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Responsible Agency: U.S. Department of Energy

Title: Western Greenbrier Co-Production Demonstration Project, Draft Environmental Impact Statement (DOE/EIS-0361)

Location: Rainelle, West Virginia

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Abstract:

The Draft Environmental Impact Statement (EIS) for the Western Greenbrier Co-Production Demonstration Project provides information about the potential environmental impacts of the U.S. Department of Energy's (DOE's) proposal to provide federal financial assistance for the construction and demonstration of a 98 megawatt (MWe) net power plant and ash byproduct manufacturing facility to be located in the municipality of Rainelle, Greenbrier County, West Virginia. Western Greenbrier Co-Generation, LLC (WGC) proposes to design, construct, and operate an atmospheric pressure circulating fluidized-bed (CFB) power plant that would generate electricity and steam by burning approximately 3,000 to 4,000 tons per day of coal refuse from several local sites as the primary fuel. The facility would be constructed and demonstrated through a cooperative agreement between DOE and WGC under the Clean Coal Power Initiative Program. DOE's support would amount to approximately $107.5 million (up to 50%) of the development cost for the proposed facility. The proposed power plant would be the first commercial application within the United States of a CFB combustor featuring a compact inverted cyclone design.

DOE determined that the proposed demonstration project constitutes a major federal action within the meaning of the National Environmental Policy Act of 1969, as amended. The *Federal Register* "Notice of Intent To Prepare an Environmental Impact Statement for the Western Greenbrier Co-Production Demonstration Project, Rainelle, WV and Notice of Floodplain/Wetlands Involvement" was published on June 3, 2003 (68 FR 33111). DOE held a public scoping meeting on June 19, 2003 at Greenbrier West High School in Charmco, West Virginia. The Draft EIS evaluates the environmental consequences that may result from the Proposed Action and reasonable alternatives, including potential impacts on air quality, groundwater supply, noise and visual resources, wetlands, and floodplains. The EIS also analyzes the No Action alternative, under which DOE would not provide financial assistance to WGC.

Comment Period:

DOE will consider all comments received by close of business January 17, 2007 in preparing the Final EIS and will consider comments received after that date to the extent possible.

1. PURPOSE AND NEED FOR THE AGENCY ACTION

This section introduces the purpose and scope of the Environmental Impact Statement (EIS). The section also summarizes the project background and other aspects, including the site and surrounding area description, the project components and objectives, identification of environmental issues associated with the Proposed Action, and an explanation of the NEPA process.

1.1 Introduction

This EIS has been prepared by the United States Department of Energy (DOE), in compliance with the National Environmental Policy Act of 1969 (NEPA), as amended (42 USC 4321 et seq.), to evaluate the potential environmental impacts from providing federal financial assistance for the construction and demonstration of an approximately 98 megawatt (MWe net) power plant and cement manufacturing facility (hereafter referred to as the "WGC Project" or "Co-Production Facility"). The lead organization for the federal action, the National Energy Technology Laboratory (NETL), is a multi-purpose laboratory owned and operated by DOE. NETL has a mission to solve the environmental, supply, and reliability constraints of producing and using fossil energy resources to promote a stronger economy and a more secure future for America, while maintaining a healthy environment. The DOE goal for this project is to commercially demonstrate an innovative design for an atmospheric pressure, circulating fluidized-bed (ACFB) power plant that would generate electricity and steam using coal refuse (i.e., 'gob') as fuel while using the ash to produce cement that can be used in the manufacture of structural building blocks and other construction products.

1.2 Federal Action

Under the proposed federal action, DOE has entered into a 5-year cooperative agreement with Western Greenbrier Co-Generation, LLC (WGC) to provide financial assistance through the Clean Coal Power Initiative (CCPI) Program for the development of a Co-Production Facility to be located at Rainelle in Greenbrier County, West Virginia (see Figure 1-1). Key features of the proposed facility are described in Chapter 2. The facility would be designed for long-term commercial operation (at least 20 years) following completion of the cooperative agreement. The DOE support would be up to 50 percent of the development cost for the proposed facility. DOE's share of project costs would be paid back over a 20-year period following the one-year demonstration period based on a Repayment Agreement negotiated between DOE and WGC.

WGC is proposing to design, construct, and operate a 98 MWe net ACFB power plant that would generate electricity and steam by processing approximately 3,000 to 4,000 tons (2,720 to 3,630 metric tons) per day (tpd) (WGC, 2005a,b) of coal refuse as the primary fuel. A coal-fired rotary kiln coupled with the power plant would combine coal ash, limestone, and other waste materials into cement. The cement would be used by third parties at or adjacent to the site of the power plant to manufacture structural bricks, fast-setting specialty cements, and other products. The proposed power plant would be the first commercial application within the United States of a circulating fluidized-bed (CFB) combustor featuring a compact inverted cyclone design. This design could reduce the boiler system footprint and construction costs by approximately 40 percent, and would reduce construction time by approximately 10 percent. Additionally, the proposed Co-Production Facility would be the first commercial demonstration of cement manufacturing in the United States based substantially on waste materials, including ACFB ash.

In addition to electricity and cement, the proposed plant would co-produce steam and hot water and would serve as the anchor tenant for a new environmentally balanced industrial park. This ''EcoPark'' would use hot water produced from the plant's turbine exhaust to provide heat for buildings, agricultural activities, and aquaculture. Steam would be used for various heating and industrial processes, which might include hardwood drying. A 4-million ton (3.7 million metric tons) coal refuse site in Anjean, WV, and other coal refuse sites in the vicinity (e.g., Green Valley, Joe Knob, Donegan), would supply coal refuse fuel for the plant.

Excess combustion ash would be used to remediate acid drainage from the source coal refuse piles. If successfully demonstrated, this technology could be applied to many regions of the country for reclaiming coal refuse piles.

1.3 Purpose and Need

1.3.1 Purpose of Action

Under the CCPI Program, DOE has a mandate to promote the widespread commercial application of innovative technologies for more efficient and environmentally sustainable uses of coal by the power industry. The Proposed Action is intended to support this mandate through DOE's cooperative agreement with WGC for the commercial demonstration of an innovative Co-Production Facility.

1.3.2 Need for Action

1.3.2.1 DOE Need

DOE needs to accelerate deployment of innovative clean coal technologies that can meet near-term energy and environmental goals, reduce risk in the business community to an acceptable level, and provide incentives to the private sector for innovative research and development projects directed at solving various energy supply problems. Since the early 1970s, DOE and its predecessor agencies have supported research and development programs that include long-term, high-risk activities for the development of a wide variety of innovative coal technologies through the proof-of-concept stage. However, the availability of a technology at the proof-of-concept stage is not sufficient to ensure its continued development and subsequent commercialization. Before any technology can be considered for commercialization, it must be demonstrated. The financial risk associated with technology demonstration is, in general, too high for the private sector to assume in the absence of strong incentives.

The CCPI Program was established in 2001 as a government-industry partnership implementing a recommendation of the President's National Energy Policy (NEP) to increase investment in clean coal technology. Under the CCPI, candidate technologies are demonstrated at commercial scale to ensure proof of operation and facilitate potential widespread application. Through the use of cooperative agreements as incentives, DOE intends to accelerate commercial deployment of innovative clean coal technologies.

The WGC Project is one of eight candidates selected for further consideration by DOE in January 2003 from among 33 applicants during the first round of proposals submitted for the Program. In addition to demonstrating the first commercial application of the compact, inverted cyclone CFB design in the United States, the project offers a novel approach to converting some waste ash into commercial building products while also integrating power generation with remediation of coal refuse piles.

1.3.2.2 WGC Need

WGC was established as a Limited Liability Company owned by the municipalities of Rainelle, Rupert, and Quinwood in Greenbrier County, West Virginia. Those municipalities are located in an economically depressed coal-mining region of southern West Virginia. Area businesses have been closing and job opportunities have been shrinking as the local coal and timber industries have continued to decline. The state is also challenged by mine land remediation and reclamation needs resulting from several hundred abandoned mine sites and from an estimated 300 to 400 million tons (270 to 360 million metric tons) of coal refuse. West Virginia Department of Environmental Protection officials have characterized coal refuse as the state's primary environmental hazard, which will cost an estimated $2 to $3 billion for cleanup (WGC, 2002). WGC's need for the proposed Co-Production Facility is to:

- Create economic and social revitalization in western Greenbrier County through the development of an ecologically friendly and sustainable industrial park. This project might serve as a model for additional industrial parks regionally and in other comparable locations nationwide;
- Provide a low cost, reliable supply of steam and hot water for use by the industrial park;
- Provide electrical energy for export to the regional electric grid using coal refuse as fuel; and
- Demonstrate an economical coal refuse cleanup strategy by using the coal refuse as a fuel source and using the coal ash for both remediation of acid drainage from coal refuse piles and for the production of a cement material for use in the manufacture of building products by third parties.

1.4 NEPA Scoping Process

DOE determined that providing financial assistance for the construction and demonstration of the proposed Co-Production Facility constitutes a major federal action that may significantly affect the quality of the natural and human environment. Therefore, DOE prepared this EIS for use by decision-makers in determining whether or not to provide assistance. This EIS assesses the potential impacts on the natural and human environment of the Proposed Action and reasonable alternatives within the scope of the CCPI Program.

The EIS has been prepared in accordance with Section 102(2)(C) of NEPA, as implemented under regulations (40 CFR Parts 1500-1508) promulgated by the President's Council on Environmental Quality (CEQ) and as provided in DOE regulations for compliance with NEPA (10 CFR Part 1021). The EIS is organized according to CEQ recommendations (40 CFR Part 1502.10).

Figure 1-2 illustrates the opportunities for public involvement during EIS preparation. DOE published the Notice of Intent (NOI) to prepare the EIS in the *Federal Register* on June 3, 2003 (68 *FR* 33111) and sent copies to federal and state agencies. Publication of the NOI initiated the EIS process with a public scoping period (40 CFR Part 1501.7) for soliciting public input to ensure that (1) significant issues would be identified early and be properly studied, (2) issues of minimal significance would not consume excessive time and effort, (3) the EIS would be thorough and balanced, and (4) potential delays that could result from an incomplete or inadequate EIS would be avoided. The scoping period extended through July 3, 2003.

The NOI invited public participation in the NEPA process and announced the scheduling of a scoping meeting on June 19, 2003 at Greenbrier West High School in Charmco, West Virginia near the location of the proposed project. Announcements also were printed in the "Legal Notices" section of *The Valley Ranger* on June 15, *The West Virginia Daily News* on June 15 and 17, and *The Charleston Gazette* on June 15 and 17 (see Appendix A: Public Scoping Meeting). DOE also mailed notifications to 50 federal, state, and local agencies, public officials, and non-governmental organizations. The public was encouraged to provide verbal comments at the meeting and to submit comments to DOE by the close of the EIS scoping period. The NOI and announcements provided appropriate addresses and phone numbers where comments could be communicated to DOE via the U.S. Mail, e-mail, toll-free telephone, or facsimile.

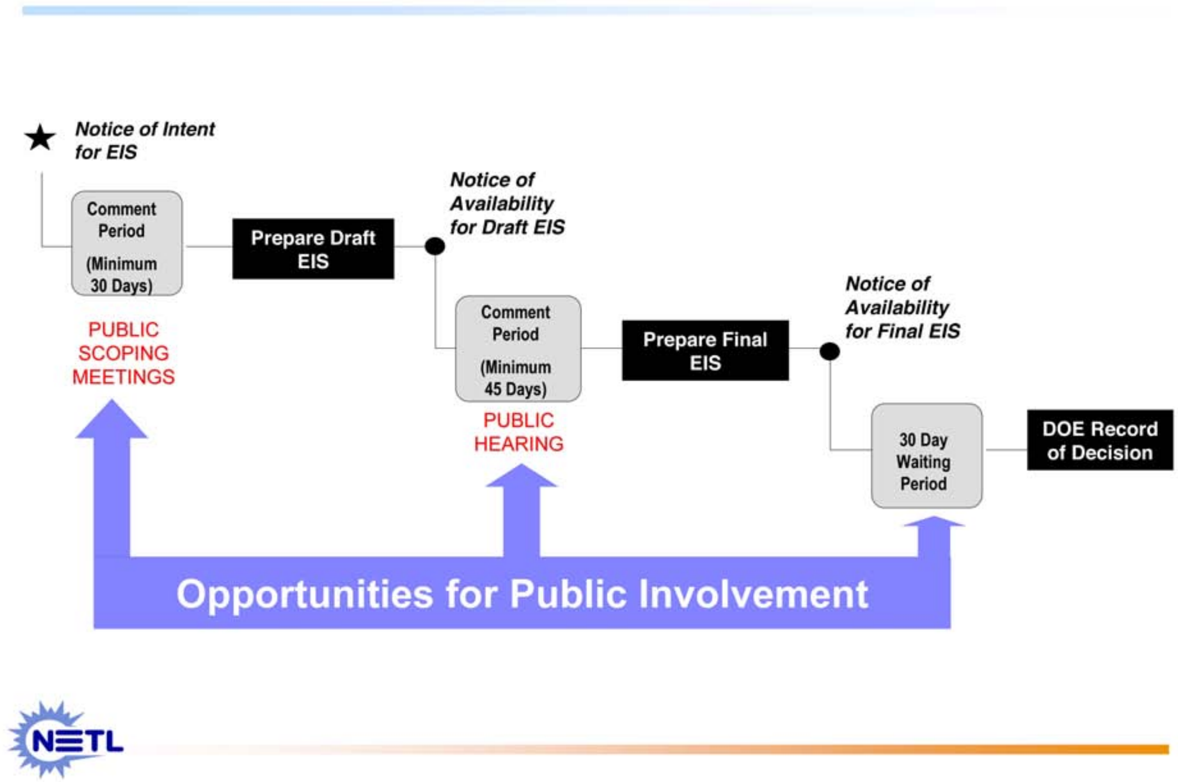


Figure 1-2. Opportunities for Public Involvement in the NEPA Process

A total of 228 individuals signed the attendance list for the public scoping meeting on June 19, 2003. The formal scoping meeting began at approximately 7:00 pm Eastern Daylight Time (EDT) and was adjourned at 9:14 pm. The formal scoping meeting was preceded by an informal information session from 4:00 to 7:00 pm, during which DOE and WGC representatives were available to answer questions about the project and EIS as depicted on graphic displays. Attendees were given handouts that included background information about the project, DOE, the CCPI program, and the NEPA process, as well as comment cards (see Appendix A Public Scoping Meeting). Individuals wishing to speak at the meeting were given an opportunity to sign up.

The formal scoping meeting began with a presentation by DOE representatives who explained the purpose of the meeting, the NEPA process, and the CCPI program. Next, a representative of WGC presented general and technical information about the proposed project. Afterwards, the floor was opened for comments and prepared statements by members of the public and interested parties in attendance. A court reporter was present to ensure that all oral comments were recorded. There were 22 attendees who spoke at the meeting, and 44 individuals submitted comment cards.

In addition to the comments received during the formal scoping meeting, 44 comments were received on comment cards (post cards), 13 comments were received by telephone, eight comments were submitted via e-mail, and four letters were received via the U.S. Mail during the June-July 2003 public scoping period.. Included in these comments was a letter from the U.S. Department of the Interior, National Park Service (NPS) providing scoping comments and indicating a desire to cooperate in preparation of the EIS (Appendix A). However, after discussion with DOE on the Proposed Action and the opportunities for cooperation, both the NPS the DOE agreed to cooperate informally. All submissions are maintained as part of the DOE Administrative Record.

1.5 Scope of this EIS

The scope of issues to be addressed in this EIS, and the significant issues related to the Proposed Action, were determined through several means including:

- The preliminary identification of issues by DOE as a part of the early project planning and internal scoping;
- The identification of issues and concerns expressed in comments received from the public and interested parties during the scoping process; and
- Additional issues identified by DOE as a result of state and federal agency consultation, data collection, data analysis, and other EIS-related efforts.

Table 1-1 lists the composite set of issues identified for consideration in the EIS. Issues are discussed and analyzed in this EIS in accordance with their level of relative importance. The most detailed analyses focus on air quality, transportation, noise, surface waters, flood hazards, and wetland impacts. As discussed in the following sections, comments received by DOE during the public scoping period generally aligned according to three categories:

(1) The need for the proposed project;

(2) Project aspects and alternatives that should be considered;

(3) Concerns about specific environmental resources that may be affected.

Table 1-1. Issues Identified for Consideration in the EIS

Issues identified in the Notice of Intent
• Air quality: Potential impacts from air emissions during operation of the power plant and kiln, impacts on sensitive receptors, increases in smog and haze, water vapor plumes, dust from construction and transportation, and impacts on special-use areas • Noise and light: Potential impacts resulting from construction, transportation of materials, and plant operation • Traffic: Potential impacts resulting from the construction and operation of the proposed facility, including changes in local traffic patterns, deterioration of roads, traffic hazards, and traffic controls • Floodplains and wetlands: Potential impacts on flood flow resulting from earthen fills, access roads and dikes constructed within the floodplain; impacts to wetlands • Visual: Potential impacts associated with plant structures, views from neighborhoods, impacts on scenic views, impacts from water vapor plumes and haze; internal and external perception of the local community • Reclamation: Potential impacts resulting from recovery of coal refuse and from the reclamation of the coal refuse source sites; mitigation of acid drainage from coal refuse piles, and other environmental improvements • Water quality: Potential impacts resulting from wastewater utilization and discharge, water usage, and reclamation of coal refuse sites • Infrastructure and land use: Potential environmental and socioeconomic impacts of plant construction, delivery of feed materials, recovery of coal refuse, steam and heat distribution, electric power generation and transmission, ash byproducts production and distribution, and site restoration • Water usage: Potential impacts on surface and groundwater resources and withdrawal of water from the municipal sewage treatment plant • Solid waste: Pollution prevention and waste management, including ash, slag, and wastewater treatment facility sludge • Cumulative effects that result from the incremental impacts of the proposed project when added to the other past, present, and reasonably foreseeable future projects • Ecology: Potential on-site and off-site impacts to vegetation, terrestrial wildlife, aquatic wildlife, threatened and endangered species, and ecologically sensitive habitats • Connected actions: Use of heat and energy from the plant for the adjoining EcoPark • Compliance with regulatory requirements and environmental permitting • Environmental monitoring requirements

Table 1-1. Issues Identified for Consideration in the EIS (continued)

Issues Identified During Public Scoping
• Demonstration of need for the proposed project based on demand for electricity in Greenbrier County
• Consideration of alternatives other than coal refuse combustion (use of higher-grade fuels, wind or solar power, energy conservation)
• Apparent dependence of power plant cost-effectiveness on the success of associated operations (EcoPark, ash byproducts production, use of ash for remediation)
• Air emissions of the proposed facility based on dispersion models, ability to obtain air permits, impacts on attainment (especially ozone) of NAAQS, use of Best Available Control Technologies, increased smog and acid rain, water vapor plumes and fog from cooling towers, air impacts on natural areas
• Human health impacts of air emissions, impacts on sensitive populations, impacts from the use of treated sewage effluent for power plant operations
• Water resources impacts from disturbance of the Anjean site and temporary storage of coal refuse piles, elevated stream temperatures from disposal of waste heat, reduced stream flow due to diversion of treated sewage effluent for power plant use, acid rain and mercury deposition in streams
• Impacts on wetlands and flood plains from project siting, impacts on property owners caused by wetland mitigation requirements
• Impacts on protected plant and animal species, terrestrial and aquatic ecosystems, including facility construction and operation as well as operations at the Anjean site
• Transportation and roadway infrastructure impacts from truck transport of coal refuse and ash, impacts on traffic, and roadway safety resulting from the use of overweight trucks
• Noise impacts along potential truck and rail routes for coal refuse and ash hauling; noise impacts from construction and operation of power plant and associated facilities
• Socioeconomic impacts on the community and county, local employment, potential effects on tourism, reductions in property values near facilities, vulnerability of project economic success due to dependence on EcoPark success, impacts on taxpayers to support the project
• Environmental justice issues due to the predominance of low-income households in the region
• Potential impacts on historic and archeological resources
• Materials and waste management impacts associated with Anjean site reclamation, storage areas for coal refuse at the plant, ash disposal and other waste products, potential radiation exposure associated with ash byproducts.
• Impacts on viewsheds, especially at nearby parklands, due to visible vapor plumes; other potential impacts on recreational resources
• Cumulative impacts from the construction of additional co-production plants in the region based on the successful demonstration of the proposed plant; cumulative impacts from coal mining and limestone quarrying to support the proposed plant
Further Issues Identified by the WGC Design Team
• Groundwater impacts from water supply wells
• Capacity of existing power transmission lines to receive electricity generated by the plant
• Availability of adequate sources of coal refuse in the vicinity of the proposed plant.

