FOREWORD

River View Coal (Alliance Coal, LLC) submitted this site for evaluation for potential development as an alternative energy facility. The site was evaluated against preliminary criteria which identifies characteristics beneficial for development of a wind, solar, biomass, nuclear, or coal-to liquid (CTL)/coal-to-gas (CTG) facility. This site benefits from a location in the Western Kentucky Coal Fields, access to substantial water resources and flexible transportation options.

Cover photo (2006) - Proposed development site
Alliance Coal, LLC (Alliance Coal) has offered the River View property along the Ohio River in Union County to be evaluated as a potential energy facility. The development of an energy facility, whether for CTL/CTG, wind, nuclear, solar or biomass, must consider basic common factors which include assets like access to transportation, general topography, proximity to public access areas, and available utilities.

**GENERAL SITE CONSIDERATIONS**

**Ownership**
The site is owned in fee by Alliance Coal. Alliance Coal also has an option on an additional 150 acres located east of the site.

**Size**
The site consists of approximately 600 acres located west of Uniontown in Union County along the Ohio River (USGS Uniontown and Morganfield Topographic Quadrangle Maps). The eastern portion of the site encompasses Lost Creek. State Highway 360 forms the northern and western border of the site property. The 150 acres available under option are east of the site and are not contiguous. The proposed site is a former underground mining operation, coal preparation, coal refuse disposal and barge load-out facility.

**Topography**
The site is fairly flat with elevations ranging between 360 to 420 feet above mean sea level (AMSL) and refuse impoundment which rises above the remainder of the property. Additional portions of the site are forested and contain wetlands and large ponds, some of which are constructed slurry refuse areas. The southwestern portion of the property has an elevation of approximately 450 feet AMSL.
Floodplain and Wetlands

No Flood Insurance Rate Maps were available online from the Federal Emergency Management Agency’s (FEMA) website. According to FirstSearch Technology Corporation (FirstSearch) and the site sponsor, the site lies above the 100-year floodplain. The Ohio River is north of and adjacent to the site.

Several wetlands are documented within the development site. Wetlands are located near the barge facility and adjacent to the refuse disposal area and Lost Creek. The wetlands stretch along the western part of the site for approximately 3/4 of a mile and the area of wetlands impact is estimated at greater than 10 acres. Portions of the area designated as wetlands are constructed slurry refuse areas and may not be regulated as wetlands. Further investigation prior to site development is recommended.
Development site with constructed wetlands – looking west

**Site Hazards**

The River View site is not identified on any 2006 environmental databases searched; however, two LUST (leaking underground storage tank) sites were identified at a distance of 0.75-miles, both with a verified removal date of 1997. Current information from Environmental Protection Agency (EPA) Envirofacts website does not suggest that there are any NPL sites listed within one mile of the site. EPA’s Enviromapper also indicates that Island Creek Coal is a mining operation within five miles southwest of the site and is identified as a hazardous waste generator. The site sponsor has stated that there are no hazardous or radioactive materials and wastes at the site. No identified state, county, or municipal zoning restrictions apply to the area. No residential development was noted during site observations.

**Oil and Gas Wells**

Observations during the site visit identified at least two dry and abandoned wells onsite. The Kentucky Geologic Survey’s (KGS) Petroleum Geology Map identified additional wells to the east-northeast.
**Sensitive Areas**

The proximity of non-attainment areas and Class I Visibility Areas to the site was examined for potential impacts to air quality or limitations on a required air permit for a CTL/CTG or biomass facility. The nearest non-attainment area for air pollutants is the Vanderburgh County – Evansville (IN) area, which is listed as non-attainment for PM 2.5. This area is 17-miles northeast of the site. Other Indiana counties listed for non-attainment include Warrick (30-miles northeast), Spencer (40-miles northeast) and Pike (50-miles northeast). The site is also approximately 108 miles northwest of Mammoth Cave National Park, the Class I Visibility Area closest to the site.

State water data was searched to determine if designated impaired streams in the area might affect discharge requirements for an energy facility. The Ohio River at this location is on the 2008 303(d) List of Surface Waters for impaired uses or habitats of threatened/endangered species. Impaired uses include partial support of primary contact recreation due to fecal coliform and partial support of fish consumption due to dioxins and polychlorinated biphenyls. The use designations for the Ohio River in accordance with 401 KAR 10:026 are warm water aquatic habitat, primary contact recreation, secondary contact recreation, and drinking water source. There are no public water intakes within 25 miles downstream of the site.

