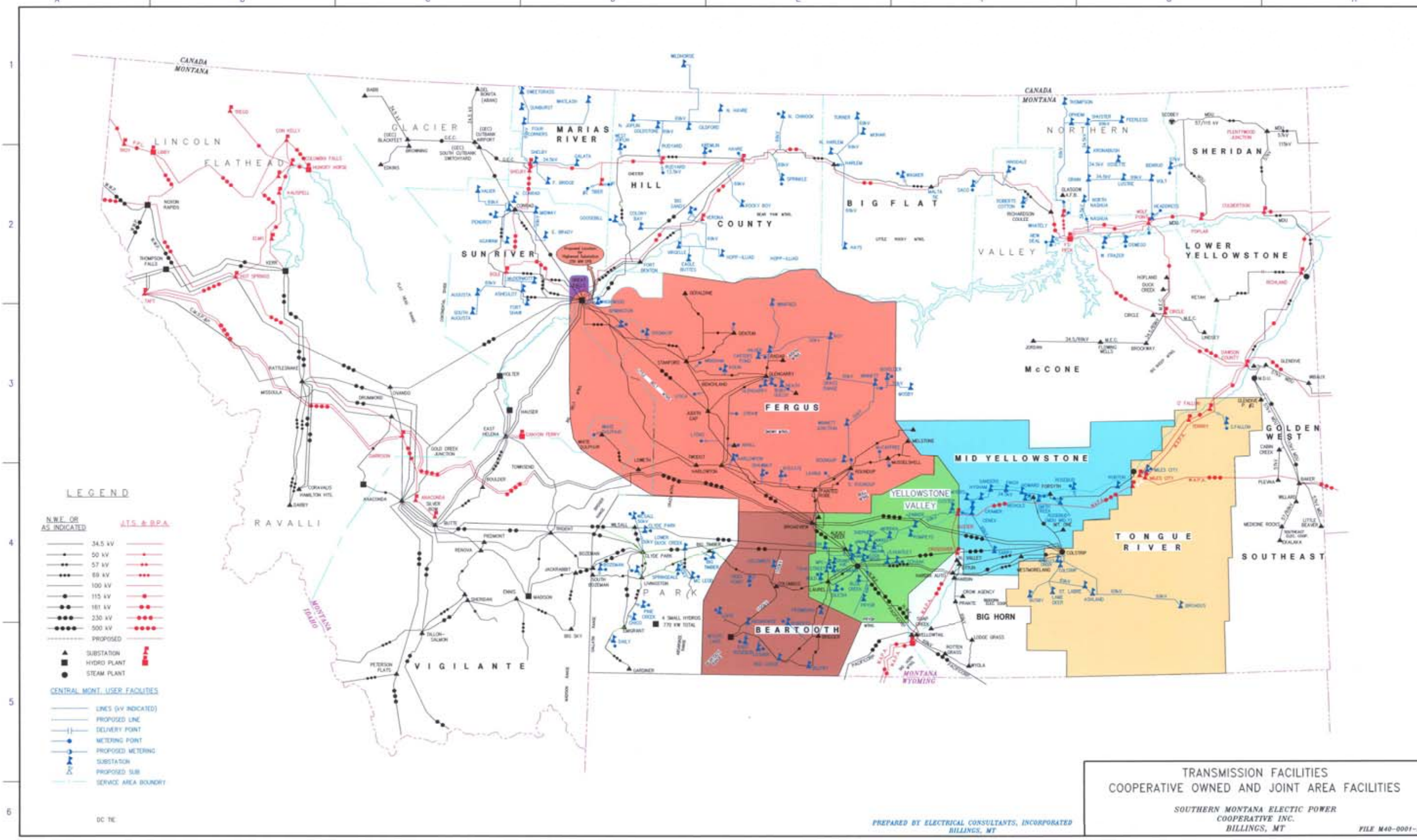
At present, all of the electrical power generation supplied to SME for distribution is through existing power purchase agreements. These agreements are due to expire in the years between 2008 and 2011. The renewal of these existing power purchase agreements will be subject to substantial cost increases. Therefore, it became prudent for SME to study the viability of locating a new power generation facility within its member distribution system territory to self-serve its future power supply needs.

Southern Montana's service area encompasses twenty-two counties in two states (Montana, and Wyoming). The geographic area served by the members of Southern Montana Electric G&T is approximately 58,000 square miles. Yellowstone Valley's service territory includes the suburban areas surrounding Billings, Montana. Figure 2-1 represents graphically the territory covered by SME.

Mission Statement

The mission of Southern Montana Electric Generation and Transmission Cooperative is to provide a reliable, economical source of electric energy for our consumer owners for the long term.

Figure 2-1
SME Service Territory



Section 3

Purpose and Need

Estimated Electric Load

An estimate of the projected load requirements of the consumer classifications is as follows.

Residential

Historically, residential loads have accounted for approximately 67 percent of projected total sales made by Southern Montana to the member cooperatives. The number of residential customers served by the member systems of Southern Montana has been increasing at an annual rate of approximately 1.75 percent over the last 10 years, with most of this growth coming from residential subdivisions being developed on the peripheral edges of Billings, Montana in Yellowstone Valley Electric Cooperative's service territory. The rate of increase in residential customers ranges from less than one half of one percent (.5%) in Mid Yellowstone Electric Cooperative's service territory, to approximately three and one half percent (3.5%) in Yellowstone Valley Electric Cooperative's service territory. The number of "farm customers" is reflective of a national trend and has declined somewhat over the last decade. This reduction is due to a number of reasons ranging from farm economics to consolidation of smaller operations into larger corporate holdings.

Southern Montana projects a system increase in residential customers of approximately 1.75 percent annually over the next 20 years. The primary contributing factor to Southern Montana's increase in residential customers will be the continued expansion of the City of Billings into the area served by Yellowstone Valley Electric Cooperative. Southern Montana also anticipates additional growth in the residential customer segment of the member systems it serves in some of the more attractive rural locations in close proximity to areas known to offer recreational and "quality" lifestyle opportunities. As a general rule where the is a combination of "trees, scenery and water" there will be growth – if these qualities are not present there is little or no growth.

The amount of electricity used on a per residential customer basis is expected to remain relatively constant to increasing slightly over the course of the next 20 years. Factors influencing individual residential customer use of electricity are the following:

- Steady to a moderate decrease in electricity use for household heating, due to more efficient heating appliances.
- Increased use of air conditioning
- Steady to a moderate decrease in electricity use for water heating due to more efficient water heaters.
- More efficient refrigerators and freezers
- More efficient lighting
- Increased electricity use by "farm customers" resulting from an increase in farm size and enhanced mechanization.

As already mentioned, Southern Montana predicts that the average annual energy use per residential customer at the G&T level will remain constant to increasing slightly over the course of the next 20 years. This increase will primarily be the result of an increase in the use of air conditioning. Total electricity sales to residential customers is expected to increase 4.6% percent per year over the next 10 years primarily as a result of significant residential development in the area surrounding Billings and a number of projected subdivisions in the Clark, Wyoming area. Once the already planned developments are built, Southern Montana anticipates the surge in growth will subside and future load growth will return to more traditional levels. Based on current projections, most of the anticipated growth is expected to occur in the period 2004-2014.

In addition to traditional load development, Southern Montana anticipates a continued increase in the use of air conditioning and a reduction in the number of homes selecting natural gas as a home heating fuel. The recent increases in the price of natural gas has seriously eroded the economic advantage natural gas previously enjoyed as the fuel of choice for home heating purposes. In fact, if the rapid increase in the price of natural gas continues as a result of the wide spread use of natural gas in combined cycle and simple cycle gas turbines, while electric prices remain stable or increase at a more gradual pace, we may see an increase in the number of homes using electric heat. This increase in the use of electric heat would most likely come in the form of high efficiency electric heat pumps offering the added advantage of air conditioning.

Even though Southern Montana anticipates sustainable growth in the residential sector of member system loads, Southern Montana foresees a slight shift in the "mix" of its existing customer base. For the period 1971 through 2003 residential load accounted for approximately 67% of Southern Montana's supply requirements. Due to increased industrial activity currently under way in Fergus Electric's service territory and planned methane gas development in Tongue River Electric's service territory, residential customer load is expected to decline to approximately 59% of Southern Montana's service obligation for the period 2003-2018, with the bulk of that shift occurring in the period 2003-2008.

Commercial and Industrial

Southern Montana partitions its “commercial and industrial customers” into small commercial and large commercial customer classifications. The small commercial customer classification includes restaurants, retail stores, “cottage industries”, and small manufacturing facilities. Large commercial customers are mostly “larger” manufacturing facilities, industrial sites and facilities with sizable motor loads such as compressor stations. The number of small commercial and industrial customers is expected to increase by 1.5 percent per year over the next 20 years. This increase would be in line with projected growth in the region for petroleum product extraction and the continued growth in the development of the methane gas wells in southeastern Montana in Tongue River’s service area.

An additional illustration of the impact of the aforementioned trend in natural gas price is occurring in Beartooth Electric’s service territory and will put upward pressure on Beartooth’s commercial energy requirements. Beartooth has been notified by one of its small commercial customers in the Clark, Wyoming area of the customers plans to discontinue using natural gas pumped from their wells to “self generate” electricity to power an existing compressor station. The owner/operator of this facility has determined that it is far more economical to sell the gas previously used to self generate in the gas market, and buy electric energy for the compressor station from Beartooth Electric. Long term projections of natural gas prices show no signs of the price of natural gas retreating to the point it can seriously be considered as a economic choice for fuel in the generation of base load electric production.

Although Southern Montana does not expect a dramatic increase in the consumption rates of small commercial and industrial users of electricity on a per customer basis, Southern Montana does anticipate a significant increase in the overall requirements of these customer classes. This increase will be the result of two large pumping stations on Fergus Electric’s system and the expected growth in the Methane gas industry in Tongue River Electric’s service area located in close proximity to the Powder River Basin (PRB) coal fields. Fergus Electric has received a deposit to cover the cost to construct facilities necessary to serve approximately 16,000 horsepower of new load by the end of first quarter 2005. The impact of the installation of this large pumping load, in concert with ongoing methane gas development, represents a projected increase in sales to the large commercial segment of Southern Montana’s load base of approximately 40% over the 2003-2008 time frame.

Tongue River Electric Cooperative projects the development of the Methane gas industry to result in an additional large commercial load requirement of 3,000 horsepower in 2007, 3,000 horsepower in 2008 and 4,000 horsepower in 2009. The Methane gas load development in Montana reflects the established trend in other regions such as northern Wyoming. Southern Montana estimates the total increase in the load requirements of Tongue River’s large industrial class to be approximately 10,000 horsepower, or an increase to Southern Montana of approximately 30% over projected 2004 requirements. These projections are rather conservative estimates when compared to the actual growth and future projections made by neighboring utilities experiencing similar industrial activity.

The aforementioned increases in the load requirements of large industrial consumers will contribute substantially to the increase in Southern Montana’s wholesale power requirements during the period 2004 through 2013. If it were not for the increased obligation fostered by these two predictable activities, Southern Montana would anticipate a more modest growth rate of approximately 3% over the 2003-2009 period.

If the efforts by local governmental agencies such as the City of Great Falls are successful in encouraging industrial development and strong regional economic growth, the projected increases in the load requirements of the member systems for small commercial and industrial customers would need to be adjusted accordingly. For the purpose of this study, a more conservative approach was taken in projecting the future load requirements of the small commercial and industrial customer sector. In order for a load to be considered in the context of this study there must be considerable assurance that the load is likely to develop before it was included in the forecast algorithm.

For the period 2003-2018 Southern Montana anticipates a 1.7 % increase in the wholesale energy requirements of the member systems small commercial loads. Over the same period large industrial customer load is expected to increase approximately 40% over the 2003-2008 time frame, and approximately 15% when the window of analysis is expanded to 2003-2016. A review of the period 2008-2013 indicates that by 2009 the "requirement spike" will have passed and growth moderates to 2.61%. For the period 2013-2018 load growth with have "flattened" to a rate of less than 1%.

Other Classes

Southern Montana expects electricity use for irrigation, street lighting, and public authorities to remain relatively flat over the next 20 years. This sector presently accounts for approximately 6.75 percent of Southern Montana's total supply requirement. For the period 2003-2018 the combined requirements of the irrigation and "others" is expected to decline to approximately 3.6%. This decline is not a reflection of an actual decrease in the needs of this important segment of our member system requirements, but an indication in the shift of member system load to higher level of industrial need.

GENERATION AND SUPPLY

Generating-Capacity Mix

The most economical means of supplying the cyclical load on an electric power system is to have three basic types of generating capacity available:

a. Base load capacity
b. Intermediate load range capacity
c. Peaking capacity

Base load capacity runs near its full rating continuously, day and night, all year long. It is economical to design these units with a maximum of fuel-economizing features, highest practical steam temperatures and pressures, extensive use of regenerative boiler-feed water heaters, reheat and double-reheat boiler-turbine arrangements, and large condensers with minimum-temperature cooling water. These items increase the cost of the plant but are justifiable because the fuel-cost saving is large due to the large amount of power produced by having the unit run continuously.

The design of the plant is optimized to obtain the balance between high first cost and low fuel cost that will give the lowest overall power cost under the assumption that the unit will be heavily loaded for many years. The best design will vary depending on the unit size, money costs, and fuel type and cost.

Peaking capacity is run only during daily peak-load periods during the seasonal peak times of the year and during emergencies. Because the total annual output is low, high efficiency is not as necessary as for base load units. Very low first cost is important. Combustion turbines and pumped-stage hydro units are the typical peaking units.

Intermediate load range capacity fits between the base load capacity and peaking capacity in both first cost and fuel cost. It generally is designed to be "cycled", that is, turned off regularly at night or on weekends and loaded up and down rapidly during the time it is on the line to take the load swings on the system. Some additional cost is required to allow for repeated starts and stops without equipment damage or the need for larger operating staffs. However, owing to the lower annual production, some reduction in efficiency is justified.