1.5.1 Comments on the Need for the Proposed Project

In the first category of comments received, most respondents commented favorably on the potential for economic stimulus and job creation offered by the proposed project. However, several respondents expressed concerns about the need for the proposed facility, both from the perspective of electricity demand and from the perspective of whether coal use is the best choice to meet that demand. A few respondents questioned whether the proposed project is an appropriate candidate for demonstration of CCPI goals. Most of these comments pertained to whether Greenbrier County needs a new generating plant, and whether the envisioned economic benefits of the proposed facility are valid, rather than whether the project would meet the DOE need to promote the goals of the CCPI program. Although these comments are relevant to decisions WGC faces about future demand and generating capacity and about the economic risks underlying the co-production concepts, the comments are not strictly relevant to the decision facing DOE. The need for DOE to demonstrate clean coal technologies under the CCPI program is different than the need for WGC to create local economic development. Nonetheless, the economic risks associated with the Co-Production Facility are considered in the socioeconomic analysis of Chapter 4.

1.5.2 Comments on Project Aspects and Alternatives

The second category of comments included concerns about the range of alternatives to be considered in the EIS. Specific comments were made to the effect that the project outcome should not be pre-determined by the choice of a low-grade fuel source (coal refuse). These respondents indicated that higher-grade coal, oil, or gas fuels would reduce emissions of air pollutants. Other respondents indicated that the EIS should include alternatives for renewable energy sources, such as wind and solar power that would reduce air pollutants, greenhouse gas emissions, and impacts on global climate change, or that the alternative of avoiding plant construction through increased energy conservation should be considered. Additional comments noted that the power plant should be evaluated on its own merits with respect to potential benefits and impacts, without assuming benefits that would be dependent on the success of the EcoPark, the unproven market for the building materials, and the uncertain effectiveness of using waste ash to neutralize acid drainage from the Anjean coal refuse site. In light of these comments, and considering the basis for DOE's involvement through the CCPI Program, Chapter 2 discusses the alternatives evaluated in the EIS. Because DOE's principal interest in the project is related to the advancement of CCPI Program objectives, and because the use of coal refuse as a fuel source is a key feature that influenced the selection of this project by DOE, this EIS does not evaluate alternative fuel sources or generation technologies.

Other comments in this category requested information to be included in the EIS about particular project aspects. Examples include questions about the ownership of the Anjean site and responsibilities for remediation, whether DOE funding would be contingent on the use of coal refuse from Anjean, and which entity would bear responsibility for disposition if plant operations were not cost-effective. Other requests for information to be provided in the EIS were raised in questions about the commercial viability of building material byproducts, including the leaching of any hazardous substances during weathering, the proposed users for generated steam and means for disposal of the excess, other byproducts that may be generated by the plant, the number of years of coal refuse supply available, and whether the disturbance of the coal refuse piles and the temporary storage of coal refuse at other sites would cause additional remediation problems. The description of the proposed facility in Chapter 2 is intended to provide relevant project details. Where these aspects may have potentially significant environmental impacts, the respective impacts on environmental resources are discussed in Chapter 4.

1.5.3 Specific Environmental Concerns

In the final category of comments, respondents raised specific concerns about potential impacts on environmental resources as summarized in Table 1-1. Where the concerns addressed in these comments were determined to be within the scope of this EIS, they have been evaluated in Chapter 4. However, the following concerns were determined to be outside the reasonable scope of this EIS for the reasons stated:

- Certain alternative energy sources (high quality coal, oil, gas, solar, wind, hydro) have not been included in this EIS, because these energy sources fall outside the scope of the CCPI Program, which focuses on developing new technologies for cleaner uses of coal. There are other DOE programs for the development and commercialization of other technologies, such as gas-fired power plants and renewable energy sources. However, alternatives that would not include or benefit coal-derived energy production would not be reasonable alternatives to the proposed federal action under the CCPI Program. High-quality coal has not been considered as an alternative because the proposed use of coal refuse as a fuel source was a principal factor in the DOE's selection of the proposed project for financial assistance.

- This EIS considers the favorable and adverse impacts of the Co-Production Facility as an integrated action consisting of the power plant fueled by coal refuse from the Anjean site, the cement manufacturing facility as recipient of waste ash, and disposal of the balance of the waste ash at the Anjean site to support the neutralization of acid drainage from that site. Although the EIS has not considered the construction and operation of the power plant as an independent action separate from the features that are part of the demonstration project to be supported by the CCPI Program, the EIS considers the impacts that may result in the event that certain connected features prove to be economically infeasible.
- An evaluation of impacts related to coal mining activities and the long-term impacts from fossil fuel depletion caused by the new coal requirements in the fuel blend for the Co-Production Facility was not evaluated because the WGC plant as currently proposed would rely on coal refuse from existing gob piles as a fuel source, without the addition of high-quality coal.
- It has been suggested that this project might serve as a model for several future projects to be undertaken by other communities in southern West Virginia. However, air emissions from this project, in combination with the air emissions from hypothetical future projects in West Virginia or elsewhere, will not be subjected to point-specific air dispersion modeling because the parameters of these other projects are too speculative. The number, locations and sizes of these future projects remain completely unknown, so there is no data for such modeling.

1.6 Related Actions

This section explains the relationship between this EIS and other relevant NEPA compliance documents and DOE activities. Section 1.6.1 summarizes other NEPA documents that may affect the Proposed Action or otherwise be of interest to decision-makers concerned with the Proposed Action. Section 1.6.2 provides additional information about the CCPI program and lists the other demonstration projects selected by DOE from potential candidates in the first round of proposals.

1.6.1 Related NEPA Compliance Actions

1.6.1.1 Final Programmatic Environmental Impact Statement, Clean Coal Technology Demonstration Program, U.S. Department of Energy, November 1989

In November 1989, DOE issued the Final Programmatic EIS (PEIS) for the Clean Coal Technology (CCT) program. That program selected demonstration projects for cost-shared federal funding and was a predecessor to the CCPI program. The PEIS addressed the potential environmental benefits and consequences in 2010 of widespread commercialization in the private sector of successfully demonstrated clean coal technologies.

Two alternatives were evaluated in the PEIS: (1) The No Action alternative assumed that the program would not fund new initiatives and that the industry would continue to use conventional coal-fired technologies with controls to meet New Source Performance Standards (NSPS). (2) The Proposed Action alternative assumed that the program would fund selected demonstration projects and that successfully demonstrated technologies would reach widespread commercialization by 2010. For the Proposed Action, the PEIS projected changes in four environmental parameters of concern (sulfur dioxide, nitrogen oxides, carbon dioxide, and solid waste) assuming maximum commercialization of 22 generic clean coal technologies. The PEIS assumed a national mix of energy supply components consistent with the long-range projections of the National Energy Policy Plan (NEPP-V) in effect at the time. The national mix included liquids, gas, nuclear, renewable sources, hydro, and other components in addition to coal. The PEIS assumed that the national mix would remain constant for the Proposed Action and No Action alternatives and considered only changes in the four parameters of concern that would occur between the two alternatives relating to coal use.

Among the 22 generic clean coal technologies considered in the PEIS, two fluidized-bed processes were evaluated (Circulating Atmospheric Fluidized-Bed and Pressurized Fluidized-Bed). The PEIS projected that maximum commercialization of the Circulating Atmospheric Fluidized-Bed technology could result in a 44 percent reduction in sulfur dioxides, 17 percent reduction in nitrogen oxides, 5 percent reduction in carbon dioxides, and 8 percent increase in solid waste in 2010 compared to the No Action alternative with the same use of coal in the national mix of energy supply. The study also projected that maximum commercialization of the Pressurized Fluidized-Bed technology could result in a 48 percent reduction in sulfur dioxides, 17 percent reduction in nitrogen oxides, 8 percent reduction in carbon dioxides, and 4 percent reduction in solid waste in 2010 compared to the No Action alternative. These changes were considered to be significant and, along with favorable reductions demonstrated by the other clean coal technologies evaluated, were considered to provide potentially significant beneficial effects on air quality for the Proposed Action (CCT implementation) compared to the No Action alternative.

The PEIS provided a basis for DOE decision-making in the selection of proposed projects for cost-shared federal funding. The PEIS also stated that: "Site-specific NEPA documentation will be prepared for each project selected by DOE for cost-shared funding and will be made publicly available."

1.6.2 Related DOE Activities

CCPI is a multi-year program funded at a total federal cost of up to $2 billion with the private sector sharing at least 50 percent of the cost. Through competitive selection, the program funds organizations that can develop promising new concepts rapidly to a point enabling private sector decisions on deployment. CCPI builds on the successful accomplishments of the joint government-industry Clean Coal Technology (CCT) program in the 1980s and 1990s that helped achieve sharp declines in pollutant emissions from U.S. power plants.

The CCPI program is driven by research and innovations in the private sector. Potential applicants include industry, manufacturing and service corporations, research and development firms, energy producers, software developers, academia, and other interested parties. Selected projects address needs not being met by the private sector and technologies that have not been proven commercially in the United States. Key selection criteria include the applicability to existing or future advanced energy systems and the potential for substantial public benefit.

The WGC facility is one of eight projects selected competitively for further consideration during January 2003 from among 33 applicants during the first round of proposals submitted under the CCPI program. The other seven projects are:

- **Great River Energy - Increasing Power Plant Efficiency through Lignite Fuel Enhancement**. The objective of this project at the Great River Energy Coal Creek Station in Underwood, North Dakota, is to demonstrate moisture reduction of lignite coal using waste heat, thereby increasing its value as a fuel in power plants.
- **Colorado Springs Utilities – Integration of Advanced Emissions Controls to Produce Next-Generation Circulating Fluid Bed Generation Unit**. This project aims to layer low-cost

emission-control technologies in a way that achieves better environmental performance than current state-of-the-art circulating fluidized bed systems. (Withdrawn)

- **Commercial Demonstration of the Airborne Process**. This project is a full-scale demonstration of advanced emission control technologies integrated with existing emissions control equipment. The host site is the 524 MW Unit 2 at the LG&E Energy Corporation's Ghent Generating Station, located near Carollton, Kentucky. (Withdrawn)
- **Demonstration of Integrated Optimization Software at the Baldwin Energy Complex**. For this project, NeuCo, Inc. will demonstrate integrated on-line optimization systems at Dynegy Midwest Generation's Baldwin Energy Complex in Baldwin, Illinois.
- **Advanced Multi-Product Coal Utilization By-Product Processing Plant**. The University of Kentucky Research Foundation in partnership with LG&E Energy Corporation will design, construct, and demonstrate an advanced coal-ash beneficiation processing plant at the 2,200 MW Ghent Generating Station near Carollton, Kentucky.
- **TOXECON Retrofit for Mercury and Multi-Pollutant Control on Three 90 MW Coal-Fired Boilers**. Wisconsin Electric Power Company will design, install, operate, and evaluate the TOXECON process as an integrated emissions control system for mercury, particulate matter, SO2, and NOx at the Presque Isle Power Plant in Marquette, Michigan.
- **Gilberton Coal-to-Clean Fuels and Power Project**. WMPI PTY, LLC of Gilberton, Pennsylvania has assembled a team to design, engineer, construct, and demonstrate the first clean coal power facility in the United States using coal refuse gasification as the basis for clean power, thermal energy and clean liquid fuels production.

1.6.3 Related Regional Activities

Invenergy Wind LLC of Chicago, Illinois is currently planning a wind-powered electricity generation project in northern Greenbrier County. The project would have a nominal average generating capacity of 40 to 45 MWe, with a peak generating capacity of approximately 200 MWe, and it would be sited on Field Mountain east of the Grassy Falls Substation. The Invenergy project information was submitted to PJM (Pennsylvania-Jersey-Maryland) Interconnection, and it has been identified as PJM Project #M24. PJM is the regional transmission organization (RTO) that coordinates the movement of wholesale electricity in the region and is responsible for maintaining the integrity of the regional power grid, and for managing changes and additions to the grid to accommodate new generating plants, substations and transmission lines. PJM has reviewed the proposed connection to the regional power grid by the WGC power plant based on the anticipated completion and connection of the Invenergy project. The results of the PJM Impact Study Report are discussed in Section 4.12 of this EIS.

1.7 CCPI Program Considerations Under NEPA

Merely providing financial assistance to private sector investments in energy systems places DOE in a more limited role than if the federal government were the owner and operator of the energy systems. In the latter case, DOE would be responsible for a comprehensive review of reasonable alternatives for power generation, as well as for the siting of proposed facilities. However, while dealing with applicants under the CCPI program, the alternatives available to DOE are necessarily more restrictive. Once DOE selects a prospective applicant and project, the agency must defer to the reasonable alternatives available to the applicants within the constraints of the application and the applicant's needs for the project.

This relationship creates an important distinction between alternatives that might be available to WGC as a generator of electricity and alternatives that are available to DOE as the federal sponsor of an energy program initiative. Because the proposed federal action is to partially finance a project that was proposed in response to a public solicitation for demonstration projects, DOE may accept or reject the proposal, "as is," or subject to conditions (e.g., mitigation measures), and will have significantly reduced opportunity to determine alternative sites or technologies. In other words, the reasonable alternatives available to DOE are either to partially finance the applicant's project or to decline to participate in the project. If DOE elects to provide financial assistance for the WGC Project under a cooperative agreement, the agency may also specify measures to mitigate potential impacts as identified in the EIS. If DOE declines to provide financial assistance for the WGC Project, the agency may choose to fund a project proposed by another applicant during a future round of the CCPI solicitations. In the absence of DOE funding (the federal No Action alternative), it is unlikely that WGC would elect to construct and operate the Co-Production Facility.

The scope of this EIS includes potential impacts that the proposed project may have on the natural and human environment in the region of influence. The region of influence for the proposed project will depend upon the environmental resource affected. The site for the proposed project, the associated EcoPark, and the coal refuse sites represent the narrowest regions of influence in which environmental resources may be affected. For some resources, such as biological and cultural resources, the region of influence may extend beyond these sites into lands adjacent to the property boundaries. For other resources, such as socioeconomics and transportation, the region of influence may encompass the surrounding local communities. Even other resources, such as air quality, may have regions of influence that extend beyond municipal and county boundaries.

2. THE PROPOSED ACTION AND ALTERNATIVES

This section describes the Proposed Action, alternatives to the Proposed Action including the No Action alternative, and alternatives eliminated from further consideration. In addition, proposed technologies that are integral to the project are described to provide the reader with sufficient information to understand the scope and purpose of the major project elements.

2.1 Proposed Action

2.1.1 DOE's Proposed Action

Under the Proposed Action, DOE would provide cost-shared funding to a private-sector applicant for the design, construction, and demonstration of a Co-Production Facility based on an innovative atmospheric-pressure circulating fluidized-bed (ACFB) boiler with a compact inverted-cyclone design. In addition to producing electricity and steam, the Co-Production Facility would include a kiln that would produce cement for use in the production of structural brick and other similar products. The Co-Production Facility would utilize coal refuse (also referred to as "gob") from nearby coal refuse sites as the primary fuel source, and portions of the ash generated by the circulating fluidized-bed (CFB) would be returned to the coal refuse sites for use in site reclamation efforts. DOE has entered into a 5-year cooperative agreement with Western Greenbrier Co-Generation, LLC (WGC) to provide financial support through the CCPI program. The cooperative agreement consists of four phases including:

- Phase I - Project Definition
- Phase II - Detailed Design and Construction
- Phase III - Start-Up and Test
- Phase IV – Demonstration (12 months)

DOE has authorized Phase I of the cooperative agreement to provide financial assistance for technical and economic evaluations to identify the optimum plant configuration and to establish a reliable capital cost estimate in the form of fixed price bids for detailed design and construction. This phase also includes the development of the financial structure and legal documentation necessary to obtain bond financing for subsequent phases of the project. DOE will use data prepared in Phase I to facilitate its decision-making process related to the execution of the remaining three phases of the cooperative agreement. Phases II, III, and IV are contingent upon a Record of Decision (ROD) by DOE to go forward with funding of these phases. DOE's total participation under the cooperative agreement could be approximately $107 million for the project. The new Co-Production Facility would be designed by WGC for long-term commercial operation (at least 20 years) after completion of the cooperative agreement with DOE.

2.1.2 Western Greenbrier Co-Generation (WGC), LLC Project Overview

WGC was a successful applicant in Round 1 of the CCPI program and will be ultimately responsible for the siting, design, construction, and operation of the facility and related components. WGC is collectively owned by the towns of Rainelle, Rupert, and Quinwood, and its mission is to provide economic development for the area through the construction and operation of the proposed facility. WGC has the following specific objectives for the project:

- Utilize coal refuse as fuel to generate approximately 98 MWe (net) for sale while remediating a significant environmental hazard through the elimination of multiple coal refuse piles in the vicinity of Rainelle.
- Process a significant fraction of the combustion ash in a kiln to convert it physically and chemically to a cement material, while routing the exhaust gas from the kiln back to the power plant to reduce kiln emissions. The cement could be sold to third parties for use in the manufacture of building products (e.g., structural blocks).

- Return the balance of waste ash to the coal refuse sites to assist in remediation efforts by providing a source of alkalinity to neutralize acid runoff.
- Provide process steam and recover waste heat from the steam cycle, which is normally rejected to a heat sink such as a cooling tower, for productive use in heating local buildings, greenhouses, and aquaculture facilities.
- Generate sufficient revenues from the sale of electricity, cement, and recovered heat to repay the private and government funds used to finance the project. The sponsoring municipalities aim to foster economic development in the region.
- Demonstrate that the integrated project concept is technically and economically viable for larger, commercial scale units (e.g. >200 MWe).

The main focus of the WGC Co-Production Facility Project is the construction and operation of the 98 MWe generating plant that utilizes the technologies described in Section 2.3. However, there are several unique and important aspects of the project that extend beyond the construction and operation of the power plant. In addition to generating power for the national grid and demonstrating the inverted cyclone technology, the proposed plant is intended to use coal refuse as its primary fuel source, to apply potential waste streams to beneficial uses, and to serve as an economic catalyst for the region by providing an anchor tenant for a planned industrial park (the "EcoPark") to be located in Rainelle. As a result, there are connected actions associated with the excavation and reclamation of the proposed coal refuse piles (e.g., beneficiation of the coal refuse by a third party), the additional industrial activities that may occur with the project (e.g., potential production of building products from the cement), and potential future commercial and industrial development that are intended to occur as a result of the plant. These additional project aspects are not integral to the DOE decision on whether to provide cost-shared funding to demonstrate the clean coal technologies of interest.

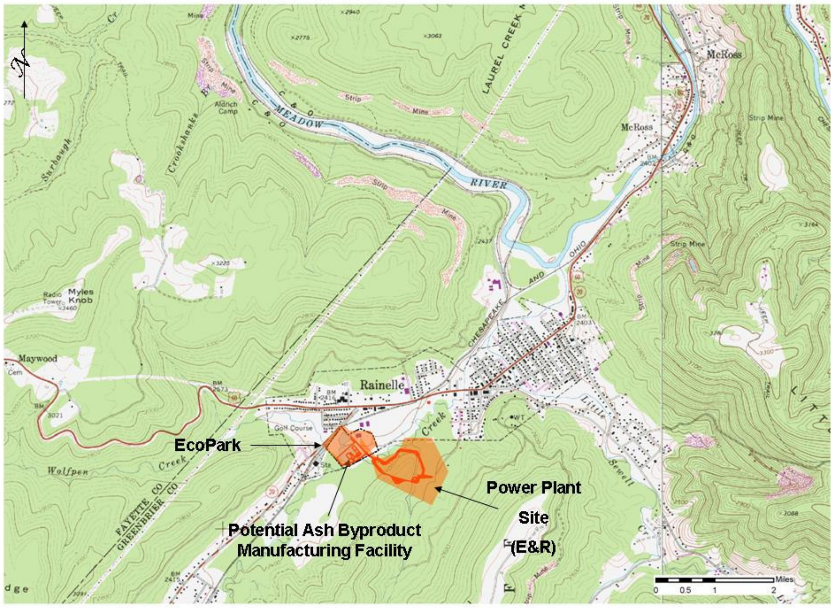
2.2 Locations of Principal Project Features

This section describes the principal project features and provides an overview of the major components of the WGC Project. Because planning considerations are beyond the realm of consideration by the federal decision-makers, they are presented in Section 2.4 for comparative purposes and to provide additional background information. The proposed project and related elements cover a number of areas in the vicinity of Rainelle, West Virginia (see Figure 2.2-1). Rainelle is located in western Greenbrier County, approximately 30 miles (50 kilometers) northwest of Lewisburg (the county seat) on US 60 (also referred to as the Midland Trail). The major components of the project, as described in the following sections, include:

- Power Plant Site, Cement Kiln and potential ash byproduct facilities, and EcoPark
- Fuel Sources
- Beneficiation/Prep Plant Site
- Limestone Sources
- Water Supply Sources
- Material Transportation
- Power Transmission Corridors

2.2.1 Co-Production Facility

The proposed site for the Co-Production Facility is located principally in an area identified as the "E&R Property," which is positioned just within the southwestern city limits of Rainelle (see Figures 2.2-2 and 2.2-3). The site includes approximately 23 acres (9 hectares) of land directly southeast of the proposed EcoPark site across Sewell Creek. From its boundary with Sewell Creek, the site extends to the east and southeast astride the partially leveled northeastern end of a ridgeline connected with Sims Mountain. The proposed EcoPark site is located within the city limits of Rainelle and consists of approximately 26 acres (11 hectares) of land between Sewell Creek, Wolfpen Creek, and a CSXT rail line that parallels WV 20. The potential ash byproduct manufacturing facilities (privately financed and independent of the Co-Production Facility) is currently planned to be located in the southern portion of the EcoPark property on a 6-acre (2-hecatre) site immediately northwest of Sewell Creek.



