

Medicine Bow Fuel & Power, LLC

Coal-to-Liquids Project Carbon County, Wyoming

Industrial Siting Permit Application

Prepared by



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Acronym List

AADT	annual average daily traffic
AASHTO	American Association of State Highway and Transportation Officials
AGR	acid gas removal unit
AOW	Arch of Wyoming
ASU	Air Separation Unit
AVO	audio/visual/olfactory
BACT	Best Available Control Technology
BLM	Bureau of Land Management
CAA	Clean Air Act
CBM	Coal Bed Methane
CFR	Code of Federal Regulations
CO	carbon monoxide
CO ₂	carbon dioxide
Corps	U.S. Army Corps of Engineers
COS	carbonyl sulfide
CTG	gas turbine generator
CTL	Coal to Liquids
CWA	Clean Water Act
DOE	Department of Employment
FEED	front-end engineering and design
gal/min	gallon per minute
GE	General Electric
gpm	gallon per minute
H ₂ S	hydrogen sulfide
HAP	hazardous air pollutant
HRSG	heat recovery steam generator
IRS	Internal Revenue Service
ISC	Industrial Siting Council
LNB	low NO _x burner
LOS	level of service
LTGC	low-temperature gas cleanup
MBFP	Medicine Bow Fuel & Power
MBTA	Migratory Bird Treaty Act
mgd	million gallons per day
MMBtu/hr	million British thermal units per hour

MOA	Memorandum of Agreement
mph	miles per hour
MW	megawatts
NEPA	National Environmental Policy Act
NH ₃	ammonia
NO _x	nitrogen oxides
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NSR	New Source Review
°F	degree Fahrenheit
OSM	Office of Surface Mining
PM ₁₀	particulate matter less than 10 microns
ppmv	part per million by volume
ppmvd	part per million by volume dry
ppmvw	part per million by volume wet
PRB	Powder River Basin
PSD	Prevention of Significant Deterioration
psia	pounds per square inch absolute
psig	pounds per square inch gauge
RAM	ranching, agriculture, and mining
RV	recreational vehicle
SCR	Selective Catalytic Reduction
SH	State Highway
SHPO	State Historic Preservation Office
SO ₂	sulfur dioxide
SRU	sulfur recovery unit
SSURGO	Soil Survey Geographic Database
STG	steam turbine generator
SWTSD	solid waste treatment, storage, and disposal
T&E	threatened and endangered
tph	tons per hour
tpy	ton per year
U.S.D.I.	United States Department of the Interior
USEPA	United States Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
VOC	volatile organic compound

WDEQ	Wyoming Department of Environmental Quality
WIDISA	Wyoming Industrial Development and Siting Act
WSEO	Wyoming State Engineer's Office
WYDOT	Wyoming Department of Transportation
WYGF	Wyoming Game and Fish Department
WYNDD	Wyoming Natural Diversity Database

SECTION 1.0

Introduction

Medicine Bow Fuel & Power is proposing to construct a coal-to-liquids (CTL) facility in Carbon County south of Medicine Bow. Construction of the facility will begin in 2008 with commercial operation in 2012. The facility will produce up to 20,000 barrels per day of transportation fuel and associated energy products.¹ The facility could be expanded in the future. It is estimated that employment will range from a high of 2,000 workers for the CTL facility and 307 workers for the coal mine during construction. During operation, it is estimated that the plant will require up to 200 workers for the CTL facility and up to 250 workers for the coal mine. The total construction cost for the CTL facility and coal-handling operations is approximately \$2.0 billion. The facility location is shown in Figure 1-1.

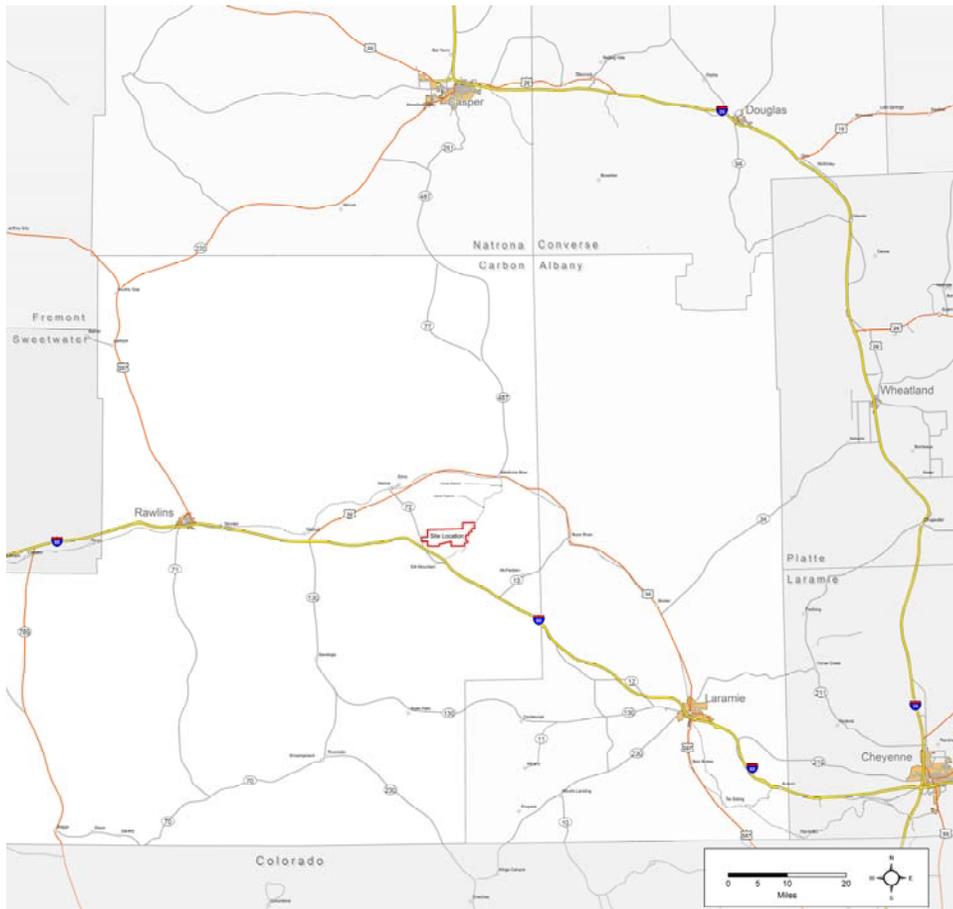


FIGURE 1-1
Site Location

¹ The exact output quantity will not be known until after detailed engineering is complete.

Project Benefits

Benefits of the proposed project to local communities surrounding the project and the State of Wyoming include the following:

- ❖ New Investment
 - \$2.0+ billion investment
 - Millions of dollars to be spent on local purchases
 - Local service industry expanded
 - Related increase in oil production from availability of carbon dioxide
- ❖ Employment
 - Approximately 2,307 construction jobs
 - Approximately 450 full-time operations jobs
- ❖ Expanded tax base
 - Additional property, ad valorem, severance, and other taxes paid by the project
 - Additional property taxes paid by new employees moving into area
- ❖ Educational and Training Opportunities
 - Local work training programs and internship positions
 - Possible research and development initiatives with University of Wyoming
 - Additional training for local emergency and medical personnel
- ❖ Energy Security
 - Opportunity for Wyoming natural resource to have major role in new fuel source
 - Less dependence on foreign imports

Details of these project benefits will be discussed in Sections 3.0 and 4.0 of the application.

Application Organization

This industrial siting application is organized into the following sections and appendices:

- Section 1.0 – Introduction. This section provides an overview of the project, provides a summary of project benefits to the local communities and State of Wyoming, and describes the report organization.
- Section 2.0 – Project Description. This section provides a detailed description of the CTL process, information on the applicant, and a legal description of the property.
- Section 3.0 – Construction and Operations Description. This section provides information on the project schedule, construction workforce, construction logistics, permits required, and the operations workforce.
- Section 4.0 – Socioeconomic Analysis. This section provides a summary of the detailed socioeconomic analysis that is in Appendix B. The analysis summarizes the study area conditions, evaluates impacts due to the project, and provides plans for alleviating the impacts.
- Section 5.0 – Public Involvement. This section summarizes the public involvement activities conducted on the project to date including meetings with agencies, public open houses, and local infrastructure surveys.

- Section 6.0 – Potential Environmental Impacts. This section summarizes project and cumulative environmental impacts and plans for alleviating impacts.
- Section 7.0 – Mitigation to Local Governments. This section summarizes the primary impacts as a result of the project and the plans for mitigation.
- Section 8.0 – References. This section lists documents used in preparation of the application.
- Appendices A through K. Supporting information in the appendices includes letters of support; the detailed socioeconomic analysis report; the local agency level of service survey form and contact list; the Wyoming Industrial Siting Division impact assistance estimate; public involvement information including project fact sheet, meeting notices, newspaper ads, and sign-in sheets; site location and general arrangement drawings for the CTL facility and the underground mine; environmental resource maps; transportation routes; the Carbon County Conditional Use Permit; water supply and water yield analysis; and communications with the State Historic Preservation Office.

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Project Description

2.1 Applicant Information

Medicine Bow Fuel & Power LLC is 100 percent owned by DKRW Advanced Fuels LLC. DKRW Advanced Fuels LLC (DKRW) is 33.9 percent owned by DKRW Energy LLC, 24 percent by Arch Coal, and 42.1 percent by others. DKRW Advanced Fuels LLC is a company specializing in energy conversion projects. By utilizing proven coal gasification and syngas liquefaction technologies, more abundant resources, primarily hydrocarbons such as coal and pet coke, can be converted into competitively priced products, including ultra-clean transportation fuel. DKRW is focused on the commercial development, construction, ownership, and operation of facilities designed to convert lower-value hydrocarbons into products that traditionally have been produced from crude oil. The DKRW vision is to develop, own, and operate a diverse, worldwide portfolio of conversion facilities that will help meet the critical need for new sources of energy. Products will include transportation fuels, electricity, steam, off-gas, slag, chemicals (including sulfur), other fuels, and energy products. This is the initial project, but DKRW is also pursuing projects in other parts of the United States and internationally.

Medicine Bow Fuel & Power LLC has an option with Arch Coal to purchase coal reserves and associated surface rights for the Medicine Bow Fuel & Power project.

2.2 Project Description

Medicine Bow Fuel & Power LLC (MBFP), a subsidiary of DKRW, proposes to construct and operate a CTL facility and coal mine in Medicine Bow, Wyoming. The CTL facility will use an advanced gasification and liquefaction process to convert coal resources into products that meet critical energy needs while reducing the environmental concerns associated with coal combustion. Proven processes and technologies are available to convert the significant underutilized or “stranded” coal resources that exist in the United States and the rest of the world, into valuable outputs, such as transportation fuels.

2.2.1 Site Location

The project area is located in eastern Carbon County north of I-80 between Rawlins and Laramie, Wyoming. The CTL facility and coal-handling facility would be located at the mouth of the Saddleback Hills Mine, located approximately 10 miles north of the town of Elk Mountain and approximately 13 miles southwest of Medicine Bow. A site location map and general arrangement drawings are shown in Appendix F. The CTL facility is approximately 200 acres and the coal-handling facility is approximately 205 acres for a total of 405 acres. During construction of the CTL facility, there will also be an equipment and construction laydown area north of the site that is approximately 338 acres. All of these parcels are on the permitted Arch Coal mine property (under the land quality mine permit) that has a total land area of 14,348 acres. The project site is at an elevation of 7,000 feet.

2.2.2 Process Description

The following section describes the CTL process. This information is based on the CTL facility's preliminary front-end engineering design (FEED). The CTL, coal-handling facility, construction laydown area, and underground mine locations are shown in Appendix F.

2.2.2.1 Coal Handling and Preparation

Run-of-mine coal is delivered to large covered bins for storage. The raw coal is routed to the Coal Crusher in multiple parallel trains. The crushed coal is screened using the Coal Screener to a maximum size of 1 inch, with oversized coal recycled back to the Crusher. The crushed and screened coal is conveyed and stored in multiple Prepared Coal Bins, from where it is gravity flowed to the Coal Grinding Mill in the Coal Preparation Unit.

The Coal Preparation Unit receives the coal from the Raw Coal Processing Unit and grinds it with water into a slurry that is pumped at high pressure into the Gasification Section. This section is divided into three separate coal grinding/slurry systems, each with the capacity to supply one-third of total plant requirements. The slurry produced by the three systems is cross connected such that feed to any of the five gasifiers can be achieved with one system feeding no more than two gasifiers.

2.2.2.2 Gasification

The plant will contain five gasifier trains, each with one-fourth of plant capacity. In normal operation, four gasifier trains will be in operation with the fifth as a spare. The following description refers to one train only.

The slurry from the Slurry Pump and oxygen from the Air Separation Unit (ASU) are mixed in the Feed Injectors and flow into the combustion chamber of the Gasifier where partial combustion occurs. The gasification reaction is conducted at a high pressure and temperature. The raw products consist of syngas together with small amounts of a number of impurities (including chlorides, sulfides, nitrogen, argon, and methane), with liquid slag and fine solid particles.

These raw products exit the combustion chamber and flow to the Quench Chamber, which is maintained water full. The quench water cools the raw products and removes most of the particle fines from the syngas. The molten slag solidifies and settles to the bottom of the Quench Chamber. The syngas exits the Gasifier and flows to the syngas scrubber. Solidified slag is removed through a lock hopper system connected to the bottom of the Quench Chamber. The solidified slag passes through the Slag Crusher, which crushes the slag. The crushed slag settles out in the Lock Hopper. The slag and water discharged from the bottom of the Lock Hopper drop onto the Slag Drag Conveyor in the Slag Sump. The slag is removed from the sump by the Drag Conveyor, with further water removal by the Coarse Slag Screen and the Coarse Slag Conveyor.

2.2.2.3 Air Separation Unit

The ASU is designed to provide oxygen to the gasifier for syngas production. Onsite storage of liquid oxygen will be included for backup purposes. Two identical air separation trains are provided, each of which will produce 50 percent of the required quantity.

Atmospheric air is compressed using an electric driven compressor, treated to remove condensibles, and fed to the ASU where oxygen is separated from atmospheric air cryogenically. Following separation, the oxygen product is pumped to high pressure as a cryogenic liquid and vaporized against a stream of condensing high-pressure air within the ASU main heat exchanger. Most of the gaseous oxygen product is fed as oxidant to the GE Gasifiers. A small portion of the oxygen is let down in pressure and routed to the Sulfur Recovery Unit, where it is used for sulfur production.

Because water is at a premium in the facility, ASU compressor intercooling and aftercooling are provided by a closed-loop circulating glycol system, with heat rejection to the atmosphere by air coolers.

A quantity of nitrogen is taken from the ASU and compressed for general plant usage such as purging and tank inerting. Liquid nitrogen is kept in storage onsite as a backup nitrogen supply.

2.2.2.4 Syngas Scrubbing

The plant includes five syngas scrubbing trains, each sized for one-fourth of plant capacity. Each syngas scrubbing train is integral with a particular gasifier, with four such trains operating, and the fifth being a spare during normal operations.

The syngas leaves the Gasifier through a side connection. Process condensate is injected into this syngas line to prevent the buildup of solids. The syngas is mixed with additional process condensate to wet the entrained solids thoroughly and facilitate their removal in the Syngas Scrubber.

The Syngas Scrubber is a tower, which contains a water sump in the bottom and four trays in the top. The wet syngas enters the Syngas Scrubber below the first tray and flows downward through a dip tube into the water sump. This removes most of the solids contained in the syngas. The syngas then flows upward through the annular space surrounding the dip tube and then through the four trays. Process condensate is supplied to the top tray and flows downward, counter-currently washing any remaining solids from the syngas. From the Scrubber trays, a vane type de-mister removes any entrained water droplets, such that an essentially particulate-free syngas exits from the top of the Syngas Scrubber. The raw syngas is then routed to the Low-Temperature Gas Cleanup (LTGC) unit for further processing.

2.2.2.5 Low-Temperature Gas Cleanup

The LTGC Unit is a single system sized for 100 percent of plant capacity. The purpose of this system is to cool the raw syngas from the Quench Unit with production of useful heat, and provide other gas cleanup functions including COS hydrolysis. The product syngas is routed to the Acid Gas Removal Unit (Area 2000).

2.2.2.6 Sour Water Unit

The Sour Gas and Sour Water Unit is a single system sized for 100 percent plant capacity; its purpose is to remove dissolved sour gases (ammonia [NH₃], hydrogen sulfide [H₂S], and COS) from quench water and condensate, and send them to the Acid Gas Removal Unit.