Older small base load units and hydro units with restrictions on water use are sometimes used for intermediate and peaking service.

Southern Montana's Existing Supply Resources

Southern Montana currently meets its wholesale electric energy and related services obligations through the use of power purchase agreements with BPA and WAPA. Southern Montana covers approximately 80% of its wholesale supply requirements with a power purchase agreement with BPA and the remaining 20% through a power purchase agreement with WAPA. The WAPA power purchase agreement allows Southern Montana to purchase "fixed" amounts of demand and energy at contractually defined points of delivery. Member system demand and energy requirements in excess of the level of service provided by WAPA is met with purchases from BPA under the terms and conditions of an "all supplemental requirements" contract that went into affect on 22 June 2000.

Until the advent the Energy Policy Act of 1992, and Federal Energy Regulatory Commission (FERC) Orders number 888 and 889, Southern Montana's member systems could only view with hope the obvious benefits of aligning supply needs contractually with BPA. Absent the provisions of the Energy Policy Act (and subsequent FERC orders), Southern Montana's members did not have access to transmission facilities necessary to deliver its entitlement of highly valued BPA resources such as the "Hungry Horse Reservation" to its member systems. With the help of quality BPA Account Executives, in June 2000 all the "pieces were in place" and Southern Montana was able to bridge the gap that would allow a previously energy supply deficient segment of Montana's electric consumers access to public power generated in the Pacific Northwest.

On 22 June 2000, Southern Montana's members began purchasing electric energy and related supply services from BPA to meet the needs of our member systems in NorthWestern Energy's (NWE) load control area. Southern Montana was very appreciative of having gained access to BPA resources because with the addition of this resource to its wholesale power supply portfolio, Southern Montana was a 100% hydro based services provider. For obvious reasons the member systems of Southern Montana viewed this power purchase agreement with BPA as a much-needed breath of fresh air in a region that has not always shared fully in the robust economic opportunities enjoyed in the more populous areas of the Pacific Northwest.

Despite the many positive attributes of our contract with BPA, there is a condition of this agreement that manifested itself as an "Achilles heal" to what originally appeared to be an ideal compliment to Southern Montana's power supply portfolio. Specifically, the provision of the power sales agreement between BPA and Southern Montana that allowed BPA to recall the Excess Federal Power (EFP) portion of our purchase rights beginning in 2008, and the remaining power purchase rights of the contract by 2011. Even though the contract was not set to expire until 2017, this recall provision was triggered by BPA's statutory obligation to be a full service provider to public power entities in BPA's defined service territory. Because Southern Montana's service territory lies east of the continental divide, Southern Montana is considered an "extra-regional" customer with purchase rights "secondary" to "act beneficiary loads' located west of the continental divide.

Southern Montana made several attempts to persuade BPA to reconsider its decision to recall the power purchase rights Southern Montana had enjoyed for such a short period of time. Unfortunately, BPA did not waiver in its stance on the issue and beginning in 2008 Southern Montana will experience a 50 mW reduction in its EFP power purchase rights with BPA. By 2011 Southern Montana's power purchase rights with BPA will fully expire leaving Southern Montana approximately 150 mW short of being able to meet the wholesale energy and related supply service requirements of the member systems it serves. The recall of EFP was made in accordance with Section 508(a) and 508(b) of Public Law 104-46, 16 U.S.C. 832m, and was consistent with Bonneville's Excess Federal Power Policy.

In 2011 when the inherent power purchase rights in the BPA contract fully expire, Southern Montana will have a projected load of approximately 185 mW. At that time Southern Montana will have residual power purchase rights with WAPA of approximately 20 mW. It should be noted that WAPA has the right to reduce this power purchase right for a number of reasons and has historically made periodic reduction to purchase rights on a scheduled basis. Southern Montana is clearly between a "rock and a hard spot". The wholesale power supply shortcoming left in the wake of demise of the power purchase rights provided for in the BPA contract fostered the need for Southern Montana to embark on this AES in search of an appropriate solution to the wholesale power requirements of the member systems it serves. Southern Montana is "living proof" that the promise that electric restructuring would foster a robust wholesale electric supply market, with competitive rates lower than what existed in a regulated supply environment, has not come to fruition – in fact the direct opposite is true. Overlay this wholesale power supply deficit with regional transmission constants and the magnitude of the problem increases exponentially. Faced with this less than fortunate predicament, Southern Montana must now focus clearly on putting in place a long term solution to this defined wholesale power need that will ensure Southern Montana's ability to provide affordable, reliable, quality electric energy and related services to its member systems.

Southern Montana conducted an extensive search in the power supply market place for a suitable source of energy to meet its member system requirements with a power purchase agreement secured from an existing source of generation within the WSCC. The lack of affordable generation capacity in the WSCC, combined with ever increasing transmission constraints has yielded a less than "pleasant picture" of the future viability of purchasing capacity from existing sources of wholesale supply. The WSCC, of which Southern Montana is a member, has relied completely on very expensive gas fired generation to meet future regional supply requirements. A review of the response Southern Montana received to its most recent RFP strongly indicates that the forward price of a power purchase agreement will closely track the forward price of natural gas. With the cost of natural gas fired generation constituting the future marginal cost for wholesale electric energy and related supply services, shadowed with the price volatility of natural gas, the price Southern Montana would pay for power supply would be nearly double its current costs for this service commodity. Based on the results of Southern Montana's RFP, and analysis of related transmission issues, negotiating an acceptable power purchase agreement does not appear to be a viable option.

Figure 1-1, 1-2, and 1-3 show the results of Southern Montana's most recent RFP on the basis of the cumulative cost of the proposal for 10, 15 and 20 year periods

Figure 3-1
Summary of the results of Southern Montana's November 2004 RFP
10 Year Evaluation

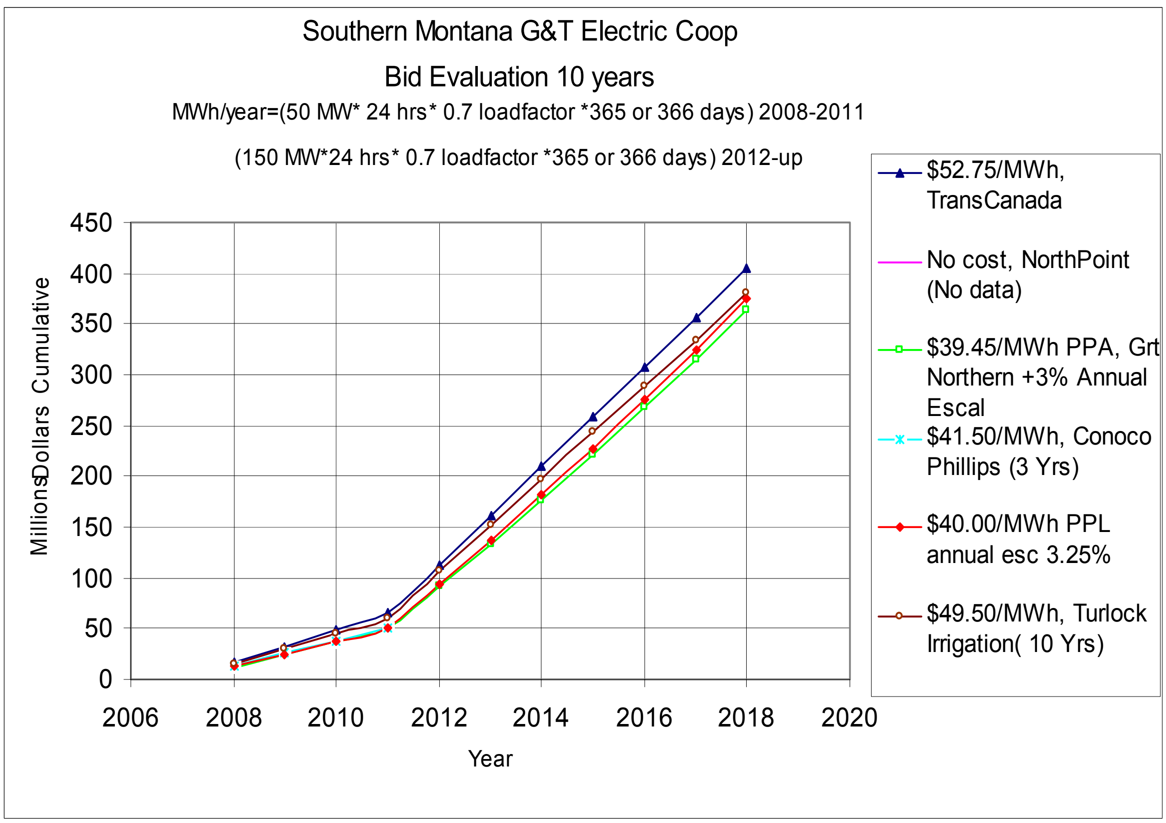


Figure 3-2
Summary of the results of Southern Montana's November 2004 RFP
15 Year Evaluation

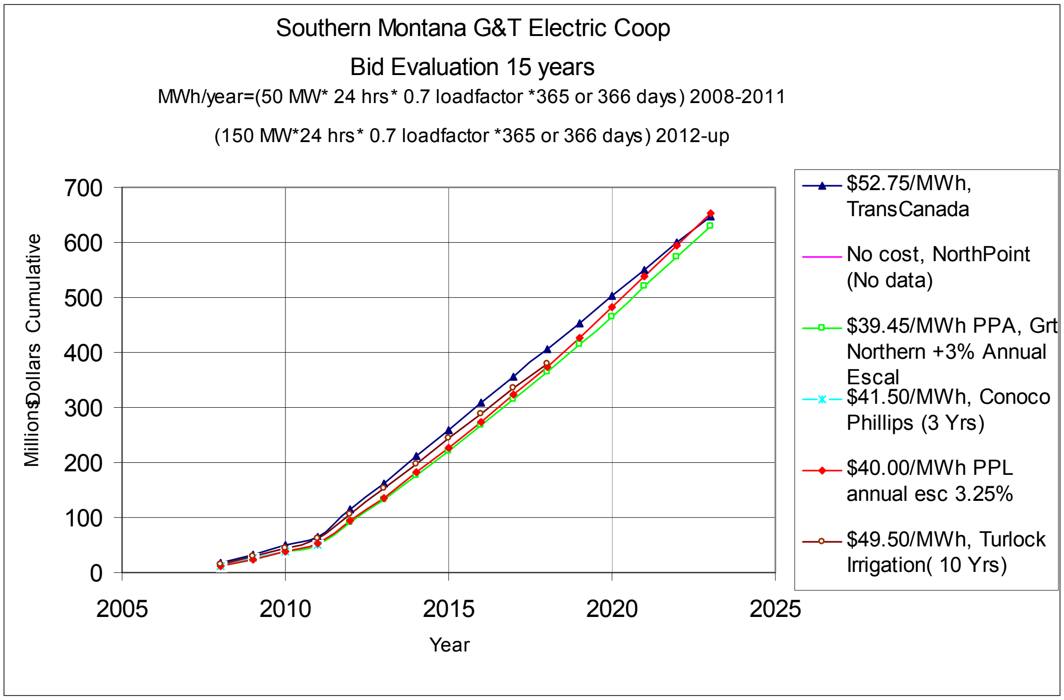
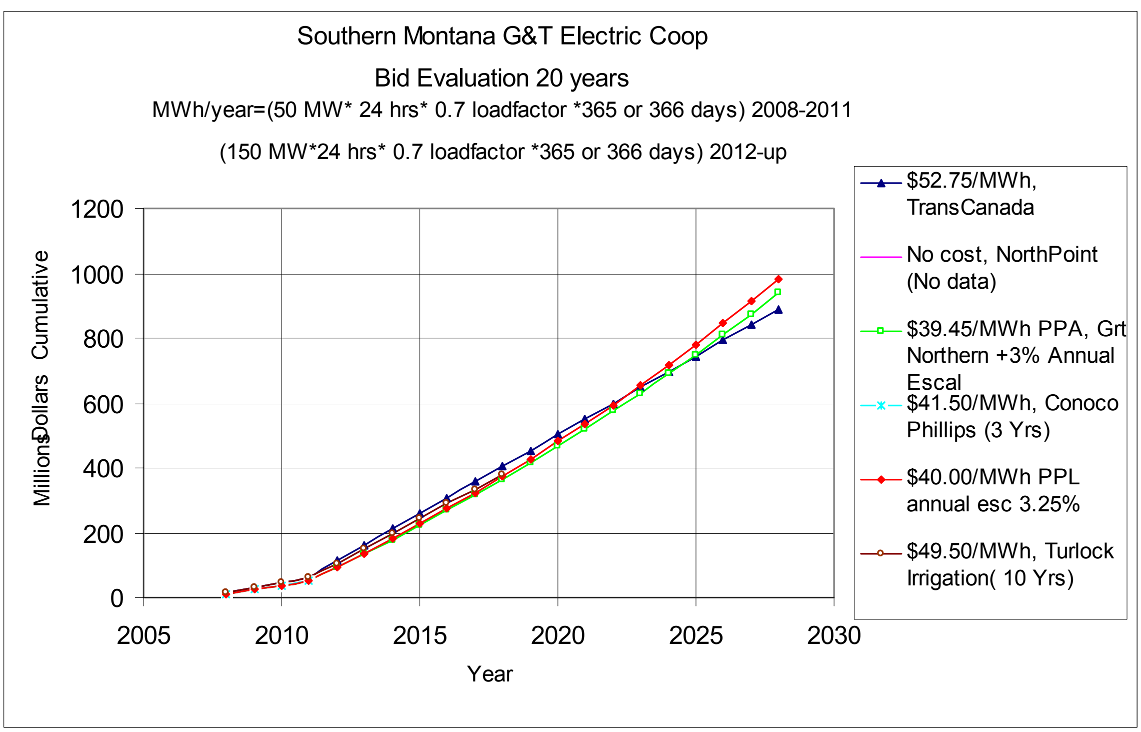


Figure 3-3
Summary of the results of Southern Montana's November 2004 RFP
20 Year Evaluation



Load and Generating Capability

Growth in Generation to Serve Base Load

At this time Southern Montana does not own base load generation and meets it wholesale power requirements through the use of power purchase agreements with BPA and WAPA. As stated above, the BPA contract begins to expire in 2008 and by 2012 Southern Montana will have supply deficit of approximately 170 mW which includes the WAPA component. Table 1-1 is a summary of Southern Montana's projected capacity requirements. Given the unfavorable conditions of the power purchase option this table may also represent Southern Montana's need for a generation resource suitable to meet this requirement. The following information is based on the assumption that Southern Montana will continue to have the opportunity to purchase approximately 20 mW from WAPA. If the power purchase rights extant in WAPA power purchase agreement were reduced, the following projections would need to be increased accordingly. If the WAPA power purchase agreement was to be completely withdrawn, Southern Montana would have a projected requirement of approximately 160 mW in 2008 escalating to approximately 190 mW by 2012. Table 1-1 is a summary of Southern Montana's projected capacity requirements for the period 2004 through 2018.