Siting considerations for any energy facility include the presence of Threatened and Endangered (T&E) species in the area, the presence of significant cultural or historical resources in and around the project area, and proximity to public access areas and airports. Sloughs Wildlife Management Area, Hovey Lake Fish and Wildlife Area, and Henry Higgenson Wildlife Management Area are located within 2.25 miles, 3 miles and 7 miles, respectively, of the site. The Shawnee National Forest is approximately 12.5 miles southwest in Illinois, across the Ohio River. Additional investigation may be required to characterize and determine or mitigate the impact of development to these public access areas. No other public access areas, such as trails or nature preserves were identified in the area. The nearest airport is the Morganfield Airport for general
aviation, which is located at a distance of 8 miles to the southeast of the site. Henderson City-County Airport and Sturgis Airport are within 15 miles of the site. The height and activity of required equipment for CTL/CTG or an alternative energy facility can present a hazard to air traffic.

Based on reference to National Register Properties, National Register Districts, and Inventoried (potentially eligible) Sites, a previously recorded site was identified at or within 2 kilometers of the project area. However, the previously recorded site was not listed as eligible or potentially eligible for listing on the National Register. Informal consultation with the Kentucky State Historic Preservation Office indicates that parcels with Ohio riverfront often have archaeological assets. Therefore, additional review and a site survey may be necessary prior to development.

Federal and state lists of T&E species were reviewed to determine if there is documented evidence of the occurrence of a listed species on the USGS quadrangle maps for the site. The site is located in the Uniontown and Morganfield quadrangles. Two federal threatened or endangered species were listed with regard to the area: the Bald Eagle and Copperbelly water snake. State lists included nine species: Bald Eagle, Bank Swallow, Black Crowned Night-Heron, Copperbelly Water Snake, Fish Crow, Great Blue Heron, Great Egret, Osprey, Yellow Crowned Night-Heron. Most of these species live in wetland areas and along riverbanks. The Copperbelly water snake generally is a concern in states north of Kentucky and has been subject to a Conservation Agreement eliminating the listing as endangered within the southern portion of its range, including Kentucky. Additional site evaluation would be required to determine if development would have a negative impact on these species or critical habitat, although this is unlikely due to the site’s history as a mine property.
Geological Assets

Siting considerations for a biomass or CTL/CTG process must take into account available geological assets for potential sequestration. Analysis by the KGS ranked the geologic assets for the site as fair. The graphic on the following page depicts geologic assets within a 15 mile radius of the site, indicating substantial development of both oil and gas in the region. The site is identified as C on the graphic. Devonian shale is present with the average depth to the top of this structure being about 4,200 feet. The average depth to the Knox, the primary sequestration target in the area, is identified as about 8,400 feet. Deep, un-mineable coal beds are not identified in the immediate area. Both deep (>2,500’) and shallow (<2,500’) oil fields are present within 20 miles of the subject site, providing a potential resource for enhanced oil recovery by CO₂ injection in the area.

The proximity of faults to a site may impact the development of a nuclear, biomass, or CTL/CTG facility. Fault systems are identified both beneath the site and approximately 7 miles south of the site. Based on mapping from the KGS, the seismic risk at the proposed site is moderate.
Utilities

Based on information from the sponsor, potable water is supplied to the site by the City of Uniontown and sewer is accessible. Basic electrical service, provided by Kentucky Utilities, is available at the site. Natural gas availability has not been confirmed on the site and broadband internet access is available.

Transportation

Road access is essential for any large industrial facility and particularly so for an energy
facility that brings in its fuel or trucks out its product. Although interior roads will need to be developed, roads are constructed into the site. Current access to the site includes State Route 360, a 2-lane paved asphalt road along the northern portion of the property, although it was reported that SR 360 occasionally floods between the site and Uniontown. Alternative access is available by State Route 666, although this is not a major thoroughfare.