2.2.2.7 Acid Gas Removal Unit

The Acid Gas Removal Unit (AGR) performs three functions: removal of sulfur compounds (H₂S and COS) from the syngas to a level acceptable to the downstream Syngas Conversion Unit, recovery of most of the carbon dioxide (CO₂) in the syngas as a purified stream for export, and recovery of a concentrated H₂S/COS stream to be sent to the Sulfur Recovery Unit (SRU). One AGR process train will be supplied. The concentrated H₂S/COS stream is sent to the SRU, the recovered CO₂ is sent to the CO₂ compression unit, and the syngas is routed to the Syngas Conversion Unit for further processing.

2.2.2.8 CO₂ Compression and Drying

The CO₂ recovered from the AGR is compressed from near atmospheric pressure to 2,100 pounds per square inch gauge (psig) by four-stage compressors in parallel trains. After the second compression stage (at approximately 225 psig), the CO₂ gas is passed through a drying system for removal of residual water to a dew point of -40 degrees Fahrenheit (°F), reducing the risk of pipeline corrosion and to prevent ice and hydrate formation during winter operation. The choice of drying technology has not yet been determined.

2.2.2.9 Sulfur Recovery Unit

The preliminary design of the Sulfur Recovery Unit (SRU) is based on proven sulfur recovery technology. Given the acid gas stream (Claus gas) from the AGR and from the sour water stripper, the single train SRU will produce liquid sulfur, with an overall expected sulfur recovery of better than 99.9 percent.

2.2.2.10 Syngas Preparation

The treated syngas from the AGR is expected to contain less than 0.1 part per million by volume (ppmv) total sulfur. Nevertheless, the Sulfur Guard Beds are included to protect the catalyst downstream from the risk of sulfur spikes from unit upsets. Each of the parallel beds is sized for full plant capacity. For best performance, the syngas is heated before entering the guard bed. The syngas pressure may be increased or decreased depending on the conversion process selected.

2.2.2.11 Area 4000 – Syngas Conversion Unit

The Syngas Conversion Unit consists of multiple reactors that convert syngas to a transportation fuel or chemical product along with generation of steam resulting from the exothermic reactions. In each reactor, the hydrogen and carbon monoxide present in the syngas feed react over a catalyst to produce a mixture of hydrocarbons, hydrocarbon oxygenates, and water. The volumetric composition of the products is dependent on the catalyst and the process conditions selected but includes transportation fuels, electricity, steam, off-gas, slag, chemicals, to include sulfur, other fuels, and energy products.

2.2.2.12 Area 5000 – Product Upgrading Units

Product Upgrading technologies will be utilized by MBFP to convert intermediate products into end products with the highest market value and demand, such as transportation fuels and/or chemical feedstock. Upgrading is usually performed over a catalyst and may require addition of Hydrogen. By-products, such as acetic acid, butane, and alcohols, can be separated if supported by market conditions.

2.2.2.13 Utilities and Product Storage

Electric power for the CTL facility will be provided in the Power Block. This facility will consist of a combined cycle power plant fueled by a combination of natural gas, syngas, plant off-gas, as well as steam from the plant's exothermic reactions. The entire output of the power plant will provide energy for the plant's internal needs.

The facilities for raw water processing, including storage, primary treatment, and demineralization, for the entire facility are included in the Power Block. The raw water will be obtained from wells.

The CTL facility is designed to be a zero liquid discharge facility. Aqueous effluents, including Gasification quench blowdown and steam generation blowdown, that cannot be recycled within the process areas will be sent to the raw water-processing unit within the Power Block. If possible, this water will be re-used as substitute raw water feed, otherwise it will be sent to evaporation. Biological treatment of process water is not expected to be required.

The brine concentrate from reverse osmosis raw water treatment, along with any aqueous process effluents, will be sent to a steam evaporation system. The evaporation concentrate is sent to an onsite evaporation pond, which is sized to handle plant storm water runoff after oil/water separation.

Storage tanks will be provided for intermediate and end products. Tank sizing will depend on off-take agreements. Although intermediate transfer pumps and product send-out pumps are included in the scope, the final battery limit requirements for product transfer have not yet been defined.

2.2.3 Plant Capacity

The CTL facility will produce the following (volumes are approximate):

- Up to 20,000 barrels per day of transportation fuels, electricity, steam, off-gas, slag, chemicals (including sulfur), other fuels and energy products which will be sold into the market.
- Steam, tailgas, and power produced from the CTL process will provide energy for internal CTL facility use. If additional power is required, it will be purchased from the grid or generated from onsite generators with natural gas, syngas and/or off-gas as the fuel. Any surplus energy will be sold to the electric utility grid.
- Other by-products for sale in the market are elemental sulfur, chemicals, and slag, which will be put to productive use in the region.

2.2.4 Expansion

The CTL facility may be expanded by the addition of gasifier trains in order to optimize output and to provide a more efficient power plant as necessary.

2.3 Option Agreement

MBFP has an option agreement to purchase assets with Ark Land Company and Arch of Wyoming, LLC. The option agreement includes the properties discussed in this application for the CTL facility and the coal mine facility.

Construction and Operations Description

3.1 Project Schedule

The current project timeline is summarized in Figure 3-1. The initial project feasibility study, FEED, and permitting activities have been conducted in 2006 and 2007. The basic engineering design is in progress, and project financing is expected to be completed in the third quarter of 2008. MBFP anticipates that site mobilization and construction will start in the second quarter of 2008 with mechanical completion in 2011. Startup and commissioning will follow with commercial operation expected in the middle of 2012.



FIGURE 3-1
Project Schedule

3.2 Construction Workforce

The estimated number of construction workers by calendar quarter for both the CTL facility and the coal mine are shown in Table 3-1. The estimated workforce will peak in the second quarter of 2010 with a total of 2,307 personnel. The estimated peak workforces in 2008 and 2009 are 935 and 2,157, respectively.

TABLE 3-1
Estimated Number of Construction Workforce Summary by Calendar Quarter

Classification	2008			2009				2010				2011
	2 ND	3 RD	4 TH	1 ST	2 ND	3 RD	4 TH	1 ST	2 ND	3 RD	4 TH	1 ST
CTL Facility												
Civil	210	330	380	380	330	280	180	60	0	0	0	0
Structural Steel	0	150	210	240	210	180	130	0	0	0	0	0
Equipment	0	110	110	130	220	270	270	120	240	110	0	0
Piping	0	0	0	0	350	750	850	800	1000	650	220	0
Electrical	0	0	0	0	60	90	140	110	190	130	60	20
Instrumentation	0	0	0	0	0	60	60	110	140	110	80	30
Insulation/Paint	0	0	0	0	0	0	0	90	270	270	220	100
Construction Indirect	160	160	160	220	220	220	220	160	160	160	160	50
CTL Subtotal	370	750	860	970	1390	1850	1850	1450	2000	1430	740	200
Mine												
Mechanical	0	0	0	4	4	26	26	26	26	26	26	26
Piping	0	0	0	0	0	2	2	2	2	0	0	0
Structural	0	0	20	50	155	155	155	155	155	155	155	85
Platwork	0	0	0	0	0	5	5	5	5	5	5	5
Civil & Concrete	0	20	50	85	85	85	85	85	85	85	85	50
Electrical	0	0	2	8	4	24	24	24	24	24	24	24
Construction Mgmt	0	2	3	10	10	10	10	10	10	10	10	10
Mine Subtotal	0	22	75	157	258	307	307	307	307	305	305	200
CTL and Mine Total												
	370	772	935	1127	1648	2157	2157	1757	2307	1735	1045	400

Source: SNC Lavalin, Englobal, Roberts & Schaffer, Arch Coal

3.3 Construction Logistics

The project team anticipates that offsite storing and staging areas for equipment during the construction phase will be in and around the town of Medicine Bow. MBFP is currently working with the Union Pacific railroad for a rail spur siding in the town of Medicine Bow for equipment unloading. The project site will also have a construction laydown area and warehousing facilities. All quantities indicated in this study are estimated and will not be final until detailed design is completed.

A detailed review of the impacts of construction and operations traffic on the roads and highways in the study area can be referenced in Section 3.2.4.6 of the Socioeconomic Impact Analysis report in Appendix B.

3.4 Permits

The CTL facility and the coal mine (Saddleback Hills Mine) are considered one facility by the Clean Air Act as well as other regulations. For operational reasons, some permitting activity will be conducted only for the CTL facility or only for the Saddleback Hills Mine and some permitting activity (i.e., the PSD Air Construction Permit) will cover both operations.

Tables 3-2 and 3-3 show a list of anticipated permits for the CTL facility and the Saddleback Hills Mine, respectively. The PSD air construction permit application for the CTL facility was submitted in June 2007. The water yield analysis was submitted to the State Engineers Office in May 2007. The Carbon County Planning Department approved the Conditional Use Permit for the project on September 4, 2007. The staff report and Planning and Zoning Commission approval can be referenced in Appendix I. It is expected that all permits required for construction to begin will be obtained by February 2008.

TABLE 3-2
List of Potential Permits and Clearances for the CTL Facility

Agency	Permit or Clearance	Status	Anticipated Permit Date
Federal			
Federal Aviation Administration	Title 14 CFR Part 77 Navigable Airspace Notification of Proposed Construction	Pending final design File prior to construction	Early 2008
	Notification of Actual Construction		Prior to operation
U.S. Army Corp of Engineers	Section 404 Permit	Pending additional design on project linear facilities (transmission, natural gas, rail spur, CO ₂ pipeline, water supply)	2009
U.S. Department of Interior, Bureau of Land Management (BLM)	Right-of-way to lease and/or cross BLM land Easement - for pipelines, transmission line, railroad spur, and access road.	Submit right-of-way applications Winter 2007/2008	2008/2009
Environmental Protection Agency (EPA)	Spill Prevention Control and Countermeasures Plan (SPCC)	File prior to operation (will be submitted to EPA and WDEQ)	2011
	Facility Response Plan		2011
State of Wyoming			
Wyoming Department of Environmental Quality (WDEQ), Air Quality Division	PSD Air Construction Permit	Submitted application June 2007, responding to comments	2007/2008
	Title V Operating Permit	Submit within 12 months after facility is operational	2012
	Title IV Acid Rain Permit	Contingent upon selling	2011

TABLE 3-2
List of Potential Permits and Clearances for the CTL Facility

Agency	Permit or Clearance	Status	Anticipated Permit Date
		power to grid	
WDEQ, State Engineers Office	Groundwater Appropriation Permit	Submitted Water Yield Analysis May 2007. Pending final opinion from SEO (expected September 2007)	March 2008
	Surface Water Appropriation Permit	Pending design of evaporation pond	2008/2009
WDEQ, Industrial Siting Division	Industrial Siting Permit	Submit application September 2007	January 2008
WDEQ, Water Quality Division	NPDES Construction Stormwater Permit	Submit application September 2007	January 2008
	NPDES Industrial Stormwater Permit	Pending completion of construction	2011
	NPDES Industrial Discharge Permit	Pending final design	2011
	Class V Injection Facility Permit (septic system)	Pending final design	2011
	Permit to Construct Public Water Supply Potable Water System	Pending water system design	2011
Wyoming Office of State Lands and Investments	Right-of way across state lands Easement for pipelines and transmission line Temporary use permits for roads	Pending final design of pipeline and transmission routes	2009
Wyoming Department of Transportation	Utility Right-of-Way Permit	Pending final design of utility routes	2009
	Access Road Right-of-Way Permit	Pending final design of road access	2009
Wyoming State Historic Preservation Office	Cultural Resource Compliance (Section 106 of the National Historic Preservation Act)	Pending additional design on project linear facilities (transmission, natural gas, rail spur, CO ₂ pipeline, water supply)	2008/2009
County			
Carbon County Planning Department	Conditional Use Permit for Project Site	Submitted July 2007	Permit Approved September 2007
	Building Permits for Project Site	Prior to construction	Early 2008
	Conditional Use Permits for Worker Camps (as required)	Prior to construction	2008
Carbon County Transportation Department	Utility Right-of-Way Permit	Pending final design of utility routes	2009
	Access Road Right-of-Way Permit	Pending final design of road access	2009

Source: URS Corporation, CH2M HILL

TABLE 3-3
List of Potential Permits and Clearances for the Saddleback Hills Mine

Agency	Permit or Clearance	Status	Anticipated Permit Date
Federal			
U.S. Department of Interior, Bureau of Land Management (BLM)	Final Environmental Impact Statement Carbon Basin Coal Project	FEIS-98-32	Issued 01/99
U.S. Department of Interior Mine Enforcement and Safety	Safety Permit	MSHA ID # 48-01694	Issued 04/05/06
U.S. Army Corp of Engineers	Programmatic General Permit 99-03	Application in progress Delineation of Wetlands Verified and approved	Not Yet Issued
Environmental Protection Agency (EPA)	Spill Prevention Control and Countermeasure Plan (SPC)	Plan in place and to be maintained on site	N/A
Environmental Protection Agency (EPA)	Public Water System NTNC	Application to be made at a later date	Not Yet Issued
Federal Communications Commission (FCC)	Radio License, Mobile Radio Station License	Various permits issued	Issued 2002 to 2003
Federal Aviation Administration	Radio Tower Permit, Construction	If necessary, application to be made at a later date (to be acquired prior to construction)	Not Yet Issued
State of Wyoming			
Commissioner of Public Lands and Farm Loans	State Approval of Mining and Reclamation Plan	If necessary, application to be made at a later date	Not Yet Issued
WDEQ, Industrial Siting Division	Industrial Siting Permit	Submit application September 2007 (mine included in CTL application)	January 2008
Land Quality Division, (LQD)	Permit to Mine	TFN 3 1/135	Issued 11/22/05
Air Quality Division, (AQD)	PSD Air Quality Permit to Construct (will include both the CTL Facility and the Mine)	Application review in progress	Not Yet Issued
Water Quality Division (WQD)	NPDES Water Discharge Permit	Application approved WY0051900	Permit issued 10/22/04
Water Quality Division (WQD)	Storm Water Associated with Industrial Activities under NPDES (SWPPP)	Application approved WYR-00-0000	Issued and effective 30 Aug 2004; Exp. 2006
Water Quality Division (WQD)	Fuel Storage Tank Facility	Application to be made at a later date	Not Yet Issued
Wyoming Department Of Transportation (WYDOT)	Access Permits to State Highway 72 and US Highway 30	To be held by County	Not AOW Permit
State Engineers Office (SEO)	Appropriation of Surface Water Approval to construct Sediment Ponds (various)	Application to be made at a later date	Not Yet Issued
State Engineers Office (SEO)	Appropriation of Surface Water Approval to construct ASCMs	Application to be made at a later date	Not Yet Issued

State Engineers Office (SEO)	Appropriation of Ground Water, Active	Various	Some not yet Issued
County			
Carbon County Planning Department	Building Permits	Application to be made at a later date (to be acquired prior to construction)	Not Yet Issued

Source: Arch Coal, URS Corporation, CH2M HILL

3.5 Operations Workforce

It is anticipated that both the CTL facility and the Saddleback Hills mine will have initial operation workforces in early 2011 with full staffing in early 2012. The estimated job classifications and number of each are displayed in Table 3-4 for the CTL and mine.

TABLE 3-4
Estimated Operations Workforce Summary by Job Classification

Job Classification	Number of Personnel
CTL Facility	
Operations Division	
Plant Manager	1
Operations Plant Superintendent	1
Operations Plant Supervisors	3
Operations Shift Coordinators	4
Control Room Operators	12
Outside Operators	65
Supervisor Operators	12
Maintenance Division	
Maintenance Superintendent	1
Maintenance Area Supervisors	3
Maintenance Technicians	16
Shop Foreman	1
Shop Mechanics and Technicians	8
Warehouse Supervisor	1
Warehouse Clerks	7
Maintenance Administration Supervisor	1
Maintenance Administration Clerks	6

TABLE 3-4
Estimated Operations Workforce Summary by Job Classification

Job Classification	Number of Personnel
Technical Support Division	
Engineering Supervisor	1
Plant Engineers	5
Engineering Support	4
Laboratory Supervisor	1
Laboratory Technicians	8
Administration Division	
Administration Division Supervisor	1
Human Resources and Payroll	3
Purchasing/Contracts/Accounting	3
Public Relations/Transportation/Security	3
Document Control	5
Administrative Support	24
CTL Subtotal	200
Mine	
Salary Exempt (Supervisory)	
Mine Manager	1
Production Superintendent	1
Maintenance Superintendent	1
Surface Superintendent	1
Engineering Superintendent	1
Safety/Human Resources/Business Managers	4
Shift/Area Supervisors	4
Mine/Longwall/Surface Foremen	13
Maintenance Foremen	8
Safety Specialists	4
Engineers	3
Environmental Coordinator	1
Warehouse Supervisor	1
IT Specialist	1
Salary Non-Exempt	
Mine Monitoring Clerks	6

TABLE 3-4
Estimated Operations Workforce Summary by Job Classification

Job Classification	Number of Personnel
Utility Clerks	3
Warehouse Clerks	4
Environmental Specialist	1
Surveyors/Drafters	3
Hourly	
Mine/Longwall Operators	34
Weekend Crews	31
Coal Handling Operators	46
Mechanics	33
Electricians	12
Surface Operators	33
Mine Subtotal	250
CTL and Mine Total	
	450

Source: DKRW Advanced Fuels, Arch Coal

Socioeconomic Analysis

4.1 Introduction

This section presents a summary of findings from the Socioeconomic Impact Analysis prepared as part of this project. The data used in that study will not be reproduced in this application. For further details on the data cited in this section, see the Socioeconomic Impact Analysis included in Appendix B (CH2M HILL, 2007).