Table 3-1
Southern Montana Electric G&T
System Requirements: Peak Demand in mW 2004-2018

	System Peak	Option 1	System Peak	Option 2	Maximum
Year	Avg. L.F.	Less WAPA	2003 L.F.	Less WAPA	Requirement
2004	106	86	110	90	0
2005	132	112	136	116	0
2006	136	116	140	120	0
2007	145	125	149	129	0
2008	154	134	159	139	46
2009	165	145	170	150	117
2010	168	148	174	154	123
2011	172	152	177	157	128
2012	175	155	181	161	161
2013	179	159	185	165	165
2014	183	163	189	169	169
2015	187	167	193	173	173
2016	191	171	197	177	177
2017	195	175	201	181	181
2018	199	179	205	185	185

Option 1: Peak Demand Projections based on average system load factor for period 2001-2004 less WAPA

Option 2: Peak Demand Projection based on annual system load factor for 2003 less WAPA

"Maximum Requirement" column takes into consideration residual purchase rights with BPA

Table 3-2 offers a summary of Southern Montana's system energy requirements for the period 2004 through 2018. The estimated energy requirements and associated rates of growth are segmented by customer classification. Table 1-2 is a summary of Southern Montana's projected energy requirements for the period 2004 through 2018.

Table 3-2

Southern Montana Electric G&T

SYSTEM ENERGY REQUIREMENTS BY CONSUMER CLASSIFICATION (mWh)

Southern Montana G&T	YEAR	RESIDEN-TIAL	SMALL COM-MERCIAL	LARGE COM-MERCIAL	IRRIGA - TION	Other SALES	TOTAL SALES	OWN USE & LOSSES	TOTAL ENERGY REQUIRE-MENTS
HI	1971	109,356	16,564	9,765	4,413	14,880	154,978	16,425	171,403
ST	1993	276,505	33,779	39,590	12,700	9,858	372,432	34,611	407,043
ORY	1998	287,688	36,349	39,471	20,577	9,957	394,042	38,435	432,477
	2003	329,497	51,270	31,077	19,944	10,001	441,789	44,737	486,526
	2004	338,229	52,105	31,600	19,294	10,042	451,268	47,749	499,018
P	2005	347,265	53,030	127,123	19,366	10,043	556,827	60,188	617,015
R	2006	356,669	53,882	133,180	19,426	10,043	573,201	61,988	635,190
O	2007	371,884	55,658	154,017	19,486	10,043	611,088	66,046	677,133
J	2008	387,576	57,475	174,864	19,548	10,043	649,508	70,149	719,657
E	2009	408,731	59,514	198,354	19,611	10,043	696,252	75,156	771,409
C	2010	421,723	60,506	198,605	19,674	10,043	710,551	76,613	787,164
T	2011	435,101	58,518	198,859	19,738	10,043	722,259	78,113	800,372
E	2012	448,876	62,550	199,117	19,804	10,043	740,389	79,653	820,042
D	2013	463,062	63,603	199,376	19,870	10,043	755,953	81,237	837,190
	2014	477,671	64,677	199,637	19,937	10,043	771,965	82,864	854,828
	2015	492,718	65,771	199,901	20,005	10,043	788,438	84,537	872,975
	2016	508,215	66,880	200,169	20,075	10,043	805,382	86,258	891,640
	2017	524,191	68,016	200,439	20,145	10,043	822,834	88,028	910,861
	2018	540,625	69,174	200,710	20,217	10,043	840,769	89,848	930,617
	YEAR	**RESID.**	**SM COMM.**	**L. COMM.**	**IRRIG.**	**OTHER**	**T. SALES**	**USE & LOSS**	**T. REQ.**
Growth Rate	1971-2003	3.72%	3.59%	3.68%	4.83%	-1.23%	3.33%	3.18%	3.31%
Historic	1993-2003	1.76%	2.10%	-1.20%	2.28%	0.07%	0.83%	1.51%	0.90%
	1998-2003	2.75%	7.12%	-4.67%	-0.62%	0.09%	2.31%	3.08%	2.38%
Growth Rate	2003-2008	3.30%	2.30%	41.27%	-0.40%	0.00%	8.01%	9.41%	8.14%
Projected	2003-2016	3.39%	2.06%	15.40%	0.05%	0.00%	4.72%	5.18%	4.77%
	2008-2013	3.62%	3.15%	2.66%	0.33%	0.00%	3.08%	2.98%	3.16%
	2013-2018	3.15%	1.69%	0.13%	0.35%	0.00%	2.15%	2.04%	2.14%
Historical									
% of Total	1971-2003	66.98%	9.21%	8.01%	3.85%	2.98%	91.04%	8.96%	100.00%
Projected									
% of Total	2004-2018	56.11%	7.84%	22.50%	2.55%	1.30%	90.29%	9.71%	100.00%
Total Projected		6,522,536	911,358	2,615,950	296,196	150,644	10,496,684	1,128,427	11,625,112
% of Total		56.11%	7.84%	22.50%	2.55%	1.30%	90.29%	9.71%	100.00%

Conclusion

Based on Southern Montana's existing and projected capacity and energy requirements, in 2008 Southern Montana will have a resource requirement of approximately 93 mW. By 2012 Southern Montana's resource requirement will increase to approximately 170 mW as the BPA power purchase agreement no longer allows Southern Montana to meet a major portion of its supply requirements with this resource. Given the price volatility of natural gas and the lack of viable wholesale power purchase options, Southern Montana will need to give serious consideration to developing an alternate wholesale power supply resource. This alternate wholesale power supply resource could take the form of participating in the development of a variety of generation options.

Southern Montana understands the difference between base load production and peak requirements. Even though the estimated load requirements referenced in this AES are more "peak" in nature, Southern Montana has reached the conclusion that it would be far more prudent to view participation in resource development from the perspective of having the capability to meet peak requirements. Given the volatility of the regional supply market, and the high cost of "going to the market" to meet peak requirements, Southern Montana believes that the likelihood of being able to offer affordable, reliable, and stable wholesale electric energy and related services will be much greater if it has the ability to cover system peak with its own resources. The forecasted prices for off peak and temporary surplus sales indicate that the cost of these two components of project economics can be more predictably managed through resource ownership than being placed in the situation where a market purchase is the next best option. To that end, Southern Montana has engaged in discussions with large regional hydroelectric based generators who have expressed significant interest in working with Southern Montana to ensure that the total output of a contemplated facility would be economically dispatched with the participating generators sharing risk and benefits.

Clearly a decision to consider the construction of member owned generation should be approached with caution and an appropriate level of concerted scrutiny. The member systems of Southern Montana have had a long history of meeting the wholesale electric service requirements of the consumers they serve with affordable electric energy and related services. Unfortunately, the wholesale supply industry in this region has changed requiring the members of Southern Montana to view possible participation in this proposed project as a way for Southern Montana to serve its members with a much higher level of confidence than can be afforded by a traditional power purchase agreement – particularly in a restructured wholesale electric supply market place.

Section 4

Alternatives to Meet Project Objectives

An Alternative Evaluation Study was conducted to determine the most appropriate way to meet SME's needs for additional generation capacity. This included an evaluation of different generation technologies as well as alternatives to constructing new generation facilities such as energy conservation and purchasing power from other utilities. The different generation technologies evaluated are described below.

Wind

The greatest advantage of wind power is its potential for large-scale, though intermittent, electric generation without emissions of any kind. In addition, over the years, wind energy production cost has benefited from improvements in technology and increased reliability.

The development of wind power is increasing in many regions of the United States, including Montana. Installed wind electric generating capacity now totals 6,374 mW and is expected to generate approximately 16.7 billion kWh. Wind energy installations across the United States are expected to reach 8,000 MW by the end of 2010 (Ref. 12). Technological advances have improved the performance of wind turbines and driven down their cost. In locations where the wind blows steadily, wind power has been shown to compete favorably with coal and natural gas fired power plants based on receiving the federal Renewable Energy Production Incentive (REPI).

Solar (Photovoltaic and Thermal)

The sun is a direct source of energy. Using renewable energy technologies can convert that solar energy into electricity. However, solar energy varies by location and by the time of year. Solar resources are expressed in watt-hours per square meter per day (Wh/m2/day). This is roughly a measure of how much energy falls on a square yard over the course of an average day.

Collectors that focus the sun (like a magnifying glass) can reach high temperatures and efficiencies. These are called solar concentrators. Typically, these collectors are controlled by a tracker, which positions the collector so that they always face the sun directly. Because these collectors focus the sun's rays, they only use the direct rays coming straight from the sun.

Other solar collectors consist of simply flat panels that can be mounted on a roof or on the ground. Called flat-plate collectors, these are typically fixed in a tilted position correlated to the latitude of the location. This allows the collector to best capture the sun. These collectors can use both the direct rays from the sun and reflected light that comes through a cloud or off the ground. Because they use all available sunlight, flat-plate collectors are the best choice for many northern states.

Solar resources are greatest in the middle of the day - the same time that utility customers have the highest demand, especially during the summer months.

Hydroelectric

Flowing water creates energy that can be captured and turned into electricity. This is called hydroelectric power or hydropower.

The most common type of hydroelectric power plant uses a dam on a river to store water in a reservoir or a run of the river approach, which does not result in the construction of a large reservoir. Water released from the reservoir flows through a turbine, which in turn activates a generator to produce electricity. Another form of hydroelectric power does not require a large dam but instead uses a small canal to channel the river water through a turbine.

Another type of hydroelectric power plant, referred to as a pumped storage plant, has the capacity to store energy. The power is sent from a power grid into the electric generators. The generators then turn the turbines backward, which causes the turbines to pump water from a river or lower reservoir to an upper reservoir, where the energy is stored. To use the energy, the water is released from the upper reservoir back down into the river or lower reservoir. This turns the turbines forward, activating the generators to produce electricity.

Geothermal

Geothermal energy is contained in underground reservoirs of steam, hot water, and hot dry rocks. Electric generating facilities utilize hot water or steam extracted from geothermal reservoirs in the Earth's crust to drive steam turbine generators to produce electricity. Moderate-to-low temperature geothermal resources are used for direct-use applications such as district and space heating. Lower temperature, shallow ground, geothermal resources are used by geothermal heat pumps to heat and cool buildings. Hence, the only geothermal resources that may be considered to generate power are the high temperature sources.

Biomass

For heating applications or electricity generation, biomass can be directly burned in its solid form, or first converted into liquid or gaseous fuels by off-stoichiometric thermal decomposition. Biomass power technologies convert renewable biomass fuels into heat and electricity using modern boilers, gasifiers, turbines, generators, fuel cells, and other methods.

Biomass resource supply includes the use of five general categories of biomass: urban residues, mill residues, forest residues, agricultural residues, and energy crops. Of these potential biomass supplies and the quantities cited below, most forest residues, agricultural residues, and energy crops are not presently economic for energy use. New tax credits or incentives, increased monetary valuation of environmental benefits, or sustained high prices for fossil fuels could make these fuel sources more economic in the future. In addition, forest fires in the past several years in western states have generated increased stimulus to initiate forest thinning programs. Several biomass plants are being proposed in the west to use forest thinnings as a major fuel source.

Biogas

The same types of anaerobic bacteria that produce natural gas also produce methane rich biogas today. Anaerobic bacteria break down or "digest" organic material in a two step process. The first step is to utilize acid former bacteria to breakdown the volatile solids in a waste stream to fatty acids. The second stage of the process is environmentally sensitive to changes in temperature and pH and must be free of oxygen to produce "biogas" as a waste product. The anaerobic processes can be managed in a "digester" (an airtight tank) or a covered lagoon (a pond used to store manure) for waste treatment. The primary benefits of anaerobic digestion are nutrient recycling, waste treatment, and odor control. Except in very large systems, biogas production is considered a secondary benefit.

In most cases, the methane produced by the digester is well-concentrated. Because methane is the principal component of natural gas (usually on the range of about 75%), it is an excellent source of energy for use either in cogeneration on the electrical grid or simply for fueling boilers at the wastewater treatment plant.

The methane captured from an anaerobic digester will naturally contain some impurities, chiefly sulfur, which should be scrubbed prior to pressurization and combustion. Anaerobic digesters are used in municipal wastewater treatment plants and on large farm, dairy, and ranch operations for disposal of animal waste.

Landfill biogas (LFG) is created when organic waste in a landfill naturally decomposes. This gas consists of about 50 percent methane, about 50 percent carbon dioxide, and a small amount of non-methane organic compounds. Instead of allowing LFG to escape into the air, it can be captured, converted, and used as an energy source. Using LFG helps to reduce odors and other hazards associated with LFG emissions, and it helps prevent methane from migrating into the atmosphere and contributing to local smog and global climate change.

The various types of biogas can be collected and used as a fuel source to generate electricity using conventional generating technology.