Although not a significant siting consideration for a solar, nuclear or wind facility, a biomass or CTL/CTG facility will require several transportation options due to the substantial feedstock required for these technologies. Coal or other material transport by rail is not currently directly accessible to the site; however, a rail line is visible on the mine permit map running north out of Morganfield along State County Route 130. The rail line runs into Uniontown. A barge loading facility is located at the north of the site with a coal conveyor connecting the remainder of the site.
Transmission

Any energy facility will require access to electric transmission points. A 69kV line should be an adequate capacity to carry generated power from a solar facility in Kentucky. A nuclear, biomass, wind or CTL/CTG facility would require access to larger electric transmission points. Based on the Big Rivers Electric Corporation Transmission System Map, the closest suitable transmission line (161 kV or greater) is more than 5 miles away. A 69kV transmission line provides power to the site from Kentucky Utilities, according to site representatives. Additional power would be required at the site, but it may be possible to utilize the existing right-of-way to access the higher voltage lines. Consultation with Kentucky Utilities would be required to determine how the site will be able to access high voltage lines.

Natural gas is used as a feedstock and fuel in CTL/CTG and for some biomass facilities, making access to a supply important. Additionally, if the facility makes synthetic natural gas, access to a transmission pipeline will be important in getting products to market. A natural gas line was reported to be located to the east of the site, but the line was not observed or confirmed during the site visit. No gas transmission lines were observed on the property. Information obtained from the Kentucky Economic Development Cabinet's webpage indicates that the City of Morganfield and Sturgis Municipal Gas System are two natural gas suppliers in the area.

Water Supply

Available water supply is a critical project component for the development of a CTL/CTG, biomass or nuclear facility. The River View site is in the Ohio River Basin and the Hydrologic Unit Code (HUC) 11 at the site is 05140202170. Station 03322420 at Uniontown is the nearest USGS gauging station and is 2-miles downstream from the site. The lowest annual mean flow at the station is 52,152 million gallons per day (MGD), or 36,216,667 gallons per minute (gpm). The Ohio River will provide adequate raw water supply for a CTL/CTG facility, which will need in excess of 2,500 gpm or 3.6 MGD for a facility making 10,000 barrels of liquid fuel per day or for a biomass facility.
that may have cooling water needs. The Ohio River will also provide the minimum adequate raw water supply for a nuclear facility, which would need in excess of 8,000 gpm for cooling purposes.

**Workforce Availability**

Development of a CTL/CTG, biomass, or nuclear facility would require access to an adequate supply of construction and skilled labor. The labor market area for the proposed site would include Union, Henderson, Webster, and Crittenden counties in Kentucky, Saline and Gallatin counties in Indiana. Based on information developed by the Kentucky Economic Development Cabinet, these seven counties have a civilian workforce of approximately 147,000.

Source: [www.thinkkentucky.com](http://www.thinkkentucky.com)
Other General Characteristics

The proximity to military sites was reviewed in order to consider the potential impact of an energy facility to military training routes or long range radar. Based upon information produced by the Federal Aviation Administration’s Department of Defense Screening Tool, the proposed site is greater than 20 miles from any military site or long range radar.

Atmospheric extremes, such as tornadoes, are capable of structurally damaging a facility and must be considered particularly during siting for a solar, nuclear, or wind facility. Based upon FEMA mapping, the site is at a moderate risk for tornado activity.
TECHNOLOGY SPECIFIC CONSIDERATIONS

CTL/CTG
In addition to the common factors described above for energy site development, unique factors specific to a particular technology must be considered. For a CTL/CTG facility, access to coal resources is important. For this proposed site, coal resources are adequate. The Western Kentucky Coal Field covers approximately 6,400 square miles and contains approximately 35 billion tons of remaining resources. In 2007, offices of the Kentucky Office of Mine Safety and Licensing listed 3 active mining operations in Union County and 2 operations in adjacent Henderson County. River View Coal is a new underground operation that began construction in 2008 with an expected startup by the end of 2010. Annual production will be 9.2 million tons of raw coal, making River View the largest room and pillar underground mine in the United States.