The purpose of the Socioeconomic Impact Analysis is to ensure that assistance is provided to communities and political subdivisions significantly affected by the siting of the CTL facility and to provide information to the Wyoming Industrial Siting Council regarding socioeconomic impacts and the associated mitigation efforts.

The Socioeconomic Impact Analysis evaluates the benefits and impacts to social and economic resources in the Study Area, including the benefits derived from increased tax revenue, direct employee opportunities, and indirect employment benefits.

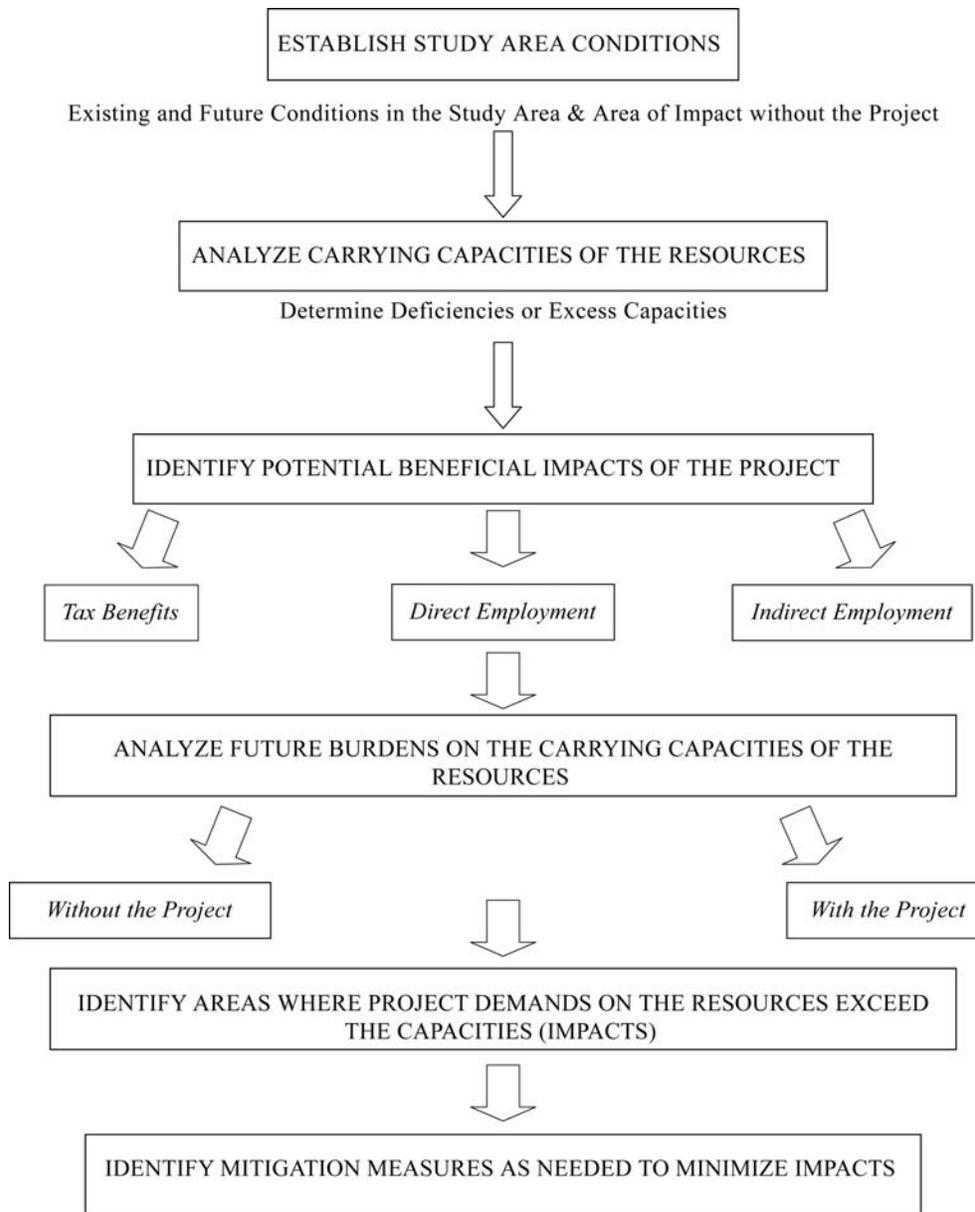
The analysis of the impacts includes the effects on the following:

- Housing
- Educational facilities
- Public safety and security
- Health resources
- Municipal services
- Transportation systems

The analysis includes an assessment of the future and present baseline conditions (without the project) in a large area of influence called the "Study Area." The project impacts a narrower geographic region called the "Area of Impact" (see Figure 4-2). The baseline conditions include the identification of the capacity of the resources involved, including the current standards for carrying capacities and the number of people currently served.

The impacts are based on the number of additional workers-families that these resources will likely need to serve and whether or not the systems in place or the anticipated expanded systems in the future (based on current plans) will be able to satisfy the anticipated additional demand caused by the project. Mitigation efforts are proposed in the event that the resources are unlikely to be able to meet the additional demands.

The steps taken during the socioeconomic process are presented in Figure 4-1.



Source: CH2M HILL.

FIGURE 4-1
Socioeconomic Process

4.2 Study Area

The area surrounding the proposed project site in Carbon County consists of four counties:

- Albany
- Carbon
- Natrona
- Sweetwater

These counties are included in the Study Area because they were identified in cooperation with the Industrial Siting Division staff as having the potential for workers to locate and commute to work at the site. A map of the Study Area is shown in Figure 4-2.

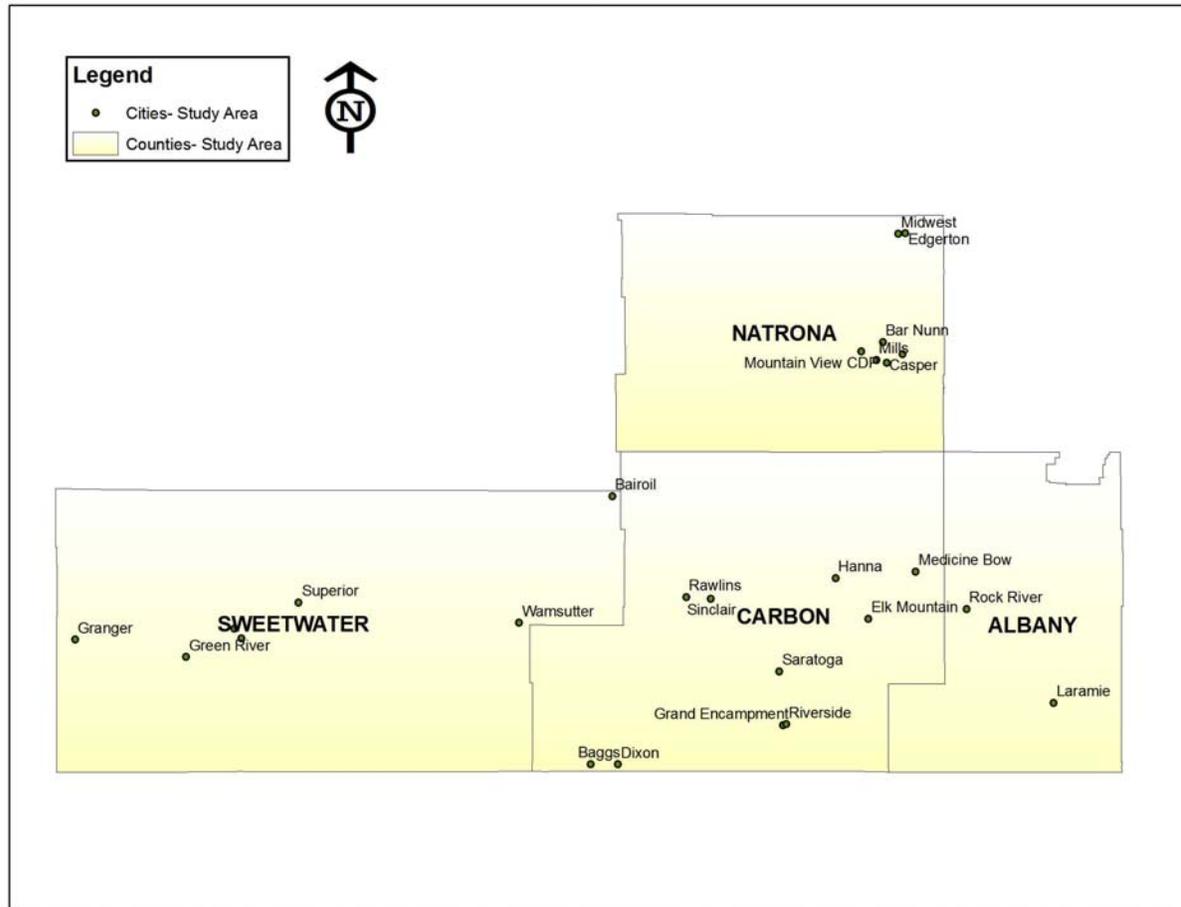


FIGURE 4-2
Study Area

4.3 Study Area Conditions

A summary of the existing and future conditions in the study area and the area of impact without the project are discussed below.

4.3.1 Population

4.3.1.1 Past and Present Population

Natrona County experienced the most dramatic population increase in the study area during the period from 1920 to 2000. While the number of residents in Albany, Carbon, and Sweetwater Counties has also grown, Natrona County has registered the largest growth, increasing from 14,635 persons in 1920 to 66,533 residents in 2000. Between 1920 and 2000, Natrona County had the largest population in the six-county area. Carbon County experienced the lowest population increase in the study area, increasing from a 1920 population of 9,525 to 15,639 residents in 2000.

The population factors that will be the most important in determining the location and availability of the local labor force include the location of the population centers and the age distribution of the population (i.e., the identification of areas where work-age persons reside). Future forecasts presented are for the years 2008 and 2011 because these years coincide with the anticipated start and end of construction for the projects.

Of the four counties in the study area, Albany, Natrona, and Sweetwater Counties currently account for 90 percent of the total population, with totals of 32,014, 66,533, and 37,613 residents, respectively. With a 2000 census population of 49,644, Casper is the largest city in the study area, followed by Laramie, Rock Springs, Green River, and Rawlins. The average household size in the study area is 2.34 persons per household. More than 84 percent of the population lives in the 24 cities and census-designated places contained in the study area.

The age distribution in the study area counties is consistent with the age distribution for Wyoming as a whole. The one exception is Albany County, which had a higher percentage of the age cohort from 20-34 and a lower percentage of the age cohort from 35-59.

4.3.1.2 Future Population

Future population projections for the study area show slow growth in Natrona and Sweetwater Counties, and little to no growth in Albany and Carbon Counties. Natrona and Sweetwater Counties are projected to grow at an average annual rate of 13.2 and 11.4 percent, respectively. Carbon County is projected to grow at an average annual rate of 0.5 percent. Albany County is anticipated to decline at an average annual rate of -1.6.

4.3.2 Economic Conditions

4.3.2.1 Labor

The total labor force in the four counties of the study area totaled 92,507 in 2006. Of these, 89,479 were actually employed, representing an unemployment rate of slightly higher than 3 percent.

Natrona County has the largest labor force with 41,103 able workers, followed by Sweetwater County with a labor force totaling 23,523 workers. The workforce in Albany County is 20,045 workers. Carbon County has the highest unemployment rate, with 4.1 percent of its 7,836 workers unemployed.

The majority of the workforce within the study area is employed in the retail and services; construction; finance, insurance, and real estate (FIRE); professional/technical services; health care and social assistance; accommodation and food services; and governmental services sectors of the economy.

Employment in the study area is heavily focused in the following sectors:

- Governmental services (19 percent)
- Retail trade (12 percent)
- Health care/social assistance (8 percent)
- Accommodation/food services (8 percent)

Work in farming and agriculture and mining has decreased in all of the counties over the past 30 years. Manufacturing (except in Albany and Natrona Counties) and the services and professional employment categories (except Sweetwater County) have increased. Construction employment has increased in all counties, with the exception of Sweetwater County.

4.3.2.2 Revenues

Ad Valorem Taxes

Ad valorem taxes support a variety of county and municipal operations including airports, fire protection, hospitals, libraries, museums, public health, recreational systems, special districts, and education. Assessed property values are the basis for ad valorem taxes. Properties are assessed at both the local (county) and state level. The state assesses utility and mineral properties, while the counties assess residential, agricultural, commercial, and industrial properties. Total assessed land values in 2006 for the four-county study area were \$4,494,177,516.

Sweetwater County has the highest assessed property values in the study area with a total of \$2,380,640,895. The major share of assessed land valuations in Sweetwater County are the mineral properties assessed at \$1,841,393,877 followed by industrial land assessed at \$201,398,891. Albany County has the lowest assessed property values in the study area with a total of \$270,747,259.

Mill levies are then assessed to property values to determine the tax rates for various properties. Average mill levies range from 63.09 in Carbon County to 66.38 in Natrona County. Ad valorem taxes support a number of county and municipal operations including airports, fire protection, hospitals, libraries, museums, public health, recreational systems, special districts, and education.

Sales and Use Taxes

The State of Wyoming levies a 4 percent sales and use tax. Counties have the option of levying additional sales and use taxes up to 2 percent and a lodging option tax. All of the counties in the study area levy an additional 1 percent general purpose county sales and use tax. Albany and Sweetwater County have an additional 1 percent specific purpose option tax. The lodging tax rate for Albany County is 4 percent, 3 percent in Natrona County, and 2 percent in Carbon and Sweetwater Counties. The total lodging and sales/use tax rate for Albany County is 10 percent, 7 percent in Carbon County, 8 percent in Natrona County, and 8 percent in Sweetwater County.

4.3.3 Housing

There were a total of 62,322 occupied housing units in the four-county study area at the time of the 2000 U.S. Census. Natrona County, with the highest population, had the greatest number of occupied housing units, with a total 26,819, followed by Sweetwater and Albany Counties with 14,105 and 13,269 occupied units, respectively. Carbon County had the lowest number of occupied housing units with 6,129. Most of the housing stock is owner rather than renter occupied. Approximately 51 to 75 percent of the units are owner occupied, with the remaining stock being rental units.

Most of the occupied housing stock for all counties is single family. Natrona County has the greatest percentage of single-family units, with approximately 73 percent of its nearly

26,819 units consisting of single-family housing. Natrona County also had the highest number of renter-occupied units. Carbon County had the least amount of housing units, with a total of 6,129 units. Albany County had the highest percentage of multi-family housing units with 7 percent duplexes, 8 percent tri- and four-plexes, and 17 percent multi-family units. Carbon County had the highest percentage of mobile home units making up a total of 18 percent of the total housing.

The number of housing units for each county increased between 1990 and 2000. The increase ranged from a low of 1 percent in Carbon County to a high of 10 percent in Albany County. As the housing stock increased, the number of vacant units between 1990 and 2000 also decreased, with the exception of Albany County, which experienced a 3 percent increase in the number of vacant units. The percent of vacant units dropped by 42 percent in Natrona County and 1 percent for Carbon and Sweetwater Counties.

The reduction in total vacancy units also translated to a reduction in both the number of units available for rent or for sale. Rental unit availability declined 25 percent in Albany County and 29 percent in Carbon County. Natrona County experienced the greatest decline in rental unit availability at 54 percent. Sweetwater County essentially remained unchanged. The number of houses for sale decreased in every county between 1990 and 2000, with the exception of Albany County. From 1990 to 2000 the number of houses for sale in Albany increased by 4 percent. Natrona County experienced the largest decrease in housing units for sale, with a decrease of 71 percent from 1990 to 2000. Housing units for sale in Carbon County decreased by 13 percent, and there was a 4 percent decrease in Sweetwater County.

Rents and home values also increased between 1990 and 2000. Rents increased between 30 percent (\$84) in Sweetwater County and 45 percent (\$134) in Albany County. Rents in Carbon and Natrona Counties increased by 34 percent and 40 percent, respectively. Housing values increased substantially more than monthly rents between 1990 and 2000, increasing anywhere from 45 percent in Carbon County to 76 percent in Albany County. The actual value increases for Carbon and Albany Counties were \$23,800 and \$51,300, respectively.