Municipal Solid Waste

Municipal Solid Waste (MSW) typically uses a Refuse Derived Fuel (RDF) technology in waste-to-energy facilities to combust trash, garbage, and other combustible refuse. The material is received in its “as discarded” form and subjected to segregation of some of the recyclables and shredding prior to being fed into the boilers for combustion. MSW provides energy for power production and at the same time provides waste volume reduction. The plants range upward to 90 mW in size using multiple boilers to provide steam to a single condensing steam turbine generator. There are also a number of mass burn units in operation that burn the MSW directly in its “as discarded” form with only the larger non-combustibles removed. Mass burn technology has largely given way to RDF in response to pressure to recycle materials and because the boilers designed to handle RDF are more economical to build.

Natural Gas Combined Cycle

Combustion turbine generators (CTGs) are used for simple cycle and combined cycle applications. 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 applications, which primarily are operated during the peak summer months (June through September) 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 compared to a combined cycle configuration.

Combined cycle operation consists of one or more combustion turbine generators exhausting to one or more heat recovery steam generators (HRSGs). The resulting steam generated by the HRSGs is then used to power a steam turbine generator (STG).

There is a wide range of gas turbine size ranging from approximately 1 MW output up to "G" and "H" class machines which are rated at 240 MW and higher. Gas turbines for electric utility services generally range from a minimum of 20 MW for peaking service up to the largest machines for use in combined cycle mode.

Microturbines

Microturbines are small electricity generators that burn gaseous and liquid fuels to create high-speed rotation that turns an electrical generator. Current microturbine technology is the result of development work in small stationary and automotive gas turbines, auxiliary power equipment, and turbochargers, much of which was pursued by the automotive industry beginning in the 1950s. Microturbines entered field testing around 1997 and began initial commercial service in 2000.

The size range for microturbines commercially proven and currently available is from 30 to 70 kW, compared to conventional gas turbine sizes that range from approximately 1 to 240 MW. Microturbines operate at high speeds and may be used in simple cycle or cogeneration systems. They are able to operate on a variety of fuels, including natural gas, sour gas, landfill gas, anaerobic digester gas and diesel fuel/distillate heating oil. In resource recovery applications, they burn waste gases that would otherwise be flared.

Microturbines are ideally suited for distributed generation applications due to their small power output and space requirement, flexibility in connection methods, ability to be installed in parallel to serve larger loads, ability to provide stable and reliable power, and low emissions. Types of applications include stand-alone primary power, backup/standby power, peak shaving and primary power (grid parallel), primary power with grid as backup, resource recovery and cogeneration.

Pulverized Coal

Pulverized coal plants represent the most mature of technologies considered in this analysis. Coal plants, although having a high capital cost relative to some alternatives, have an advantage over other non-renewable combustible energy source technologies due to the relative low and stable cost of coal.

Modern pulverized coal plants generally range in size from 80 MW to 1,300 MW and can use coal from various sources. Coal is most often delivered by unit train to the site, although barges or trucks are also used. Many plants are situated adjacent to the coal source where coal delivery can be by conveyor.

Coal can have various characteristics with varying Btu heating values, sulfur content, and ash constituents. The source of coal and coal characteristics can have a significant effect on the plant design in terms of coal-handling facilities and types of pollution control equipment required.

Regardless of the source, the plant coal-handling system unloads the coal, stacks out the coal, reclaims the coal as required, and crushes the coal for storage in silos. Then the coal is fed from the silos to the pulverizers and blown into the steam generator. The steam generator mixes the pulverized coal with air, which is combusted, and in the process produces heat to generate steam. Steam is conveyed to the steam turbine generator, which converts the steam thermal energy into mechanical energy. The turbine then drives the generator to produce electricity.

The steam generator produces combustion gases, which must be treated before exiting the exhaust stack to remove fly ash, NOx, and SO2. The pollution control equipment includes either a fabric filter (bag house) or electrostatic precipitator for particulate control (fly ash), SCR for removal of NOx, and a FGD system for removal of SO2. Limestone is required as the reagent for the most common wet FGD process, limestone forced oxidation desulphurization. A limestone storage and handling system is a required design consideration with this system.

Coal plants produce several forms of liquid and solid waste. Liquid wastes include cooling tower blowdown, coal pile runoff, chemicals associated with water treatment, ash conveying water, and FGD wastewater. Solid wastes include bottom and fly ash and FGD solid wastes. Disposal of these wastes is a major factor is plant design and cost considerations.

Circulating Fluidized Bed Coal

In the mid 1980s, an alternative to the standard PC fired plant emerged called CFB combustion. The fuel delivery system is similar, but somewhat simplified, to that of a pulverized coal unit but with a greater fuel cost advantage in that a wider range of fuels and lesser quality of fuel can be used (coal, coke, biomass, etc.). The bed material is composed of fuel, ash, sand, and sorbent (typically limestone). CFB units compete in the marketplace in sizes up to 300 mW with larger sizes available soon.

CFB combustion temperatures are significantly lower than a conventional boiler at 1,500 to 1,600 degrees Fahrenheit (°F) vs. 3,000°F which results in lower NOx emissions and reduction of slagging and fouling characteristic of PC units. In contrast to a PC plant, sulfur dioxide is partially removed during the combustion process by adding limestone to the fluidized bed.

The plant fuel handling system unloads the fuel, stacks out the fuel, crushes or otherwise prepares the fuel for combustion, and reclaims the fuel as required. The fuel is usually fed into to the CFB by gravimetric feeders. In the CFB the fuel is combusted and in the process produces steam. Steam is conveyed to the steam turbine generator, which converts the steam thermal energy into mechanical energy. The turbine then drives the generator to produce electricity.

The CFB produces combustion gases, which must be treated before exiting the exhaust stack to remove fly ash and sulfur dioxides. NOx emissions can be mitigated through use of selective non-catalytic reduction (SNR) using ammonia injection, usually in the upper area of the combustor. The pollution control equipment external to the CFB includes either a fabric filter (bag house) or electrostatic precipitator for particulate control (fly ash), and a polishing FGD system for additional removal of sulfur dioxides to achieve similar levels to PC units. Limestone is required for the most common wet FGD process, limestone forced oxidation desulphurization, and also as sorbent for the fluidized bed. Another method is to re-circulate the fly ash and lime (remaining from the limestone desulphurization process) thru a hydration process. This hydrated material is re-injected into the inlet of the of the bag house for additional sulphur capture.

Similar to a PC plant, a CFB plant produces several forms of liquid and solid waste. Liquid wastes include cooling tower blowdown, chemicals associated with water treatment, ash conveying water, and FGD wastewater. Solid wastes include bed and fly ash and FGD solid wastes. As with PC fired units, disposal of these wastes is a major factor in plant design and cost considerations.

Integrated Gasification Combined Cycle Coal

Coal gasification for use in power generation reacts coal with steam and oxygen under high pressure and at high temperature to produce a gaseous mixture consisting primarily of hydrogen and carbon monoxide. The gaseous mixture requires cooling and cleanup to remove contaminants and pollutants to produce a synthesis gas suitable for use in the combustion turbine portion of a combined cycle unit. The combined cycle portion of the plant is similar to a conventional combined cycle. The most significant differences in the combined cycle are modifications to the combustion turbine to allow use of a 250 to 300 Btu/SCF gas and steam production via heat recovery from the formation of the raw gas in addition to the combustion turbine exhaust (HRSG). Specifics of a plant design are influenced by the gasification process, degree of heat recovery, and methods to clean up the gas.

Conclusion

A comparison of the alternate technologies regarding their capability of meeting the SME purpose and need criteria is shown in Table 4-1. Only the PC and CFB coal technologies are capable of meeting all of the criteria. Although NGCC offers the average capacity factor SME requires and the capital cost component of the levelized cost of NGCC power is attractive as compared to a CFB or pulverized coal plant. This coupled with the volatility of natural gas prices results in NGCC being a costly option for SME's member cooperatives and customers.

Table 4-1

Ability of different generation technologies to meet project objectives

	Capable of Meeting Purpose and Need Criteria							
Type of Power Plant	250 mW in 2009	Baseload Operation	Environmentally Permitable	Cost-effective	Fuel Cost Stability	High Reliability	Commercially Available	Meets All Criteria
Wind	Yes	No	Yes	Yes	Yes	Yes	Yes	No
Solar -Photovoltaic	No	No	Yes	No	Yes	No	Yes	No
Solar-Thermal	No	No	Yes	No	Yes	No	Yes	No
Hydroelectric	No	No	Difficult	Yes	Yes	Yes	Yes	No
Geothermal	No	Yes	Yes	N/A	Yes	Yes	N/A	No
Biomass	No	Yes	Yes	No	Yes	Yes	Yes	No
Biogas	No	Yes	Yes	Yes	Yes	Yes	Yes	No
Municipal Solid Waste (MSW)	No	Yes	Difficult	No	Yes	No	Yes	No
Natural Gas Combined Cycle (NGCC)	Yes	Yes	Yes	Yes	No	Yes	Yes	No
Microturbines	No	No	Yes	No	No	Yes	Yes	No
Pulverized Coal (PC)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Circulating Fluidized-Bed (CFB) Coal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Integrated Gasification Combined Cycle Coal	Yes	Yes	Yes	No	Yes	No	Yes	No

Section 5

POWER PLANT OPERATIONAL CRITERIA

The power plant operational criteria used for the siting study were based on the need for base load capacity that would provide competitively priced energy to SME's customers consistent with the wise use of resources. To this end, the following operational criteria were developed that would result in the selection of a site that would meet the requirements for a highly efficient and cost effective base load electric generating facility:

- Base load plant with a capacity of up to 250MW net
- Circulating fluidizing-bed coal technology
- Environmentally compliant
- Cost effective
- High level of reliability
- Provide fuel cost stability
- Commercially available and proven technology
- Deliverable (new generation must be connected to the SME system at interconnection points capable of distributing the power or require limited additional transmission resources)
- Located inside of or in reasonably close proximity to SME's service territory
- Operational availability by 2009
- Fuel source is Powder River Basin coal
- Condenser cooling by cooling towers or once through cooling
- Cooling water system must minimize impacts to the environment
- Must meet all applicable air quality standards and permitting requirements
- Absolute minimum site area of 80 acres, with preferred minimum site area of 160 acres
- Water source must be available for condenser cooling and other make up

requirements

- Site must be in close proximity to at least one rail line and/or barge delivery of coal
- Facility must have a competitive Net Present Value to be cost-effective for SME's customers.

Section 6

Approach to the Site Selection Study

The site-selection process was established and conducted under a central guiding principal: identify the site of least overall land use and environmental impact at a reasonable economic cost. To meet his objective, the study needed to be comprehensive, both geographically and with respect to the types of information gathered and considered through the course of the study.

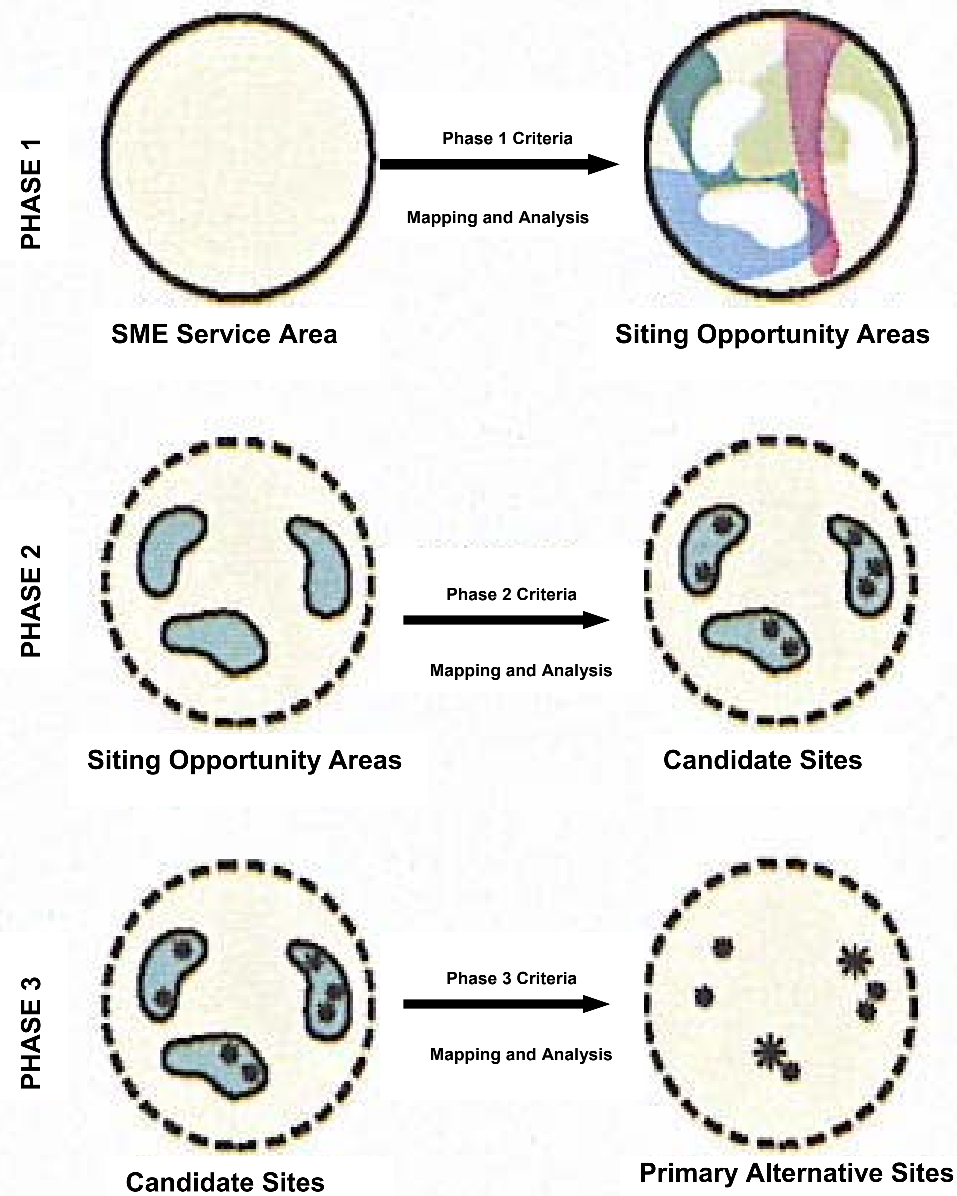
The study was carried out in three-phases:

- Phase 1 - using available land use and environmental data to identify areas of highest opportunity,
- Phase 2 - using more refined criteria and data to identify candidate sites within these areas; and
- Phase 3 - a comparison of these sites against a range of detailed land use and environmental criteria to identify a small number of alternative sites (two primary alternative sites have been identified). The study process is graphically represented in Figure 6.1.