View from US 60 looking south

View from EcoPark site looking south

Figure 2.2-2 WGC Project Site

2.2.2 Fuel Sources

A major feature of the WGC Project is the use of coal refuse from nearby coal refuse piles, also referred to as "gob" piles, as a primary fuel source for the boiler. This feature is important, because it is expected to provide added benefits to the state by addressing a persistent regional problem – water quality deterioration due to runoff and leachate from coal refuse piles – in addition to generating economic benefits associated with the construction and operation of the Co-Production Facility.

WGC is considering coal refuse sites that are within approximately 30 miles (50 kilometers) of Rainelle (see Figure 2.2-4), that are reasonably accessible from existing roads, and that have acceptable coal refuse characteristics (e.g., British thermal unit (BTU) value, sulfur content, particle size, etc.). WGC's conceptual design has identified four coal refuse sites (Anjean, Joe Knob, Donegan, and Green Valley) that would serve as the initial fuel sources for the Co-Production Facility (see Figures 2.2-5 through 2.2-8). WGC proposes to extract coal refuse from these four sources over a 20-year operating period at a rate of approximately 1.2 million tons (1.1 million metric tons) per year. It is expected that the sequence of use and the period required to completely use each coal refuse source would be as follows:

- Anjean (3.5 million tons [3.2 million metric tons]) – 3 years;
- Joe Knob (approximately 1.5 million tons [1.4 million metric tons]) – 1 year;
- Donegan #1 (approximately 12 million tons [11 million metric tons]) – 11 years; and
- Green Valley (6 million tons [5 million metric tons]) – 5 years.

Donegan and Joe Knob are currently undergoing core drilling and volumetric measurements to determine more accurately the potential amount of available fuel supply. These initial sites were selected by WGC in collaboration with WVDEP. When these sources become depleted, additional sites will be identified and considered in accordance with WVDEP clean-up priorities.

Anjean Site – The initial fuel supply for the Co-Production Facility would come from Anjean Mountain, also referred to as Buck Lilly (see Figures 2.2-5 and 2.2-16), an abandoned surface mine, which is located approximately 14 miles (23 kilometers) northeast of the Co-Production Facility site. This site is owned by the Western Greenbrier Business Development Corporation (WGBDC). The entrance to Anjean Mountain is approximately 6 miles (10 kilometers) north of Rupert on Anjean Road (CR 1).

Figure 2.2-5. View of Anjean Mountain

Green Valley Site – The Green Valley coal refuse site (see Figures 2.2-6 and 2.2-17) is located approximately 12 miles (19 kilometers) north of Rainelle and 3 miles (5 kilometers) north of Quinwood on WV 20, just east of the community of Green Valley in southern Nicholas County. The site is owned by the Green Valley Coal Company (GVCC). The northwest portion of the site is bordered by WV 20, and Hominy Creek and a small tributary borders it along the south and east.

Figure 2.2-6. View of Green Valley

Initially WGC's intent was to focus on using these two coal refuse pile sites assuming that they could provide at least 11 years of fuel to the facility (WGC, 2005). However, project financing agreements under negotiation by WGC would require a minimum of 20 years demonstrated fuel supply. Therefore, WGC has evaluated additional coal refuse pile sites and is currently investigating sites located at the former Donegan and Joe Knob mines (see Figures 2.2-7 and 2.2-8).

Figure 2.2-7. View of Donegan

Donegan Site –The Donegan Site (see Figures 2.2-7 and 2.2-18), which is owned by the Falcon Land Company, LLC, is located along CR 39/14 and is adjacent to the community of Jetsville in southeastern Nicholas County. The site is approximately 14 miles (23 kilometers) north of the Anjean coal refuse site and is located a total of 28 miles (45 kilometers) from Rainelle (see Figure 2.2-1 for site vicinity map).

Figure 2.2-8. View of Joe Knob

Joe Knob – The Joe Knob site is located on lands managed by Mead–Westvaco (see Figures 2.2-8 and 2.2-16) approximately 2 miles (3 kilometers) east of the Anjean site following the same access road off CR 1 that reaches Anjean's Buck Lilly pile.

2.2.3 Beneficiation/Prep Plant Site

WGC intends to procure the services for crushing, sizing, and beneficiation of coal refuse from a third party, which would design and construct a "Low Elevation Coal Processing Plant" (hereafter referred to as a prep plant). The prep plant system is a fairly new innovation, which can be used in conjunction with modern surface mining methods to provide beneficiated coal at or near a mine site. The major advantage to the proposed prep plant is the reduction in its height and structures and its modular design, which is optimized for the relative ease of construction and disassembly for relocation and use at another coal refuse source. The beneficiation process is described in Section 2.3.6, and planning considerations for the prep plant are described in Section 2.4.4.

Figure 2.2-9. View of AN1

As was mentioned in Section 2.2.2, the sequence of use for the four sources of coal refuse would begin with Anjean and Joe Knob, then Donegan, and finally Green Valley. For the purposes of siting a prep plant, Anjean and Joe Knob are considered one source because of their close proximity to each other (access between both coal refuse piles is within 2 miles [3 kilometers] and on the same haul road). Therefore, a total of three sites would ultimately be used for prep plant operations at different stages of the project. To minimize transportation-related impacts, such as costs, traffic safety, and exhaust emissions, the location of the prep plant would ideally be at or near the fuel source. The suitability of a site for a prep plant would be based on several siting criteria, including property availability, acreage, accessibility, proximity to coal refuse source, utilities, environmental impacts (e.g., potential for flooding) and required permits.

Figure 2.2-10. View of AN2

WGC is in the preliminary stages of screening prep plant sites and has identified six areas as possible candidates. The candidate sites are presented in Figures 2.2-9 through 2.2-15. AN1, AN2, and AN3 are candidate locations for the prep plant to process coal refuse from the Anjean and Joe Knob sites. DN1 and DN2 are candidate sites for the Donegan prep plant, and GV is the proposed location for the prep plant at Green Valley. The majority of the sites are located within a mile or two of the fuel source that they would be processing, with the exception of DN2, at Beech Knob, which is located approximately 7 miles (11 kilometers)

Figure 2.2-11. View of AN3

south of Donegan. All of the sites, with the exception of DN2, are located away from homes, businesses and other sensitive receptors. DN2 is adjacent to the current property owner's residence.

AN1 is located near the valley bottom and near the base of the access road leading to the Anjean coal refuse pile. The land is maintained by Mead-Westvaco. Currently, the site includes settling ponds that are used by WVDEP to manage some of the runoff from Anjean's coal refuse area. AN2 is located west of CR 1 and is directly across CR 1 from the access road leading to the Anjean coal refuse pile. This property is owned by Mead-Westvaco and includes an abandoned rail line and gravel road. AN3 is located at the foot of the Buck Lilly pile along the access haul road. This area is currently owned by WGBDC and is approximately 2 miles (3 kilometers) west of Joe Knob.

DN1 is the location of a previously developed site on CR 39/14, which provides access to the Donegan site. The site includes an abandoned building, which was used in the past for Donegan's mining activities. This site is located on the west side of CR 39/14 and is approximately 500 feet (150 meters) north of the access road to the Donegan coal refuse pile. The land is currently being held by the state for tax recovery.

DN2 is on developed, private property adjacent to CR 1 and may have been used in the past for agriculture. This location is approximately 7 miles (11 kilometers) south of Donegan. An existing haul road, which parallels CR 1, was used in Donegan's mining past and could be used again by off-road trucks to transport coal refuse to a point of intersection with CR 1 approximately 10 miles (16 kilometers) south of Donegan. DN2 could potentially serve the Anjean, Joe Knob, and Donegan sites.

At this time, WGC has identified one area to potentially serve as the prep plant site for the Green Valley coal refuse pile. Access to the site is located along WV 20, in the vicinity of the coal refuse pile. The site is situated along the southern boundary of the refuse pile and is partially located on the pile.

Figure 2.2-12. View of DN1

Figure 2.2-13. View of DN2 (Beech Knob)

Figure 2.2-14. View of GV

2.2.4 Limestone Sources

The proposed facility will require limestone for sulfur removal in the boiler operations and for a kiln that produces "clinker" as a raw material for cement production. Because the kiln requires a higher quality limestone than does the boiler, WGC evaluated several commercial sources for limestone supply, including the Alta, Savannah Lane, Greystone, Fort Springs, and Mill Point quarries (see Figures 2.2-1 and 2.2-19). WGC also considered the use of lime kiln dust to serve as the source of calcium oxide, versus limestone, for the kiln operations. Lime kiln dust could be obtained from sources located in Virginia or from shipments received via barge in Charleston, West Virginia. Potential sources of limestone are described further in Section 2.4.5.

Figure 2.2-19. Typical Quarry Site (Greystone)

2.2.5 Water Sources

The principal sources of water for the plant process would include treated effluent from the Rainelle Sewage Treatment Plant (RSTP) supplemented by water withdrawn from the Meadow River and/or from local groundwater wells. These potential water sources are described in Section 2.4.6. A water pipeline would convey treated effluent to the WGC site from the RSTP, which is located at the confluence of Sewell Creek and the Meadow River. The proposed corridor for the water line would primarily follow existing pipeline easements held by the Public Service District #2 (PSD#2) to the site as depicted in Figure 2.2-3. Depending upon the availability of customers, steam lines may also be extended along the water line corridor and could potentially be routed to industrial users in the EcoPark or elsewhere in the immediate vicinity of Rainelle.

2.2.6 Material Transportation

Several material streams would be transported to and from the plant on a day-to-day basis. On the input side, the largest material sources would be the CFB fuel and limestone needed for sulfur removal and kiln operations. Initially, coal refuse would be transported off road from Anjean/Joe Knob, then Donegan, and finally Green Valley to the respective prep plant site servicing the coal refuse pile. The resulting beneficiated coal refuse would be transported to the CFB plant site using equipment and routes described in Section 2.4.7. As these fuel sources are depleted, other coal refuse sites would be used as identified by WVDEP within the 30-mile (50-kilometer) radius of Rainelle. The most likely sites are located along either WV 20 or US 60 (see Figure 2.2-4).

Limestone sources are generally located in the vicinity of Lewisburg. Other inputs delivered on a smaller scale would include aqueous ammonia for NO_x reduction at the power plant, an alumina source, and a gypsum source. There are several options under consideration by WGC for transportation of coal refuse and limestone as described in Section 2.4.7. Delivery of other materials would be the responsibility of the respective commercial suppliers.

On the output side, the largest waste streams requiring transport from the site would be fly ash and bottom ash generated by the boiler, along with smaller amounts of general solid wastes. Marketable outputs could include cement and other ash byproducts from the EcoPark. A portion of the bottom ash would be transported to the clinker kiln as raw material for the cement manufacturing facility. The fly ash and excess bottom ash not required for cement production would be returned to the coal refuse sites in the trucks that delivered the beneficiated coal refuse. WGC would contract for the collection and disposal of general solid wastes. Distribution of ash byproducts to market and collection of general solid wastes for EcoPark facilities would be the responsibility of the respective organizations.

2.2.7 Power Transmission Corridors

The WGC Co-Production Facility would produce electricity for distribution on the national power grid. An existing American Electric Power (AEP) transmission corridor right-of-way (ROW) is located approximately 4,000 feet (1,220 meters) west of the proposed WGC power plant site (see Figure 2.2-3). Initial WGC plans included connecting at this point on the power network via a proposed transmission line that would cross WV 20, traversing in a northwesterly direction. However, as project planning and coordination with PJM (Pennsylvania Jersey Maryland) Interconnection progressed, it was determined that the electrical capacity of the existing AEP transmission lines was not sufficient to support the load from the plant without substantial upgrades in both directions. As a result, network reinforcements were considered too costly for this approach to be viable.

Current plans provide for an interconnect point at the Grassy Falls substation, which is approximately 18 miles (29 kilometers) north of Rainelle. Transmission corridor options under consideration by WGC are described further in Section 2.4.8.

2.2.8 Land Exchange

The proposed transmission corridor from the Co-Production Facility site to the existing AEP transmission line traverses approximately 17 acres (7 hectares) of land owned by the City of Rainelle. The property ranges from 300 to 500 feet (90 to 150 meters) in width and is approximately 2,000 feet (600 meters) in length from east to west. This land has been set aside for recreational and other public uses, and it includes a small picnic area that abuts WV 20 and the Greenbrier Hills Golf Club. Because public funds for open space recreation were used to reserve this property, the land cannot be used for a transmission corridor unless it is acquired and replaced with like property. As a result, WGC has worked with a local property owner, Plum Creek Timberlands, L.P., which has agreed to acquire the property and provide alternate property in exchange (i.e., the "exchange property"). The exchange property is located between the AEP transmission line and US 60, immediately west of the Rainelle golf course (see Figure 2.2-3).

2.3 Process and Technology Description

This section provides an overview of the technologies proposed as part of the WGC Co-Production Facility. In the most general terms, the proposed plant would burn coal refuse to generate steam for the purpose of driving a turbine to produce electricity. The co-production aspect refers to the production of electricity while simultaneously producing cement.

2.3.1 Circulating Fluidized-Bed

Fluidized-Bed Combustion (FBC) boilers use some form of particulate matter, typically coal ash or limestone, to make up a "bed." Combustion air is passed through the bed causing the particulates to become partially supported by the air resulting in a suspended mass that behaves like a fluid. When fuel (e.g., coal or coal refuse) is burned in this bed, the combustion process can be carefully adjusted to limit emissions by controlling bed parameters. In addition, various sorbents, such as limestone, can be added to the bed to capture pollutants that would otherwise be emitted from the stack.

In general, FBC boilers can be divided into two types: bubbling fluidized bed (BFB) boilers and circulating fluidized bed (CFB) boilers. The BFB boilers operate at low air velocities, which results in the bed particles remaining in the bed. The CFB boilers operate at velocities that are 3 or 4 times those in a BFB, which results in the bed particles being carried out of the boiler with the combustion gases. Thus, in a CFB the bed materials must be continually replenished or "circulated" back into the boiler. This recirculation is achieved by separating the larger particles from the gas stream, typically by using a cyclone separator (WGC, 2002).

In the United States, CFB technology has been utilized in a broad spectrum of qualifying facilities and independent power projects since the 1980s. The CFB process facilitates power production while

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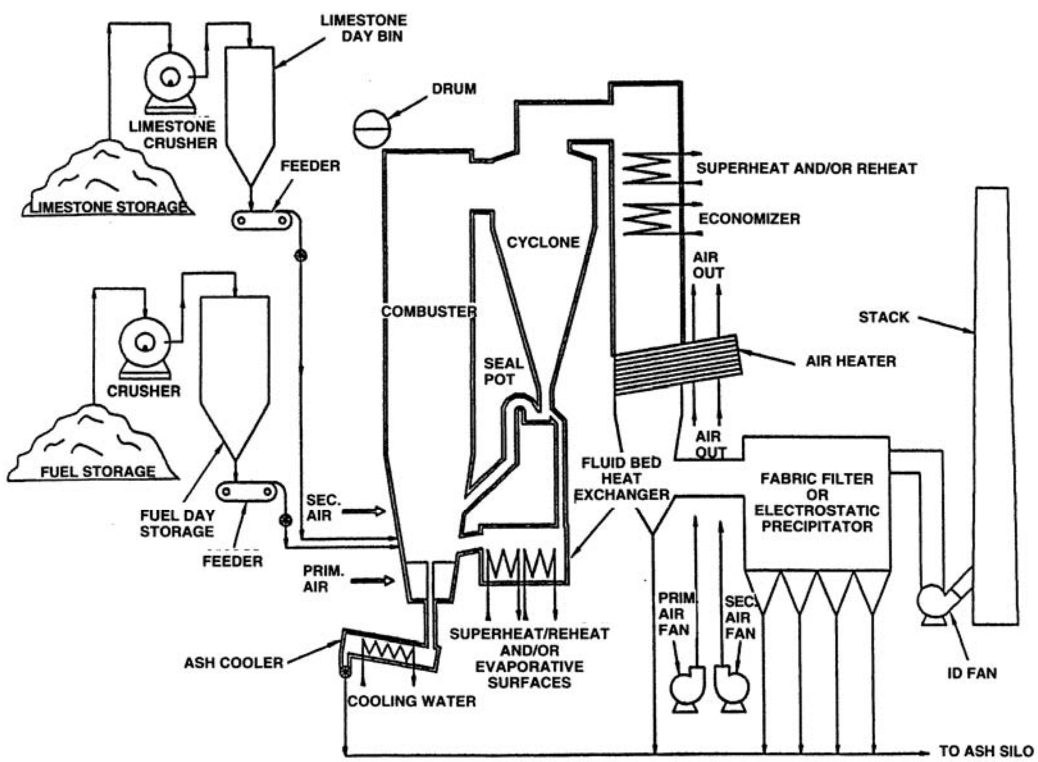
In the United States, CFB technology has been utilized in a broad spectrum of qualifying facilities and independent power projects since the 1980s. The CFB process facilitates power production while firing a wide range of fuels, and while meeting stringent emission limits. ALSTOM Power has been selected by WGC to provide the CFB design for the proposed Co-Production Facility. Over the past 5 years, ALSTOM Power has supplied 20 CFB steam generator systems utilizing the licensed process technology from Lurgi GmBH. Within the last three years, ALSTOM Power has successfully commissioned eight reheat CFB projects.

Figure 2.3-1 presents a typical flow schematic of an ALSTOM Power CFB steam generator (courtesy of ALSTOM Power). Combustion in a CFB system takes place in a vertical waterwall chamber called the combustor, the lower part of which is protected from erosion by refractory. The fuel and sorbent are fed into the combustor, fluidized, and burned at temperatures of 1,550-1,650 degrees Fahrenheit (°F) (840-900 degrees Celsius). The sorbent is fine-grained limestone, which reacts with the sulfur dioxide released from burning the fuel to form calcium sulfate (anhydrite). The solid anhydrite is removed through ash drains in the combustor floor or is collected in the particulate removal system.

The bed material in the combustor consists primarily of mineral matter from the fuel, anhydrite, and excess calcined lime. The main particle size of the bed material is in the range of 50-300 microns. The suspended solids form a pressure gradient along the height of the combustor, which decreases gradually toward the outlet at the top. The combustion gas entrains a considerable portion of the solids inventory from the combustor. Solids are separated from the gas in one or more recycle cyclones and are continuously returned to the bed via a recycle loop. A controlled amount of solids from the cyclone(s) can also be passed through an external fluidized-bed heat exchanger (FBHE) and returned to the combustor. The high internal and external circulating rates of solids, characteristic of the CFB, result in uniform temperatures throughout the combustor and the solids recycle system.



$CaCO_3 \rightarrow CaO + CO_2$ eq. (1)

$2SO_2 + 2CaO + O_2 \rightarrow 2CaSO_4$ eq. (2)

Figure 2.3-1. Typical ALSTOM Power CFB Steam Generator (schematic and generic description provided courtesy of ALSTOM Power)

Because of the differences in velocity between gas and solids, the solids proceed through the combustor at a lower velocity than the gas. The long residence and contact times, coupled with the small particle sizes and moderate-to-high gas temperatures result in high combustion efficiency. These conditions also allow for the decomposition of the limestone and the subsequent capture of the SO_2 at relatively low calcium to sulfur molar (atomic) ratios.

Combustion air is fed to the combustor at two levels. Roughly 40 percent of the combustion air is introduced as primary or fluidizing air through the grate at the bottom, and the balance is admitted as secondary air through multiple ports along the combustor front, rear and side walls. Combustion thus takes place in two zones: a primary reducing zone in the lower section of the combustor followed by complete combustion using excess air in the upper section. This staged combustion, at controlled temperatures, effectively controls NO_x formation.

The primary loop is where heat is removed from the solids circulating in the CFB system. Heat removal is achieved by:

- Heat-absorbing surface in the waterwalls of the combustor.
- Additional heat-absorbing surface, if necessary, located in the FBHE.
- The convective pass (backpass), where heat is removed from the flue gas exiting the recycle cyclone.