From 2003 to 2005, Albany County had the largest growth in its housing stock with 1,275 buildings permitted, followed by Natrona County with 962. Sweetwater County had the third-highest growth with 539 buildings permitted, while Carbon County had the fewest with 158 buildings permitted during the 3-year period.

4.3.4 Education

There are six school districts in the Study Area operating a total of 104 educational facilities. The majority of the 104 facilities are elementary schools (66), followed by 20 junior highs/middle schools and 18 high schools. Natrona County District 1 is the largest, with 38 educational facilities, followed by Albany District 1 and Sweetwater District 1, with 19 and 14 educational facilities, respectively.

Natrona District #1 has the highest current enrollment with 11,444 students, followed by Sweetwater District #1 with 4,413 students, then Albany District #1 with 3,491 students. Sweetwater District had an enrollment of 2,551 students, and there were 1,753 students in Carbon District #1 in 2006. Carbon District #2 had the lowest enrollment for 2006, with

662 students. Pupil-teacher ratios within the study area tend to be essentially the same as the state standards and significantly better than national standards.

4.3.5 Public Safety

The four-county study area has a total of 35 fire stations, five highway patrol offices, 16 police stations, and four sheriff's departments.

The study area has over 200 full-time and volunteer fire fighters in each county totaling 940 personnel. Although Carbon County has the greatest number of fire fighters with 10 stations, Sweetwater County has 12 stations. Sweetwater County also has the only fire training center within the study area.

Actual police department staffing figures could not be obtained for the four-county study area.

There were a total of 6,828 crimes within the four-county study area in 2002, the latest year that crime information could be obtained. The most crime occurred in Natrona County with 3,349 events, followed by Sweetwater County with 1,603 events. In all counties, the most common crime is larceny, with 4,824 occurrences, followed by burglaries, 1,100 of which occurred in 2002.

4.3.6 Health Care

There are seven hospitals located in the study area. In order to assess the direct impact on emergency medical treatment and emergency response, the number of ambulances within the Area of Impact was identified. Some data, such as number of long-term admissions per year, number of surgeries, and number of patients, were unavailable.

Natrona County has the highest total number of physicians with 120. Albany County has the second-highest number of physicians at 75, while Carbon County has the lowest number of physicians at 15. Natrona County has the highest number of total medical staff at 813. Carbon County also has the lowest number of total medical staff at 121.

The level of services may be impacted in the near future by the aging population. National and state trends show aging of the population coincident with the "baby boom" generation moving into retirement years. This aging population will likely increase the demand for health services. The cost of health care may also increase due to this aging population. Health care will become an increasingly important issue in the next few years in each of these counties and for the entire state.

4.3.7 Municipal Services

Water in the study area is provided through municipal water services in cities and more densely populated areas. Cities and towns in the study area that operate and maintain a municipal water supply include Laramie and Rock River in Albany County; Baggs, Dixon, Elk Mountain, Encampment, Hanna, Medicine Bow, Rawlins, Saratoga, and Sinclair in Carbon County; Casper, Edgerton, Evansville, Midwest, and Mills in Natrona County; and Bairoil, Granger, Green River, Rock Springs, Superior, and Wamsutter in Sweetwater County. Private wells serve the remaining, more rural portions of each of these counties.

Natrona County has the largest population of all of the counties within the study area and has the most wastewater treatment facilities. The county has 48 facilities serving 71,410 customers. The largest facility is the Casper Board of Public Utilities wastewater treatment plant, which serves almost 54,500 customers.

Sweetwater County has 43 facilities and serves the second highest number of customers. The six facilities serve 47,751 persons. The largest facility is the City of Rock Springs, serving 19,050 persons. Albany County's 28 wastewater treatment facilities serve 33,940 customers, the third highest number of customers within the study area. Carbon County's 29 facilities serve the least number of customers, at 17,094.

The predominant types of waste disposal facilities in the study area are industrial landfills and Type II municipal facilities. Sweetwater and Natrona Counties have the most waste disposal facilities in the study area with 43 and 31, respectively. Albany County has the fewest with 12 facilities.

4.3.8 Transportation

There are two major transportation corridors within the study area. They are Interstate 25 (I-25), which extends from the east of Natrona County and runs north from Casper, and Interstate 80 (I-80), which extends east-west through Albany County, Carbon County, and Sweetwater County. Natrona County had the highest traffic volume with average annual daily traffic (AADT) of 49,716. This is due to the higher volumes on Route 255 and U.S. Highway 20 and 26. Albany County has the second highest traffic volume with an AADT of 39,501. Carbon County had an AADT of 25,868, and Sweetwater County had the lowest traffic volume with AADT of 19,875.

There are approximately 655 miles of freight rail track within the study area. Sweetwater County has the largest rail infrastructure with 210 miles of track, followed by Albany County with 170 miles of track, then Carbon County with 160 miles of track, and Natrona County with 115 miles of track.

Union Pacific Railroad is the largest rail operator with 480 miles of track. Burlington Northern Railroad is the second largest rail operator in the study area, operating 88 miles of track. Other rail infrastructure is distributed throughout the four counties and is operated by several smaller rail companies.

The Wyoming Department of Transportation (WYDOT) has planned construction for the counties in the Study Area to accommodate population growth and any increases in traffic. WYDOT's planned construction activities in the four-county area consist of widening, resurfacing, grading, paving, and bridge repair or replacement.

There were no roadways identified in the vicinity of the proposed project that are presently over capacity. The segment of County Road 1/3 adjacent to the proposed site is currently a two-lane, gravel road. It serves oil trucks, school buses, local residents, and summer tourists. Traffic volumes suggest that the level of service (LOS) on this road is good.

4.4 Analysis of Impacts

4.4.1 Area of Impact

As determined by a review of the larger, four-county study area, the Primary Area of Impact defined for the project can correctly be narrowed to Carbon County. The project team desires to maximize the benefits of the project to the local communities, while containing the impacts as much as possible. This is based on the following:

- Census 2000 Journey to Work data indicate that 90 percent of those who work in Carbon County also live in Carbon County. We anticipate that this trend will continue with the implementation of this project. Therefore, the number of workers who would actually commute to the site from outside of Carbon County is estimated to be about 10 percent.
- Every attempt will be made to house the imported workforce within Carbon County, thereby minimizing or eliminating any potentially negative impacts to the surrounding counties.

4.4.2 Project Employment

The project will require an estimated 2,000 CTL facility workers and 307 coal mine workers for the Engineer-Procure-Construct (EPC) contractor and its subcontractors at the peak of construction. The total duration of employment greater than 1,500 workers is only anticipated to last 11 months, with the actual peak of 2,307 workers lasting for a much shorter duration.

The total EPC man hours of labor required for the construction are estimated at 5,321,244 hours. It is estimated that the construction of the coal-to-liquids facility will require a workforce of approximately 2,000 at peak construction and 900 on average. For the construction of the coal-handling system and coal mine improvements, the required workforce is approximately 307 at peak construction and 226 on average.

There will be a need for approximately 200 full-time workers for operation of the CTL facility and approximately 250 skilled full-time workers to operate the coal mine and maintain the underground mining equipment and the mine coal-handling system.

Wages are somewhat higher than local wages paid for similar construction jobs, which should assist in recruitment of workers.

4.4.3 Project Benefits

4.4.3.1 Direct Benefits

Peak construction is anticipated to be 2010 for the proposed plant. This would produce construction jobs over a 3-year period, with 2,307 EPC jobs at peak construction. In addition, a total of 450 permanent jobs will be required for operations at both the CTL facility and coal mine.

4.4.3.2 Indirect Benefits

In order to estimate the potential for indirect job creation in Carbon County and the Secondary Area of Impact, a regional economic analysis model was used. For this project, IMPLAN was used to estimate the indirect and induced impacts. Indirect and induced employment effects include the purchase of goods and services by firms involved with construction.

It is estimated that up to 638 indirect jobs (potentially temporary employment over 3 years) would be created as a result of the construction jobs. It is estimated that 374 indirect jobs would result from the operations phase. These jobs would be created permanently in Carbon County and the Secondary Area of Impact.

Table 4-1 below summarizes the generated indirect employment.

TABLE 4-1
Indirect Employment Generated as the Result of Project Actions

Type of Project Activity	Number and Type of Direct Employment	Indirect Employment Created
Construction for Coal-to-Liquids Facility	2000 - Temporary	337 jobs
Construction for Coal Mine	307 - Temporary	301 jobs
Operations for Coal-to-Liquids Facility	200 - Permanent	140 jobs
Operations for Coal Mine	250 - Permanent	234 jobs

Source: CH2M HILL HILL Projections

4.4.3.3 Tax Implications

All tax calculations are based on preliminary estimates and are subject to change at project completion. Project benefits from a tax perspective would occur based on the ad valorem taxes that would be collected and the state and local sales and use taxes on purchases of goods required to complete the construction. Indirectly, the project would also increase the coal mine production in the area of impact so that mineral severance taxes would also increase after commencement of operation of the project. Carbon County currently receives about 5 percent of the state total for mineral taxes. In 2006, Carbon County's mineral taxable valuation was \$730,458,033.

Ad Valorem Taxes

For the period 2008 through 2102, it is estimated the total ad valorem tax revenue generated will be \$9,830,000. The estimate incorporates the pollution control equipment exemption, 11.5 percent assessed value, and a 60.10 mill levy. The coal production from the mine during construction is subject to the Gross Production Ad Valorem tax and is included in the overall revenue estimate. The annual ad valorem tax estimate is shown in Table 4-2.

In addition to the ad valorem taxes, the mine coal production is subject to the state's mineral severance tax. The mine production will be taxed at the underground coal production rate of 3.75 percent of the gross value of the coal produced.

TABLE 4-2
Estimate of Ad Valorem Taxes Paid Per Year

Operation	2008	2009	2010	2011	2012	Total
CTL Facility	-	\$450,000	\$1,200,000	\$2,500,000	\$3,300,000	\$7,450,000
Mine	-	-	\$170,000	\$410,000	\$700,000	\$1,280,000
Coal Production	-	-	-	-	\$1,100,000	\$1,100,000
Total	-	\$450,000	\$1,370,000	\$2,910,000	\$5,100,000	\$9,830,000

Source: DKRW Advanced Fuels. Estimate based on CTL facility equipment value of \$807 million and mine equipment value of \$101 million. The annual estimate is based on equipment installed as of January 1 each year. The estimate utilized the pollution control exemption, an 11.5% assessed value, and a mill levy rate of 60.10.

Sales and Use Tax

State sales and use taxes are 4 percent of the value of the goods on materials and supplies during construction. Carbon County also assesses a 1.0 percent County Option tax. The estimated total sales and use taxes that will be paid on the materials purchased for the construction of this project is \$3,710,000. The estimate for each year is shown in Table 4-3.

TABLE 4-3
Estimate of Sales and Use Taxes Paid Per Year

Operation	2008	2009	2010	2011	2012	Total
Total for CTL and Mine	\$450,000	\$810,000	\$1,500,000	\$950,000	-	\$3,710,000

Source: DKRW Advanced Fuels. Estimate includes state sales and use tax and county option tax.

4.4.4 Housing

The construction of the proposed project will require 2,307 EPC workers for both the CTL facility and mine during peak construction. Based on Medicine Bow calculations, it is assumed that 10 percent will be local workers and 90 percent will be imported workers coming to Carbon County. At peak construction, this results in 2,076 imported workers coming who will need housing. At peak construction in 2010, the total housing gap is a surplus of 1,978 total units (see Appendix B, Socioeconomic Analysis, Table 3-6). Of these units, 723 are renter units and 1,255 are homeowner units. With the construction jobs being temporary, it is assumed that the majority of the workers relocating to the area will rent.

Assuming a worse-case scenario in which all 2,076 workers relocating at peak construction will rent and a projected surplus in Carbon County of only 723 units, there is a shortfall of 1,353 rental units in Carbon County.

The project team has completed a study on potential housing options for the construction workforce. The proposed plan is summarized in Table 4-4 for each of the construction years 2008, 2009 and 2010. The housing need in 2011 is less than the initial requirement in 2008.

The housing plan includes a worker camp for 500 personnel at the project site. This camp will support the smaller staff winter construction campaigns and the startup and operation phases of the project. Additional 200 person work camps are being evaluated at Medicine Bow and Rawlins. The remainder of the housing need includes fifth wheel and rental units (single and family) sites in the various Carbon County communities surrounding the site and the towns of Rock River and Laramie in Albany County.

TABLE 4-4
Preliminary Medicine Bow Fuel & Power Housing Plan

Housing Option	Location of Housing Options										
	Carbon							Albany		Natrona	Total
	Project Site	Medicine Bow	Hanna	Elk Mountain	Walcott	Rawlins	Arlington	Rock River	Laramie	Casper	
Existing Housing in Project Area											
Available 5 th Wheel Sites	0	80	10	0	0	85	10	10	50	-	245
Available Rental	0	5	-	5	0	50	0	5	65	-	130
Total Available Housing	0	85	10	5	0	135	10	15	115	-	375
2008 Housing Required for Project [935 Peak Workforce – 94 local hire – 375 existing housing = 466 accommodation requirement]											
Worker Camps	200	-	-	-	-	-	-	-	-	-	200
Rental Units	-	36	-	40	-	47	-	-	143	-	266
5 th Wheel Sites	-	-	-	-	-	-	-	-	-	-	0
Total	200	36	0	40	0	47	0	0	143	0	466
2009 Housing Required for Project [2157 Peak Workforce – 216 local hire – 375 existing housing = 1566 accommodation requirement]											
Worker Camps	500	200	-	-	-	200	-	-	-	-	900
Rental Units	-	64	25	50	-	47	-	-	308	-	494
5 th Wheel Sites	-	75	32	-	24	-	-	41	-	-	172
Total	500	339	57	50	24	247	0	41	308	0	1566
2010 Housing Required for Project [2307 Peak Workforce – 231 local hire – 375 existing housing = 1701 accommodation requirement]											
Worker Camps	500	200	-	-	-	200	-	-	-	-	900
Rental Units	-	64	25	50	-	47	-	-	388	-	574
5 th Wheel Sites	-	100	40	-	24	-	-	63	-	-	227
Total	500	364	65	50	24	247	0	63	388	0	1701

TABLE 4-4
Preliminary Medicine Bow Fuel & Power Housing Plan

Housing Option	Location of Housing Options											Total
	Carbon							Albany		Natrona		
	Project Site	Medicine Bow	Hanna	Elk Mountain	Walcott	Rawlins	Arlington	Rock River	Laramie	Casper		
Source: SNC Lavalin, CH2M HILL Notes: 1) Existing housing (245 fifth wheel sites and 130 rental units) based on August 2007 SNC Lavalin study. 2) Peak workforce based on annual construction projections for CTL facility and mine. 3) Used conservative estimates of local hires (with existing housing) to determine maximum accommodation requirements that may be required for each year of construction. 4) It is assumed that the project would construct the worker camps, however, some partnering may be possible on the worker camps in surrounding towns. 5) It is assumed that the new fifth wheel sites would be privately owned and mostly privately developed. 6) The primary worker camp of 500 at the project site would support winter construction campaigns and also the startup and operation phases of the project. 7) The project anticipates that up to 50 personnel may travel from Casper and 500 from Laramie. The project plans to set up chartered busing from areas outside Carbon County to minimize traffic on Highway 30 and parking requirements.												

Medicine Bow Fuel & Power will also be working with the local communities to address long-term housing needs for the permanent operations workforce.

4.4.5 Education

It is estimated that an additional 389 school-aged children will be enrolled in the Carbon County School Districts at the peak of construction. Because this is significantly lower than the 1,093 students needed to exceed the national student-teacher ratio, the carrying capacity of the school district will not be impacted by the project. However, Medicine Bow Fuel & Power plans to work closely with the school districts in the surrounding communities to ensure that individual schools can meet the increased demand on resources.

4.4.6 Public Safety

Neither the ratio of law enforcement officers nor fire fighters per 1,000 citizens falls below the national ratio for these statistics when the projected population increase is included in the calculations. The ratio of law enforcement officers to 1,000 citizens with the additional population associated with the project is 2.2, compared to the national standard of 2.5. In terms of the ratio of fire fighters to 1,000 citizens, the ratio with the additional population falls from 8.1 fire fighters per 1,000 citizens to 6.8 fire fighters per 1,000 citizens. Again, this is substantially better than the national standard established by the National Fire Protection Administration. Therefore, despite a slight decline in the ratios of public safety officers to citizens, the resulting ratios are still significantly higher than the state and national ratios, indicating that the population increase due to the project will have negligible impact on the level of public safety in the county.