The site-selection study involved extensive use of Geographical Information Systems (GIS), which facilitated the iterative approach needed to quickly and comprehensively review the results of various suitability analyses covering this 58,000 square mile siting area, which approximates the SME Service Territory boundary. At the same time, it provided the needed ability to look in detail at increasingly smaller areas and sites as the study progressed from one phase to another.

Figure 6-1

The Site Selection Process



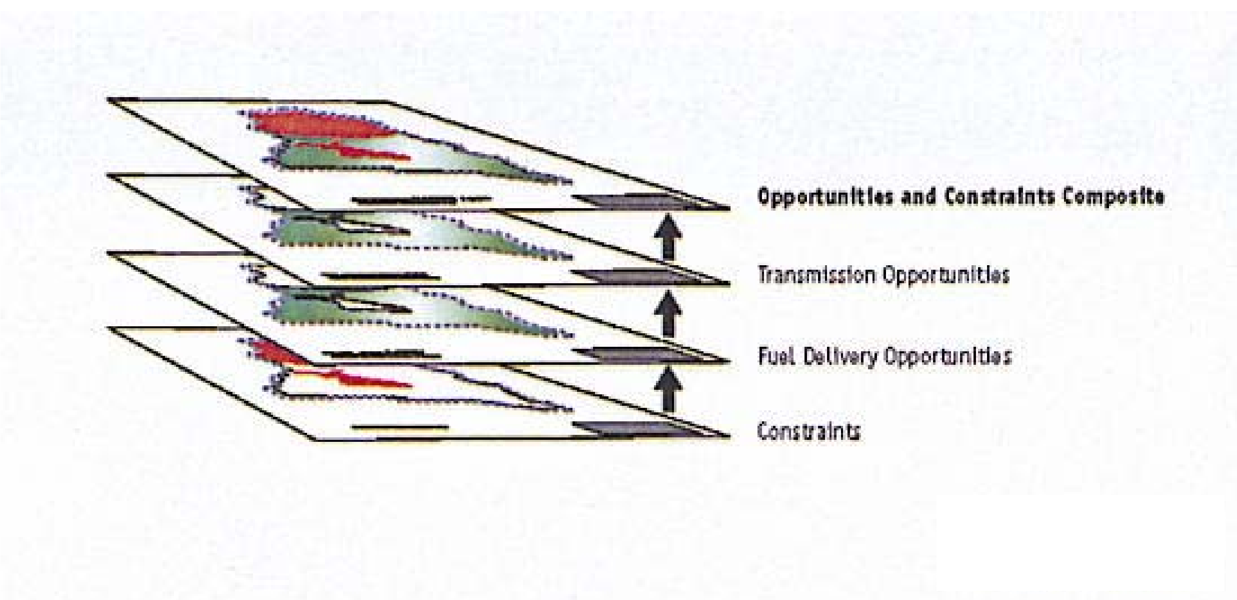
Section 7

PHASE 1

The primary objective completed during Phase 1 was to reduce the 58,000 square mile study area to a number of potential siting areas that could be analyzed in more detail in later phases. To achieve this, a relatively small number of fundamental opportunity and constraint criteria were identified. These were combined to identify areas of highest opportunity that could be carried forward to subsequent phases of the site selection process (Figure 7.1).

Figure 7-1

Phase 1 Process



The proximity to suitable transmission and to a means of fuel (coal) delivery were identified by the project team as the most important factors in the siting of a new power plant. Different levels of opportunity were assigned based on how close to these two elements a particular area is located. It can be assumed in general terms that areas of higher opportunity would tend to have lower costs and lower impacts because of less fuel delivery and transmission infrastructure being required. Phase 1 opportunity criteria are listed below.

Fuel Delivery

Lands within 5, 10, and 20 miles of existing railroads where considered good locations for project development. These rail locations included those rail lines which are operative and those which are abandoned but which were at one time connected to an operative railroad.

Transmission

Lands within 5, 10, and 25 miles of an existing transmission tine that has a voltage of 230kV or higher, which were not constrained in through put capacity were also considered as potential locations for project development.

Lands within 5, 10, and 25 miles of a potentially suitable interconnection point were considered potential locations for project development. These locations were generally either an existing substation or switching station where a connection can effectively be made within SME's electric system. This category also includes 500kV transmission lines because of their greater capacity.

The 5, 10 and 25 mile buffers for transmission and fuel delivery were given ratings, to enable a combined opportunity value to be created when the two criteria are overlaid. The closer a potential location or area is to a suitable transmission line, injection point and/or fuel delivery route, the greater the opportunity level.

Phase 1 constraint areas comprised exclusion areas and avoidance areas. Exclusion areas are areas where a power plant could not reasonably be expected to be sited. Avoidance areas are not desirable from a siting perspective but under some circumstances may be considered. Phase 1 constraint criteria were identified as follows.

Exclusion Areas

Air Quality

Lands within a Class I air shed area which are defined by the U.S. Environmental Protection Agency were identified.

Reserved Land

- National Parks
- National Scenic Riverway
- National Wildlife Area

- National Forest
- State Forest
- State Parks
- Wildlife Area
- Wildlife Management Area

Avoidance Areas

Land with Special Designations

Sovereign Tribal Lands

Urban Areas

Incorporated city and town limits

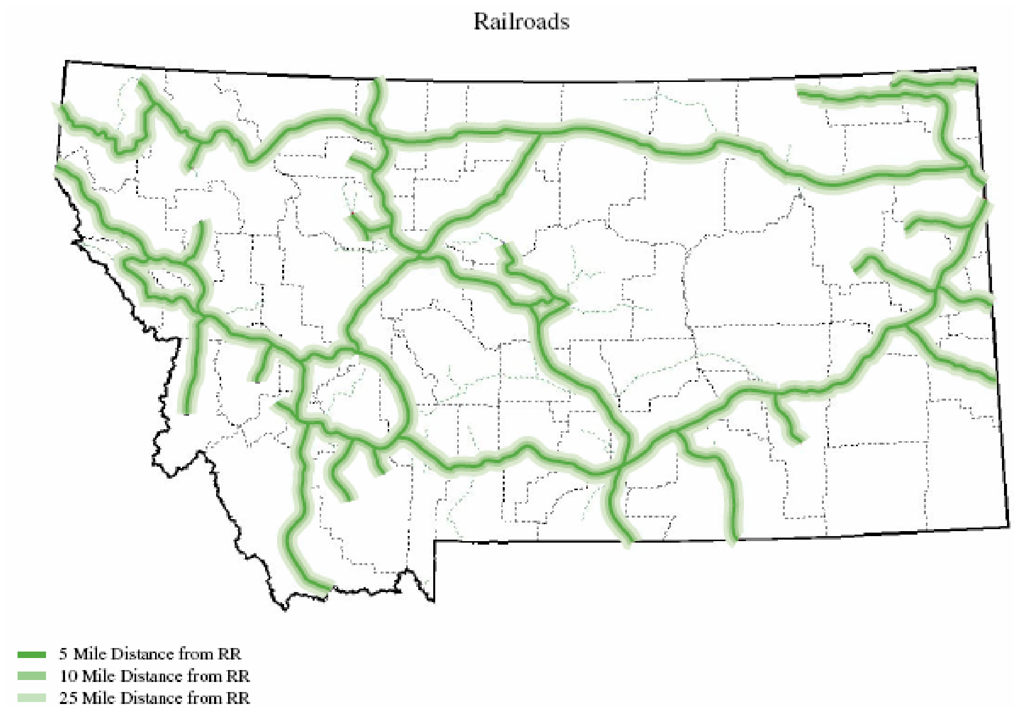
Figure 7.2 shows rail fuel delivery opportunities. These are shown in various shades of green, the darkest shade being lands within 5 miles of a suitable railroad. The next lighter tone represents lands between 5 and 10 miles from a railroad and the third lightest tone are lands at a distance of 10 and 25 miles.

Significant areas of land within the study area are outside of the corridor identified as within 25 miles of an existing railroad line. Thus it will be important to develop the resource closely to the corridor noted. More significantly however, the fuel delivery opportunity map provides the ability to focus the search for suitable sites within close proximity (e.g. within 2 miles) of this needed infrastructure. Constructing a shorter rail tine will generally result in fewer adverse effects to people and the environmental and cost less.

Rail lines serve the major cities of Billings and Great Falls. In addition, the rail lines serve the coal mines in the south central portion of the state. A major rail line borders the Yellowstone River on the southern and eastern portion of the state. Many of the rail lines were developed in the late 1800s and early 1900s in response to the trade in the state. Most of these rail lines utilized locally mined coals and utilized the water sources of the rivers to power the steam locomotives. These resources and the additional requirements of terminal points identified the routes of the rail which remain relatively unchanged to this date. Several of the rail lines have been abandoned and the rail has been removed. In addition, the land ownership may have been returned to the original land owner. In many cases, the rail civil work remains and yet in some additional cases the rail bed is intact. Thus some existing developed infrastructure is available for a proposed project.

Figure 7-2

Rail Fuel Delivery Infrastructure

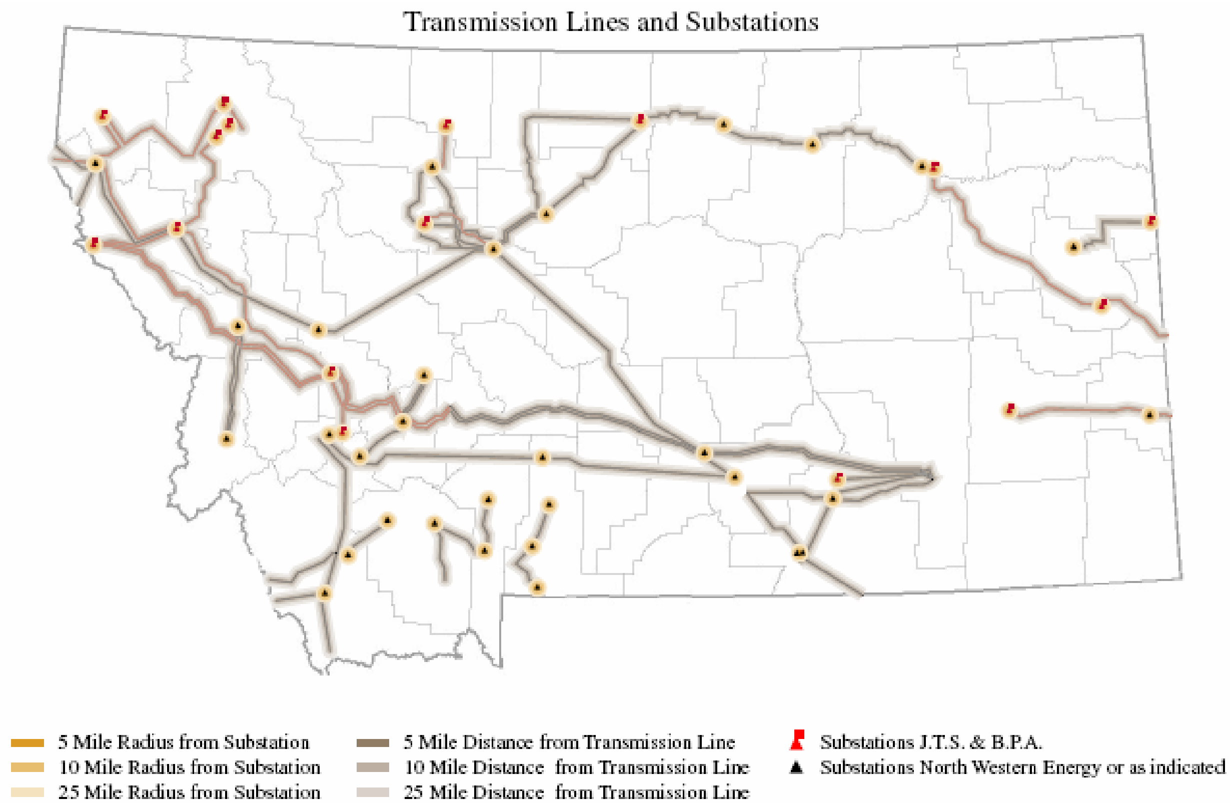


Transmission opportunities are shown in Figure 7.3. Areas that are in close proximity to both an interconnection point and a transmission line are given a higher opportunity rating than areas that are in close proximity to a transmission line alone. For the purpose of this analysis, 500kV transmission lines are regarded as being both a transmission line and an interconnection point and receive the highest transmission opportunity rating.

Because of the capacity of the existing transmission lines and the amount of electricity being carried at peak times, not all lines are equally capable of delivering the power that would be generated by the proposed plant. In Phase 1 however, the capacity of transmission lines is treated in general terms, with any transmission line 230kV or greater being regarded as having potentially adequate capacity. SME has a network of 69kV transmission lines, however without significant upgrades, the 69kV transmission lines would not be capable of delivering the volume of power produced by the proposed power plant project. The majority of potentially adequate transmission lines occur in two broad east-west corridors in the south-central portion of the study area. There is much less transmission infrastructure in the north-central and eastern portions of the study area.