Typically, after the convective pass, the gases are further cooled in an air preheater. After the air preheater, the flue gases are cleaned in a baghouse or electrostatic precipitator and vented via an induced draft fan to the stack.

2.3.2 Integrated, Inverted Cyclone – Mid Support (I^2CMS) Design

Centrifugal or cyclone collectors are widely used for removing particulate matter from gas streams. These devices normally consist of a cylindrical shell with a tangentially aligned inlet duct that directs a particle-laden gas into a cylinder with a funnel-shaped bottom and a gas outlet tube at the top (see Figure 2.3-2). As the gas spirals downward around the cylinder walls, the particles are forced to the cylinder walls where gas velocities are lower, and through gravitational forces the particles migrate to the bottom of the cyclone where they are captured in a hopper or other similar device. The cleaned gas is then directed out of the top of the cylinder through an outlet tube.

A key feature of the WGC Project, for technology demonstration purposes, is the use of ALSTOM Power's inverted cyclone (I^2CMS) design versus a typical or conventional cyclone design. In concept, the IC operates under the same principles as a conventional cyclone with a very simple and straightforward difference. In the I^2CMS, the cleaned gas exits from the bottom of the cyclone versus the top of the cyclone (see Figure 2.3-2). The bottom is configured as an eccentric funnel to enable the gas outlet duct to extend vertically up into the center of the cyclone body.

Overall, the I^2CMS retains many of the same inherent design parameters as the conventional cyclone. However, the change in where the gas stream exits has a dramatic impact on the arrangement of other CFB components, resulting in the primary benefit of achieving a substantially smaller configuration. In addition, the I^2CMS design provides additional reduction in the configuration size by allowing a mid-support structural system to be employed, as opposed to a conventional top support system. Collectively, the I^2CMS design structure can result in a reduction of up to 60 percent in structural steel weight and 30 percent to 40 percent of the primary structure footprint and height over conventional systems. Thus, this technology provides substantial cost and space savings. Figure 2.3-3 illustrates the reduced profile of the I^2CMS boiler. While the inverted cyclone design has been used successfully on small power plants in China, it has never been demonstrated in the U.S.

2.3.3 Flash Dryer Absorber

The flash dryer absorber (FDA) consists of a reactor vessel, a particulate capture device, and a mixer that was developed to reduce the SO_2 levels in a flue gas stream (Figure 2.3-4). SO_2 is controlled by treating some of the fly ash with water, and re-injecting the mixture back into the flue gas stream. For this CFB application, CaO is created in the furnace and ejected with the fly ash, so a lime injection system is not required and is not included as part of the process. The reactor vessel provides contact between the combustion gases leaving the CFB and a stream of wet solid particles laden with CaO (WGC, 2005d). A specially designed pulse jet fabric filter (OPTIPULSE® LKP) removes the particulates from the flue gas prior to the discharge of the gas to the atmosphere.

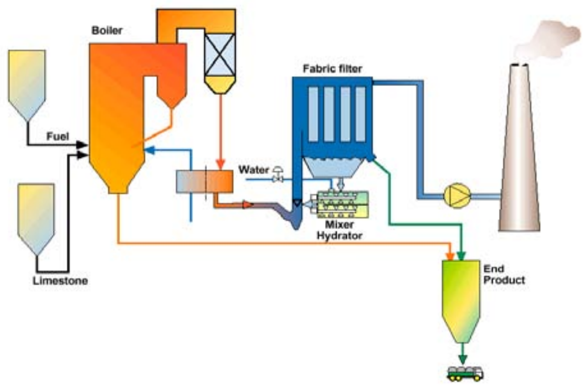


Figure 2.3-4. DFGD FDA Concept for Fossil Fuel CFB Application

2.3.3.1 Absorbent

The CFB FDA system uses the residual alkali (CaO) available in the CFB fly ash, and thus lime absorbent, a lime-handling system, and any slaking equipment are not required.

2.3.3.2 Absorber Operating Temperature/Absorption Mechanism

The amount of water fed into the FDA system is dependent on the desired temperature difference between incoming and outgoing gas across the FDA reactor (the cool down): the larger the cool down that is desired, the greater the amount of water that must be evaporated to cool the flue gas. The water partially reacts with the CaO to form $Ca(OH)_2$.

SO_2 is a relatively slow-reacting component of flue gas. By keeping the reactor outlet temperatures low, the individual particles retain a wet film on the surface for a longer time, which promotes the reaction between SO_2 and $Ca(OH)_2$.

2.3.3.3 Mixer

The mixer accurately blends recycled powder and water in controlled ratios to achieve the desired gas outlet temperature and the required removal efficiency. The unique design of the mixer provides excellent mixing and a homogenous product with even water distribution. The intense mixing action and long residence time in the mixer enhances the utilization of the residual alkali in the fly ash. The system lends itself ideally to activation of the alkaline ash produced in limestone-charged CFBs. This design is based on decades of experience from ash humidifiers used in various processes (see Figure 2.3-5).

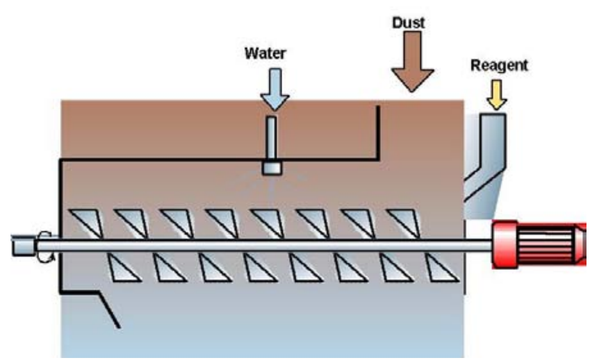


Figure 2.3-5. Mixer

2.3.3.4 FDA Reactor

The goal of the reactor is to ensure an optimal distribution of the absorbent across the flue gas duct cross-section so that SO_2 removal is maximized. The reactor is designed to create adequate turbulence for efficient mixing of gas and absorbent over the entire load range. The FDA system features a two-point waste ash discharge system. Waste ash can be discharged from the bottom of the FDA reactor and from the fabric filter. A two-point discharge system is advantageous because it avoids potential blockage of the gas path. Normally, the FDA system does not require exhaust gas reheat.

2.3.3.5 Dust Collector – Fabric Filter

A pulsejet fabric filter located downstream of the reactor collects the mixed ash formed during the absorption process as well as the fly ash present in the flue gas. The pulsejet fabric filter is an ALSTOM Power LKP OPTIPULSE® unit with a central inlet plenum. The LKP has been widely accepted in industrial applications, and the design is the most widely used pulsejet collector for coal-fired utility boilers around the world. The LKP design is characterized by the following:

- Heavy industrial design for reliability and durability
- Maintenance from the clean side
- Powerful cleaning system for on-line automatic bag cleaning

The LKP filter has proven its capability of achieving low dust emissions in a multitude of applications.

2.3.4 Selective Non-Catalytic Reduction

Selective Non-Catalytic Reduction (SNCR) systems can be used to reduce the emissions of nitrogen oxides. The SNCR process is based on the injection of ammonia into the combustion gas stream. A metering module serves to deliver an accurately measured amount of reagent to the injectors, which enables the treatment rate of the system to be controlled. The metering module also controls dilution water flow and pressure. Compressed air from the plant service air system is used for atomization of the ammonia and cooling of the injectors. The potential NO_x reduction is sensitive to the temperature of reaction and time available for the NO_x reducing reaction to occur. The injectors would be located in the particle separator outlets where the required temperatures exist for the SNCR reaction. Final injector quantities and locations would be determined by computer modeling to ensure proper distribution of reagent.

A usage rate of approximately 45 gallons per hour (170 liters per hour) of aqueous ammonia (28 percent solution) is anticipated. Safety features for the handling of aqueous ammonia would include:

- Storage in a single 15,000-gallon (56,800-liter) carbon-steel, registered pressure storage tank that would have a maximum working volume (90 percent) of 13,500 gallons (51,100 liters) and provide 14 days of storage.
- Location of the tank within a 612 square foot (57 square meter) diked concrete containment area (sufficient to hold the contents of the tank).
- Transfer of aqueous ammonia from a tanker truck through a liquid-filled connection supported by a bulkhead containment wall designed to withstand the force arising from a tanker truck pulling away while still connected. Emergency shut-off valve in the event of an accidental pull-away of a truck or a hose rupture.
- Secondary containment for the tanker truck unloading area to capture any potential spills and prevent migration to soil or groundwater.
- Unloading during daylight hours on weekdays only, with procedures requiring the operator to remain with the truck until unloading is complete.
- Continuous monitoring of the tank level, including a high-level alarm at 90 percent of maximum capacity.
- Excess flow valves mounted on all storage tank liquid lines designed to detect a sudden drop in pressure due to the release of ammonia through an opening equivalent to the diameter of the liquid ammonia line and to stop its flow.
- Implementation of a detailed emergency response/spill control plan.
- Spill response equipment provided near the tank and truck unloading areas.

2.3.5 Kiln Facilities

The WGC Project integrates a kiln facility with the 98-MWe (net) CFB power plant as illustrated in Figure 2.3-6. The kiln converts waste ash materials produced by the CFB, purchased limestone or other calcium source, alumina, and gypsum to produce up to 100 short tons (st) (90 metric tons) per day of a cement material that can be used in construction and in the manufacturing of building products. Production rates for the cement material would be dependent upon the size of the kiln that WGC ultimately procures. A kiln that could produce up to 100 st/day (90 metric tons/day) represents the production rate of the largest kiln that might be used and is presented as the upper bound for purposes of this EIS. WGC's air permit currently limits production to 75 st (68 metric tons) per day; however, WGC may request a permit amendment based on the final kiln size.

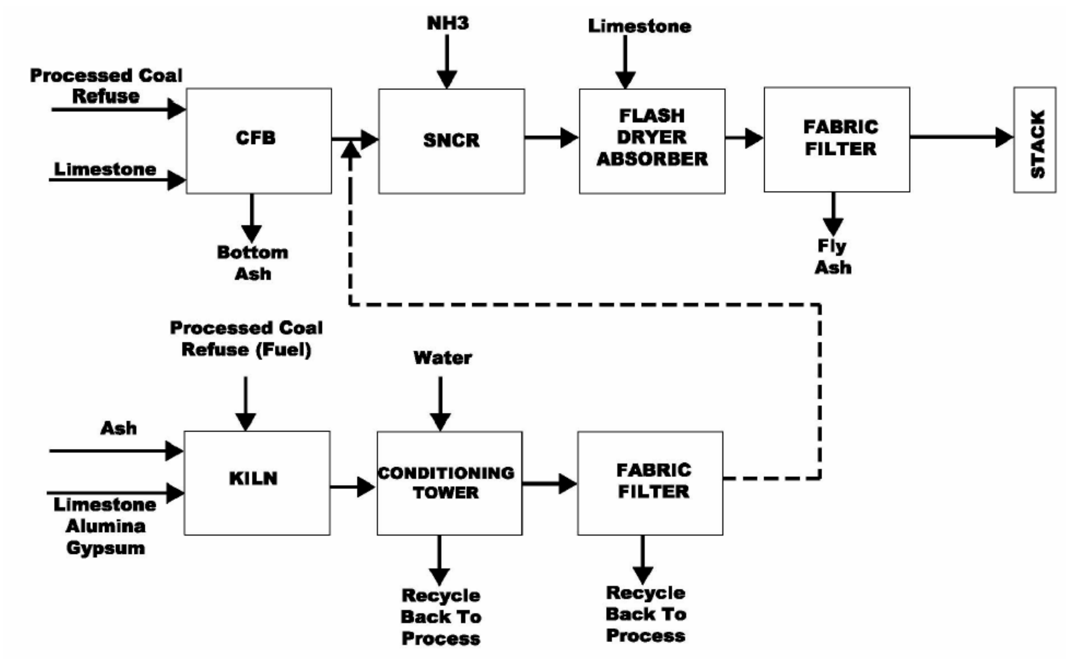


Figure 2.3-6. Kiln Process Flow Diagram

2.3.5.1 Kiln Raw Material Handling and Storage

The raw material handling and storage facilities would receive the following approximate quantities of materials based on a kiln with a maximum capacity of 100 st/day (90 metric tons/day). These represent the upper bounds of materials that would be received, handled, and stored at the kiln facility:

- 20 st/day (18 metric tons/day) of bottom ash transferred from the CFB.
- 72 st/day (65 metric tons/day) of limestone received from area quarries.
- 25 st/day (23 metric tons/day) of gypsum slurry received as a waste product from a coal-fired power plant scrubber in West Virginia (stored in an agitated tank).
- 13 st/day (12 metric tons/day) of a commercially procured alumina (stored in a separate silo).

The gypsum slurry would be mixed with the other constituents to form a damp but conveyable mixture. Conventional dust collection systems and bin vents would control dust emissions generated as the raw materials are handled and stored by conveyors, pipes, feeders and bins.

2.3.5.2 Raw Grinding and Blending

All raw materials (bottom ash, limestone, alumina source, and gypsum slurry) would be conveyed together to the raw grinding and blending area. The mixture (raw mix) would be ground to a fine powder in an airswept ball mill. Mill product (raw meal) would be classified and pneumatically conveyed to a 600-st (540-metric ton) capacity storage and homogenization silo. Homogenized raw meal would be pneumatically conveyed to the kiln system, where the meal would be heated causing a chemical change to form a material with the desired chemical and physical properties, known as "clinker." The thermal-based kiln system would consist of a pre-heater, calciner, rotary kiln, and clinker cooler.

2.3.5.3 Kiln Fuel System

High-quality coal fines from the coal refuse beneficiation process would provide the approximately 16.7 million BTU/hr thermal energy required to produce clinker. The thermal energy would be supplied by firing pulverized high-quality coal fines in the kiln burner. High-quality coal fines would be delivered to the kiln material handling system, de-lumped, and then transferred to a 100-st (90-metric ton) capacity coal storage bin. The coal fines would be further pulverized, if required, in an air-swept vertical mill and transferred pneumatically to the burner. A direct firing system would mix combustion air with the pulverized coal and pass the combustible mixture into the kiln burner. Approximately 17 st/day (15 metric tons/day) of beneficiated coal would be fired in the kiln burner.

2.3.5.4 Kiln System

Raw meal would be fed to a long, dry kiln to form the clinker. Hot kiln gas, comprised of excess air, combustion gases, and carbon dioxide produced by the calcining process, would exit the kiln and be cooled in a spray tower, filtered in a baghouse, and the flue gas vented into the boiler inlet air feed to remove any residual sulfur dioxide and kiln NO_x from the gas stream. The combined, cleaned flue gases would be discharged to the power plant stack. To provide added flexibility and control, the exhaust from the kiln would be combined with the CFB exhaust after the CFB baghouse. The kiln system also provides the option of ducting kiln gases directly to the power plant stack following the kiln baghouse; however, this option would only be used if directing the kiln's exhaust into the CFB is unsuccessful. Air emissions would be within permit limits whether or not gases from the kiln would be directed to the CFB system or directly to the air stack. The hot clinker formed in the kiln would pass into a grate-type, air-swept cooler. The air would cool the clinker from about 2,300°F to 250°F (1,260°C to 120°C).

2.3.5.5 Finish Grinding

Cooled clinker would be conveyed to a 210-st (190-metric ton) capacity clinker storage bin, where the cooled clinker would be withdrawn as needed and conveyed to an air-swept ball mill for grinding. The grinding mill product would be collected and stored prior to delivery for an end user.

2.3.5.6 Ash Byproduct Manufacturing Facility

An ash byproduct manufacturing facility is considered to be a likely tenant on the planned EcoPark. Although this facility is not part of WGC's action and most likely would be independently owned and operated, consideration has been given to such a facility as part of the Co-Production Facility Design Process. Thus, conceptual layouts for such a facility are included in the Co-Production Facility layout drawings presented in Figures 2.4-1 and 2.4-2

2.3.6 Fuel Processing/Beneficiation

As stated in Section 2.2.3, WGC proposes to procure services for crushing, sizing, and beneficiation of coal refuse by a third party at a prep plant to be located at or near the coal refuse source. The prep plant system incorporates a heavy media (HM) cyclone and super spiral technologies that can process 250 tons/hr (230 metric tons/hr) of coal refuse in a modular design that can be disassembled, relocated, and reassembled. The design incorporates the following circuits and functions:

- HM cyclone separation;

- Super spiral fines circuits ;
- Iron pyrite removal feature (>50 percent reduction expected in reject material blend);
- State-of-the-art process controls;
- Refuse mixing and neutralization using alkaline combustion ash; and
- Approximately 40 percent yield for WGC fuel specification.

Figure 2.3-7 shows a prep plant process flowchart. The process begins with the raw coal refuse being deposited into a feed hopper, conveyed to a crusher, and discharged into a sump below ground level as a water/slurry mix. This water/slurry mix is then screened to separate the denser materials from the lighter materials. The denser materials are conveyed to a HM cyclone for further separation. The desired product is conveyed from HM cyclone to the CFB fuel stockpile, and the rejected material is diverted for further processing in a splitter. The splitter divides the rejected material into useable product (conveyed to the CFB fuel stockpile) and final refuse.

Meanwhile, the lighter materials that were separated during the initial screening are conveyed to the primary classifying cyclones, where desired materials are separated and conveyed to spiral concentrators, and rejected materials are conveyed to the secondary classifying cyclones. The spiral concentrators separate the desired materials passed by the primary classifying cyclones into useable product (conveyed to the CFB fuel stockpile) and final refuse. The secondary classifying cyclones process the material rejected by the primary classifying cyclones to separate out the final refuse from potentially useable product. The potentially useable product is conveyed from the secondary classifying cyclones to a floatation circuit, which separates the concentrated product (conveyed to the CFB fuel stockpile) from the tailings (final refuse).

The refuse disposal constraints would be substantially simplified by the use of froth flotation to remove iron pyrite (>50 percent reduction target in the ash/reject blend as compared with the original coal refuse) and neutralization by free CaO in the blended combustion ash. WGC is currently investigating the feasibility of marketing the recovered iron pyrite as a product to third parties. If this material is not marketable, WGC would dispose of it in a landfill permitted to accept iron pyrite or would otherwise dispose of the material as agreeable by WVDEP for the remediation of the coal refuse piles.

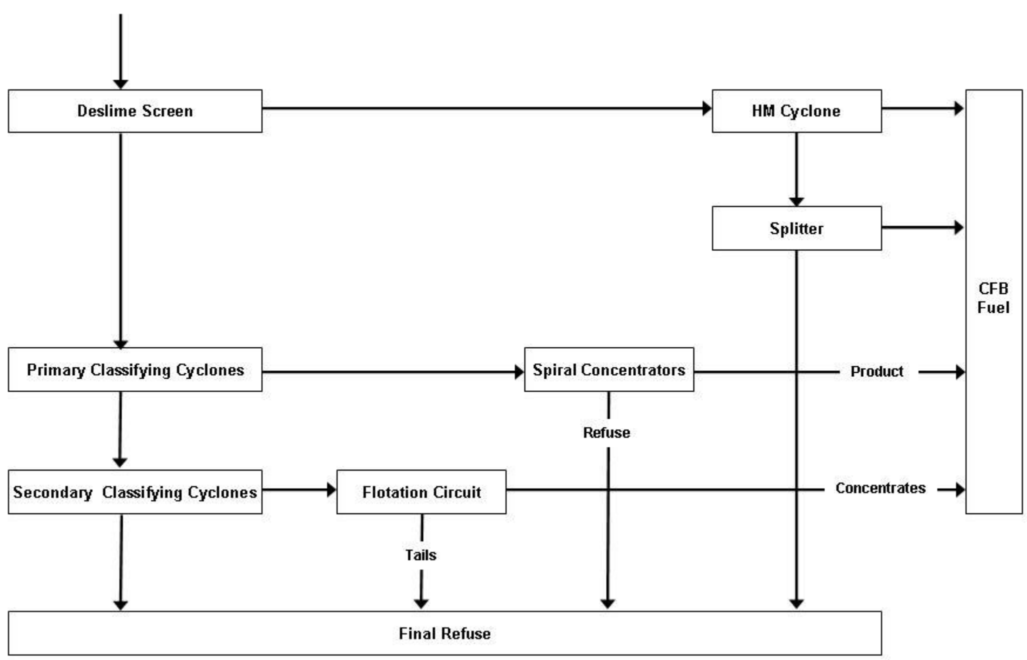


Figure 2.3-7. Prep Plant Process

The process would involve a close-looped circuit with a make-up water demand of less than 100 gallons per minute (380 liters per minute) and a power demand of less than 2,500 kW. The main advantage to this type of prep plant is the use of underground sumps, which significantly lowers the height envelope compared to typical coal prep plants. Because a large amount of equipment is required, traditional plants stacked the equipment floor by floor so that the media could be fed by gravity from one processing machine to the next in a building 50 to 85 feet (15 to 26 meters) tall. The new arrangement allows for a substantial reduction in height and noise, resulting in a building 15 to 25 feet (5 to 8 meters) tall.