4.4.7 Health Care

The national standard for physicians to population is one physician to every 433 persons (according to the Bureau recommendations) or one physician to every 514 persons (according to the Advisory Committee recommendations). For the Carbon County area, the

number of physicians goes from one for every 1,049 persons without the project to one for every 1,277 persons with the project. Both numbers are well below the national standard for physician-to-patient ratios. However, the Wyoming and U.S. averages are also well below the national standard, with one physician to every 689 and 506 persons, respectively.

Similarly, the number of beds per person is reduced from one bed for every 349 persons without the project to one bed for every 339 persons with the projects. These ratios may be somewhat higher in reality because they are calculated using the projected 2010 population but only 2000 data for total physicians and beds. It is expected that the number of physicians and beds would increase to some extent in this period. Regardless of the calculation, it is clear that the exceedance of the carrying capacity is not a result of the project but rather due to current staffing levels.

4.4.8 Municipal Services

The municipalities within Carbon County average over 50 percent available peak day use before reaching maximum capacity. It is anticipated that the additional population of workers and their families to the area will not impact current municipal water supply.

The carrying capacity of the wastewater treatment facilities was not available in the study area. It is anticipated that the wastewater treatment facilities projections would have results similar to the municipal water supply and will have not impact.

4.4.9 Roads and Highways

The highways and intersections that will experience additional traffic due to the construction and operations of the proposed project will operate at a lower level of service than without the project. However, they will still operate at desirable levels of service in the peak hours. The most significant degradation to the operating conditions of the facilities occurs during the 11-month peak construction period. If the US 30/287 and County Road 1/3 intersection operations do prove to be unacceptable during the construction period, the project team is prepared to hire off-duty police personnel to control traffic through the intersection in the morning and evening peak hours.

4.5 Cumulative Impacts

In reviewing the potential projects in the study area, it was determined that the development of several wind energy projects could have the potential for cumulative impacts. These include Seven Mile Hill, High Plains Wind Energy, and Pine Draw Wind Farm Facility projects. These projects are described below:

- PacifiCorp proposes to develop the Seven Mile Hill wind farm located in Carbon County approximately 3 miles northwest of Medicine Bow. The facility, as presently designed, will include 66-1.5 megawatt General Electric wind turbines and associated plant assets. Construction is expected to commence in 2008 with operation to follow in 2009.
- GreenWing Pacific Energy Corp proposes to develop the High Plains Wind Energy project in Albany and Carbon Counties, approximately 5 miles southwest of the town of Rock River. The facility will consist of up to 125 wind turbine generators and associated plant assets. Construction of the wind farm is scheduled to begin in early 2008 and expected to occur over 10 to 12 months.

- Pine Draw Wind Farm is located 5 miles north and west of Medicine Bow in Carbon County. This wind farm is expected to include up to 125 wind turbines capable of generating up to 187.5 MW of electricity.

Based on potential housing needs for the above projects as well as for the Medicine Bow CTL facility, the current housing mitigation plan as proposed will be adjusted accordingly to account for fluctuations in available housing units.

In addition, the cumulative effect of these projects represents a major benefit to skilled trade workers in the community as it provides the opportunity for much steadier employment in the region.

4.5.1 Plans for Alleviating Impacts

It is estimated that the rental market in Carbon County will be very tight during project construction and that the construction workforce will exceed available rental housing by approximately 1,353 units. The housing study evaluated housing options for up to 1,701 personnel. This was based on a peak workforce of 2,307 minus 231 local hire minus 375 existing accommodation.

The following general housing scenarios were identified in the study:

- The project site will have a housing facility with the capability of housing up to 500 personnel. The onsite housing facility will aid in the winter construction campaigns and also during startup and operations phases of the project.
- Additional 200 person work camps are being evaluated at Medicine Bow and Rawlins.
- The remainder of the housing need includes fifth wheel and rental units (single and family) sites in the various Carbon County communities surrounding the site and the towns of Rock River and Laramie in Albany County.

It is recommended that the project team continue to meet with local stakeholders and work to meet the housing needs of the temporary construction workforce in a manner that facilitates the long-term housing needs of adjacent communities and the county.

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SECTION 5.0

Public Involvement

The Medicine Bow Fuel & Power Project fulfilled the ISA permit application requirements to conduct meetings with state agencies and local officials, and also undertook outreach activities that went beyond the ISA requirements. A summary of these activities is outlined below, with further details included in this section, as well as in Appendix E.

5.1 Required Activities

The following three meetings were held by the project as part of the regulatory requirement to meet with and receive comments from state agencies and local officials. The project impact area, as identified by the Industrial Siting Division, defined those local officials to whom the project sent meeting invitations and sought to engage.

- Meeting with State Agencies held on Wednesday, July 11, 2007, in Cheyenne.
- Meeting with local officials of Carbon County, and surrounding incorporated towns; held on Tuesday, July 10, 2007, in Rawlins.
- Meeting with local officials of Albany County, and surrounding incorporated towns; was held on Thursday, July 12, 2007, in Laramie.

5.1.1 Meeting Format/Information Provided

The meeting format and the information provided at the meetings for state agencies were generally the same as that provided at the meetings with local officials. The format and information consisted of the following:

- Informational boards were displayed around the meeting room for attendees to see and discuss with project planners prior to a formal presentation. These displays included
 - a map of the proposed project location
 - a map of the general facility footprint
 - a schematic of the coal-to-liquids process
 - information on project benefits (such as jobs, tax revenue, energy independence)
 - environmental considerations
 - a tentative project schedule
 - information on the ISA permit application process
- After a period of informal mingling and review of the displays, the meeting was called to order, and project representatives gave a PowerPoint presentation and overview of the project.
- Copies of the PowerPoint presentation were provided to participants.

- A question-and-answer session followed the presentation.
- A representative of the Industrial Siting Division was on hand to answer questions and provide information.

5.1.2 Questions/Answers

A summary of the questions received at each meeting and the answers provided is included in Appendix E, organized by meeting location/ date.

The types and nature of the questions posed were similar across all the meetings, and included such topics as:

- The ISA process and impact assistance
- Socioeconomic issues (jobs/employment, housing, tax revenue, and community partnerships)
- Environment , coal to liquids by-products, and safety
- Technical aspects
- Business viability and business aspects

5.1.3 Meeting Notices and Attendees

Copies of the meeting invitations are included in Appendix E. The state agencies and local entities notified of the meeting were those specified in the ISA permit regulations. A list of the names/entities is who were mailed the meeting invitation is included in Appendix E.

Copies of the attendee sign-in sheets from the state agencies meeting and the two local officials meetings are also included in Appendix E. The results of attendance records are the following:

- Approximately eight people from Wyoming state agencies signed into the meeting in Cheyenne.
- Approximately 35 local officials signed in for the local official meeting in Rawlins.
- Approximately 25 local officials signed in for the local official meeting in Laramie.

5.2 Additional Activities

The following activities are not specifically required by the ISA permit application process. However, project planners undertook these additional activities as a way to better understand community perspectives about the Medicine Bow CTL project:

5.2.1 Local Agency Service and Infrastructure Survey

A survey of local entities and agencies was conducted via phone and mail. The purpose of the survey was to gather general information from local agencies that could be relevant to the project and ISA application. A copy of the survey questions is included in Appendix C, along with a summary listing the entities/person(s) contacted. Survey responses were shared with the Industrial Siting Division.

5.2.2 Informal Meetings /Phone Contacts

Some state agencies, local officials, university representatives, businesses, and other stakeholders were contacted in advance of the required and additional meetings. Those contacts were via phone or informal meetings with project planners. The purpose of these calls and meetings was to introduce the project planners, give a basic overview of the project, hear concerns and ideas, and get names of other people to contact.

A summary table listing all of the formal meetings and many of the informal meetings is shown in Table 5-1.

5.2.3 Newspaper Advertisements

Newspaper advertisements announcing the project and informational open houses were placed in two local papers about 8 days in advance of the open house events. The advertisements were placed in the main local newspapers serving residents of Carbon County and Albany County. The advertisements briefly described the CTL project, its general location, and potential benefits. A project email contact was provided in the advertisement. The advertisements invited the public to come to the open house to learn more and ask questions. These are the publishing details:

- Advertisement in the Rawlins Daily Times- published on July 3, 2007
- Advertisement in the Laramie Boomerang - published on July 3, 2007

5.2.4 Public Open Houses

Two public open houses were held. The purpose of the open houses was to give residents and community members an opportunity to find out more about the project and to give comments.

- The first open house was held in Rawlins (Carbon County) on the evening of July 10, 2007.
- A second open house was held in Laramie (Albany County) on the evening of July 12, 2007.

Notification of the open houses was made primarily through newspaper advertisements.

The list of attendees who signed in at each of the open houses is included in Appendix E.

Open house format and information provided is below:

- The format for the public open houses held in Rawlins and Laramie was the same as what was used in the local officials and state agencies meetings. Informational boards were displayed, a PowerPoint presentation was given, and a question-and-answer period followed.
- A representative of the Industrial Siting Division was on hand to answer questions and provide information.
- A summary of the questions received and the answers provided at each of the open houses is included in Appendix E.

- Copies of the PowerPoint presentation were not provided as a handout at the public open houses; however a project fact sheet was handed out. A copy of the fact sheet is included in Appendix E.

Questions/Answers:

The types and nature of the questions posed were similar across all the open house meetings. A summary of the questions received and the answers provided at these open houses is included in Appendix E, organized by meeting location/date.

The information presented in Table 5-1 is a summary list of public involvement activities/meetings.

TABLE 5-1
Medicine Bow Fuel & Power Public Involvement Meetings

Date	Location	Description
January 16, 2007 2:15 pm	Rawlins	Meeting with Carbon County Economic Development Corporation (EDC) and County Commissioners
January 16, 2007 4:10 pm	Hanna	Meeting with Hanna Mayor, Elk Mountain Mayor, Hanna Town Council and EDC
January 16, 2007 5:50 pm	Medicine Bow	Meeting with Medicine Bow Town Council and EDC
March 14, 2007 11:30 am	Hanna	Meeting with Johnson brothers to discuss the MBFP project update with Arch Coal and DKRW; water pipeline for cattle needs on property
March 14, 2007 1:30 pm	Rawlins	Meeting with Carbon County Planning & Zoning Dept.
April 18, 2007 7:30 to 9:00 am	Cheyenne	Meeting with Wyoming Department of Transportation
April 18, 2007 9:00 to 10:30 am	Cheyenne	Meeting with Wyoming State Parks and Cultural Resources
April 18, 2007 10:30 am to 12:00 pm	Cheyenne	Meeting with Wyoming Game & Fish
June 13, 2007 9:00 am to 10:00 am	Rawlins	Meeting with Carbon County Economic Development Director Mark Ducker
June 13, 2007 10:00 am to 11:00 am	Rawlins	Meeting with Carbon County Commissioner Terry Wieckum
June 13, 2007 1:30 pm to 2:30 pm	Rawlins	Meeting with Reese Johnson, School District #2 Board Member
June 13, 2007 3:30 pm to 4:30 pm	Rawlins	Meeting with Hanna Mayor Rick Kinder
June 13, 2007 6:30 pm to 7:30 pm	Medicine Bow	Meeting with Medicine Bow Mayor Frank Brennen, Council members Jilaine Marble and Don Mayfield and Town Clerk Karen Heath
June 14, 2007 10:00 am to 11:00 am	Rawlins	Meeting with Sen. Bill Vasey and Rep. Jeb Steward.

TABLE 5-1
Medicine Bow Fuel & Power Public Involvement Meetings

Date	Location	Description
June 25, 2007 7:30 pm to 9:00 pm	Casper	Meeting with Rep. Roy Cohee, Speaker of the House, Rep. Tom Lockhart, Sen. John Schiffer, President of the Senate, and Sen. Jim Anderson
June 26, 2007 all day	Casper	Participation in and presentation to Enhanced Oil Recovery Institute's Joint Producers Meeting on CO2 in Wyoming.
June 27, 2007 5:00 pm to 6:00 pm	Laramie	Meeting with Ben Blaylock, UW Foundation
June 27, 2007 6:00 pm to 8:00 pm	Laramie	Dinner meeting with Bill Gern and Vijay Sethi of UW
June 28, 2007 10:00 am to 11:00 am	Laramie	Meeting with Gus Plumb of UW
June 28, 2007 11:00 am to 11:45 am	Laramie	Meeting with Brian Towler of UW
June 28, 2007 12:00 pm to 1:00 pm	Laramie	Meeting with Myron Allen of UW
June 28, 2007 7:30 pm to 9:00 pm	Laramie	Meeting with Sen. Phil Nicholas
July 10, 2007 2:00 to 4:00 pm	Rawlins	Carbon County Local Agencies Meeting
July 10, 2007 6:00 to 8:00 pm	Rawlins	Public Meeting
July 11, 2007 1:30 pm to 3:00 pm	Cheyenne	Meeting with Governor Freudenthal and Rob Hurless
July 11, 2007 3:00 to 5:00 pm	Cheyenne	State Agencies Meeting
July 12, 2007 2:00 to 4:00 pm	Laramie	Albany County Local Agencies Meeting
July 12, 2007 6:00 to 8:00 pm	Laramie	Public Meeting
September 4, 2007 10:00 am	Rawlins	Public Hearing with Planning Commission on Carbon County Conditional Use Permit
September 10, 2007 2:00 pm	Medicine Bow	Local Open House
September 10, 2007 6:30 pm	Hanna	Local Open House
September 11, 2007 8:00 am	Elk Mountain	Local Open House
September 11, 2007 11:00 am	Saratoga	Local Open House
September 12, 2007 11:00 am	Encampment/ Riverside	Local Open House

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Potential Environmental Impacts

6.1 Project Impacts

6.1.1 Introduction

Potential environmental impacts associated with the construction, operation, and maintenance of the project are discussed below. Resource data were collected, and impact analyses were conducted to evaluate impacts on the natural environment. Methods of mitigating potential impacts will be implemented as part of the project and have been incorporated into the impact analysis. Unless otherwise stated, the area of analysis for the various resources evaluated consisted of the CTL site and adjoining area. Environmental permits and clearances anticipated for the project are shown in Tables 3-2 and 3-3 in Section 3.0.

6.1.2 Air Quality

MBFP has applied for a Prevention of Significant Deterioration (PSD) air permit from Wyoming Department of Environmental Quality (WDEQ), which has jurisdiction for regulation of air emissions in the state of Wyoming. The analyses required as part of this application demonstrate that the project will use Best Available Control Technology (BACT) to limit pollutant emissions. Analyses also demonstrate that the impacts associated with the project will be well within state and federal ambient air quality standards. Construction of the project cannot begin until WDEQ issues a final air permit after appropriate United States Environmental Protection Agency (USEPA) and public comment periods. Furthermore, the project will be required to demonstrate compliance with the terms of the permit continuously, and will also be required to obtain a Title V operating air permit from WDEQ after construction.

Air Emission and Control Technology Tables 6-1 through 6-9 discussed below are from the PSD air construction permit application submitted to WDEQ in June 2007.

The Clean Air Act (CAA) defines 28 major source categories that have a 100 ton per year (tpy) threshold for determining PSD major source status. This facility falls within the major source category of "Fuel Conversion Plant," and therefore is subject to the 100 tpy major source threshold. Annual estimated emissions are shown in Tables 6-1 and 6-2.

TABLE 6-1
Annual Criteria Pollutant Emissions (tons)

NO_x	CO	VOC	SO₂	PM
259.40	828.25	119.95	200.55	204.9

Note: NO_x (nitrogen oxides), CO (carbon monoxide), VOC (volatile organic compound), and PM₁₀ (particulate matter < 10 microns).

TABLE 6-2
Annual Hazardous Air Pollutant Emissions (tons)

Acetaldehyde	Acrolein	Benzene	Formaldehyde	Hexane	Toluene	Total HAPs
0.39	0.08	0.11	0.91	1.04	1.12	4.24

Note: Hazardous Air Pollutant (HAP) emissions shown in this table have emission greater than 0.01 tpy.

Based on these emissions, this facility is considered major for PSD (40 Code of Federal Regulations [CFR] Part 51.165), and Title V Operating Permit Program (40 CFR Part 70) and minor for HAPs (40 CFR Parts 61 and 63).

Emission sources associated with the Saddleback Hills Mine during the development phase are shown in Table 6-3.

TABLE 6-3
Saddleback Hills Mine Development Particulate Emissions

Development Year	Coal Conveying and Loading PM ₁₀ (tpy)	Coal to Seminole II PM ₁₀ (tpy)
1	0.16	26.8
2	0.72	104.9
3	0.63	93.0

Note: These emissions were based on calculations provided in Permit Application AP 2989 for the Carbon Basin Mines. Only particulate emissions associated with the Saddleback Hills Mine were included.

The conveyor transfer points will be controlled with foggers, and the truck loadout will be partially enclosed. All haul roads will be treated with suitable dust suppressant chemicals and/or water to control fugitive dust emissions.