Figure 7-3

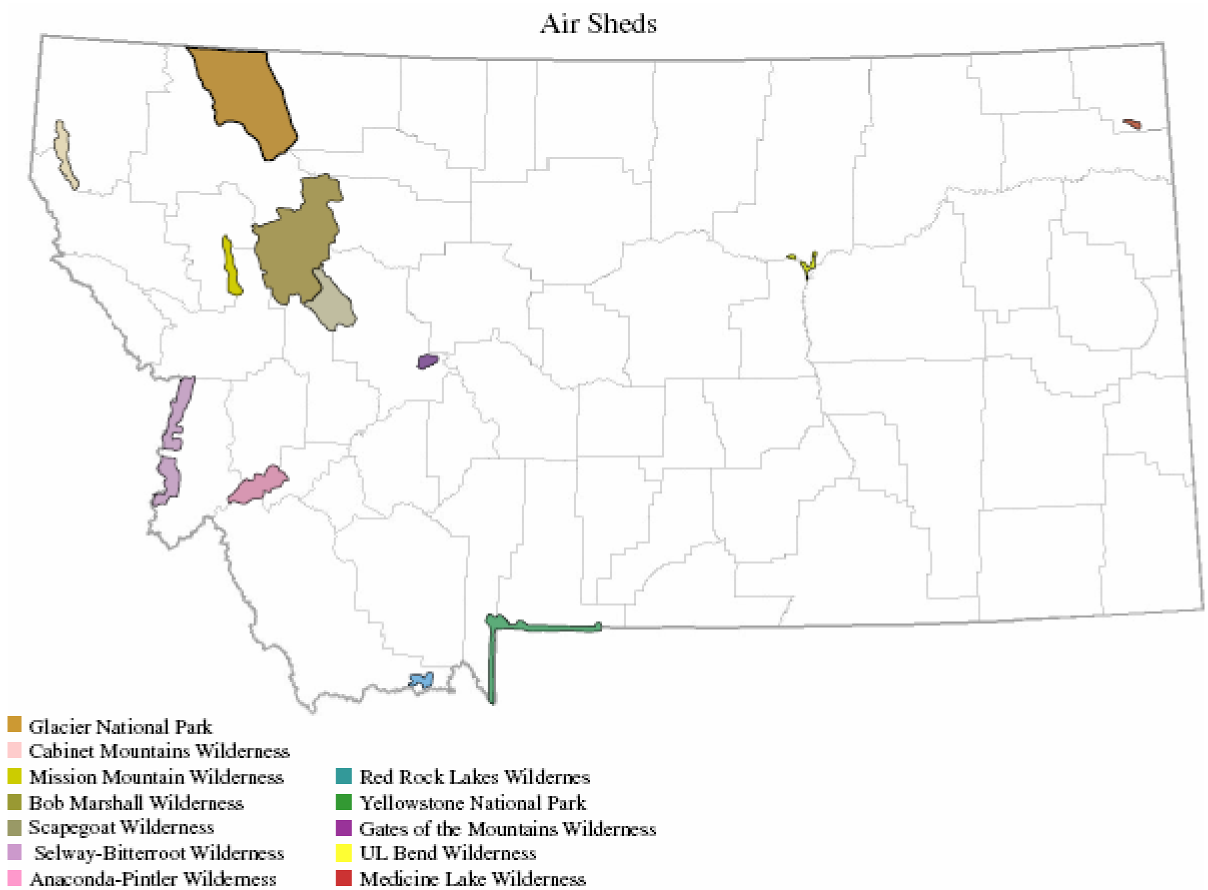
Transmission Lines and Substation Infrastructure



Constraints are shown in Figure 7.4. Approximately the western quarter of the state of Montana was excluded as a result of the national parks and wilderness areas of the designated Class I Air Sheds. However, these areas are located at significant distances from the SME service territory thus having little impact on siting of a proposed project. There are three additional air sheds located in a close proximity to the SME service territory, those being Gates of the Mountains Wilderness area to the west, UL Bend Wilderness area to the North and Yellowstone National Park to the south. Any new development cannot have any detrimental effect on air quality in the areas noted due to their designation under the clean air act. The wind rose patterns for the state were examined to determine the potential impacts to those parks & wilderness areas from a proposed project location in the SME service territory. To identify the size of the exclusion area necessary, a preliminary CALPUFF screening model was run. This model identified the likely distance, beyond which a new 250MW power plant would have no impact on the air quality of the wilderness areas and national park.

Figure 7-4

Class I Air Sheds

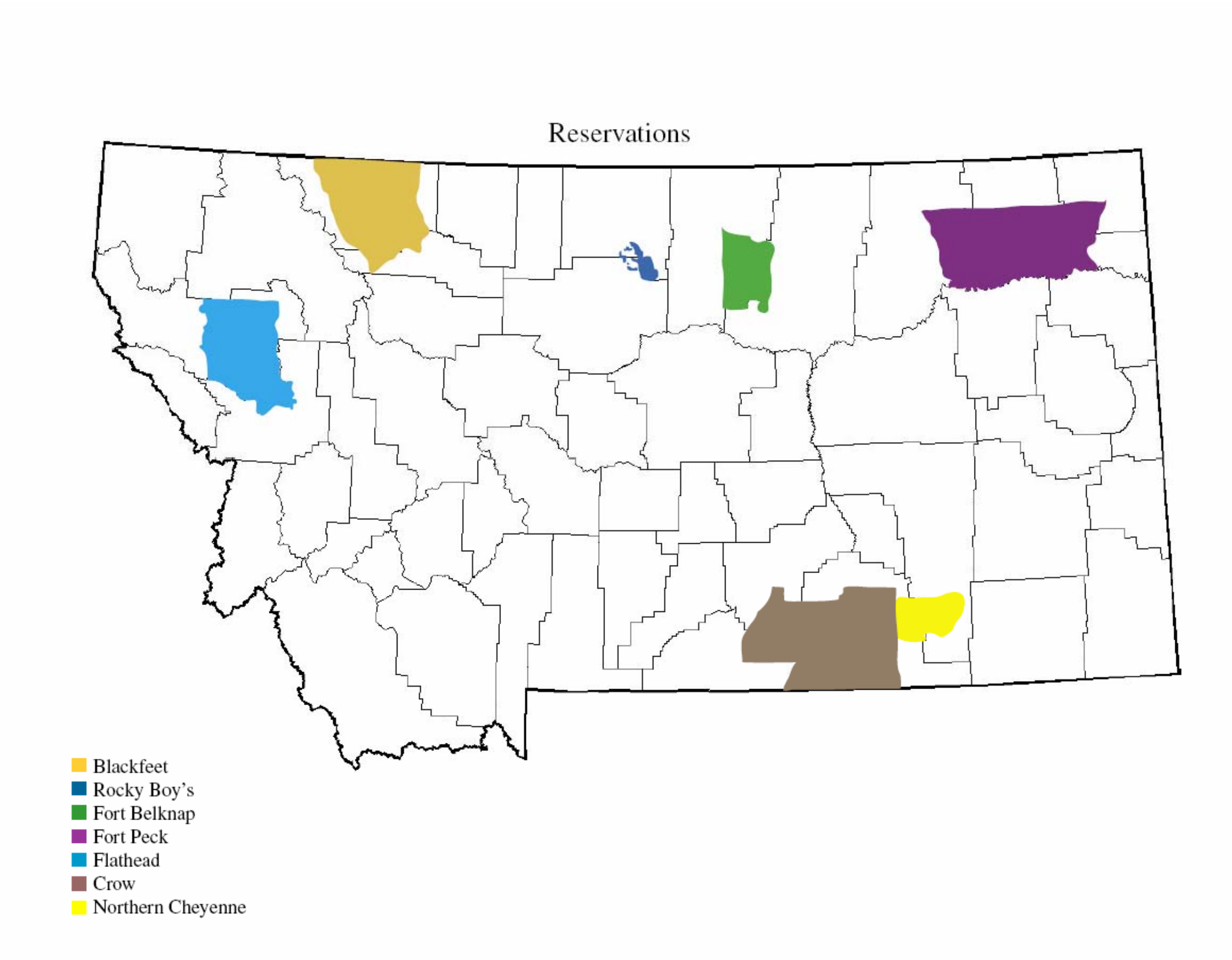


Avoidance areas occur at various locations and include cities, towns and sovereign tribal lands.

There are significant areas of land set aside for reservations within and near the SME service territory. The reservations located within the SME service territory are the Crow and Northern Cheyenne sovereign tribes. These areas were given a low probability of development in the study effort. Immediately to the north of SME's service territory is the land reserved for the Rocky Boys and Fort Belknap reservations. The Fort Peck reservation is to the north east of the SME service territory. Again, the wind rose patterns for the state were examined to determine the potential impacts to the sovereign nation areas from a proposed project location in the SME service territory. The reserved sovereign tribal lands are identified in Figure 7.5.

Figure 7-5

Avoidance Areas – Sovereign Tribal Land Locations



Much of the highest opportunity areas extend along the Great Falls to Broadview transmission line, branching into the interior areas of Montana. Also, another high opportunity area extend along the 500 kV transmission line from Billings Montana east to Colstrip. Finally, the areas West of Billings toward Big Timber, Montana along the 230 kV and 500 kV transmission lines represent good opportunities for transmission of electrical power. Most of the areas of opportunity are located within, Cascade, Judith Basin, Wheatland, Sweet Grass, Golden Valley, Stillwater, Yellowstone, Bighorn, Treasure, and Rosebud counties.

The identification of these higher opportunity areas concluded the Phase 1 portion of the study and provided the starting point for a more refined level of study in Phase 2 to identify alternative site

Section 8

Phase 2

The objective of Phase 2 was to identify specific power plant sites within the opportunity areas identified in Phase 1. In accomplishing this, a greater number of criteria conditions were inventoried and mapped. In all, three criteria categories were used in the Phase 2 assessment. They include the following:

- transmission (a refinement of the transmission considerations used in phase 1)
- fuel delivery (a refinement of the rail considerations used in phase 1)
- water source and discharge

Sources of data used in this phase of study came from an analysis of ground and surface water documentation, and local planning documents among others.

While Phase 1 identified opportunity areas, the combination of Phase 2 criteria was evaluated in terms of level of suitability within these areas of opportunity. For each criterion these were expressed as high, medium or low suitability, or as an exclusion area. These are listed in Table 8-1, while the suitability mapping process is shown in Figure 8-1.

Figure 8-1
Phase 2 Suitability Mapping Process

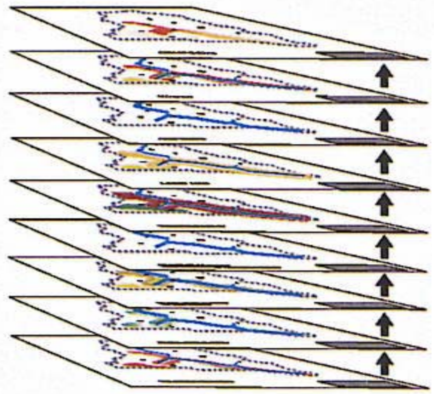


Table 8-1
Phase 2 Suitability Values

Phase 2 Criterion	Suitability Value
Transmission	
within 5 miles of a best or good injection	high
within 5 miles of a fair or marginal injection point	medium
Over 5 miles from an injection point	low
Fuel Delivery (rail access)	
within 5 miles of an active railroad	high
Within 5 miles of an abandoned railroad	medium
beyond 5 miles of any railroad	low
Fuel Delivery (rail competitiveness)	
within 5 miles of a competitive rail junction	high
beyond 5 miles of a competitive rail junction	low
Water Supply	
within 1 mile of surface water of sufficient capacity	high
within area of probably sufficient groundwater	medium
within area of probably insufficient groundwater	low

A discussion of the rationale and application of each of the three criteria follows.

Transmission

All of the opportunity areas carried forward to the Phase 2 analysis are in close proximity to a transmission line of potentially adequate capacity. To differentiate between these, the focus of transmission as a Phase 2 criterion was on the proximity to potential interconnection points. The locations where a large injection of electrical voltage could be most efficiently added to the existing system with the least need for system upgrades, such as new or rebuilt transmission lines and substations.

In Phase 2, a distinction was made between interconnection points based on their quality (capacity to take on the electric load created by the new power plant with minimal system upgrades). Identified interconnection points were given a score based on a combination of sub-criteria influencing quality, such as available capacity and number of transmission lines connected to the interconnection point. Total interconnection point scores were determined from a rating of best, good, fair or marginal.

Table 8-2 summarizes the interconnection point quality evaluation. The criteria used in Table 8-2 are described below.

Table 8-2
Interconnection Point Rating

Interconnection Point	HV Line Score	Network Line Score	Northwest Energy Queue Score	Ownership Score	Total Rating
Great Falls Substation	Medium	High	Low	Medium	Good
Great Falls to Broadview Line	Medium	High	Medium	Medium	Good
Broadview Substation	Medium	High	Medium	Medium	Good
Colstrip Substation	Medium	Medium	Medium	Medium	Fair
500 kV Transmission Line	Medium	Medium	Medium	Medium	Good

HV Line Score

The number of high voltage (HV) lines above 161kV correlate to the actual or potential outlet capacity of a generator injection point. The possibility of the capacity leaving the site that can be increased, in general, by upgrading or rebuilding existing lines rather than constructing additional lines.

Network Line Score

This is the value of the network outlet capacity of the lines at a particular generator interconnection point. The outlet capacity provides an indication of the how much transmission upgrades are needed in order to make the site suitable as a generator interconnection point.

Northwestern Energy Queue Score

The system operator, Northwestern Energy, has a queue of planned generators. These generators have the potential to consume available transmission capacity and must be considered when evaluating the suitability of the generator injection point.

Ownership Score

If SME owns the facility, capital Investments become SME assets. If SME must spend money to upgrade the facilities of other utilities, it is considered not as advantageous.

The 500kV transmission line in the study area was also regarded as a high quality interconnection point for the purposes of this analysis. Making a connection at any point along the length of this transmission line not identified as a constrained interface would be effective from an electric system perspective.

Areas within 5 miles of a best or good injection point were given a high suitability rating. Areas within 5 miles of a fair or marginal injection point were given a medium suitability rating. A low suitability rating was applied to areas beyond 5 miles of one of these interconnection points.

The transmission suitability analysis reveals a pattern of high suitability around the interconnection points along the Great Falls to Broadview transmission line or at the Great Falls or Broadview substations

Fuel Delivery - Rail Access

Proximity to railroads for fuel (coal) delivery was one of the opportunity criteria in Phase 1. In Phase 2, a distinction was made between active and abandoned railroads. Proximity to an active railroad is considered to be more advantageous than proximity to an abandoned railroad because of the expense and potential impacts of restoring an abandoned railroad to an operational level.