2.4 WGC Project Planning and Considerations

This section describes each component of the WGC Project and the relevant aspects of these components from the perspective of the EIS. As part of its planning and design process, WGC has considered and evaluated numerous options with respect to key components of the WGC Project. Although these planning considerations are outside the control of DOE, they are presented in the EIS for comparative purposes. It should be noted that WGC is in the preliminary design stage for this proposed project and that details of the project components described herein may be modified as the design progresses. In instances where there is still a degree of uncertainty with respect to a particular aspect of the project, discussion is provided on options that are currently available or being considered by WGC.

2.4.1 Power Plant and Facilities Siting, Layout, and Planning

The site selected for the power plant by WGC is principally located on the E&R Property as described in Section 2.2.1. The E&R property on the south side of Sewell Creek was selected by the municipalities based upon a number of considerations, including the availability of adequate site acreage with limited disturbance of wetlands, as well as concerns about economic, community, and surrounding land uses that were identified by WGC through numerous town meetings and discussions with community leaders. As part of the planning and conceptual design process, WGC considered a number of site layouts for the E&R Property, as well as several alternate sites that were removed from further consideration based on economic feasibility constraints or potentially adverse environmental impacts. Alternate sites given consideration included the proposed EcoPark property and sections of the Plum Creek property immediately southwest of the E&R property. WGC also considered the use of the CSXT property located between Sewell Creek, Wolfpen Creek, and WV 20 as a potential site for coal handling facilities.

Final consideration was given to the three siting and layout options that included constructing the facility on the E&R property and adjacent lands. These options are differentiated by two primary characteristics, including the size of the facility footprint on the E&R property and the potential use of a rail spur within the EcoPark (see Figures 2.4-1 through 2.4-3).

WGC and the design team gave careful consideration to each of these options, which included numerous iterations of a conceptual design. The team's principal concerns included financial feasibility, impacts to the planned EcoPark and to other adjacent land uses, and environmental issues, such as the potential for impacts to wetlands, streams, and floodplains.

Of the siting and layout options considered, Option A is preferred by WGC and is the basis for planning and conceptual design. WGC does not consider Option B or C feasible because of the degree to which these siting options would impact streams and wetlands, and because of financial concerns. As described further in Section 2.4.7, WGC determined that providing rail access to the site and to the coal refuse sites would not be economically feasible. However, these options are discussed in the EIS for comparative purposes.

Option A would require the leveling of the previously cleared northeastern end of a ridge that is connected with Sims Mountain and that occupies the greater part of the site. The site grade would be raised from the existing base elevation of approximately 2,400 feet (730 meters) to approximately 2,420 feet (740 meters) above mean sea level. A small wooded area (approximately 2 acres [1 hectare]) of the

The process would involve a close-looped circuit with a make-up water demand of less than 100 gallons per minute (380 liters per minute) and a power demand of less than 2,500 kW. The main advantage to this type of prep plant is the use of underground sumps, which significantly lowers the height envelope compared to typical coal prep plants. Because a large amount of equipment is required, traditional plants stacked the equipment floor by floor so that the media could be fed by gravity from one processing machine to the next in a building 50 to 85 feet (15 to 26 meters) tall. The new arrangement allows for a substantial reduction in height and noise, resulting in a building 15 to 25 feet (5 to 8 meters) tall.

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Of the siting and layout options considered, Option A is preferred by WGC and is the basis for planning and conceptual design. WGC does not consider Option B or C feasible because of the degree to which these siting options would impact streams and wetlands, and because of financial concerns. As described further in Section 2.4.7, WGC determined that providing rail access to the site and to the coal refuse sites would not be economically feasible. However, these options are discussed in the EIS for comparative purposes.

Option A would require the leveling of the previously cleared northeastern end of a ridge that is connected with Sims Mountain and that occupies the greater part of the site. The site grade would be raised from the existing base elevation of approximately 2,400 feet (730 meters) to approximately 2,420 feet (740 meters) above mean sea level. A small wooded area (approximately 2 acres [1 hectare]) of the ridge would be cleared and graded at a slope of approximately 45.5 percent to the south and west of the ridgeline. Based on geotechnical studies, WGC has determined that the grading operations would be accomplished mainly using heavy equipment; however, a limited amount of blasting may be necessary to reduce consolidated bedrock. To support construction, a temporary access road and bridge would be constructed to the south of the Park Center Shopping Complex, extending from John Raine Drive and crossing Sewell Creek to the E&R property.

The facility layout would include all of the key technological components discussed in Section 2.3, including (also see Figure 2.4-4):

- Boiler/CFB
- Exhaust Stack (approximately 300 feet [90 meters] high)
- Material Handling Area
- Kiln
- Cooling Towers
- Material Storage Areas
- Water Treatment Plant

For illustrative purposes, the potential ash byproduct manufacturing facilities by a third party are shown in Figure 2.4-4; however, the site layout for these facilities is unknown at this time.

2.4.2 Site Access, Circulation, and Equipment

Access to the site from within the region would be via I-64 to US 60 and WV 20 connecting with local roads. Site access is substantially similar for each of the siting and layout options considered by WGC. The primary access for each of these layouts would be off of WV 20 onto Tom Raine Drive, through the EcoPark, and over a permanent bridge (to be constructed) that would span Sewell Creek to enter the site from the west. A secondary entrance for emergency vehicles would connect with Pennsylvania Avenue on the southeastern side of the E&R property. When considering potential entrances to the site, and the location of the bridge that would cross Sewell Creek, consideration was given to potential traffic flow, stream, wetlands, and floodplain impacts from the WGC facility. Also, to the greatest extent practicable, WGC has designed internal site circulation to minimize the need for backing up of trucks and other heavy vehicles, thereby improving safety and reducing noise from back-up warning devices.

Materials handling for the power plant would occur on the southern and western portions of the site, which are the most distant from nearby residences. Delivery trucks would proceed to the 2-day processed fuel storage pile or the 3.5-day limestone storage pile, as appropriate. Fuel trucks would be on site for approximately 10 minutes each, and limestone trucks for approximately 5 minutes each. Deliveries of fuel and materials would occur as described in Section 2.4.7, and the subsequent transfer of materials to the coal and limestone preparation buildings would occur 24 hours per day by front-end loaders and conveyors. Front-end loaders would be used to remove material from a pile (fuel or limestone) and deliver it to the appropriate feeder, which would then transfer the material to the conveying system.

The following is a list of the principal material handling equipment expected to operate at the plant site:

- Hauling – On-road tractor (550 HP or equivalent)
- Fuel supply and wet ash return – 40-ton dump trailers
- Limestone supply – 20-ton dump trailers
- Fuel handling and ash loading – Cat 988G wheeled loader (or equivalent)

WGC and WV Department of Highways (WVDOH) have discussed the prospect for WVDOH to extend Tom Raine Drive to the plant site and construct the necessary bridge for this extension. In this case, WGC, with WVDOH assuming the costs for maintenance, would be responsible for the design, construction, and maintenance of the structure. Public use of the bridge would be required if constructed using WVDOH funds. The bridge would be constructed in accordance with WVDOH guidelines and standards, which require that there would be no increase in upstream flood levels. Based on preliminary hydraulic analysis, WGC expects that the bridge would consist of three 100-foot (30-meter) spans 28 feet (9 meters) wide and 48 inches (122 centimeters) in depth, with two intermediate concrete piers 4 feet (1.2 meters) in thickness that would be aligned parallel with stream flow. The bridge would begin and terminate with a wall abutment that would include wingwalls on each side of the abutment to retain the approach roadway embankment. The approaches to the bridge would be constructed using material excavated from the power plant site.

A temporary road would be provided for site access during construction. It would extend southward from John Raine Drive and lead to a temporary, prefabricated bridge erected across Sewell Creek that would be constructed near the confluence of the unnamed tributary downstream of the permanent bridge site. The temporary bridge would provide site access for the duration of plant construction (less than 5 years), after which it would be disassembled and replaced by the permanent bridge constructed upstream. The hydraulic design requirement for the temporary bridge would be expected to pass a 2- or 5-year storm. During more severe storm events, Sewell Creek may overflow its banks and overtop the height of the temporary bridge, causing water to flow over the bridge and restricting access to the site during construction. However, the backwater effect would impact undeveloped areas that are immediately upstream of the temporary bridge.

2.4.3 Fuel Supply

The WGC plant would be fueled by beneficiated coal refuse obtained from Anjean, Green Valley, Donegan, Joe Knob and other sites having a high remediation priority (as defined by WVDEP) that become available or are more economical. The characteristics of coal refuse from Anjean and Green Valley are depicted in Table 2.4-1. The characteristics of the Donegan and Joe Knob coal refuse are still being investigated by WGC; however, the proposed use of beneficiation would result in comparable characteristics of processed fuel for the CFB plant.

Table 2.4-1. Characteristics of Anjean and Green Valley Coal Refuse

Parameter	Anjean[1]	Green Valley[2]
Carbon	26.94%	23.31%
Hydrogen	1.62	1.41
Nitrogen	0.68	0.59
Oxygen	3.07	2.66
Sulfur	1.48	0.59
Moisture	5.50	5.50
Ash	60.71	65.94
Total	100.00%	100.00%
Volatile Matter	12.14%	N/A
Fixed Carbon	21.66	N/A
HHV	4,184 Btu/lb	3,743 Btu/lb

[1]*Based on weighted averages from 13 borings, 160 data points, no pond fines, 3/8-in x 100m product.*
[2]*Based on weighted averages from 8 borings, 52 data points, 3/8-in x 100m product.*

2.4.3.1 Anjean Mountain

In 1972, a surface mine permit was issued in Anjean, Greenbrier County, to the Leckie Smokeless Coal Company, later bought by Royal Scot Minerals, Inc., which became bankrupt in 2000. Anjean, which is approximately 14 miles (23 kilometers) from the proposed Co-Production Facility, is a 400-acre (160-hectare) abandoned coal mining area that allegedly has the most environmentally costly coal refuse pile in West Virginia, referred to as the Buck Lilly pile or Anjean Mountain. The Buck Lilly pile is a 40-acre (16-hectare) "black mountain" with approximately 4 million tons (3.6 million metric tons) of coal refuse. The West Virginia Department of Environmental Protection (WVDEP) assumed responsibility for the site when it revoked the surface mine permit and has undertaken remediation at Anjean that is supported by the state's Special Reclamation Fund. WVDEP is currently spending approximately $250,000 per year in water treatment costs to mitigate acid mine drainage generated by the site and to protect adjacent trout streams. Remediation efforts primarily consist of diverting water that runs off or leaches from the coal refuse areas through a series of chemical treatment ponds before discharge to receiving waters.

In June 2003 the WGBCD purchased the Anjean property out of bankruptcy in order to free the property for future community use. On March 2, 2004 WGC and WGBCD entered into a Memo of Understanding (MOU) with WVDEP in which WGC would have access to the Anjean site and the coal refuse (Buck Lilly pile) as a fuel source for its proposed Co-Production Facility in return for the use of the proposed facility's waste ash in reclamation processes at Anjean. The MOU states that:

WGC will develop a remediation plan for the Anjean site, secure WVDEP approval for the plan, provide the plan to WVDEP to administer, and serve as a no-cost contractor to implement portions of the plan with WVDEP's direction and supervision pursuant to a no-cost reclamation contract having one or more phases.

Pursuant to the reclamation contract, WGC will remove coal refuse from the Anjean site in consecutive phases; provide a performance bond for each phase of the work; not be required to obtain a mining permit as long as the coal refuse does not qualify as "coal" (under ASTM standards); return as much waste ash to the site as WVDEP determines necessary to reclaim the site; and mix the ash with the unused coal refuse to neutralize it and reduce the cost to WVDEP of treating the ponds at the site. By the conclusion of the process, the entire site will be reclaimed in accordance with the initial or modified surface coal mining permit as revoked from Royal Scot Minerals.

WVDEP believes that the WGC Project may enable the state agency to fulfill its obligations to reclaim the Anjean site more cost-effectively, thus reducing future financial impact on the Special Reclamation Fund; and that the removal of the coal refuse will help minimize environmental effects that would otherwise occur if the pile were left in place.

WVDEP and WGC agree to explore the feasibility of extending the MOU to other Forfeited Sites and other sites covered by the federal Abandoned Mines Land Program.

WVDEP and WGC agree to cooperate on the development of specific details for the Anjean site with respect to areas of responsibility for reclamation, but for which WVDEP will retain full and final authority.

WGC, WGBDC, and WVDEP subsequently entered into a Prospective Purchaser and Waste Coal Access Agreement for the Anjean site on August 12, 2004, which reinforced and formalized the MOU. As part of project planning efforts, conceptual reclamation and reuse plans for Anjean are currently being developed.

Although Anjean is currently abandoned, a surface mine permit application was submitted in June 2005 by the Oxford Mining Company to exercise mining rights in high-quality coal locations on the site. These mining activities would precede WGC's proposed activities at Anjean and would not be expected to conflict with WGC plans to reclaim the coal refuse pile areas. The mining would be covered under a special reclamation agreement between the Oxford Mining Company and the WVDEP, and would result in the reclamation of mining-impacted areas not associated with the coal refuse areas.

2.4.3.2 Green Valley

The Green Valley site is located approximately 12 miles (19 kilometers) from the proposed Co-Production Facility. The majority of the site is subject to an active mining permit held by Green Valley Coal Company (GVCC), a subsidiary of the Massey Coal Company, which owns the site. The site has been used for coal refuse disposal since the 1920s but is not currently being used for this purpose. Much of the site has been reclaimed. A portion of the coal refuse pile is located on a pre-Surface Mining Control and Reclamation Act of 1977 (SMCRA) mining area that is not subject to a permit and is currently maintained by the WVDEP. The pile covers 70 acres (30 hectares) and ranges in depth from approximately 30 to 200 feet (9 to 60 meters). The use and reclamation of the Green Valley coal refuse pile would be subject to the same conditions as stated in the MOU with WVDEP for the Anjean site (see Section 2.4.3.1 above). As part of project planning efforts, conceptual reclamation and reuse plans for Green Valley are currently being developed.

2.4.3.3 Donegan Mine

The Donegan coal refuse site is located approximately 28 miles (45 kilometers) from the proposed Co-Production Facility on CR 39/14 north of Anjean. It is estimated that mining at Donegan began in the late 1940s or early 1950s and the site was mined by several coal companies (WVDEP, 2005). According to WVDEP, the site is fully reclaimed (i.e., graded and vegetated). Reclamation in the 1970s was started by the Island Creek Coal Company (ICCC), which included the construction of a cap and the construction of a diversion ditch that was completed in the 1990s. The site is now owned by Falcon Land Company, Inc. The mining permit was revoked and the bond forfeited in April 2005 due to failure of continuing water treatment and failure to submit required data concerning water quality. Two weeks after this permit was revoked, WVDEP began treating acid mine drainage at the site. WVDEP is responsible for the treatment costs and has actively updated treatment capabilities for the site; however, no cost estimates are currently available. The use and reclamation of the Donegan coal refuse pile would be subject to the same conditions as stated in the MOU with WVDEP for the Anjean site (see Section 2.4.3.1 above).

2.4.3.4 Joe Knob

The Joe Knob coal refuse site is located approximately 16 miles from the proposed Co-Production Facility and is accessed from the same route as the Anjean Buck Lilly pile. The site has been fully reclaimed and is owned by Mead-Westvaco. WVDEP is currently treating water from this site, but cost estimates for this treatment were not readily available. The use and reclamation of the Joe Knob site would be subject to the same conditions as stated in the MOU with WVDEP for the Anjean site (see Section 2.4.3.1 above).

2.4.4 Fuel Processing

2.4.4.1 Beneficiation/Prep Plant

The proposed beneficiation/prep plant for the WGC Project is described in Section 2.3.6. As planning evolved, WGC considered three fuel-processing alternatives for the CFB plant:

- Crushing and sizing of coal refuse at the power plant site (without beneficiation);
- Crushing, sizing, and beneficiation of coal refuse at the coal refuse sites by a third party using semi-mobile equipment; and
- Crushing, sizing, and beneficiation of coal refuse at a planned new coal preparation facility at the Browns Creek Complex near Anjean.

The owners of a planned coal preparation facility at Browns Creek had considered including a complementary process that would provide shared-use by WGC at the new facility. Consent by the third party was based on assumptions that shared-use would cover the incremental capital cost and also result in additional yield from its newly mined coal. However, after running simulation models, the third party determined that shared-use would not be cost-effective as originally assumed, and it opted to remove this option from further consideration.

The other alternative would be to contract a third party to design and construct an innovative "Low Elevation Coal Processing Plant" that would meet WGC processing requirements. A typical coal preparation plant consists of a building measuring 50 to 85 feet (15 to 26 meters) in height that houses or supports in a vertical arrangement the various levels of machinery necessary to process coal by gravity feed. Thus, the cost of the machinery and construction in a typical installation can reach tens of millions of dollars. Additionally, the costs of transportation and labor to disassemble a typical plant are high, making it more cost-efficient to abandon the equipment and structures, rather than to move the plant to the next site.

The proposed innovative prep plant as mentioned in Section 2.3.6 would be designed to reduce the overall height to an approximate 25-ft (8-meter) height envelope. Through the use of underground sumps and optimized subcircuits, the housing structure, along with the requisite engineering, platework, concrete foundation, piping, labor and maintenance expenses, would be greatly reduced. The reduction in housing height would also reduce the number and total length of steel chutes in the building, thereby lowering noise emissions from the plant. Because pumps would be located in the underground sumps, noise pollution also would be minimized. The novel arrangement not only reduces noise impacts and structural costs, but the ease of construction and disassembly means that this type of facility can be relocated close to another coal refuse source when the nearby sources become depleted. These features were important factors in WGC's decision to use this type of prep plant. The prep plant site would require approximately two to seven acres (one to three hectares) to support plant facilities, truck movements, and storage areas.

The prep plant would employ separation methods, such as froth flotation, to separate out the reject materials. In the coal industry an anionic polyacrilimide flocculant, either in the form of an emulsion (liquid) or a dry solid (powder), is typically used for liquid/solids separation. Coal cleaning plants typically choose emulsion flocculants due to ease of application, because they require less equipment and manpower and are easier to store. Additionally, because of colloidal material such as clays in the coal refuse, a cationic coagulant is required to aid in the liquid/solids separation. To aid in flotation separation, many prep plants also use diesel or kerosene. Sulfuric acid and sodium hydroxide are commonly used to assist in precipitating colloidal material and controlling pH. Ammonia may also be used, but it is less favored due to odor issues. In some instances water runoff is treated with coagulants or flocculants due to high solids.

The types of chemical and rates would be dependent on the coal refuse characteristic. It is expected that industry-standard chemicals would be used during the beneficiation process. It is anticipated that the prep plant would employ general storm water management practices that are typical at cleaning plants (e.g., containment ditches, secondary containment basins and special collection ponds), although details on specific contamination prevention devices are also uncertain at this time. It is expected that bulk chemicals would typically be delivered in chemical "totes" and stored inside a secondary containment barrier. Chemicals would likely be fed into equipment using chemical feed pumps providing delivery in a controlled manner. The material and waste streams would be handled and managed in accordance with federal and state regulations. Anticipated chemicals to be used in the prep plant are listed in Table 2.4-2. WGC is currently investigating the feasibility of marketing the recovered iron pyrite as a product to third parties; however, this action would be dependent on the chemical makeup of the spoils. If this material were not marketable, WGC would dispose of it in a landfill permitted to accept iron pyrite or would otherwise dispose of the material as agreeable by WVDEP in accordance with the remediation of the coal refuse piles.

Beneficiation of the coal refuse near the source piles results in significantly less on-road hauling of materials, lower capital costs for the power plant, and reduced environmental impacts at the power plant site. If crushing and sizing would be conducted at the power plant site, and un-beneficiated coal refuse were used to feed the boiler, all of the coal refuse (above a certain BTU heating value) would need to be trucked from the refuse piles to the power plant site. If beneficiation were conducted at the power plant site, additional space would be required, and additional noise and dust would be generated at the power plant site. Alternatively, if beneficiation were performed near the coal refuse piles, only the beneficiated fuel would be transported to the power plant site. Also, less limestone would be required for the boilers to neutralize the production of sulfur oxide gases. Hence, a smaller power plant and smaller appurtenant facilities would be required, which would result in lower costs and reduced environmental impacts at the power plant site.