Coal to Liquids Facility

Emissions associated with this facility include both point source and fugitive emission sources. Combustion sources account for the majority of emissions. Table 6-4 shows the combustion-related equipment that produce point source emissions of criteria and hazardous pollutants.

TABLE 6-4
Equipment with Point Source Emissions

Description	Identification	Size	Use
Combustion Turbine 1	CT 1	66 MW	Electrical and steam generation
Combustion Turbine 2	CT 2	66 MW	Electrical and steam generation
Combustion Turbine 3	CT 3	66 MW	Electrical and steam generation
Gasifier Preheater 1	GP 1	15 MMBtu/hr	Gasifier refractory preheating
Gasifier Preheater 2	GP 2	15 MMBtu/hr	Gasifier refractory preheating
Gasifier Preheater 3	GP 3	15 MMBtu/hr	Gasifier refractory preheating
Gasifier Preheater 4	GP 4	15 MMBtu/hr	Gasifier refractory preheating

TABLE 6-4
Equipment with Point Source Emissions

Description	Identification	Size	Use
Gasifier Preheater 5	GP 5	15 MMBtu/hr	Gasifier refractory preheating
Sulfur Recovery Unit (SRU)	H-3102	11.2 MMBtu/hr	SRU Incinerator (H ₂ S Control)
Fractionation Feed Heater	H-5401	87 MMBtu/hr	Process heater
Catalytic Dewaxing Charge Heater	H-5301	3.9 MMBtu/hr	Process heater
Unicracker Feed Heater	H-5201	16.32 MMBtu/hr	Process heater
Unicracker Intermediate Heater	H-5202	44.25 MMBtu/hr	Process heater
Unionfiner Feed Heater	H-5101	5.11 MMBtu/hr	Process heater
Unionfiner Intermediate Heater	H-5102	6.37 MMBtu/hr	Process heater
Black Start Generator 1	Gen 1	2889 hp	Electrical generation
Black Start Generator 2	Gen 2	2889 hp	Electrical generation
Black Start Generator 3	Gen 3	2889 hp	Electrical generation
Firewater Pump Engine 1	FWP 1	475 hp	Supplies emergency firewater
Emergency Flare	Flare 1	6020 MMBtu/hr	For safety and VOC control

Emissions associated with the facility are separated into three categories: (1) normal operation, (2) cold startup, and (3) warm startup and malfunctions. These emissions are shown in Tables 6-5, 6-6, and 6-7, respectively.

TABLE 6-5
Emissions Resulting from Normal Operations

Description	Usage	Potential Emissions (tpy)				
		NO _x	CO	VOC	SO ₂	PM ₁₀
CT 1	Power Generation	62.74	38.20	5.52	0.15	36.30
CT 2	Power Generation	62.74	38.20	5.52	0.15	36.30
CT 3	Power Generation	62.74	38.20	5.52	0.15	36.30
H-3102	Sulfur Plant Incinerator			38.13		
H-5401	Process Heater	0.57	0.87	0.26	41.65	8.93
H-5301	Process Heater	8.36	1.83	0.12	0.09	0.16
H-5201	Process Heater	0.10	0.02	0.00	0.00	0.00
H-5202	Process Heater	0.40	0.09	0.01	0.00	0.01
H-5101	Process Heater	1.10	0.24	1.99	0.01	2.75
H-5102	Process Heater	0.13	0.03	0.23	0.001	0.32
FWP 1	Firewater Pump Engine	0.16	0.03	0.29	0.002	0.40
Various	Product Storage	1.51	0.09	0.34	0.002	0.02

TABLE 6-5
Emissions Resulting from Normal Operations

Description	Usage	Potential Emissions (tpy)				
		NO _x	CO	VOC	SO ₂	PM ₁₀
Equipment Leaks	Fugitives			44.81		
Coal Storage	Fugitives					60.18
Total Emissions		200.54	117.82	102.72	42.21	181.67

TABLE 6-6
Emissions Resulting from Cold Start

Description	Usage	Potential Emissions (tpy)				
		NO _x	CO	VOC	SO ₂	PM ₁₀
CT 1	Power Generation	9.42	5.64	0.84	0.02	5.00
CT 2	Power Generation	9.42	5.64	0.84	0.02	5.00
CT 3	Power Generation	9.42	5.64	0.84	0.02	5.00
CO2 Vent Stack	Vent for Off-Spec CO ₂		420.33	0.22		
GP 1	Refractory Preheating	0.18	0.31	0.02	0.002	0.03
GP 2	Refractory Preheating	0.18	0.31	0.02	0.002	0.03
GP 3	Refractory Preheating	0.18	0.31	0.02	0.002	0.03
GP 4	Refractory Preheating	0.18	0.31	0.02	0.002	0.03
GP 5	Refractory Preheating	0.18	0.31	0.02	0.002	0.03
H-5401	Process Heater	2.13	3.58	0.23	0.03	0.32
H-5301	Process Heater	0.10	0.16	0.01	0.001	0.01
H-5201	Process Heater	0.40	0.67	0.04	0.005	0.06
H-5202	Process Heater	1.08	1.82	0.12	0.01	0.16
H-5101	Process Heater	0.13	0.21	0.01	0.002	0.02
H-5102	Process Heater	0.16	0.26	0.02	0.002	0.02
Gen 1	Startup Generators	0.80	1.93	0.72	0.0014	0.00019
Gen 2	Startup Generators	0.80	1.93	0.72	0.0014	0.00019
Gen 3	Startup Generators	0.80	1.93	0.72	0.0014	0.00019
Total Emissions		35.57	451.30	5.43	0.13	15.75

Note: During the cold start all equipment will be fired on pipeline-quality natural gas.

TABLE 6-7
Emissions Resulting from Warm Starts and Malfunctions

Description	Usage	Potential Emissions (tpy)				
		NO _x	CO	VOC	SO ₂	PM ₁₀
CT 1	Power Generation	4.54	2.76	0.36	0.01	2.50
CT 2	Power Generation	4.54	2.76	0.36	0.01	2.50
CT 3	Power Generation	4.54	2.76	0.36	0.01	2.50
CO2 Vent Stack	Vent for Off-Spec CO ₂		168.13	0.09		
Flare 1	Emergency Flare	9.68	82.71	0.63	158.18	
Total Emissions		23.29	259.13	1.81	158.21	7.50

Best Available Control Technology

The proposed CTL project is one of the 28 named source categories in 40 CFR Part 52.21(b)(1) and is classified as a new major source of regulated emissions under the PSD New Source Review (NSR) program. An analysis of the BACT is required for sources with potential emissions greater than the PSD established significance thresholds. The BACT analysis evaluates the technical feasibility and cost-effectiveness of emission control options to determine the applicable control technology and emission limits.

BACT is determined on a case-by-case basis taking into consideration technical practicability and economic reasonableness. For PSD BACT requirements, energy and environmental impacts should also be considered. Control technology alternatives are identified for each new or modified source of pollutants based on knowledge of the applicant’s particular industry and previous regulatory decisions for other identical or similar sources.

The proposed CTL facility will be located in Carbon County, Wyoming. Carbon County is currently designated attainment or unclassifiable for all national ambient air quality standards. Table 6-8 evaluates the applicability of BACT requirements.

TABLE 6-8
BACT Applicability

Pollutant	Significance Threshold (tpy)	Estimated Facility Potential to Emit (tpy)	BACT Applicable
Carbon Monoxide (CO)	100	828.25	Yes
Nitrogen Oxides (NO _x)	100	259.40	Yes
Sulfur Dioxide (SO ₂)	100	200.55	Yes
Particulate Matter <10 microns (PM/PM ₁₀)	100	206.16 (PM ₁₀ - filterable)	Yes
Volatile Organic Compounds (VOCs)	100	110.86	Yes

BACT Summary

Table 6-9 summarizes BACT proposed for this project:

TABLE 6-9
Summary of BACT Applied to the MBFP Project

Source	Proposed BACT Method
Combustion Turbine/HRSG/Steam Turbine Combined Cycle Trains (3x3x1)	NO _x : SCR with NO _x control to 6 ppmvd NO _x (corrected to 15% O ₂) in the HRSG exhaust when firing tail gas or natural gas; CO: Catalytic Oxidation control to 6 ppmvd CO (corrected to 15% O ₂) in the HRSG exhaust when firing tail gas or natural gas; VOC: Collateral control from Catalytic Oxidation control to 1.4 ppmvw CO (corrected to 15% O ₂) in the HRSG exhaust when firing tail gas or natural gas; PM/PM ₁₀ : Good combustion practices SO ₂ : SRU system designed to reduce fuel sulfur concentrations to 0.1 ppmvd

TABLE 6-9
Summary of BACT Applied to the MBFP Project

Source	Proposed BACT Method
Process Heaters	NO _x : Low NO _x burners
	CO, VOC, PM/PM ₁₀ : Good combustion practices
	SO ₂ : SRU system designed to reduce fuel sulfur concentrations to 0.1 ppmvd
Storage Tanks	Storage tanks with a vapor pressure greater than 0.5 psia at normal operating temperature and containing VOCs will have internal or external floating roofs
Coal Handling	Dust suppression (fogging) used in combination with fully enclosed conveyors and passive engineering design at transfer points
Equipment Fugitives	VOC: Emissions are inherently low due to minute VOC content of tail gas, small number of fugitive components
	H ₂ S: Emissions are low due to small number of fugitive components, audio/visual/olfactory (AVO) leak detection
	NH ₃ : Emissions are low due to small number of fugitive components
Sulfur Recovery Unit (flare and thermal oxidizer)	Optimized CTL Process Design including low-pressure absorber system, minimize frequency and duration of control by flare
	Flare: Tail gas pilot, flame detection system, smokeless flare design, auto-ignition system, and maximum gas velocity, <500 hours/year Thermal Oxidizer: Tail gas pilot, minimum operating temperature, low NO _x burners
Carbon Dioxide Vent	Startup, shutdown, upset conditions only (<50 hours/year), optimized process design
Gasifier Preheaters	Low-sulfur fuel (natural gas), good combustion practices, restricted operation (initial startup and new refractory only, < 500 hours/year per gasifier)
Black Start Generators	Low-sulfur fuel (natural gas), good combustion practices, restricted operation (initial startup only, <250 hours/year)
Firewater Pump	Restricted operation (<500 hours/year), ultra-low-sulfur diesel fuel (15 ppm sulfur), good combustion practices

6.1.3 Noise

Industrial Siting Regulations state that noise is an issue that must be taken into account in the siting process, but numeric limits are not specified at the state level in Wyoming. In addition, there are no existing county regulations that directly address sound levels in Carbon County. Based on a review of aerial photographs and the site reconnaissance, there are no residences within 1 mile of the project site. Therefore, the project will not result in any significant impact to sensitive noise receptors.

6.1.4 Cultural Resources

The CTL facility is located within the previously permitted Carbon Basin Mines. The entire 14,348-acre Carbon Basin Mines permit boundary has been surveyed for cultural resources as part of the Wyoming Department of Environmental Quality, Land Quality Division mine permit process.

A Class I file search was performed through the Cultural Records Office of the Wyoming State Historic Preservation Office (SHPO) for the mine permit area on April 28, 2007. The search indicated that nine small-scale cultural resource inventories and three large-scale block inventories had been previously conducted in the area. Additionally, surveys conducted to Class III standards were performed on 4,567 acres of the Carbon Basin Mines permit area. These surveys identified 16 historic sites and 30 prehistoric sites. Arch of Wyoming (AOW) conducted Class III cultural resources inventories on the remaining 9,781 acres of the mine permit area in 1997. The Survey Report for Consultant Project No. 20241-02 documents all cultural resources that occur within the Carbon Basin Mines permit area.

Based on the cultural resources findings within the Carbon Basin Mines permit boundary, a Memorandum of Agreement (MOA) has not yet been signed by United States Department of the Interior (U.S.D.I.) Office of Surface Mining (OSM), U.S.D.I Bureau of Land Management (BLM), Wyoming SHPO, WDEQ, Northern Arapaho Tribe of Wyoming, Northern Cheyenne Tribe of Montana, and the Assiniboine and Sioux Tribes of Montana. The draft MOA stipulates mitigation measures, employee orientation, authorizations to begin mine-related activities, unanticipated discoveries and effects, annual reporting, termination, and duration of agreement.

Execution of the MOA (expected in the near future) by OSM, WDEQ, BLM, SHPO, AOW, and the tribes, and implementation of its terms, evidence that OSM, WDEQ, and BLM have afforded SHPO an opportunity to comment on the AOW Carbon Basin Mines within the area of potential effect and its effects upon historic properties. In addition, the OSM, WDEQ, and BLM have taken into account the effects of Carbon Basin Mines development on historic properties.

The CTL project will not require any additional federal approvals as the Carbon Basin Mine has already gained the necessary permit approvals from the WDEQ, Land Quality Division. A letter was sent to the State Historic Preservation Officer on July 6, 2007 requesting a satisfactory recommendation to the Industrial Siting Division. A copy of this letter is in Appendix K.

6.1.5 Geology and Geologic Hazards

The Hanna Formation is the most common rock unit exposed on the surface in the project area. Other units include (from the oldest to youngest) the Mesaverde Formation, the Lewis Shale, the Medicine Bow Formation, and Quaternary alluvial deposits. The Hanna Formation consists of alternating beds of conglomerate, light yellow to gray siltstone and sandstone, gray shale, carbonaceous shale, and coal. The Mesaverde Formation, which outcrops on top of Simpson Ridge, is composed primarily of a white to gray sandstone. The Lewis Shale is a gray marine shale containing numerous lenticular beds of brown and gray sandstone. The Medicine Bow Formation is exposed in only a few narrow areas, consisting of a light gray to white quartzose sandstone. Quaternary alluvial deposits include exposures of terrace gravels of well-rounded pebble to boulder-size materials deprived from weathering of all underlying rocks of the surrounding area.

Data from the U.S. Geological Survey (USGS) was reviewed for the presence of faults that would be considered geologic hazards within the vicinity of the permit area. The nearest fault is approximately 240 miles to the west of permit area. No impacts associated with

geologic hazards are expected to occur as a result of project implementation. The project will not contribute to increased risks of seismic events, subsidence, flooding, or landslides.

6.1.6 Land Use and Recreation

Land Use

The current Carbon Basin Mines permit area lies within Section 6 T20N R79W, Sections 20, 21, 28, 29, 30, 31 and 32 T21N R79W, Sections 1, 2, 3, 4, 5, and 6 T20N R80W and Sections 25, 26, 27, 28, 29, 31, 32, 33, 34, 35 and Section 36 T21N R80W. Baseline surveys were conducted on this permit area in 1997 and 2002. All land in the permit area (T21N, R79W Sections 29, 30, 31, and 32) is zoned for ranching, agriculture, and mining (RAM). A large portion of the Carbon Basin Mines permit area is found within the BLM North Anschutz Grazing Allotment (#0832), which currently provides an overall total of 5,526 animal unit months. Union Pacific Railroad rights-of-way exist as the railroad extends through the unincorporated land of Carbon County. All ranges and sections are in T21N.

Historically, the land uses within the Carbon Basin Mines permit area included grazing land, wildlife habitat, outdoor recreation, oil and gas exploration and mining activities. The primary present land use type within or adjacent to the Carbon Basin Mines permit area is grazing land. No impacts associated with land use are expected to occur.

Recreation

Information from the 2002 Digital Wyoming Atlas (University of Wyoming Department of Geography) was reviewed to determine the location of recreational areas. Hunting on or adjacent to the permit area is likely the most prevalent recreational activity in the area. No developed recreational areas exist within or adjacent the permit area. The closest large recreational area, Elk Mountain, is approximately 5 miles from the project. Opportunities for dispersed recreation exist on federal and state lands in the larger region. Dispersed recreational opportunities include hunting, fishing, sightseeing, off-road vehicle use, and camping.

6.1.7 Visual Resources

The permit area is in a rural setting with mostly flat to rolling terrain. Visual requirements were not addressed within the Conditional Use Permit. Therefore, no potential visual restrictions apply to permit area. However, due to the remoteness of the project site and limited amount of residential homes and ranches in the area, visual impacts are expected to be minimal.

6.1.8 Mineral Resources

According to the 2002 Arch of Wyoming land use survey report, there are no locatable minerals known to exist in sufficient quantities for development within the permit area. There are several sites adjacent to the permit area that contain good quantities of sand and/or gravel deposits that could at a future date be mined. Arch Coal will operate and maintain the coal mine per permit conditions. Additionally, MBFP will operate and maintain the CTL facility per the Conditional Use Permit. The construction and operation of the project will not preclude access to, exploration of, or development of any mineral resources in the general area. No such developments are currently proposed.

6.1.9 Soil Resources

Because of the variety of landforms and changing topography in such a large area, soils and depositional environments exhibit substantial variation. Arch of Wyoming in 1998 summarized the various soil conditions within the permit area. Wyoming does not maintain a list of soils of statewide concern. Therefore, no potential soil concerns apply to permit area.