Areas within 10 miles of an active railroad are identified as high suitability, while areas within 10 miles of an abandoned railroad are medium suitability. All areas beyond 10 miles of any railroad were regarded as low suitability.

Areas of medium suitability areas cover much of the Great Falls to Broadview transmission line. Active railroads in other parts of Montana, create high suitability areas near Hysham, Billings and Great Falls.

Water Supply

The availability of a reliable water source is a key siting criterion for all steam cycle power plants. A comprehensive screening of all potential water sources was conducted as part of the Phase 2 siting process. Specific characteristics of the potential water sources that were evaluated included the quantity of the source, reliability over the projected life of the project, seasonal variability, quality, and regulatory status. Based on these characteristics, a ranking was given to each potentially available water source.

The majority of water used for the coal fired power plants is used for condenser cooling (cooling water), with other uses including steam cycle make up, potable water, and other incidental uses. Condenser cooling is accomplished through either the use of once through systems or through the use of cooling towers. In the case of once through cooling, water is drawn into the facility, typically from a large surface water source, and used for condenser cooling without the use of evaporative cooling. The resulting discharge has an increased temperature but with little or no change in quality. Cooling systems that utilize cooling towers typically recycle the water from three to ten times and thus use less overall water. However, approximately three quarters of the cooling water is lost through evaporation, resulting in an increase of dissolved solids. Therefore, discharges from power plants using cooling towers typically have lower volumes and temperatures than once through systems but have higher concentrations of dissolved solids.

Major sources of surface water are regarded as highly desirable for the operation of a wet cooled coal fired power plant, while groundwater may also be effectively used provided it is available in sufficient quantities and of required quality. For this phase of the study all rivers and lakes within SME's service area that were of sufficient size were identified and evaluated for water volume, quality and discharge acceptability.

An evaluation of the availability of groundwater including potential yields and quality information was conducted.

An analysis of surface and groundwater resources within the study resulted in the identification of three classes of water availability. These include:

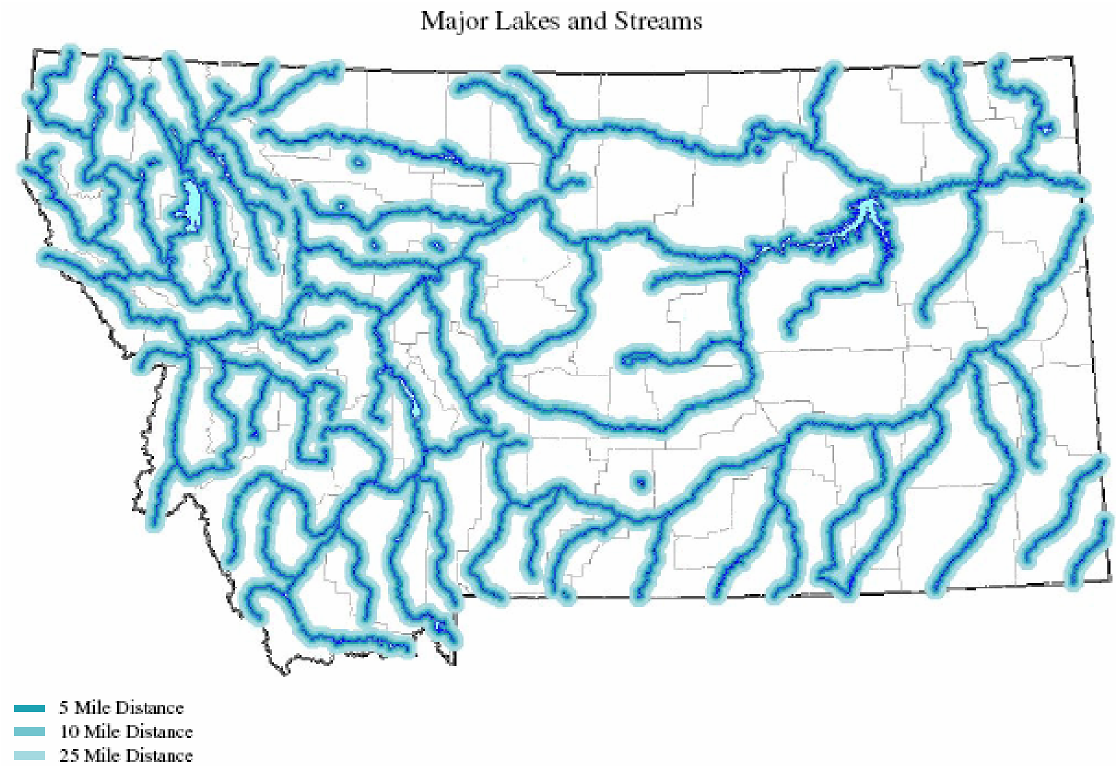
- Areas of sufficient surface water availability (rated as high suitability). These areas were the major river systems that had a water supply sufficient for a plant that utilized cooling towers to achieve multiple cycles of cooling. The cooling water volume needed was estimated to be approximately 4.6 million gallons per day. The criteria was established for the purposes of the siting study, that the needed water volume be less than 10% of the 7 day minimum flow for the surface water body to be rated as high suitability. It was recognized that this criteria was set based on previous permitting and discharge experience and site specific analysis would be necessary to confirm that this supply could be used for the intended purpose. This analysis resulted in the following rivers being identified as high suitability. The Missouri River, Yellowstone River, and the Tongue River. Smaller rivers and lakes were still considered as possible sources but were grouped with groundwater sources rated as medium suitability since it was unlikely that all the necessary water needed for cooling could be withdrawn from these types of sources and that groundwater may be necessary to supplement the surface water source.

  Areas of sufficient groundwater availability (rated as medium suitability). These are areas where it is likely that groundwater of sufficient quantity and quality will be available over the life of the facility. There exist no major aquifers with in SME's service area that have the capacity to yield the required volume and quality of water.

- Areas of insufficient groundwater availability (rated as low suitability). These are areas where the bedrock aquifers are mainly crystalline rock which have low permeability resulting in low yields insufficient for cooling water purposes. Groundwater that is used locally in this area is typically from surficial, glacial or alluvial deposits. Surficial aquifers comprised of unconsolidated alluvium and/or glacially-deposited materials in these areas are available, but were considered too localized to be considered as viable options.

- Figure 8-2 shows the classification of Phase 2 lands with regard to water availability. Surface water is available along the major rivers, namely the Missouri River, the Yellowstone River, and the Tongue River. Areas of low suitability are found throughout the Phase 2 study area where groundwater is less available or has a poor quality.

Figure 8-2
Major Lakes and Streams

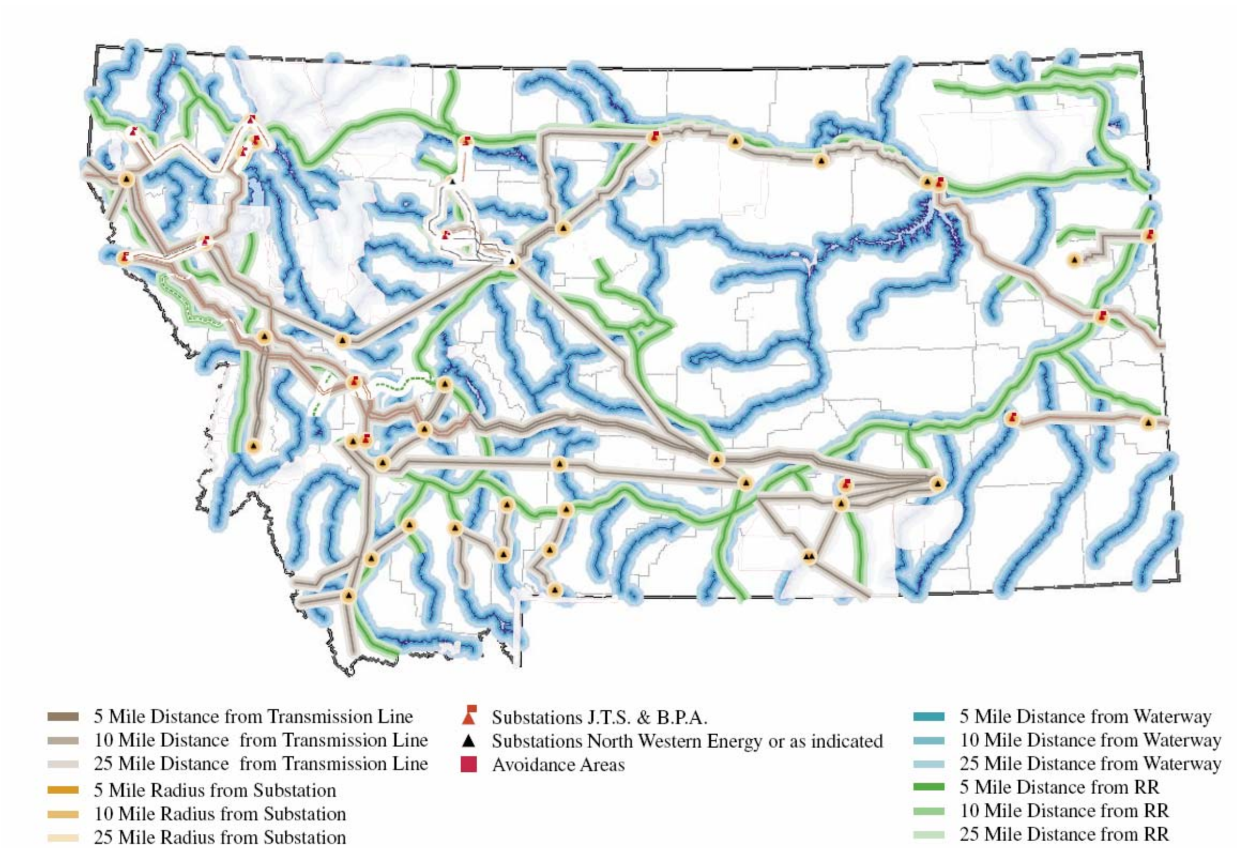


In addition to surface waters and groundwater, discharges from municipal Wastewater Treatment Plants (WWTPs) can be used for cooling water purposes. Tertiary treatment of this effluent would be necessary before it could be used. Municipal WWTPs with effluent discharges meeting the required volume (4.6 MGD) were identified, however, none of these WWTPs were located within an area of high suitability based on rail and transmission lines, so this option was not pursued further.

The results of overlaying the suitability values for each Phase 2 criterion is shown in the composite Phase 2 suitability map (Figure 8-3).

To produce the composite map, values were assigned to each suitability level for each criterion. Areas of high suitability received a favorable rating while areas of low suitability were assigned unfavorable ratings. The values of the three criteria were compiled and the resulting totals presented in map form. Areas with the greatest suitability thus had the highest favorability and areas of poorest suitability had lowest favorability.

Figure 8-3
Composite Map



This process resulted in different levels of suitability, plus identified areas for exclusion. The top suitability levels included areas around Great Falls, Hysham, Decker and Circle Montana.

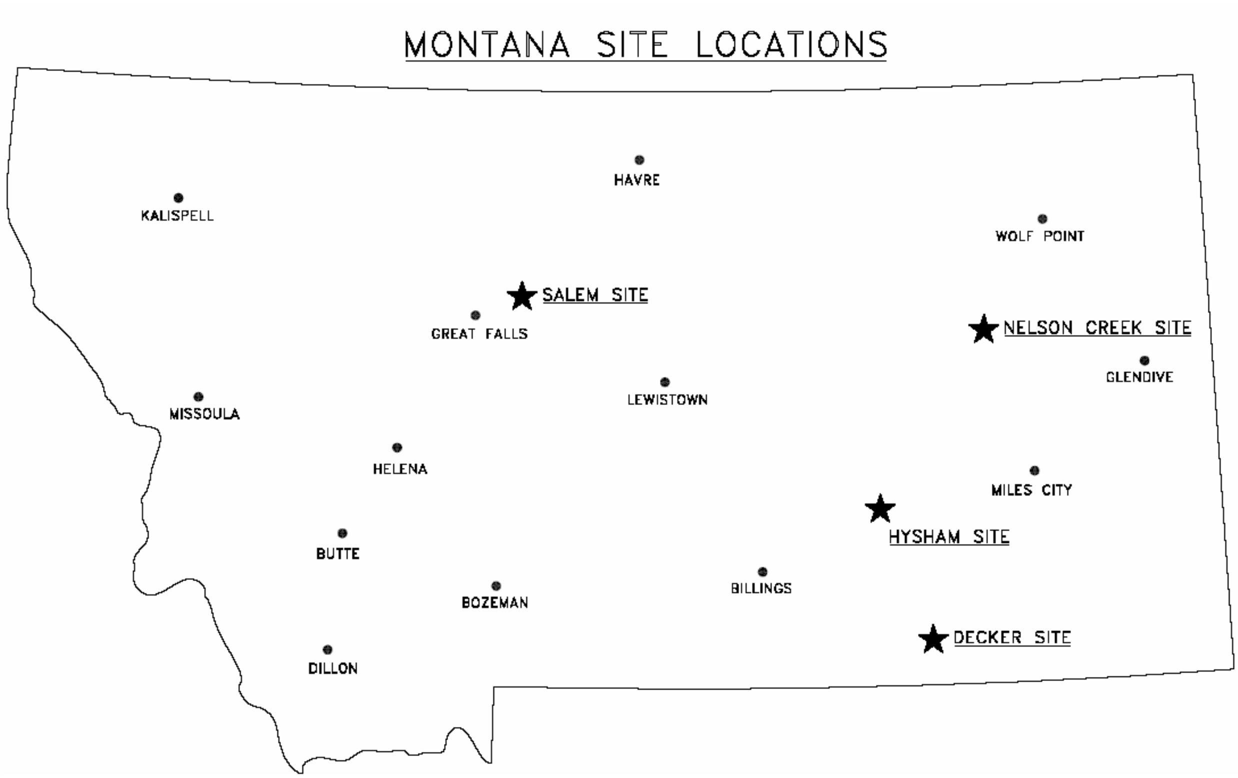
A more detailed examination of the lands included in the top suitability levels was then conducted. This was done in part by reviewing large scale aerial photography. The aerial photography allowed a more precise identification of specific land uses than the broad scale land use data that had been used in developing the composite suitability map.