Table 2.4-2. Anticipated Prep Plant Chemicals (or Comparable)

Product Name	Manufacturer	Application	Characterization
CAT-FLOC® 83701	Nalco Company	Coagulant	Non-hazardous
CAT-FLOC® 9851 PLUS	Nalco Company	Coagulant	Non-hazardous
NALCO 9850	Nalco Company	Closed circuit coagulant	Non-hazardous
OPTIMER® 83949	Nalco Company	Flocculant	Non-hazardous
OPTIMER® 9806	Nalco Company	Flocculant	Non-hazardous
03DF038	Nalco Company	Flocculant	Hazardous (CAS* 79-06-1)
EN/ACT® 7880	Nalco Company	Clarification aid	Hazardous (CAS 12042-91-0 and 10043-52-4)
NALFLOTE 9843	Nalco Company	Floatation reagent	Hazardous (C4-C18**)
9835	Nalco Company	Floatation reagent	Hazardous (C4-C18)
Sodium Hydroxide, 20%	Generic	pH Control	Hazardous (CAS 1310-73-2)
Sulfuric Acid, 10%	Generic	pH Control	Hazardous (CAS 7664-93-9)

**Chemical Abstract Service number; **OSHA Hazard Communication Rule, 29 CFR 1910.1200, category*

After weighing the feasibility and cost-effectiveness of the fuel-processing alternatives, WGC decided on the beneficiation of coal refuse by a third party using semi-mobile equipment at or near the coal refuse sites. WGC determined that the prep plant design would provide a significant reduction in capital cost with only a minor increase in operations and maintenance costs. Additional savings in limestone expenses would largely offset the increased costs for fuel processing. Furthermore, the volume of truck traffic to and from the power plant site would be reduced greatly by beneficiation at the source piles instead of at the power plant site. Therefore, WGC concluded that the reliability of fuel handling and storage would be greatly enhanced and environmental impacts would be reduced by this alternative.

2.4.4.2 Beneficiation/Prep Plant Siting

As discussed in Section 2.2.3, the initial location of the semi-mobile prep plant would serve the Anjean (Buck Lilly) and Joe Knob coal refuse sites, which would provide beneficiated fuel for the first 4 years of WGC operation. Additional permitted locations would be established near the Donegan and Green Valley sites for the subsequent 16 years of operation (approximately 11 years at Donegan and 5 years at Green Valley).

WGC has identified six candidate beneficiation plant sites to serve the four coal refuse sites (see Section 2.2-3 and Figure 2.2-15): three for Anjean and Joe Knob (AN1, AN2, and AN3), two for Donegan (DN1 and DN2), and one for Green Valley (GV). Important siting criteria for the prep plant include, but are not limited to, the following: property availability, acreage, accessibility for on- and off-road vehicles, proximity to coal refuse sources, proximity to sensitive receptors, type of land cover, flooding potential, and proximity to supply resources (e.g., groundwater and power). Various permits may be required, such as for storm water discharge. In the event that WGC identifies additional candidate sites for a prep plant, the same siting criteria would apply.

Preliminary site visits were conducted at all sites; however, access was restricted for DN2 (Beech Knob), so observations were limited to views from the adjoining road (CR 1) and to aerial photographs made during 1990. Table 2.4-3 summarizes general site characteristics. The following discussion provides a synopsis of each site's features based on field observations supplemented by interpretations of aerial photography and USGS topographic maps.

Table 2.4-3. Site Characteristics of Potential Prep Plant Locations

Site	Coal refuse Source	Approximate Acreage*	Distance to Coal refuse**	Distance to power plant site**
AN1	Anjean/Joe Knob	10 acres	4 miles (to Buck Lilly), 4.5 miles (to Joe Knob)	14 miles
AN2	Anjean/Joe Knob	3 acres	4 miles (to Buck Lilly), 6 miles (to Joe Knob)	14 miles
AN3	Anjean/Joe Knob	2 acres	<0.1 mile to Anjean, 2 miles to Joe Knob	18 miles
DN1	Donegan	7 acres	0.1 mile	28 miles
DN2	Donegan	8 acres	7 miles	21 miles
GV	Green Valley	8 acres	< 0.1 mile	13 miles

**To convert acres to hectares, multiply by 0.4047.*
***To convert miles to kilometers, multiply by 1.6093.*

AN1

AN1 is located just inside the access point to the Anjean mining area, east of CR 1 and south of the Big Clear Creek and South Fork intersection. A bridge crossing (over Big Clear Creek), which would need to be upgraded for the haul trucks, provides access to the site. Most of the site is disturbed and generally slopes to the north and west. The land is owned by Mead-Westvaco and there are treatment/settling ponds that manage some of Anjean's runoff. According to WGC, WVDEP would be excavating and filling these ponds in the future and the area could then potentially become available for a new prep plant. The land cover is mostly grass with some shrubs and young deciduous trees. The advantages of AN1 would be: proximity to the Anjean and Joe Knob coal refuse sources, availability of sufficient site space, proximity to CR 1, limited requirements for clearing, and the absence of sensitive receptors. A disadvantage would be potential land use conflicts associated with WVDEP activities.

AN2

AN2 is located west of CR 1, directly across the road from the access point to the Anjean site. The land is disturbed and includes an abandoned rail line and a parallel gravel road. Currently, Mead-Westvaco owns the site, which is bounded by CR 1 to the east and a small hill to the west. Based on aerial photos, the immediate area is approximately two to three acres (1 to 1.2 hectares) in size and is rectangular in shape. To provide more efficient space for the prep plant activities and truck movements, additional space may be needed to the north and south, and/or the hillside could be partially excavated. Site vegetation is mostly grass, and there is rip-rap on both sides of the gravel road. The site drains into Big Clear Creek, just east of the site. The advantages of AN2 include: its proximity to Anjean/Joe Knob coal refuse sources, its proximity to CR 1, and the absence of sensitive receptors. Disadvantages include: limited space, the likely need for excavation on the hill, the need for off-road vehicles to cross CR 1, and the potential need to remove the existing rail line.

AN3

AN3 is located at the foot of the Buck Lilly pile (eastern border) and can be accessed from the existing haul road at the mining site. This haul road is also the same road used to access Joe Knob. The site is owned by WGBDC, and WVDEP has some of its equipment scattered across the site. The immediate site is approximately two acres (one hectare) in size; however, prep plant activities would mostly likely spread to the north and south. The area is relatively flat and is bounded by Buck Lilly to the west and the hillside to the east. Runoff from the site most likely drains to Buck Lilly branch and subsequently into Little Clear Creek. The ground cover is mostly gravel with some grass and trees near the edges of the site. Advantages of AN3 include: its location on the existing haul road that serves both Anjean and Joe Knob, the absence of sensitive receptors, limited requirements for clearing vegetation, and the presence of level topography. Disadvantages include: limited space that may constrain truck movements (unless trucks can move in a circular pattern around Buck Lilly), the need for on-road trucks to travel up the steep unpaved haul road to the top of the mountain, and the prevalence of severe weather conditions on top of the mountain.

DN1

DN1 is located on CR 39/14, slightly northwest of the entrance into the Donegan site, which is located in a very remote area. There is an abandoned building on site, which was used for mining activities in the past, and WVDEP settling ponds are situated to the west. Most of the site is on disturbed land and is fairly level with some gentle sloping to the northwest. The surrounding land cover is mostly grasses, shrubs, and some deciduous trees. The majority of the site's runoff eventually discharges into Laurel Creek. Currently, the land is being held by the state for tax recovery. Advantages of DN1 include: the availability of sufficient space, proximity to the coal refuse source, and the absence of sensitive receptors. DN1 is ideally situated to serve the Donegan fuel source and, at this time, there are no observable disadvantages of DN1.

DN2

DN2 is located on CR 1, approximately 10 miles (16 kilometers) north of Anjean, in an area known as Beech Knob. The site is privately owned, and it is unknown at this time whether the property would be readily available for WGC's use. However, because of the sufficient amount of disturbed land located at this site and its close proximity to Donegan, WGC is currently investigating the site's availability. Site observation was limited to the view along CR 1; however, upon examining aerial photography, the land appears to be an open field that was most likely used for agriculture in the past. Based on USGS maps, the land appears to be relatively flat and generally slopes to the north.

An existing haul road that was used in the past for mining activities and hauling coal could provide a route for off-road vehicles between Beech Knob and Donegan (approximately 7 miles [11 kilometers] away). With some minor upgrades to this haul road, off-road vehicles could transport coal refuse to the Beech Knob site. Advantages of DN2 include: the availability of sufficient space on previously disturbed and level ground. Disadvantages include: the site's proximity to scattered residential properties that exist along CR 1 and nearby, the need for off-road trucks to travel a long distance along a haul road before reaching DN2, the uncertain availability of a water source (due to the location on a ridge), and the uncertain availability of 3-phase power.

GV

The GV prep plant site would be located along the southern margin of the Green Valley coal refuse pile on land currently owned by Massey Coal Company. The site would be situated to make use of existing treatment ponds and to provide access from WV 20. The site is heavily vegetated with grasses, shrubs, and young deciduous trees. Also, Colt Branch, which was relocated and diverted in the past to avoid the coal refuse pile, traverses part of the site. The site is bounded by Hominy Creek to the south and the coal refuse pile to the north. Advantages of GV would include: its proximity to the Green Valley coal refuse source (off-road trucks would not need to cross public roads), its proximity to WV 20, and the absence of sensitive receptors. Disadvantages include: the existence of overlying coal refuse that may need to be excavated and stored prior to construction and the need to investigate depth to the groundwater table.

2.4.5 Limestone Supply

The selection of a limestone source to support the requirements of the boiler for the proposed power plant is largely dependent on the characteristics of the material, primarily the calcium carbonate content and reactivity of the limestone. The calcium carbonate requirement for the boiler limestone is a matter of economic feasibility that maximizes the amount of usable calcium per dollar of expended cost (i.e., transport and handling costs). WGC has determined that 70 percent approximates the cutoff point for the lowest economic calcium carbonate content. The kiln requires a limestone of higher quality with greater than 90 percent calcium carbonate.

Commercial sources of limestone are available from several local quarries as identified in Section 2.2.3. The most likely source of limestone for the boiler would be the Boxley Quarry in Alta near Lewisburg, WV. The Boxley quarry is a permitted facility that is owned by the Boxley Material Company (BMC). The quarry is currently operating and has sufficient reserves to supply the WGC Project and its existing customer base. WGC has identified Mill Point Quarry as a primary source for the kiln limestone. Mill Point is also owned by BMC and is located approximately 60 miles (97 kilometers) from Rainelle along US 219. In a letter addressed to WGC, BMC has provided a statement of confidence that the required limestone for the proposed Co-Production Facility can be supplied by the quarries in Alta and Mill Point for the plant's projected 20-year operation. BMC states that the calcium carbonate levels meet or exceed the requirements of 70 percent for boiler operations and 90 percent for kiln operations.

Alternate sources of calcium carbonate or calcium oxide for the kiln operations are also being considered, such as waste kiln dust from other facilities. Materials from alternate sources would likely be barged to Charleston and trucked to the plant site. However, due to the high calcium oxide content of such sources, lesser quantities and fewer truckloads would be needed in comparison to limestone.

The options that were considered by WGC for sources of limestone or other calcium carbonate material are listed below.

- Option A – Truck limestone from Boxley's Alta New Area (for the boiler) and Mill Point (for the kiln), with trucking the responsibility of the quarry or other third party.
- Option B – Truck limestone from Greystone quarry or other permitted quarry in the Lewisburg area (for the boiler) and Mill Point (for the kiln), with trucking the responsibility of the quarry or other third party.
- Option C – Truck limestone from an acceptable quarry in the Lewisburg area (for the boiler), with trucking the responsibility of the quarry or other third party. Barge/truck material with high calcium oxide content for the kiln (e.g., limestone fines with 96 to 98 percent calcium carbonate content currently being disposed as waste by a Kentucky facility). Material would be barged into Charleston and trucked along US 60 under contract to the site.

Because of limestone quality and shorter travel distances, WGC identified Option A as the preferred means of limestone supply for the project

2.4.6 Water Supply

Water supply requirements for the facility range from approximately 900 to 1,200 gallons per minute (1.3 to 1.7 million gallons per day or 4.9 to 6.4 million liters per day) depending upon seasonal fluctuations (with peak demand in the summer months). WGC expects to use all of the treated wastewater effluent from Rainelle Sewage Treatment Plant (RSTP) for the project, supplemented by withdrawals from the Meadow River and/or groundwater sources. Based on the amount of RSTP effluent generated on a seasonal basis, an additional 300 to 800 gallons per minute (0.45 to 1.15 million gallons per day or 1.70 to 4.35 million liters per day) would be required from the supplemental sources (see Figure 2.4-5). Key assumptions (Parsons, 2005; B&A 2006) used in estimating plant water demand as illustrated in Figure 2.4-5 include:

- Circulation water flow rate of 55,000 gallons per minute (210,000 liters per minute).
- Cooling tower evaporation rate per manufacturer's curves.
- Cooling tower blowdown is set by 6 cycles of concentration. Cooling tower blowdown is liquid discharge from the cooling tower that is high in non-hazardous dissolved solids and is re-used within the plant for makeup to the flash dryer absorber, dust suppression, etc.
- In addition to the water required for cooling tower makeup (and blowdown, which is recycled within the plant), an additional makeup stream of about 100,000 gallons per day (380,000 liters per day) is required for the plant steam cycle makeup treatment system and potable/sanitary use. This rate is relatively constant throughout the year. Cooling tower blowdown is not used for this purpose as it is much too high in dissolved solids, and would impose a large and unnecessary burden on the cycle makeup treatment system.
- 100 percent of the Rainelle wastewater treatment plant effluent would be diverted for plant makeup water with a variable demand on other sources to make up the balance.

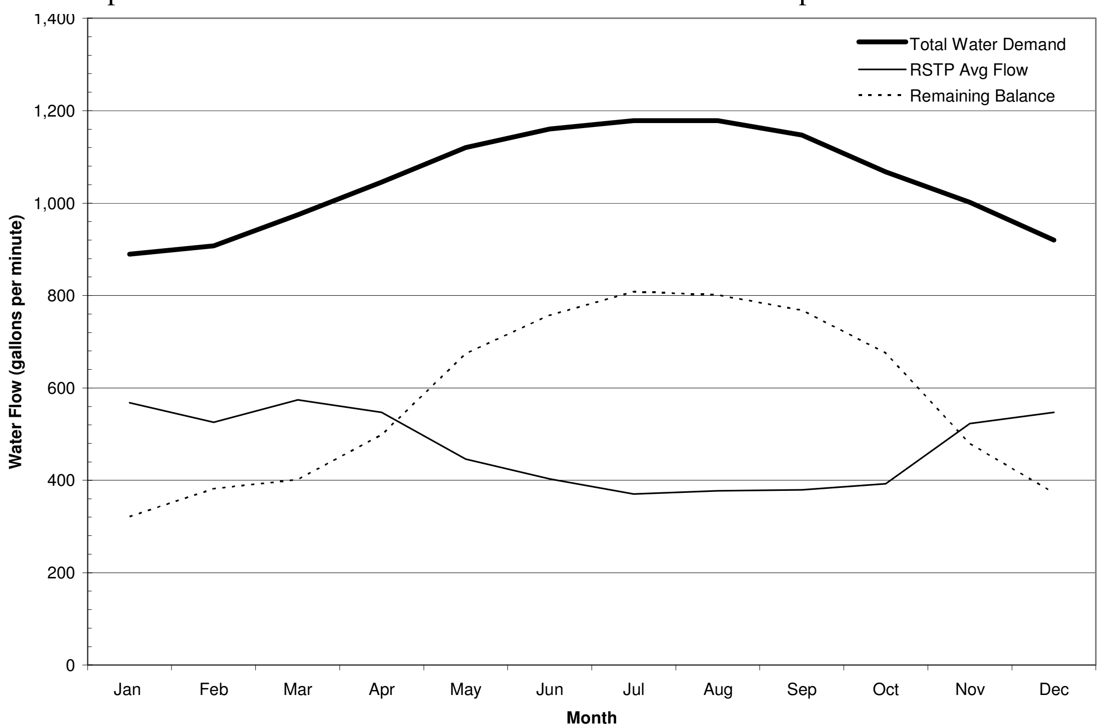

Figure 2.4-5. Water Requirements and Deficiencies

Supplemental water withdrawals from the Meadow River would be sustainable provided that the river flow would not be reduced below 60 percent of the seasonally or annually adjusted average base flow rate (i.e., the river flow rate above which adverse water quality and aquatic habitat impacts would not be expected), or another comparable withdrawal limitation measure determined in consultation with the state, on any given day. Therefore, the river could meet nearly all of the supplemental water demand by the WGC plant during the winter and spring months. However, during the dry months in summer and early autumn, and during prolonged periods of low flow, the river could not be depended upon to meet the full supplemental water demand by the plant. Withdrawal from the Meadow River would occur via a permanent or temporary structure located approximately 500 feet (152 meters) upstream of the RSTP near the confluence of Sewell Creek (see Figure 2.2-3). The river water would be pumped to a holding tank at the RSTP, where it would be mixed with RSTP effluent and conveyed to the WGC plant in the same water supply pipeline.

WGC could also satisfy part of the supplemental water demand using groundwater from two wells in Rainelle: Production Well Number 1 (PW-1) and the "Snake Island" well (PW-3). Additional and ongoing groundwater studies are planned to better characterize the local aquifer and the effects of long-term pumping. These studies were not completed in time to be incorporated into the Draft EIS, but they are expected to be available for incorporation into the Final EIS. The goal of this modeling effort is to more accurately predict the drawdown effects on the aquifer over a long period of time and under worst-case drought conditions. WGC is also investigating alternate groundwater sources outside the drawdown area for the WGC production wells for use as a potential third source of water. Data and information obtained from further study will be used by WGC to ensure that the groundwater withdrawals would not adversely impact the aquifer and other nearby wells. Groundwater would be conveyed to the same holding tank at the RSTP as for river water, where it would be mixed with RSTP effluent and conveyed to the WGC plant in the same water supply pipeline.

Because there is some uncertainty regarding whether sufficient water would be available from either the Meadow River or groundwater sources under extended low recharge conditions, WGC has considered two options for supplemental process water supply for the power plant. Both options provide measures to ensure that the power plant maintains an adequate water supply without compromising the local aquifer in Rainelle or reducing flow in the Meadow River below a state recommended threshold.

- Option A – WGC would withdraw groundwater from PW-1 and PW-3 (and other potential wells) as the secondary source of water supply to supplement the use of up to 100 percent of the RSTP effluent. As a tertiary source of water supply, WGC would take water from Meadow River using a temporary withdrawal structure to be located near the RSTP.
- Option B – As the secondary source of water supply to supplement the use of up to 100 percent of the RSTP effluent, WGC would take water from the Meadow River using a permanent withdrawal structure to be located approximately 500 feet upstream of the RSTP. During periods when withdrawals would cause the flow in the Meadow River to decline below 60% of base flow (i.e., the river flow rate above which adverse water quality and aquatic habitat impacts would not be expected), or another comparable withdrawal limitation measure determined in consultation with the state, WGC would withdraw groundwater from PW-1, PW-3, and other potential wells as a tertiary source of process water supply.

Because of the uncertainty of long-term pumping effects on the local aquifer, WGC identified Option B as the preferred means of process water supply for the project.

2.4.7 Material Handling and Transportation

Initially, WGC considered the following alternatives for transportation of fuel supplies:

- Option A – Truck transport.
- Option B – Rail transport.

For reasons described in greater detail below, WGC concluded that rail transport would not be economically feasible. Truck transport, Option A, has been evaluated as the only feasible means of transportation for fuel supplies in this EIS

Heavy trucks would be used to transport materials to and from the plant site. WGC initially considered rail transport of coal refuse and discussed this prospect with local officials and the public. The cost associated with infrastructure upgrades (including rail spurs at the site and coal refuse piles, upgrade requirements for disused sections of the rail line, and rail loading/unloading facilities) was a key consideration when evaluating the rail option. The ability of the site layout to accommodate a rail line was also a key factor, as were the material handling requirements at both the power plant and coal refuse sites.

WGC presented a comparison between the use of heavy trucks and rail transportation for the project to the local community. Considerations that were taken into account included fuel requirements, travel routes, material and transport equipment costs at the coal refuse and limestone sites and at the proposed power plant, transport scheduling and employment numbers. Based on the need for substantial rail upgrades, the rail alignment constraints at the plant site, and the cost implications related to excessive material handling requirements, rail transport was not considered economically feasible or practical from an operational standpoint and, therefore, Option B was eliminated from further consideration.

As stated in Section 2.4.4.2, one of the important factors of siting a prep plant location would be enabling access by off-road vehicles for the coal refuse transportation to the prep plants. The processed fuel would be delivered to the power plant site from the prep plant using 40-ton dump trailers hauled by 550 HP (or equivalent) on-road tractors. Limestone and other materials delivered in large quantities would be transported in 20-ton dump trailers hauled by 550 HP (or equivalent) tractors. The quantities of raw materials and associated numbers of truck deliveries for the project presented in Table 2.4-4 represent upper bound estimates, which assume worst case material demand and with deliveries restricted to between 8 a.m. and 5 p.m., Monday through Friday. The 40-ton trailers returning to the coal refuse sites would haul excess waste ash to be used in reclaiming the sites. Figure 2.4-6 illustrates the anticipated transportation routes for coal refuse, processed fuel, and limestone. With the exception of coal refuse, processed fuel, and ash, it is expected that suppliers or commercial trucking companies would provide all trucking operations. Commercial rail delivery of some process materials (e.g., alumina) to existing spurs may be considered; however, these deliveries would take place without an increase in rail frequency through Rainelle.