Colluvial and residual deposits consisting primarily of poorly sorted sand, silty sands, and sandy loams occur frequently on exposed ridge tops, deflated upland areas, and eroded slopes and at the base of slopes and ridges. Clay content is present to varying degrees in some of these deposits. Sandstone bedrock and adjacent residual sands and regolithic colluvium containing sandstone and scoria eroded from parent material are common components of this depositional environment. Alluvium occurs on major stream terraces and floodplains, particularly along the Sand Creek and tributaries and the Medicine Bow River. Small amounts of alluvium have accumulated locally along the edges of the numerous small ephemeral drainages and as small fans and toe slopes at the base of ridges. Alluvial soils include well-sorted sandy loams and silty sands, particularly along the major terraces, with clay loams and other loams occurring in some alluvial environments.

Aeolian sands occur frequently as sheet and shadow deposits on the lee slopes of ridges and on ridge tops and upland plains in areas affording some protection from wind erosion. These sediments occasionally overlie alluvial terrace deposits as well. Sand dunes occur infrequently; those that are present are small with a relatively high silt content and are located mainly near the bottom of valleys and on top of alluvial terraces. Silty, and occasionally hummocky, Aeolian accumulations are evident adjacent to playas that occur infrequently in the project area. These deposits are most extensive along the northeast shore of Sevenmile Lake. Also notable are unique localized accumulations of generally coarse-grained sand, somewhat dunal in composition but containing small weathered fragments of carbonaceous shale. They mainly occur in wind shadows of protected upland areas adjacent to weathering exposures of sandstone and shale. They are highly visible on the landscape due to their support of a vegetative micro-environment dominated by "islands" of serviceberry.

No adverse impacts on soil resources will occur. Mitigation measures will be implemented during construction and operation of the project to ensure that excessive erosion and other adverse impacts on area soils will not occur.

6.1.10 Vegetation Resources

Arch of Wyoming conducted a baseline vegetation survey in the Carbon Basin Mines permit area in January 1998. The predominant vegetation type in the project area is a big sagebrush community dominated by Wyoming big sagebrush and an understory of grasses and forbs. Dominant grasses include western wheatgrass, bluebunch wheatgrass, Indian ricegrass, and bluegrass. Other common shrubs in this community include rabbitbrush and snowberry. Within the sagebrush community, low-density mountain shrub/brush type vegetation occurs around rocky outcrops on shallow, well-drained, sandy soils. This type includes mountain mahogany, bitterbrush, rabbitbrush, snowberry, and prickly pear, as well as scattered big sagebrush and grasses. Dispersed juniper was observed only along the rocky escarpment overlooking the Medicine Bow River in Section 6, T20N, R79W.

In poorly drained soils on floodplains, stream terraces, playa areas, and saline bottomlands, greasewood is the dominant shrub. Dominant grasses in this environment include Sandberg bluegrass, bottlebrush squirreltail, and wheatgrass. Extensive greasewood zones occur frequently on sagebrush. On shallow, poor drained, clayey soils – primarily in arid upland areas – extensive shadscale communities dominated by saltbush and birdfoot sage occasionally are present. In these zones, grasses are generally sparse and big sagebrush is widely scattered or occurs in sporadic “islands” or along drainage channels.

True riparian communities are extremely rare in the project area with only an isolated cottonwood or small stand of willows occurring in a few spots along the banks of Third Sand Creek and its tributaries. Cottonwoods and dense riparian grasslands occur only on the floodplain of the Medicine Bow River, only a small portion of which flows through the project area. Wet areas around springs and seeps are the only notable areas where dense stands of sod-forming grasses and sedges occur.

There are two other notable vegetation communities in the project area. One is an area of generally widely dispersed Ponderosa pines; the other consists of highly localized communities dominated by stands of serviceberry in a unique depositional environment. The pines are located primarily in an approximately 0.5-mile-long area of residual, coarse, sandy, rocky ridges, and slopes, mainly in the southeast of Section 25, T21N, R80W, north of Third Sand Creek. The serviceberry “islands” occur within carbonaceous sand accumulations at least partially derived from Aeolian processes. Other vegetation types unique to these micro-environments are dense to widely scattered accumulations of wild rose, clumps of basin wildrye, and an occasional chokecherry. The sediment at these locales appears to retain moisture and support a higher water table, thus allowing these species to thrive in an otherwise hostile environment. These stands of vegetation occur predominantly on a ridge trending east/west across Section 34 and the extreme west of Section 35, T21N, R80W. Smaller, less dominant stands occur in a few other spots in the central portion of the project area, with other less accumulated areas of this sand type supporting a community dominated by rabbitbrush and wild rose.

Based on the findings of the Arch of Wyoming survey, there are no documented locations of rare vegetation communities within the project area. Most of the region is used for livestock grazing, although many areas lack sufficient vegetation to support this activity. The onsite vegetation reflects the historic land use of the property. The permit area is currently being used for livestock grazing. Native vegetation communities (sagebrush/native grassland) have been converted to support such agricultural practices.

Impacts to vegetation would include permanent vegetation loss within the footprint of the project. In addition, temporary impacts would occur during construction activities. Revegetation with native species in these areas of temporary impact would minimize unnecessary vegetation loss. Mitigation will include measures to prevent infestations of weeds. The cessation of livestock grazing on the project site may benefit the vegetation resources in the long term.

6.1.11 Surface and Groundwater Resources

Surface Water

The project area is in the Medicine Bow River drainage basin within the North Platte River watershed. Drainage is predominantly to the east via Third Sand Creek, a prominent ephemeral watercourse whose headwaters occur in the uplands in the western portion of the project area. Second Sand Creek generally parallels Third Sand Creek to the north, and crosses through the northeast portion of the project area. The headwaters of First Sand Creek occur near the northwest corner of the project area. The creek flows northeast within a narrow valley bounded by Simpson Ridge to the west and a sandstone-capped escarpment to the east. It eventually flows into Allen Lake, west of Medicine Bow. None of the Sand Creeks are permanent water sources and only flow briefly along portions of their courses during periods of heavy rainfall or snowmelt.

The Medicine Bow River is the only permanent stream, which cuts through only the extreme southeast corner of the project area. Other sources include six small springs, a few near-permanent seeps, and Sevenmile Lake. Three of the springs occur near each other on the east of Simpson Ridge; the northernmost flows fairly strongly into a small, poorly maintained cattle pond north of Sevenmile Lake. Prior to the development of the impoundment, the water from this spring flowed directly into the lake, which is playa-like with no outlet. It is likely that Sevenmile Lake was a perennial water source in prehistoric and historic times prior to the impedance of the spring flow. Of the other springs, one is located near a headwater tributary of First Sand Creek, one is on a tributary of Second Sand Creek, and one is on a ridge slope north of Second Sand Creek. Other springs/seeps may occur in previously inventoried areas, but none are identified on USGS topographic maps.

No surface water will be used for the project. No direct impacts to surface water features within the project site will occur.

Potential impacts to surface water from erosion and sedimentation will be prevented by measures to control runoff during construction and operation of the project. State 401 water quality certification and appropriate soil erosion and sediment controls will be implemented. A pollution prevention plan will be developed and implemented to minimize impacts on water resources during long-term operation of the project.

FEMA 100-year floodplain data identify a 100-year floodplain in the southeast corner of the project site, outside of the area that would be used for construction of the project. The floodplain is associated with the Sand Creek and Medicine Bow drainages and would not be impacted by the project.

Groundwater

There is very little groundwater production from the Carbon basin in the permit area. Therefore, the aquifer characteristics are poorly known. The mine and CTL facility site will be in the eastern part of the basin in the Second Sand Creek and Third Sand Creek drainages, where the Hanna, Ferris, Medicine Bow, and Lewis Formations occur at the surface. The Mesaverde Formation occurs beneath the Lewis Shale. The project will include a well field to tap into the Mesaverde Aquifer system. The water from this aquifer has a range of concentrations but is generally poor. Water produced from the Mesaverde Formation by MBFP will likely not be considered potable. Raw water will be treated prior to use at the CTL facility.

A report was prepared to analyze water supply and yield (URS, 2007). The report documents the availability of groundwater for project use. The analysis used data collected from two nearby wells in the Mesaverde Formation and one in the Medicine Bow and Lewis Formations near the plant site. Drawdown modeling indicated that there is sufficient groundwater within the Mesaverde Aquifer system to supply the needed 48,000 acre-feet per year for 30 years. Proposed plans include the installation of 12 production wells to obtain total yield of 1,000 gallons per minute (gal/min). These are reasonable based on the very limited information obtained from pumping tests of two test wells. If well yields are less than the anticipated 90-100 gal/min, additional wells could be drilled.

As part of this industrial siting process, the Wyoming State Engineers Office (WSEO) has issued its preliminary opinion regarding MBFP's proposed use of Mesaverde Aquifer water for the project (WSEO, 2007). In this opinion, the State Engineer indicates its concurrence that sufficient water exists in the Mesaverde Aquifer to supply the necessary quantity of water to the project. The State Engineer will require a number of conditions to verify this opinion, including installation and testing of monitoring wells and pump testing of each production well installed for the project. The final opinion is expected from the WSEO in late September 2007.

6.1.12 Wetland Resources

The U.S. Army Corps of Engineers (Corps) enforces Section 404 of the Clean Water Act (CWA) which regulates the discharge of dredged or fill material into all waters of the U.S., including wetlands. Such waters are known as "jurisdictional waters of the U.S." and have been defined to include not only obvious water bodies such as rivers, lakes, harbors, and bays, but also less obvious bodies of water such as intermittent streams and wetlands. It is acknowledged that if impacts, including discharge of dredged or fill material into jurisdictional waters (including wetlands), are proposed, a permit should be obtained from the Corps. If proposed impacts are less than ½ acre, authorization under a Nationwide Permit would likely apply. If impacts are greater than ½ acre, an individual 404 permit process would be necessary.

According to national wetlands inventory data collected for the permit area, there are five wetland areas within the permit boundary and two wetland areas outside of the permit boundary along the southern edge. A wetlands resource map is located in Appendix G. The project includes a 300-foot buffered area of wetlands. No project features will be located within this buffer zone. Sedimentation and erosion control measures will protect the wetlands from impact. The project is not expected to impact wetlands. Construction will occur well outside of the wetland boundary. Erosion and sedimentation controls will be applied both during construction and during long-term operation to prevent runoff from degrading the wetlands. No CWA permits will be required.

6.1.13 Wildlife Resources

The grassland and sagebrush communities found on the project site provide habitat for various common wildlife species. Arch of Wyoming conducted a baseline wildlife survey in the Carbon Basin Mines permit area in January 1998. All wildlife species observed at the time of site visits were recorded. These species include the following:

- Big game (pronghorn antelope, mule deer, American elk, and white-tailed deer)
- Upland game birds (sage grouse and mourning dove)
- Raptors (ferruginous hawk, golden eagle, bald eagle, red-tailed hawk, prairie falcon, Swainson's hawk, great horned owl, and American kestrel)
- Waterfowl (mallard, redhead, American widgeon, gadwall, lesser scaup, northern pintail, blue-winged teal, eared grebe, and Canada goose)
- Shorebirds (Wilson's phalarope, American avocet, and killdeer)
- Passerine birds (horned lark, Brewer's sparrow, green-tailed towhee, cliff swallow, rock wren, mountain bluebird, vesper sparrow, Brewer's Blackbird, sage thrasher, house sparrow, song sparrow, lark sparrow, violet-green swallow, house wren, American robin, brown headed cowbird, chipping sparrow, white crowned sparrow, ruby crowned kinglet, lark bunting, gray catbird, Say's phoebe, bank swallow, pinyon jay, common raven, and black-billed magpie)
- Other birds (killdeer, American avocet, Canada goose, mourning dove, common night hawk, mountain plover, red-tailed hawk, American kestrel, golden eagle, ferruginous hawk, prairie falcon, sage grouse, northern pintail, and lesser scaup)
- Small mammals (deer mice, chipmunk, dusky shrew, Wyoming ground squirrel, Northern grasshopper mouse, white-tailed prairie dogs, cottontail rabbit, and white-tailed jackrabbit)
- Predators (coyote, red fox, badger, bobcat, gray fox, black bear, raccoon, long-tailed weasel, and striped skunk)

Wildlife resource maps are shown in Appendix G for sage grouse, elk and pronghorn.

The wildlife habitat types encountered in the permit area were sagebrush shrubland, mixed shrub/rough breaks, bottomland shrub, grass/subshrub, mine reclamation, disturbed lands, reservoir/stockpond, bottomland grassland, greasewood flat, hay meadow, reservoir/playas, pipeline reclamation and cottonwood river bottom. Generally, the greatest number and diversity of wildlife species were recorded in the cottonwood river bottom type followed by the sagebrush shrubland. The reservoir/stockpond and reservoir/playa habitat types also exhibited a high number and diversity of wildlife species during the spring when water was abundant and waterbirds were migrating through the area.

Herptofauna species observed on the permit area include the tiger salamander, boreal toad, northern leopard frog, eastern short-horned lizard and western plains garter snake. Because most water bodies and drainages in the permit area are ephemeral, they do not contain habitat that would support fish populations. However, the southern most portion of the

proposed permit area does extend into part of the Medicine Bow River. Brown and brook trout have been observed in this part of the permit area.

The majority of birds that may potentially nest on the site are protected under the Migratory Bird Treaty Act (MBTA). If construction is to occur during nesting season for such species, pre-construction surveys will be conducted to ensure compliance with the MBTA.

Impacts on wildlife from the project will primarily consist of a temporary disturbance during construction activities. Wildlife will likely avoid the area during construction. Long-term impacts will be minimal, and will include a permanent loss of habitat within the footprint of the project.

6.1.14 Threatened, Endangered, Proposed and Candidate Species

Those species classified as threatened or endangered are protected under the Endangered Species Act, enforced by the U.S. Fish and Wildlife Service (USFWS). Threatened or endangered species are considered “federally listed” or “listed” once a final rule has been published in the Federal Register. Endangered species are those plant and animal species, subspecies, or varieties that are in danger of extinction throughout all or a significant portion of their range. The threatened category comprises plant and animal species, subspecies, or varieties likely to become endangered within the foreseeable future throughout all or a significant portion of their range. Federal candidate species, subspecies, or varieties are those plant and animal species being considered for listing as endangered or threatened, but for which a proposed regulation has not yet been published in the Federal Register.

The USFWS was consulted regarding listed species within the Project Area. The USFWS identified the bald eagle, peregrine falcon, and black-footed ferret as the only federally listed threatened and endangered species of concern within the Project Area. Arch of Wyoming conducted a baseline wildlife survey in the Carbon Basin Mines permit area in January 1998. This wildlife survey also included an evaluation of threatened or endangered species as well as other species of high federal or state interest. Known historic and recent occurrence data for these species were used in the evaluation. Results of this survey identified several mammals and birds that may occur within the Carbon Basin Mines permit area which are listed as threatened, endangered, candidate of high federal interest, or state sensitive.

The bald eagle, which is a federally listed threatened and endangered (T&E) species, was observed nesting on the southwestern portion of the study area and during the winter months and in migration. However, no bald eagle winter roosts or concentration areas were identified within the permit area. Several other raptor species of high federal interest have been observed in the area. They include the ferruginous hawk, golden eagle, prairie falcon, peregrine falcon, Richardson’s merlin, northern goshawk, northern harrier and burrowing owl. Other migratory birds of high federal or state interest observed on the study area or adjacent areas were only seen during migration and did not spend much time in the permit area.

No black-footed ferret sightings were confirmed during previous studies conducted in 1988, 1980, 1976-1977, or 1980. The low density of burrows in the white-tailed prairie dog towns does not provide habitat as good as that provided by the high densities typically

found in black-tailed prairie dog towns. The likelihood of any ferret occupying the permit area is low.

Based on further evaluation, it was determined that none of the above-listed species is likely to occur within the project site and therefore will not be impacted by the project. No impacts to federally listed or other species of concern are expected to occur as a result of project implementation.

6.1.15 Paleontologic Resources

The mine permit area is underlain by sedimentary deposits of the Hanna Formation of early Tertiary age and Lewis Shale and Medicine Bow Formation of late Cretaceous age. The Medicine Bow and Hanna Formations include rocks previously mapped and described as the Foote Creek and Dutton Creek Formations, respectively. These deposits are overlain in places by much younger, unnamed sediments of Quaternary (Holocene) age that are too young to contain fossils.