Within each of these areas, suitable locations were sought where a power station could be sited adjacent to or very close to both a transmission injection point and an active railroad. A number of such locations were subsequently identified that were free of residences and all other significant constraints. These sites were identified and delineated as candidate power plant sites.

In a few instances, sites were identified as having high suitability in all respects except for nearby proximity to a transmission injection point.

Seven alternative sites were identified (Figure 8-4). Three are located at Great Falls – one north of Malmstrom Air Force Base, one within the industrial park and one 8 miles east of town (the Salem Site), two at Hysham located 8.8 and 15.9 miles south of the Yellowstone River, the Decker site located 3 miles north of the Tongue River Reservoir and the Nelson Creek site located just east of state highway 24 near mile marker 15. The seven sites were then carried into a more detailed comparative analysis in Phase 3.

Figure 8-4
Alternative Site Locations



Section 9

Phase 3

The 7 alternative sites resulting from the Phase 2 analysis were subjected to additional evaluation using more refined and detailed comparative criteria in Phase 3.

The comparative evaluation included six criteria and a site visit:

- Heat Rate
- Water Consumption and Wastewater Discharge
- Environmental
- Site-specific Costs
- Infrastructure Costs
- Cost

A range of conditions for each of these six criteria from most suitable to least suitable were established. Values for each criterion were added to produce an overall value for each alternative site. The sites with the highest scores were regarded as the most suitable.

Each criterion, for the purposes of this analysis was regarded as equally important to the overall siting evaluation. Applying different values to each criterion was considered but deemed to not be appropriate due to the subjectivity of applying weights and the fact that no simple criterion was significantly more important than another.

The total value resulting from the Phase 3 analysis was intended to be a way of efficiently summarizing data collected for each site and to be a guide in eliminating some sites from further analysis. The result was a measure of relative suitability between sites, not an absolute quantitative assessment of the suitability of any one site.

The Phase 3 analyses lead to the identification of five sites that were to be evaluated. During the initial stages of the Phase 3 analysis, a site visit was conducted on all sites with the exception of the Great Falls Industrial site. The site north of the Malmstrom Air Force Base was viewed as difficult to develop due to the northeast to southwest direction of the existing run way. The plant facilities would be in the direct flight path for takeoff and landing of the planes. Another site which was ruled out is the site at Hysham which is approximately 15 miles south of the Yellowstone River. This site was difficult to access and had steep slopes. Thus, moving large construction and generating equipment onto the site and development of the site would be a huge challenge. These site investigations and the implementation of the criteria analysis above in turn led to the identification of the two primary sites (Salem and Great Falls Industrial) that are being taken to a public involvement and the environmental regulatory process before a final site is selected.

The results of the Phase 3 analysis are detailed below according to each assessment criterion.

Heat Rate

Heat balance diagrams were developed for the project for the specific site locations and heat rate curves were developed from the diagram information. The heat rate curves were utilized in the establishment of the fuel cost component for the production cost analysis. The base load summer operational condition establishes the size of the heat rejection equipment consisting of the condenser and cooling tower.

The information from the base load cases established the fuel and air demands and the annual emissions information for this study purpose. The fuel demands established the sizing of fuel, ash and limestone handling equipment, bunker sizes and fuel and limestone long term material storage volumes. These fuel volumes and coal ash and sulfur analysis provided information, which was utilized in the sizing of solid waste disposal sites for the spent bed material and fly ash. This information also provided a basis for the capital cost at each site.

Sub-bituminous coals from the Decker, Spring Creek and Absaloka mines were used in the study. Also, a lignite coal supply from Nelson Creek was included. Utilizing coal from the Decker mine, Spring Creek mine or other suitable supply from which comparable Powder River Basin will result in the best heat rate for the project. This is followed by the sub-bituminous coal from the Absaloka mine and lastly by the lignite coal from Nelson Creek. Fuel, limestone, and ammonia consumption as well as ash production are projected to be the lowest when utilizing the Decker and Spring Creek coals. Absaloka coal was ranked next with the Nelson Creek lignite coal receiving the least favorable rating.

Water Consumption & Water Discharge

A preliminary water balance diagram was developed for the project at the summer operational condition of 100% load. The preliminary water balances aided in the determination of water requirements. These water balances also aided in the development of tank and pump sizes, water treatment equipment size and wastewater stream definition.

Water rights became an overriding criterion during the Phase 3 selection analysis. Water for the Salem, Great Falls Industrial, and Nelson Creek site would be supplied from the Missouri River. Water rights were available through an agreement with the City of Great Falls. Water for the Hysham site was proposed to originate at the Yellowstone River. Water for the Decker site was proposed to originate at the Tongue River Reservoir.

The analysis indicated that water rights were not available at either the Tongue River Reservoir or the Yellowstone River. All water rights have been fully allotted to other users and transfer of these rights was determined to be of low probability.

Environmental Considerations

Additional environmental considerations were studied during the development of the values assigned to this criterion. Reviews of preliminary CALPUFF model runs were developed to determine any impact on ambient air quality. The Nelson Creek site was not modeled due to decision to eliminate the site based on economics. The Salem, Great Falls Industrial, Decker and Hysham site were modeled and the results indicated the Salem and Great Falls Industrial sites to be the least impact to the ambient air quality. In addition, the sites were reviewed for visibility impacts and while this modeling is very preliminary, there appeared to be no issues. Water permits for construction were reviewed and determined to not be significant in issues at any of the sites. However, water rights and the utilization of water was a major concern as noted above.

Solid and hazardous waste permitting were reviewed and determined not to be a significant impact to any of the proposed sites.

A Phase I Environmental Site Assessment was conducted for the five (5) sites. The evaluation included assessment of historical information pertaining to the area including historic aerial photographs, historic topographic mapping, available fire insurance mapping for the area, a review of regulatory records for the area, and visual evaluation of the assessment area. There were no environmental conditions or concerns identified during the site assessment at any of the proposed project sites.

Site Specific Costs

Housing facilities that would accommodate the construction craft trades during the construction activities near the Decker and Nelson Creek sites are limited. To accommodate the expected construction personnel a man-camp must be built to house and provide support facilities for the construction crews.

Infrastructure Costs

Transportation

Each site was reviewed and a determination was made as to the required infrastructure improvements necessary for the delivery of the commodities of fuel, limestone and ammonia and the major equipment during construction. Improvements, which were identified, are any road or rail needs for the commodities and major equipment deliveries.

Road access within the property lines of each site is estimated to be the same. Entrance road requirements, with the exception of the Nelson Creek location, are also all within approximately one-half mile in length and considered equal for each site.

All sites, with the exception of the Nelson Creek location, are within reasonable distances from existing Burlington Northern Santa Fe (BNSF) Railroad main line track systems. Eight (8) miles of new track installed on an existing railroad bed are estimated to be required for the Salem site. Five (5) miles of new track and railroad bed are expected to be needed for the Great Falls Industrial site. Coal to the Decker site will be delivered by rail via the installation of four (4) miles of new track. It is estimated that the Hysham site will require approximately a mile and a half (1½) of new track.

At Nelson Creek, it is estimated that over 45 miles of existing railroad track from Glendive to Circle will need to be upgraded to accommodate the delivery of major equipment. In addition, about 26 miles of road improvements will be needed to transfer major equipment by heavy rigging trucks from the city of Circle, Montana at the upgraded rail siding to the Nelson Creek site.

Transmission

The Salem and Great Falls Industrial sites are located east and north-northeast of Great Falls, Montana. The area has existing 230kV, 115kV, 100kV, and 69kV facilities and transmission resources concentrated in the Rainbow and Great Falls substations. The selected interconnection points are in the existing Great Falls 230kV substation and the development of an interconnection point on the Great Falls to Broadview 230 kV transmission line. The distance of line needed is approximately 9 miles.

The Hysham Site is just to the north of the Colstrip-Broadview 500kV lines and south of the Rosebud-Custer 230kV line. The 230kV system is more advantageous to SME to serve native loads than the 500kV network. The selected interconnection points are the existing Rosebud Creek autotransformer 230kV tap and the existing Custer Substation. The installation of approximately 34 miles of transmission line will be needed.

The Nelson Creek Site is located approximately 90 miles north of the existing Miles City-Rosebud-Custer 230kV system. It is located approximately 15 miles south of the Ft. Peck-Circle-Dawson County 230kv transmission system. Utilizing the Ft. Peck area 230kV system places the generation output on the east side of the Miles City HVDC tie and would require significant operational changes to deliver capacity via the link to the

SME loads. Additionally, “northern loop” flows are constrained due to a system voltage of 161kV system, rather than a 230kV system. To provide transmission paths to the City of Great Falls and to support the SME cooperative members’ native loads, transmission interconnection points at the existing Rosebud Creek autotransformer 230kV tap and at the Colstrip 230kV Substation have been selected. The distance for this transmission line is the longest of all sites at approximately 90 miles.

The Decker Site has the same terminals as the Nelson Creek Site. The site is located approximately 75 miles south of the existing Miles City-Rosebud-Custer 230kV transmission system. The distance for this transmission line is the next to the longest at approximately 80 miles.

Water Source

Make-up water for each plant location will be supplied from local rivers or reservoirs. Each plant location requires an expected make-up water quantity of three thousand (3,000) gallons per minute or 4,850 acre-feet per year. The Salem and Great Falls Industrial sites will obtain water from an intake structure upstream of the Morony Dam on the Missouri River. The distance from this dam to the Salem and Great Falls Industrial sites is approximately five (5) miles and seventeen (17) miles, respectively. The Decker site will utilize water from the Tongue River Reservoir located approximately eleven (11) miles to the south of the proposed location. The water supply for the Hysham site will be from the Yellowstone River located approximately nine (9) miles to the north of the proposed site. The Nelson Creek site requires a relatively long forty-one (41) mile pipeline to the Fort Peck Reservoir for the supply of make up water. The intake location will be close to the reservoir dam site in order to maintain sufficient water level for intake of the pumps.

Project Cost

Initial Capital Cost

The proposed project plant site costs were developed for the Salem, Great Falls Industrial, Decker, Hysham and Nelson Creek sites. The installed capital cost for the Salem site was the lowest costs followed by the Great Falls Industrial, Hysham, and Decker sites. The Hysham site was third in cost due to the necessary development of a transmission system. The Decker site was also higher in the costs of the transmission system but also required additional infrastructure development of a man camp. The highest installed capital cost was the Nelson Creek site. This is due to the larger equipment sizes needed to handle the lower quality fuel supply, and the infrastructure development of a man camp, the water source, transmission upgrades and the development of the transportation systems. Thus, the Nelson Creek site was removed from further consideration.

Fuel Cost

Fuel costs for each type and mine source of coal was obtained from the mine suppliers. This cost of delivered coal ranged as follows:

$17.50/ton for Spring Creek coal for the Salem and Great Falls Industrial sites
$9.95/ton for Absaloka coal for the Hysham site
$11.75/ton for the Decker coal to the Decker site
$7.21/ton for the Nelson Creek site

Non-Fuel Operating & Maintenance Costs

The annual fixed and non-fuel variable operating and maintenance (O&M) costs for a nominal 250 mW unit burning PRB coal were obtained from industry published information and Stanley Consultants' data base of information. An allowance was made for SO2 emissions credit costs.

Debt Service

The annual debt service cost was calculated based on financing 100 percent of the plant capital cost at 6.0 percent annual interest rate.

Net Present Value

The Net Present Value (NPV) for each plant site was calculated based on a common discount rate and annual cash flows for a plant economic life of 30 years.

Results

The results of the cost analysis indicate that the Salem site utilizing Spring Creek coal was found to have the lowest overall cost. The next lowest cost site was the Great Falls Industrial site. The site with the highest overall costs was the Nelson Creek site.

The preferred sites for moving forward are the Salem and Great Falls Industrial sites.

Section 10

Macro Corridor Study

A Macro Corridor Study was conducted to identify potential corridors for the transmission line connections required for the Salem and Great Falls Industrial alternative coal-fired power plant sites. The transmission line connections required at each alternative site consist of a new 230 kV line connected to the Great Falls substation and a new 230 kV line connected to a new switch station installed in the Great Falls to Broadview 230 kV line.

Salem Site

The new 230 kV line to the Great Falls to Broadview 230 kV line will be installed along the railroad right of way as shown on figure 10.1. The other new 230kV line will be installed along a new right of way as shown to the Great Falls substation. These corridors have been identified for further refinement and evaluation in subsequent environmental documentation that will be prepared to identify and analyze specific routes. In general, the corridors are approximately ¼ mile wide.

Great Falls Industrial Site

The new 230 kV line to the Great Falls substation will be installed along existing right of way for other transmission lines or the existing road system or follow the newly developed rail line to the site.

The identification of corridors was strongly influenced by the electric system interconnection requirements, following existing utility rights of way and other linear features such as roads. The corridors shown are intended to minimize impacts on avoidance and exclusion areas. The relative sensitivity of different resources classified as opportunities or constraints (avoidance and exclusion areas) was determined to assist in identifying the alternative corridors.

Different resources have varying degrees of sensitivity to the construction, operations and maintenance of a transmission line. Certain resources may be moderately sensitive (e.g., cropland, floodplains, surface water) and other resource areas may be highly sensitive (e.g. airports, national or state parks) and should be excluded from consideration if there are other reasonable alternates. Still other areas may provide opportunities for siting transmission lines (e.g. existing utility lines, roads, railroads). The basis for these classifications was compiled from project team experience and the RUS Environmental Guide, The Borrower's Report for Environmental Assessment Projects, RUS Bulletin 1794A-601, April 1995.

Figure 10-1
Salem Site Transmission Corridor