Table 2.4-4. Worst-Case Trucking Requirements for Hauling Beneficiated Coal Refuse and Materials to Plant Site during Plant Operation

Material	Trailer Size (tons)+	Tons/ Week+	Hours of Operation (hours/shift)	Avg Truck Roundtrips* During Operations
Power Plant				
Processed Coal and Ash Return	40	12,600	8am-5pm (8hr), Mon-Fri	8 per hour
Limestone	20	689	8am-5pm (8hr), Mon-Fri	1 per hour
Kiln/Cement Production Facility**				
Raw Material Delivery	20	163	8am-5pm (8hr), Mon-Fri	2 per shift
Alumina source	20	95	8am-5pm (8hr), Mon-Fri	1 per shift
Gypsum source	20	354	8am-5pm (8hr), Mon-Fri	4 per shift
Kiln Fuel	20	117	8am-5pm (8hr), Mon-Fri	1 per shift
Limestone (high-quality)	20	980	8am-5pm (8hr), Mon-Fri	10 per shift
Cement	20	700	8am-5pm (8hr), Mon-Fri	7 per shift

Note: Material requirements represent worst-case scenarios. (Sources: WGC a, b, c)

**1 roundtrip = 2 trips (in and out)*

*** Associated kiln/cement production trucks were estimated and analyzed to capture worst-case scenarios associated with potential cement related deliveries*

+To convert tons to metric tons, multiply tons value by 0.9072.

WGC is considering the following options for coal refuse hauling:

- WGC would procure and operate its own fleet of trucks.
- WGC would contract with a municipally-owned trucking company. Under this option, one or more of the municipalities owning WGC would form its own trucking company and be responsible for siting, construction, and operation of a truck facility, as well as the procurement and maintenance of a truck fleet.
- WGC would contract with a privately owned trucking company (e.g., a regional trucking company would locate facilities in the area and provide all trucking and hauling).

The most likely location for a truck storage and maintenance yard is a site located in Charmco (see Figures 2.4-7 and 2.4-8). The site is centrally located to the project (i.e., between the power plant site and the coal refuse sites) and is currently abandoned and available for use. WGC is currently negotiating with a private developer for the purchase or lease of this property. The area is located on the north side of WV 20 and US 60 and is approximately 9 acres (4 hectares) in size. It is located approximately 3 miles (5 kilometers) northeast of Rainelle and was formerly a drive-in movie theater. The majority of the site has been disturbed and cleared of vegetation, with the exception of areas along the perimeter of the property, and it consists of bare soil and gravel. The site contains a small, one-story masonry structure located near the center of the property.

Figure 2.4-7. Charmco Yard Site

2.4.8 Power Transmission Corridor Alternatives

Initial plans for the WGC Project included the extension of power transmission lines from the plant approximately 4,000 feet (1,220 meters) to the northwest and connecting to the existing AEP transmission lines. However, WGC subsequently determined that the AEP lines lacked adequate capacity to accommodate the plant output. Due to the infrastructure upgrade requirements and feasibility of using the AEP corridor, WGC considered the following options for exporting the generated electricity to the national grid:

- Option A –Widen existing ROW to Grassy Falls Substation to accommodate new poles and lines;
- Option B – Upgrade existing AEP poles to carry WGC lines north to Grassy Falls Substation and south to Layland Substation;
- Option C – Construct new transmission corridor to Grassy Falls Substation.

Conceptual routes for transmission corridors to Grassy Falls are illustrated in Figure 2.4-9. The existing route would be used under Options A or B as described above, whereas a newly proposed corridor would be considered under Option C. Options A and B would would affect more landowners. Option C would have least impact on private landowners as it traverses large tracts of land owned by timber companies and would be more cost effective than the other options. Therefore, WGC's preference for transmitting electricity from the proposed facility is Option C. The specific alignment for Option C would ultimately be dependent on securing options for a ROW and other factors that may affect siting (e.g., environmental constraints). Representative views of the existing AEP corridor between Rainelle and Grassy Falls are provided in Figure 2.4-10.

AEP Corridor (Rainelle to McClung)

AEP Corridor
(McLung to Grassy Falls)

Grassy Falls Substation

Figure 2.4-10. Representative Views of Existing AEP Corridor

Under Option C, WGC would procure a ROW (100 feet [30 meters] wide), clear the corridor, and construct and maintain the power transmission infrastructure. The proposed power plant would be connected to the Pennsylvania Jersey Maryland (PJM) Regional Transmission Organization (RTO) by connection to the Grassy Falls 138kV substation (owned by Allegheny Power) via a new 138kV line. WGC intends to contract for the design and construction of the transmission line, and anticipates that the contractor will use a metal pole configuration.

2.4.9 Construction and Operation Plans

2.4.9.1 Co-Production Facility Construction

Construction of facilities for the power plant and kiln would occur during an approximate 29-month period, most likely beginning during 2007, followed by several months of startup and testing. Work would commence in the first 3 months with the preparation of staging and laydown areas for the storage of equipment and supplies, as well as the construction of a temporary access road from John Raine Drive to the north end of the proposed plant site, including the installation of a temporary bridge across Sewell Creek (see Figure 2.4-11). Grading and excavation for the main plant and kiln site would follow in approximately the fourth and sixth months, along with construction of foundations for the boiler, turbine, cooling tower, and kiln in the sixth through eleventh months. Erection of the boiler, turbine, and kiln structures would proceed from the eighth through 29th months. Water supply and treatment facilities would be constructed from the ninth through 17th months, and the cooling tower would be erected from the 17th through 21st months. Finally, material-handling facilities would be constructed between the 18th and 29th months.

The general contractor selected by WGC would have ultimate responsibility for the construction of the facility. The general contractor would utilize local and regional craft labor under its own supervision complemented by specialty subcontractors as appropriate. The anticipated hours of construction would be from 7 am to 6 pm, Monday through Friday. As illustrated in Figure 2.4-12, the manpower requirements during construction would range from a low of three persons in the first month to a peak of more than 270 by the 20th month, then tapering to eight persons in the final month of testing.

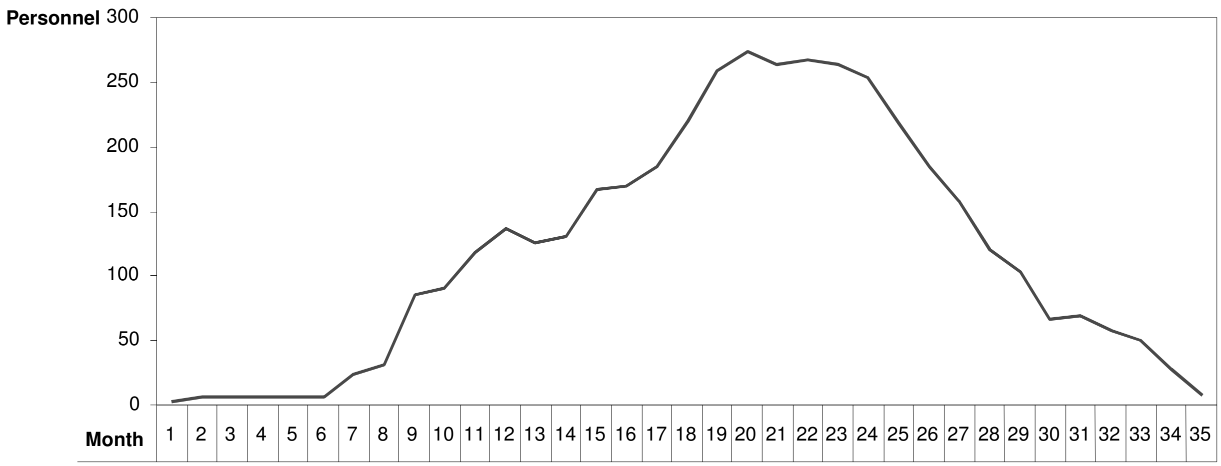

Figure 2.4-12 Manpower Requirements during Construction and Testing

2.4.9.2 Prep Plant Facility Construction

The general method of constructing a prep plant comprises of a) selection of a site; b) excavating sumps, installing concrete liners and building a foundation, and other civil works; c) construction of the plant frame and sheathing on top of the foundation; and d) installing the plant equipment.

The foundation and structural support work would be completed in advance of a move between sites enabling a transition in less than 60 days. The overall foundation footprint would be approximately 100 ft by 150 ft (30 meters by 50 meters). A prepared "ready to burn" fuel reserve sufficient for uncertainty in prep plant availability (including relocation outages) would be established at each prep plant site. The modular prep plant design would enable transport of equipment components by standard flat bed trailers with partial disassembly, loading, unloading, and reassembly facilitated by a small mobile crane.

2.4.9.3 Co-Production Facility Operation

The following paragraphs describe the principal operations at the WGC facilities.

Limestone Preparation Facilities

CFB limestone delivered by the 20-ton dump trailers would be sized and dried in a grinder/screen/dryer process to meet the limestone sizing specifications in the limestone preparation facilities. The prepared limestone would then be transported by a conveyor to the limestone day bin. Kiln limestone would be screened at the quarry and delivered directly to the kiln facility. The processing facilities (grinder/screen/dryer) would be capable of processing up to 35 tons (32 metric tons) of limestone per hour. Although two limestone crushers would be provided, generally only one would be in use at any time.

Boiler Operations

Coal and limestone from the day silos and storage pile would be burned in a CFB reactor located in the boiler building to create heat for the steam turbine generator. Residual ash would be removed, and some of it would be used in the rotary kiln to provide raw material for cement production. An induced draft fan would be connected to the boiler's stack vent to help exhaust gases from combustion. Two forced draft fans would operate to ensure sufficient air supply for the coal combustion in the boiler building.

Steam Turbine Generator (STG) Operations

High-pressure steam would turn the blades of the turbine to create electric energy. At the end of the turbine, the steam would enter a condenser to recapture water and to ensure minimum back-pressure against the turbine.

Exhaust Stack

The majority of the potential emissions from the proposed Co-Production Facility would be generated from the CFB combustor and kiln, which would be emitted through the exhaust stack. The stack would be constructed to a height of approximately 300 feet (90 meters).

Cooling Tower

A cooling tower with four cells would be constructed (tower dimensions comprise approximately 200 feet [60 meters] in length, 50 feet [15 meters] in width, and 62 feet [19 meters] in height). The purpose of the cooling tower is to remove heat from the circulating cooling water system, the principal duty of which is to condense the steam exiting the low-pressure end of the steam turbine and thereby reduce the back-pressure against the steam turbine. The water condensed on the tubes of the condenser will be collected in a sump and recycled to the boiler feedwater system. The circulating cooling water is actually cooled by evaporation in the cooling towers, and this process forms the main "water loss" (and solids accumulation), which requires cooling tower blowdown.

Kiln Operations

Approximately 20 tons (18 metric tons) per hour of high-quality coal fines from the prep plant would be used as fuel for the kiln. Raw meal would be fed into a long, dry kiln where the limestone would be decomposed and the various mineral components chemically combined to form the desired new compounds, in a melted slag called "clinker." The hot clinker formed in the kiln would pass into a grate-type, air-swept cooler. The air would cool the clinker from approximately 2,300° F to 250° F (1,260° C to 120° C). The cooled clinker would be conveyed to a storage bin, then conveyed to an air-swept ball mill for grinding. The grinding mill product would be stored for bulk delivery to cement users.

Materials Handling

Several considerations were given to the manner in which the power plant facility would manage fuel delivery and handling. Boiler feed specifications, process economics, and site spatial constraints related to available coal storage areas largely influenced the characteristics of the selected material handling system. One of the greatest challenges for handling of coal refuse is the need to reduce moisture content to a workable level. WGC elected to contract with an off-site third party contractor to beneficiate the raw coal refuse to create a ready-to-burn fuel. This option provided the greatest flexibility to WGC while reducing transportation requirements and costs.

Materials handling for the power plant would occur on the southern and western portions of the site, which are the most distant from nearby residences. Delivery trucks with beneficiated fuel, coal fines (for kiln use), or limestone would proceed to the two-day fuel storage pile, the 3.5-day limestone storage pile, or the kiln facility, as appropriate. Coal trucks carrying CFB fuel and kiln fines would be on site for approximately 10 minutes each and limestone trucks for approximately 5 minutes each. Truck deliveries would occur as described in Section 2.4.6, and the subsequent transfer of materials to the coal silos and limestone preparation building would occur 24 hours per day.

Wastewater Management

Process water from plant operations would be collected and treated by the plant's proposed wastewater treatment system for recycling as needed for plant operations. Storm water runoff on site also would be collected and treated by the onsite wastewater treatment system for reuse.

Operational Manpower

The proposed project would employ approximately 55 people during routine operations, including 44 positions for the power plant and cement operations, 7 positions for plant management, and 4 positions for plant financial administration. Among the 44 operational positions, 16 employees would staff the power plant and 12 employees would staff the kiln operations 7 days per week, 24 hours per day, in two 12-hour shifts; 16 other employees would staff the power plant during an 8-hour daytime shift along with the management and administrative employees. Final staffing levels would be determined by the operations and maintenance (O&M) contractor.

2.4.9.4 Coal Refuse Site Operations

Coal Preparation Facilities

Coal refuse would be delivered to the prep plant using off-road vehicles. The prep plant facilities would be capable of processing approximately 250 tons (227 metric tons) of coal refuse per hour (190 tons [172 metric tons] per hour planned processing rate with a 40 percent average yield of beneficiated fuel). Beneficiated fuel (ready for combustion) would be delivered by 40-ton dump trailers to the fuel storage facilities at the power plant site.

Operations at the coal refuse supply locations (Anjean, Joe Knob, Green Valley, Donegan, and potentially other sites) would include the extraction of coal refuse from the coal refuse piles and loading into off-road trucks, as well as the receipt of waste ash from the CFB plant and spreading at the remediation locations. The equipment required for coal refuse and ash handling is listed in Table 2.4-5. These assets would be relocated to the respective coal refuse site in use at any given time. Coal refuse operations would employ approximately 70 personnel at the coal refuse sites, including approximately 16 personnel for the prep plant, 12 personnel for the coal refuse operations, and 42 personnel for fuel hauling operations. Operations at the prep plant would require a staff of three to five per shift. Operation is planned for 24-hours/day, seven days per week, at least 85 percent of the time at full operating capacity. Final staffing levels would be determined by the O&M contractor.

Table 2.4-5. Equipment for Coal Refuse Site Operations

Process	Representative Equipment	Quantity
Coal refuse Handling	Cat D8R Tracked Dozer	1
	Cat 988G Wheeled Loader	1
	Cat 775E Off-Road Truck	TBD*
Waste Ash Return Handling	Cat D6N Tracked Dozer	1
	Cat CS-563E Compactor	1
	Cat 16H Motor Grader	1
	Cat 611 Water Truck	1

**TBD – To Be Determined based on location of prep plant facility*

The sequence of operations for coal refuse handling would include the following:

- Cat D8R tracked dozer (or equivalent) loosens and stockpiles coal refuse.
- Cat 988G wheeled loader (or equivalent) blends coal refuse as necessary and loads into off-road trucks.
- Cat 775E, 70-ton capacity off-road (or equivalent) trucks transport coal refuse to third party beneficiation facility (prep plant) and reload with damp waste ash for the return trip to the coal refuse site.

- On-road trucks transport beneficiated fuel to the power plant site and reload with damp waste ash for the return trip to the coal prep plant site. The contract for hauling fuel to the power plant will require 40-ton load capacity trailers.

The sequence of operations for waste ash handling would include the following:

- Cat 775E (or equivalent) off-road trucks transport waste ash to coal refuse site and dump ash at remediation location.
- Cat D6N (or equivalent) tracked dozer spreads waste ash over the appropriate areas at remediation site.
- Cat 16H (or equivalent) grader is used for haul road maintenance.
- Cat CS-563E (or equivalent) compactor compresses waste ash at remediation site.
- Cat 611 (or equivalent) water truck wets down gravel haul road and remediation site to reduce dust generation.

The Memo of Understanding (MOU) and Prospective Purchaser and Waste Coal Access Agreement between WGC and WVDEP (see Section 2.4.3.1) address management practices at the Anjean site and requirements for a reclamation plan. Requirements of the agreement and the MOU would be extended to all coal refuse sites. In accordance with the reclamation plan that would be prepared by WGC and approved by WVDEP in accordance with the agreement and MOU, the following best management practices (BMPs) and procedures would be implemented at the coal refuse sites to mitigate impacts from dust and storm water runoff:

- Water truck will be used to keep dust down on the gravel haul road.
- Grader will be used to keep the gravel road in best possible condition.
- Blend pile will be maintained to blend and allow wet coal refuse to drain/dry prior to transport and thereby minimize black water runoff from trucks.
- Other procedures will be developed in the reclamation plan to minimize black water runoff from the coal refuse during rain events.
- Wheel wash will be located at the bottom of the haul road to remove dust before entering highway.
- All trucks will be covered.
- Roadway speed limits will be observed.
- Water truck will be utilized at the load out area when needed to control dust.
- All truck drivers and operators will be trained to be aware and report any issues that affect dust generation, roadway contamination, roadway deterioration, etc.
- Management will be trained to take action on any such reported issues.

2.5 Applicable Regulations, Permits, and Other Requirements

The major federal and state laws, regulation executive orders, and other compliance actions that would be applicable to the WGC Project are identified in Table 2.5-1. A number of federal environmental statutes address environmental protection, compliance, or consultation. In addition, certain environmental requirements have been delegated to state authorities for enforcement and implementation.

- On-road trucks transport beneficiated fuel to the power plant site and reload with damp waste ash for the return trip to the coal prep plant site. The contract for hauling fuel to the power plant will require 40-ton load capacity trailers.

The sequence of operations for waste ash handling would include the following:

- Cat 775E (or equivalent) off-road trucks transport waste ash to coal refuse site and dump ash at remediation location.
- Cat D6N (or equivalent) tracked dozer spreads waste ash over the appropriate areas at remediation site.
- Cat 16H (or equivalent) grader is used for haul road maintenance.
- Cat CS-563E (or equivalent) compactor compresses waste ash at remediation site.
- Cat 611 (or equivalent) water truck wets down gravel haul road and remediation site to reduce dust generation.

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Table 2.5-1. Applicable Regulatory Compliance and Permit Requirements

Statute, Regulation, Order	Description
Federal	
National Environmental Policy Act (NEPA)	This EIS is being prepared to comply with NEPA, the federal law that requires agencies of the federal government to study the possible environmental impacts of major federal actions significantly affecting the quality of the human environment.
Clean Air Act (CAA) • Enacted by Public Law 90-148, Air Quality Act of 1967 • Amended by Public Law 101-549, CAA Amendments of 1990 • Regulations implementing the CAA are found in 40 CFR Parts 50–95.	The CAA establishes National Ambient Air Quality Standards (NAAQS) set by the U.S. Environmental Protection Agency (EPA) for certain pervasive pollutants. Regulations implementing the Clean Air Act are found in 40 CFR Parts 50–95. Applicable Titles: • Title I—Air Pollution Prevention and Control. This Title is the basis for air quality and emission limitations, PSD permitting program, State Implementation Plans, New Source Performance Standards, and National Emissions Standards for Hazardous Air Pollutants. • Title IV—Acid Deposition Control. This Title establishes limitations on sulfur dioxide and nitrogen oxide emissions, permitting requirements, monitoring programs, reporting and record keeping requirements, and compliance plans for emission sources. This Title requires that emissions of sulfur dioxide from utility sources be limited to the amounts of allowances held by the sources. • Title V—Permitting. Although a Title V permit may not be required, this Title provides the basis for the Operating Permit Program and establishes permit conditions, including monitoring and analysis, inspections, certification, and reporting. Authority for implementation of the permitting program is delegated to authorized states, including WVDEP's Division of Air Quality.
Clean Water Act (CWA) • Enacted by Public Law 92-500, Federal Water Pollution Control Act Amendments of 1972 • Amended by Public Law 95-217, Clean Water Act of 1977, and Public Law 100-4, Water Quality Act of 1987 • Regulations implementing the Clean Water Act are found in 40 CFR Parts 104–140.	The CWA focuses on improving the quality of water resources by providing a comprehensive framework of standards, technical tools, and financial assistance to address the many causes of pollution and poor water quality, including municipal and industrial wastewater discharges, polluted runoff from urban and rural areas, and habitat destruction. Applicable Titles: • Title III—Standards and Enforcement: ○ Section 301, Effluent Limitations, is the basis for establishing a set of technology-based effluent standards for specific industries. ○ Section 302, Water Quality Related Effluent Limitations, addresses the development and application of effluent standards based on water quality goals for the waters receiving the effluent • Title IV—Permits and Licenses: Section 401, Water Quality Certification, required to obtain a federal CWA Section 404 permit from the USACE, or any or any other federal permits or licenses for projects that will result in a discharge of dredged or fill material into any waters of the State. Applications are submitted to WVDEP.