Arch of Wyoming, LLC conducted a paleontology study for the Carbon Mine permit area in 1997. The study documented three known fossil localities in the area – two of which are located (entirely or in part) in the permit area. Two localities occur in the Hanna Formation. One of these contains preserved fossil leaves and is located within in the permit boundary in the SE $\frac{1}{4}$ of Section 29, T21N, R80W. The other, located in Sections 13 and 14, T21N, R80W and Sections 17 and 18, T21N, R79W, contains fragmentary vertebrate fossils; a portion of this locality (Section 17) is located within the permit area. The third locality occurs near the top of the Lewis Shale southeast of the permit area near Chimney Rock in Section 17, T20N, R79W and contains preserved invertebrate fossils characteristics of the *Baculites clinolobatus* zone. None of the three localities have produced fossils of scientific significance.

6.2 Cumulative Impacts

6.2.1 Introduction

Cumulative impacts include incremental impacts resulting from the project, in addition to any impacts that would result from past, ongoing, or foreseeable future actions within the project site or the surrounding area. For purposes of cumulative impacts analysis, the analysis area is defined as the project site plus a 3-mile buffered area.

6.2.2 Air Quality

The PSD air permitting process noted above includes cumulative analyses. Wherever impacts of the project are estimated to be greater than formally defined “insignificance” thresholds, cumulative analyses of the project plus surrounding sources are required. The application demonstrates that cumulative impacts of the project and surrounding sources are within allowable levels set by state and federal ambient air quality standards. WDEQ is reviewing this analysis under their jurisdiction for air quality permitting in Wyoming.

6.2.3 Noise

Noise levels at the property line will comply with standards for the surrounding land use. Internal noise levels will comply with occupational noise level standards. Noise levels

emitted from equipment such as turbines and boilers will be abated to provide acoustic compliance and equipment performance warranty.

The following Best Management Practices will be followed to reduce the potential for annoyance from construction-related activities:

- Establish a project telephone number that the public can use to report complaints.
- Ensure that equipment is maintained adequately and equipped with manufacturer's recommended muffler.
- Limit major construction activity to 7 a.m. to 7 p.m. daily.
- Conduct noisiest activities during weekdays between the hours of 8 a.m. and 5 p.m. For unusually loud activities, such as blasting or pile driving, notify residence by mail or phone at least 1 week in advance.
- Locate stationary construction equipment (air compressors/generators) as far away from residences uses as feasible. When feasible, utilize equipment in acoustically designed enclosures and/or erect temporary barriers.

With the above mitigation measures, project construction activities will be minimized to the greatest extent reasonable. While they still may result in short-term annoyance, they do not represent a significant adverse impact.

6.2.4 Cultural Resources

There are no known actions that will affect cultural resources within the CTL project site. However, should any additional cultural resources be discovered during construction, the Wyoming State Historic Preservation Officer will be immediately contacted.

6.2.5 Geologic Hazards

No project-related or other cumulative impacts related to geologic hazards will occur.

6.2.6 Land Use and Recreation

The CTL facility will not be detrimental to established uses of the surrounding area. All land in the permit area (T21N, R79W Sections 29, 30, 31, and 32) is zoned RAM. Oil, gas, and mineral exploration, development, and production are permitted uses in the RAM zoning district. Recreational opportunities will continue in existing locations outside of the project site. There will be a reduction or elimination of grazing on the project site. No cumulative impacts will occur to land use or recreation within the project site.

No recreational opportunities exist within the project site, and no impacts would occur to recreational opportunities as a result of project implementation. Nearby recreational areas may see an increase in visitors from new residents employed for the project.

6.2.7 Visual Resources

Cumulative impacts to visual resources are expected to continue in the general area of the permit area. These include the impacts that surrounding land uses have to visual resources in the vicinity of the permit area. Existing mines and development currently affect scenic quality. Because of the rural setting and lack of sensitive receptors both within and adjacent

to the permit area, visual resource concerns should be minimal. The CTL facility will not significantly degrade the scenic quality of the area which is already affected by coal mines and transmission lines.

6.2.8 Mineral Resources

Coal mining operations in the area will continue to account for cumulative impacts to mineral resources in the larger area. The project will not contribute to cumulative impacts on mineral resources.

6.2.9 Soil Resources

Soil resources in the Project Area will be altered by construction related to the project, but these impacts will be minimized by mitigation measures. No other foreseeable action will contribute to cumulative impacts on soil resources within the project site. Within the larger cumulative analysis area, mining operations in the surrounding areas may potentially affect soil resources, though standard mitigation practices will keep future impacts to minimum levels, and past impacts are generally stabilized.

6.2.10 Vegetation Resources

Cumulative impacts on vegetation resources include impacts from the project described above in addition to impacts that have historically occurred from livestock grazing. The cumulative impacts from livestock grazing will decrease within the project site. Reclamation measures will keep impacts to vegetation resulting from the project to a minimum.

6.2.11 Surface and Groundwater Resources

Existing and future development, mining, livestock grazing, and transportation corridors all contribute to cumulative impacts on surface water through some level of increased sedimentation. Due to mitigation measures associated with the project, contributions to such cumulative impacts will be minimal to non-existent.

Cumulative impacts on groundwater include those from project use in addition to other groundwater use in the area due to mining, agriculture, or development.

6.2.12 Wetland Resources

Historically, the onsite wetland resources have been affected by livestock grazing. The project will not affect wetlands within or outside of the project site. Cumulative impacts to wetlands should decrease with implementation of the project and the resulting decrease in livestock grazing within the project site. Grazing and development will continue to affect wetlands within the larger analysis area. Mitigation measures for the project and surrounding mining operations will keep cumulative impacts from such land use to a minimum.

6.2.13 Wildlife Resources

Habitat loss within the cumulative analysis area has occurred due to development, collisions with vehicles along transportation corridors, mining operations, and agricultural practices. Cumulative impacts to wildlife will continue as a result of future activities.

Wildlife that occurs in the area currently coexists with such uses. Additions to cumulative impacts on wildlife resources from the project will be minor.

6.2.14 Threatened, Endangered, Proposed, and Candidate Species

Cumulative impacts on federally listed and other species of concern within the project site are minimal due to the lack of habitat and unlikely occurrence of such species within the area. Cumulative impacts from past activities have altered the landscape and decreased habitat for species of concern such as the greater sage grouse. Future human impacts in the area will continue to affect such species indirectly through habitat loss; however, increased awareness and implementation of mitigation practices will help minimize such losses.

6.2.15 Paleontologic Resources

Based on the field survey that resulted in the discovery of only two fossil localities considered to have limited scientific significance, it appears unlikely that ground disturbance associated with developing the Saddleback Hills mine will impact scientifically significant fossil resources. However, the possibility remains that excavation could reveal undiscovered fossils of scientific significance anywhere within the permit area. The potential for discovery is probably greatest in areas underlain by sandstone deposits of the Hanna Formation and less likely in other deposits.

Unanticipated discovery of fossils of significant scientific interest that otherwise would be unavailable for scientific study can be beneficial. Newly discovered fossils will be properly collected, identified, evaluated, and catalogued into the collections of a museum repository so that associated geologic data are preserved, and the fossils are available for future scientific study.

6.3 Plans for Alleviating Impacts

Various mitigation measures will be implemented to alleviate impacts related to project construction and operation. These mitigation measures are described in the following paragraphs and are organized by resource topic.

6.3.1 Aesthetics

MBFP and its contractors shall exercise care to preserve the natural landscape and shall conduct construction operations (including all construction-related activities and MBFP's designated access roads/trails and staging areas) to prevent any unnecessary damage to, or destruction of, natural features.

Construction trails not required for maintenance access shall be restored to the original contour and made impassable to vehicular traffic. The surfaces of such construction trails shall be scarified as needed to provide a condition that will facilitate natural revegetation, provide proper drainage, and prevent erosion.

6.3.2 Air Quality

MBFP and its contractors shall use such practicable methods and devices as are reasonably available to control, prevent, and otherwise minimize atmospheric emissions or discharges of air contaminants.

Construction-related dust disturbance shall be controlled by the periodic application of water to all disturbed areas along the right-of-way and access roads.

Vehicles and equipment showing excessive emission of exhaust gases due to poor engine adjustments or other inefficient operating conditions shall not be operated until corrective adjustments or repairs are made.

6.3.3 Biological Resources

Removal of vegetation will be limited to that necessary for construction of the project.

A 300-foot buffered area will be implemented around wetlands and surface water features. No project features will be placed within this buffered area, though some ground alteration (grading) may occur within the boundary. Erosion and sedimentation controls will be used to prevent runoff of particulates into wetlands and waterways.

On completion of the work, all work areas, except any permanent access roads/trails, shall be regraded, as required, so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural revegetation, provide for proper drainage and prevent erosion.

All construction materials and debris shall be removed from the project site in a timely manner.

6.3.4 Cultural Resources

Should any previously unknown historic/prehistoric sites or artifacts be encountered during construction, all land-altering activities at that location will be immediately suspended and the discovery left intact until such time that MBFP is notified and appropriate measures are taken to ensure compliance with the National Historic Preservation Act and enabling legislation. Should any additional cultural resources be discovered during construction, the Wyoming State Historic Preservation Officer will be immediately contacted at:

Wyoming State Historic Preservation Office

2301 Central Avenue, Barrett Building, Third Floor
Cheyenne, Wyoming 82002
307-777-6311

6.3.5 Wildlife Resources

To reduce employee-wildlife incidents, new construction workers will receive information on wildlife awareness during their new employee orientation program. The program will include, at a minimum:

- Information regarding restricts or the prohibiting of construction employees' access to sensitive wildlife activity areas:
 - Information regarding applicable wildlife laws and resident hunting requirements
 - Information regarding policies and laws penalizing wildlife harassment and poaching
 - Statement prohibiting the possession of firearms on the site

- Reporting procedures and requirements for vehicle collisions with wildlife
- Reporting procedures and requirements for incidental observation of wildlife including threatened or endangered species
- Posted and enforced speed limits to minimize wildlife vehicle collisions

6.3.6 Fire Prevention/Control

Construction vehicles shall be equipped with government-approved spark arresters.

The contractor shall maintain in all construction vehicles a current list of local emergency response providers and methods of contact/communication.

6.3.7 Land Use

The contractor shall limit movement of crews, vehicles, and equipment on the right-of-way and approved access roads to minimize damage to property and disruption of normal land use activity.

The contractor shall maintain all fences and gates during the construction period. Any fence or gate damaged during construction will be repaired immediately by the contractor.

The contractor shall eliminate, at the earliest opportunity, all construction ruts that are hazardous to agricultural operations and/or movement of vehicles and equipment. Such ruts shall be leveled, filled and graded, or otherwise eliminated in an approved manner. Damage to ditches, tile drains, culverts, terraces, local roads, and other similar land use features shall be corrected, as necessary, by the contractor. The land and facilities shall be restored as nearly as practicable to their original condition.

MBFP will maintain all production facilities and associated properties in a clean and usable condition. Structures that are no longer required for the operation of the CTL facility will be maintained in a clean and usable condition until such time as they are dismantled and removed from the site.

6.3.8 Noise

Construction vehicles and equipment shall be maintained in proper operating condition and shall be equipped with manufacturers' standard noise control devices or better (e.g., mufflers, engine enclosures).

Noise-attenuating materials will be incorporated into the design of the facility equipment and structure to minimize impacts during operation.

6.3.9 Soils

Administered through project specifications and job supervision, erosion control measures will be implemented to minimize the impacts to soils during and after construction.

- An erosion control plan will be prepared by the contractor that addresses excavation, grading, and erosion control measures during and after construction.
- Limits of construction, areas to be disturbed, will be defined and managed by onsite inspectors and construction managers.

- Periodic inspection will be made of erosion control measures by project managers, especially after storms. Measures will be repaired or replaced as necessary.
- Berms and other water-channeling measures will be used to direct water to appropriate detention ponds.
- Barriers and other measures consisting of hay bales, silt fences, and straw mulches will be used to minimize and control soil erosion.
- All disturbed areas will be restored and reclaimed using certified weed-free native grasses.
- Side slopes created by grading will not exceed the soil characteristic limits, as prescribed by a soils engineer. As may be necessary in steep slope conditions, a retaining wall may be installed.

6.3.10 Traffic

The contractor shall make all necessary provisions for conformance with federal, state, and local traffic safety standards and shall conduct construction operations to offer the least possible obstruction and inconvenience to public traffic.

6.3.11 Water Quality

Construction activities shall be performed by methods that prevent entrance or accidental spillage of solid matter, contaminant debris, and other objectionable pollutants and wastes into flowing streams or dry water courses, lakes, and underground water sources. Such pollutants and wastes include, but are not restricted to, refuse, garbage, cement, concrete, sanitary waste, industrial waste, radioactive substances, oil and other petroleum products, aggregate processing tailings, mineral salts, and thermal pollution.

Borrow pits shall be so excavated that water will not collect and stand therein. Before being abandoned, the sides of borrow pits shall be brought to stable slopes, with slope intersections shaped to carry the natural contour of adjacent, undisturbed terrain into the pit or borrow area, giving a natural appearance. Waste piles shall be shaped to provide a natural appearance.

Dewatering work for structure foundations or earthwork operations adjacent to, or encroaching on, streams or water courses shall not be performed without prior approval by the applicable land managing agency or landowner.

Excavated material or other construction materials shall not be stockpiled or deposited near or on stream banks, lake shorelines, or other water course perimeters where they can be washed away by high water or storm runoff or can, in any way, encroach upon the actual water source itself.

Waste waters from construction operations shall not enter streams, water courses, or other surface waters without the use of such turbidity control methods as settling ponds, gravel-filter entrapment dikes, approved flocculating processes that are not harmful to fish, recirculation systems for washing of aggregates, or other approved methods. Any such waste waters discharged into surface waters shall be essentially free of settleable material.

Settleable material is defined as that material that will settle from the water by gravity during a 1-hour quiescent period.

6.3.12 Paleontologic Resources

Due to the lack of fossils of specific scientific significance in the proposed mine permit area, no specific mitigation plan is warranted and no recommendations have been made.

However, to reduce the potential for adverse impacts and to foster beneficial impacts from the discovery of as-yet undiscovered fossil resources, the following mitigation measures will be implemented:

- A qualified paleontologist will be notified if fossils of potential significance are uncovered during ground disturbance. Activities that might adversely affect such fossils will cease within 100 ft of the discovery or, if possible, the fossils will be set safely aside until their scientific significance can be determined.
- Unaffected/undisturbed portions of the mine permit area will remain available for scientific study by qualified researchers subject to landowner approval.
- Any significant fossil specimens collected as the results of unanticipated discovery will be prepared, identified, and curated along with associated geologic information into the retrievable data collections of a museum repository, such as the Geology Museum in the Department of Geology and Geophysics at University of Wyoming.

SECTION 7.0

Mitigation to Local Governments

Medicine Bow Fuel & Power has pursued solutions to potential impacts associated with the construction and operation of the Medicine Bow Coal to Liquids facility.

Housing

The MBFP Socioeconomic Impact Analysis has identified the need to provide housing mitigation measures.

MBFP has been working with local communities, developers, and other stakeholders in the development of housing options to address the shortage. Details of housing mitigation measures are discussed both in the Socioeconomic Impact Analysis report and Section 4.0 of this application document. The following housing options were identified:

- The project site will have a housing facility with the capability of housing up to 500 personnel. The onsite housing facility will aid in the winter construction campaigns and also during startup and operations phases of the project.
- Additional 200 person work camps are being evaluated at Medicine Bow and Rawlins.
- The remainder of the housing need includes fifth wheel and rental units (single and family) sites in the various Carbon County communities surrounding the site and the towns of Rock River and Laramie in Albany County.

It is recommended that the project team continue to meet with local stakeholders and work to meet the housing needs of the temporary construction workforce in a manner that facilitates the long-term housing needs of adjacent communities and the county.

Proposed Roadway Improvements

Although roadway improvements were not identified as a required mitigation measure, the project team is working with Carbon County to design upgrades to County Road 1/3 that will improve the facility to meet county standards for their Industrial Strength roadway classification and address drainage issues. In addition, acceleration and deceleration lanes on US 30/287 to accommodate turning traffic generated by the project are being evaluated to maintain the through movement operations on the highway.

Impact Assistance Payments

MBFP requested an estimate from the WDEQ Industrial Siting Division of the forecasted impact assistance payments to Carbon County. A copy of this estimate calculation is in Appendix D.

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SECTION 8.0

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APPENDIX A

Letters of Support

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APPENDIX B

Socioeconomic Impact Analysis

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APPENDIX C

Local Agency Level of Service and Infrastructure Survey

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APPENDIX D

ISD Impact Assistance Payment Calculation

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APPENDIX E

Public Involvement Information

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APPENDIX F

Site Location and General Arrangement Drawings

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APPENDIX G

Environmental Resource Maps

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APPENDIX H

Proposed Transportation Routes

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APPENDIX I

Conditional Use Permit

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APPENDIX J

Water Supply and Water Yield Analysis

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APPENDIX K

State Historic Preservation Office Communications