Solar
Adequate solar radiation is critical to the successful generation of solar power. A successful site should be relatively free from land cover, and not within a mile of a corporate city boundary. The River View site has an average direct normal solar radiation of 3.94 KWh/m²/day and an annual average solar radiation for two-axis flat plates of 6.25 KWh/m²/day. Based upon this average solar radiation, too much cloud cover and haze is present to be effective as a large scale facility. Due to coal mining operations on the property, the site is free of trees or other land cover that could impact a solar facility. Solar installations in large mass can be a visual distraction to local communities and Uniontown is less than one mile east of the site.
Wind

The most critical component for a successful wind facility is adequate and consistent wind speed. In order to generate enough power to be a utility class facility, a mean average wind speed at 60 meters of 5.6 meters per second (m/s) or greater is required. Information obtained from AWS Truewind, indicates that the average wind speed at 60 meters for the site is 5.1 m/s. Without adequate wind speed, other factors, such as foundational concerns, potential visual impacts, telecommunication interference, impacts to birds and bats, as well as operational concerns such as ice shedding, noise, blade drop and throw, and flicker are moot. Wind speed measurements to accurately assess the available resource at any potential development site would be required prior to final planning.
Biomass

An adequate feedstock supply environment includes available crop residues, animal manure, forest residues from former silviculture or clearing, primary and secondary mill residues, urban residues (i.e., wood scraps from local business such as lumberyards), landfill gas, domestic wastewater, or switchgrass. Information obtained from the National Renewable Energy Laboratory indicates that the total biomass available within Union County is 117,147 tonnes/year. Biomass in Union and surrounding counties is 957,891 tonnes/year. These supplies (>500,000 tonnes/year) are expected to provide an adequate feedstock source, and provide some of the largest availability within the State. Analysis of the potential in the area to grow feedstock specifically for a biomass facility should also be part of the planning process.
Nuclear
A limiting factor to the development of a nuclear facility is available water supply. A minimum of 8,000 gpm or 11.5 MGD of water is required to meet basic facility needs. As previously discussed, the Ohio River is an adequate water supply for the development of a nuclear facility at this location.

Safety issues associated with nuclear facilities include ensuring an adequate controlled buffer zone of at least 2,000' radius around the facility and an effective emergency plan. These aspects mean that the best location for a nuclear facility is a rural, or undeveloped site. Based upon an aerial photograph with delineated site boundaries provided by the site sponsor, due to current use of the site, it does not appear that the placement of a reactor on the property at a feasible location would allow for a 2,000' radius from properties either located outside of its boundary or personnel placement locations on the property. Additionally the site is located within one mile of Uniontown and 20 miles from a population center of 25,000 persons or more. The emergency plan should take into account egress limitations that could potentially impede emergency efforts. Slight impediments to egress are present within 5 miles of the site. More specifically, infrastructures (bridges, intersections) associated with the small urban areas of Morganfield and Uniontown are within a five mile radius of the site. However, since these are not densely populated areas, major congestion is not likely. Reported frequent flooding of SR 360 from Uniontown to the site could also provide impediment to egress.

Atmospheric considerations can be important for a nuclear facility to avoid the possibility for interaction of the nuclear cooling system plume with a plume containing noxious or toxic substances from a nearby facility. The nearest air pollutant discharge source is in Uniontown, which is within one mile east of the site.

Suitability
In summary, the River View site, located within the Western Kentucky Coal Fields, is a
viable site for a potential alternative energy facility, particularly a CTL/CTG facility. The site scored a total of 1004 points, representing 84% of the total available points for a CTL/CTG facility. Similarly, the site scored a total of 977 points for a biomass facility, representing 78% of the total available points. The site offers a large acreage in an area suitable for development with good road access, adequate water supply, coal and biomass availability, and access to a barge facility for transportation needs. The workforce in the area appears to be more than adequate to support a facility. Access to adequate electrical power and natural gas will be important to develop as will the plans for mitigating wetlands impact. Extra effort may be needed to address suitable land area for building development due to the relatively large refuse disposal area.

Due to a low average mean wind speed, this location is not a viable location for a utility scale wind facility. Additionally, available solar radiation at the site is too low to produce a significant source of energy for a utility solar facility alone, with a site score of 565 points, representing 61% of the total available points. Sizeable, cleared areas on the property make this site fairly desirable for solar panel placement; however, proximity to public access areas and current operations may provide some constraint. It is recommended that a cost-benefit analysis be conducted prior to further investigate solar facility viability at this location.

The site scored a total of 556 points for a potential nuclear facility, representing 58% of the total available points. Although located in an area with ample water supply, potential impediments to ingress, proximity to other regulated air facilities, and an inadequate exclusion zone may provide site limitation. Furthermore, prior to development of a nuclear facility, foundation concerns and further geotechnical study would be required.