Table 2.5-1. Applicable Regulatory Compliance and Permit Requirements (continued)

Statute, Regulation, Order	Description
	○ Section 402, National Pollutant Discharge Elimination System (NPDES), regulates the discharge of pollutants to surface waters. Regulations implementing the NPDES program are found in 40 CFR Part 122. Authority for implementation of the NPDES permit program is delegated to the WVDEP. Treated wastewater from the Rainelle Sewage Treatment Plant, which is discharged to the Meadow River, is regulated by WVDEP's NPDES industrial wastewater discharge permit. ○ Section 404, Permits for Dredged or Fill Material, regulates the discharge of dredged or fill material in the jurisdictional wetlands and *waters of the United States*. The USACE has been delegated the responsibility for authorizing these actions. • Regulations that affect the permitting of this project include: ○ 40 CFR Part 112—Oil Pollution Prevention. This regulation requires the preparation of a Spill Prevention, Control, and Countermeasure Plan.
Executive Order 11988, Floodplain Management ; **Executive Order 11990, Protection of Wetlands**	• Executive Order 11988, Floodplain Management, directs federal agencies to establish procedures to ensure that they consider potential effects of flood hazards and floodplain management for any action undertaken. Agencies are to avoid impacts to floodplains to the extent practical. • Executive Order 11990, Protection of Wetlands, requires federal agencies to avoid short- and long-term impacts to wetlands if a practical alternative exists. • DOE regulation 10 CFR Part 1022 establishes procedures for compliance with these Executive Orders. Where no practical alternatives exist to development in floodplain and wetlands, DOE is required to prepare a floodplain and wetlands assessment discussing the effects on the floodplain and wetlands, and consideration of alternatives. In addition, these regulations require DOE to design or modify its actions to minimize potential damage in floodplains or harm to wetlands. DOE is also required to provide opportunity for public review of any plans or proposals for actions in floodplains and new construction in wetlands. A statement of findings from the assessment will be incorporated into the Final EIS.
Surface Mining Control and Reclamation Act (SMCRA) of 1977	The SMCRA provides for the federal regulation of surface coal mining operations and the acquisition and reclamation of abandoned mines. Title IV of the SMCRA is designed to help reclaim and restore abandoned coal mine areas throughout the country. Mining and mine reclamation activities associated with the proposed facilities could require permits and approvals from the WVDEP's Office of Abandoned Mine Lands and Reclamation.
Resource Conservation and Recovery Act of 1976 • Enacted by Public Law 94-580, Resource Conservation and Recovery Act of 1976 • Amended by legislation including Public Law 98-616, Hazardous and Solid Waste Amendments of 1984, Public Law 99-499, Superfund Amendments and Reauthorization Act of 1986, and Public Law 104-119, Land Disposal Flexibility Act of 1996	RCRA regulates the treatment, storage, and disposal of hazardous wastes. Project participants would be required to identify any residues that require management as hazardous waste under RCRA (40 CFR Part 261). For some waste streams, this includes testing waste samples using the toxic characteristic leaching procedure or other procedures that measure hazardous waste characteristics. Applicable Title: Title II—Solid Waste Disposal (known as the Solid Waste Disposal Act), regulates the disposal of solid wastes. Title II, Subtitle C—Hazardous Waste Management, provides for a regulatory system to ensure the environmentally sound management of hazardous wastes from the point of origin to the point of final disposal. Title II, Subtitle D—State or Regional Solid Waste Plans.

Table 2.5-1. Applicable Regulatory Compliance and Permit Requirements (continued)

Statute, Regulation, Order	Description
Endangered Species Act of 1973, as amended (16 USC 1536 et seq.) Enacted by Public Law 93-205, Endangered Species Act of 1973 (16 USC 1531 et seq.)	Section 7, "Interagency Cooperation," requires any federal agency authorizing, funding, or carrying out any action to ensure that the action is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat of such species. Under Section 7 of the Act, DOE has consulted with the USFWS (see Appendix B).
National Historic Preservation Act of 1966 Enacted by Public Law 89-665, National Historic Preservation Act of 1966 (16 USC 470 et seq.)	Under Section 106, the head of any federal agency having direct or indirect jurisdiction over a proposed federal or federally assisted undertaking in any state and the head of any federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. The head of any such federal agency shall afford the Advisory Council on Historic Preservation established under Title II of the Act a reasonable opportunity to comment with regard to such undertaking. Under Section 106 of the Act, DOE has consulted with West Virginia's Division of Culture and History and the Greenbrier County Historical Society (see Appendix B).
Occupational Safety and Health Act (OSHA) of 1970, as amended (29 USC §651 et seq.) • OSHA General Industry Standards (29 CFR Part 1910) • OSHA Construction Industry Standards (29 CFR Part 1926)	Compliance with the OSHA would be required according to OSHA standards. Specifically, the construction and general industry rules in 29 CFR Parts 1910 and 1926 apply.
Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	This Executive Order requires federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.
State	
West Virginia Air Pollution Control Act (APCA)	West Virginia Air Pollution Control Act (APCA) charges the West Virginia DEP with regulating air quality in the state. The DEP adopts and enforces air quality standards, emission control requirements, and other air regulations. The West Virginia clean air program follows the requirements of the federal Clear Air Act (CAA). The EPA and DEP work cooperatively to enforce these requirements. WVDEP's Division of Air Quality has issued PSD Permit (R14-0028) for the WGC Project.
West Virginia CSR 150-03, Rules & Regulations for the Government of Electric Utilities	These rules govern the operation and service of electric utilities subject to the jurisdiction of the Public Service Commission of West Virginia (PSC).
W.Va. Code, Chapter 22, Article 5, Section 1	Air quality permit for coal preparation plants and coal handling operations required to prevent and control air pollution caused by the construction, modification, relocation or operation of coal preparation plants and/or coal handling operations.

Table 2.5-1. Applicable Regulatory Compliance and Permit Requirements (continued)

Statute, Regulation, Order	Description
West Virginia Water Pollution Control Act (WPCA)	The principal water quality law in the state of West Virginia is the WPCA. The WPCA designates the West Virginia Office of Water Resources (OWR), within the Division of Environmental Protection (DEP) as the water pollution control agency for the state. The OWR is charged with preserving the integrity of the state's water resources. These water resources include streams, lakes, rivers, wetlands, and groundwater. Under this act, a State 401 certification is required to ensure that any proposed dredge or fill material into waters of the State will comply with state water quality standards.
Water Resources Protection Act	In 2004, the West Virginia legislature passed this Act to gather information regarding the quantity and use of surface and groundwater resources in the State. The WVDEP has been charged with implementing the requirements of the Act. One of the main components of the Act is a survey of large quantity water users (i.e. greater than 750,000 gallons of water during any given month within a calendar year) in the State. Completion of the survey is mandatory for any company or business that meets the above definition.
West Virginia Water Quality Standards	The West Virginia Environmental Quality Board (EQB) sets water quality standards, reclassifies designated water uses, and sets site specific numeric criteria. The West Virginia administrative code sets out the water quality standards for the various water use categories.
WV CSR 150-27, Rules & Regulations for the Transportation of Coal by Commercial Motor Vehicles	These rules govern the transportation of coal upon public highways by commercial motor vehicles in the state of West Virginia. In 2003, the state enacted Senate Bill No. 583 which, among other things, transferred weight enforcement responsibility for all commercial motor vehicles from the Division of Highways (DOH) to the Public Service Commission (PSC). The legislation also authorized the Coal Resource Transportation System (CRTS) to be established and empowered the Commission to develop and enforce the system for permitting vehicles upon the CRTS.

2.6 Alternatives

2.6.1 DOE Alternatives

Because DOE's role as a federal sponsor is limited to providing financial support under the CCPI Program, the Department is not responsible for the planning of the facility, the establishment of project parameters, or the development of alternatives related to facilities siting and other project components. These activities are the responsibilities of the project proponent, in this case WGC, LLC. DOE, as the federal funding sponsor essentially may choose between two alternatives:

(1) Fund the WGC Project as proposed or subject to certain mitigation conditions (Proposed Action);

(2) Do not fund the proposed WGC Project (No Action alternative).

This EIS is intended to inform DOE's decision-making process by providing information on the potential for significant environmental impacts that may result from the proposed WGC Project.

2.6.2 WGC Alternatives

As described in Section 2.4, WGC has considered various alternatives for implementing the proposed project, and is continuing to refine and evaluate options for project components. The project components and alternatives are summarized below, including the identification of WGC's preferred options for project components and an explanation of alternatives that have been eliminated from detailed evaluation in this EIS. Unless otherwise indicated, the options have been carried forward for evaluation in Chapter 4 of this EIS, in which the potential impacts of the proposed WGC Project components and options are described in comparison to the No Action alternative.

2.6.2.1 Power Plant Site

WGC considered the following alternatives for the location of the proposed facility:

- Option A – E&R Property with a Reduced Power Island Footprint.
- Option B – E&R Property with an Expanded Power Island Footprint and Earthen Berm.
- Option C – E&R Property with an Expanded Power Island Footprint, Earthen Berm, and Rail Spur.

WGC identified Option A as the preferred configuration for the proposed power plant site. Although Options A and B have been carried forward for detailed evaluation in this EIS, WGC has eliminated Option C from further consideration, because the infrastructure improvements required to provide rail access to the plant site and to coal refuse sites would not be economically feasible.

2.6.2.2 Fuel Supply

WGC is considering suitable coal refuse sites that are within approximately 30 miles of Rainelle. As of the completion of the conceptual design for the Co-Production Facility, WGC had identified four coal refuse sites that would serve as the principal fuel sources for the project:

- Anjean Mountain (Buck Lilly)
- Green Valley
- Donegan Mine
- Joe Knob

All four sites would be used as sources of fuel over the course of plant operations, and they are expected to meet WGC's requirements for demonstrating a minimum 20-year fuel supply for the project. All four sites are components of the Proposed Action and they have been evaluated in this EIS in comparison to the No Action alternative.

Additionally the third-party prep plant would need to be sited at or near the coal refuse piles to ensure economic feasibility and provide off-road vehicle access (where needed) with limited environmental impacts. At this time WGC has identified six candidate sites for the prep plants. More sites may be identified as options, but they would require the same siting criteria as described in Section 2.4.4.2. The six candidate sites are listed below and evaluated in this EIS:

- AN1, AN2, and AN3 – for the Anjean and Joe Knob sites;
- DN1 and DN2 – for the Donegan site; and
- GV – for the Green Valley site.

One candidate site would be selected for each of the three coal refuse areas to process fuel obtained during the course of extraction from the respective area. Due to close proximity, the Anjean and Joe Knob sites would be considered as one coal refuse area served by a single prep plant site.

2.6.2.3 Limestone Supply

WGC considered the following options for sources of calcium carbonate or calcium oxide material for the project:

- Option A – Truck limestone from Boxley's Alta New Area (for the boiler) and Mill Point (for the kiln), with trucking the responsibility of the quarry or other third party.
- Option B – Truck limestone from Greystone quarry or other permitted quarry in the Lewisburg area (for the boiler) and Mill Point (for the kiln), with trucking the responsibility of the quarry or other third party.
- Option C – Truck limestone from an acceptable quarry in the Lewisburg area (for the boiler), with trucking the responsibility of the quarry or other third party, and barge material with high calcium oxide content (for the kiln) to Charleston and truck it under contract to the site.

WGC identified Option A as the preferred means of limestone supply for the project. Although Options A and B have been carried forward for detailed evaluation in this EIS, WGC has eliminated Option C from further consideration, because the transport of calcium oxide material via barge and truck would not be economically feasible.

2.6.2.4 Water Supply

WGC intends to use effluent from the Rainelle Sewage Treatment Plant as the primary source of process water for the power plant. To augment this source during periods of reduced effluent discharge from the RSTP, WGC proposes to use the following options for supplemental sources of process water:

- Option A – Groundwater would provide the secondary source of process water supply for the power plant, and surface water would be the tertiary source. Potential groundwater sources would include Production Well Number 1 (PW-1), PW-3, and other potential wells located outside the drawdown area for PW-1, PW-3 and the Rainelle public water system wells. During periods when groundwater withdrawals would cause unacceptable drawdown of the local aquifer, surface water would be withdrawn from the Meadow River using a temporary intake structure as a supplemental source of process water supply.
- Option B – Surface water would provide the secondary source of process water supply for the power plant, and groundwater would be the tertiary source. Water from the Meadow River would be withdrawn at a permanent intake structure in the vicinity of the RSTP and conveyed to the WGC plant using the same pipeline as the RSTP effluent. During periods when withdrawals would cause the flow in the Meadow River to decline below 60 percent of base flow (i.e., the river flow rate above which adverse water quality and aquatic habitat impacts would not be expected), or another comparable withdrawal limitation measure determined in consultation with the state, groundwater would be withdrawn from PW-1, PW-3, and other potential wells as a supplemental source of process water supply.

WGC identified Option B as the preferred means of process water supply for the project. Both options have been carried forward for detailed evaluation in this EIS.

2.6.2.5 Material Handling and Transportation

WGC considered the following alternatives for transportation of fuel supplies:

- Option A – Truck transport.
- Option B – Rail transport.

As described in Section 2.4.7, WGC concluded that rail transport would not be economically feasible and, therefore, Option B was eliminated from further consideration. Truck transport, Option A, has been evaluated as the only feasible means of transportation for fuel supplies in this EIS.

2.6.2.6 Power Transmission Corridor

WGC considered the following options for transmitting the generated electricity to the national grid:

- Option A –Widen existing ROW to Grassy Falls Substation to accommodate new poles and lines.
- Option B – Upgrade existing AEP poles to carry WGC lines to Grassy Falls Substation.
- Option C – Construct new transmission corridor to Grassy Falls Substation.

WGC has identified Option C as the preferred means of power transmission for the project. However, all three options have been evaluated in this EIS.

2.7 Comparison of Alternatives

Table 2.7-1 summarizes the potential impacts for the No Action alternative in comparison to the Proposed Action. The impacts for each environmental resource are based on the analysis found in Chapter 4.

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Table 2.7-1. Summary Comparison of Alternatives and Potential Impacts

Resource	No Action	Proposed Action
Aesthetic Resources	No change in existing conditions; however, adverse impacts from degraded landscapes at coal refuse sites would remain.	**Power Plant Facilities:** • Option A – Most adverse impacts during construction and operation would occur for the nearest residential properties (located within 1,500 ft (460 m) east of the plant site), including approximately 12 single-family homes, a 52-unit apartment complex, a nursing and rehabilitation center, and approximately 12 mobile homes. The 300-ft (91-m) tall exhaust stack and portions of the 150-ft (46-m) tall boiler building would be visible from various locations in Rainelle. • Option B – The aesthetic impacts would be comparable to Option A. Although the site footprint would be larger, an earthen berm would be provided for noise mitigation and may limit the view of the power plant from adjacent properties. **Fuel Supply:** Extraction of coal refuse would occur at sites in remote areas that were used historically for mining purposes. Reclamation of the sites following completion of extraction would provide long-term aesthetic benefits. The optional sites for the fuel prep plants would be located in remote areas in the vicinities of the coal refuse sites. **Limestone Supply:** Option A or B would obtain limestone from commercial quarries near Lewisburg, approximately 20 miles (32 km) and 40 mi (64 km), respectively, from Rainelle. Both options may also obtain a higher quality limestone from a commercial quarry in Mill Point, approximately 60 mi (97 km) from Rainelle. Aesthetic impacts would be comparable to existing conditions, because extraction would occur within permitted areas of active commercial quarries. **Water Supply:** Water supply structures, including the effluent pipeline from the Rainelle Sewage Treatment Plant (RSTP) to the power plant site, generally would be located within existing utility right-of-ways (ROWs) and would not affect viewsheds permanently. **Material Transportation:** The transport of fuel from the prep plant sites to the power plant would occur on existing heavy haul roadways used for coal and lumber transport regionally. The transport of limestone from the quarries to the power plant would also occur on existing heavy haul roadways. In the worst case, trucks would make a total of 97 round trips (mainly on US 60 and WV 20 or CR 1, depending on source of fuel – see Figure S-1) to the site daily. **Power Transmission:** All three transmission options would include the development of a 100-ft (30-m) wide power transmission line ROW from the plant site approximately 4,000 ft (1,220 m) northwest to an existing American Electric Power (AEP) ROW, which would affect the viewshed along a 9.2-ac (3.7-ha) corridor. • Option A – Widening of the existing AEP ROW by approximately 50 ft (15 m) for 17 mi (27 km) to the Grassy Falls substation would affect the viewshed along a 103-ac (42-ha) corridor. • Option B – Upgrading existing structures along the AEP ROW would not substantially alter the existing viewshed along the corridor after completion of construction. • Option C – The development of a new 17-mi (27-km), 100-ft (30-m) wide ROW to the Grassy Falls substation would affect the viewshed along a 206-ac (83-ha) corridor.

Table 2.7-1. Summary Comparison of Alternatives and Potential Impacts (continued)

Resource	No Action	Proposed Action
Atmospheric Conditions	No impact; no change in existing conditions.	**Power Plant Facilities:** Emissions would be identical regardless of the option selected for the plant site. Stationary emissions of priority pollutants would comply with National Ambient Air Quality Standards (NAAQS). Volatile organic compounds (VOCs) and carbon monoxide (CO) emissions would be below the prevention of significant deterioration (PSD) threshold. The Class II PSD increment consumption by power plant emissions for sulfur dioxide (SO_2), nitrogen oxides (NO_x), and particulate matter (<10 microns [PM_{10}]) would range between 25% and 75% depending upon the pollutant and associated averaging time. The highest increment consumption would occur for PM_{10} emissions (24-hr averaging time) in the immediate vicinity of the site. Visibility analysis in Class I areas predicted a total of 6 days over a 3-yr period in which the 5% change in light extinction threshold could be exceeded. However, meteorological records suggest that these occurrences may be attributable to natural obscuring conditions (such as fog, clouds, and rain). The plant is expected to meet the Clean Air Mercury Rule limitations and is not expected to discharge objectionable odors. The plant would emit up to 0.87 million tons (0.79 million metric tons) annually of carbon dioxide ([CO_2] a greenhouse gas). Potential plans to provide for the capture and use of waste heat from the power plant for potential commercial, industrial, and residential uses may offset the plant's CO_2 emissions in the range of 0.18 million tons per year (0.16 million metric tons) to 0.32 million tons per year (0.29 million metric tons). **Fuel Supply:** The extraction and processing of coal refuse would result in emissions of fugitive dust (total suspended particulates [TSP] and PM_{10}) that would be comparable for all coal refuse sites and prep plant locations. Emissions would be contained within site boundaries through the use of dust suppression activities in accordance with WV Rules 38CRS2. Most of the prep plant system would be enclosed and equipped with control devices such as fabric filters. **Limestone Supply:** Option A or B would obtain limestone from active commercial quarries. The increased production to supply the WGC plant would be accommodated within existing permits for these quarries. Depending upon the future demand for limestone and site-specific quarry operation plans, increases in PM_{10} and TSP air emissions could occur over existing conditions at the commercial quarry sites. It is expected that increased levels of these pollutants would generally be limited to the quarry sites. **Water Supply:** Construction of the water supply facilities would cause short-term impacts from fugitive dust and vehicle emissions. **Material Transportation:** Screening for mobile emissions sources based on guidelines established by U.S. Environmental Protection Agency (EPA) indicated that transportation activities would have *de minimis* impacts on air quality. **Power Transmission:** Operation of the power transmission lines would not affect air quality. Construction of the lines would result in short-term impacts from fugitive dust and vehicle emissions. • Option A – Widening the existing AEP ROW would require ground-disturbing activities along a 103-ac (42-ha) corridor. • Option B – Upgrading existing structures along the AEP ROW would disturb the least land area of the options. • Option C – The development of a new ROW would require ground-disturbing activities along a 206-ac (83-ha) corridor.

Table 2.7-1. Summary Comparison of Alternatives and Potential Impacts (continued)

Resource	No Action	Proposed Action
Surface Water Resources	No change in existing conditions; however, adverse impacts from acid mine drainage at coal refuse sites would remain.	**Power Plant Facilities:** Impacts on surface waters during plant construction would be minimized through the implementation of an erosion and sedimentation (E/S) control plan required for a National Pollutant Discharge Elimination System (NPDES) General Construction Permit. Potential impacts during operation would be minimized through the implementation of a storm water management pollution prevention (SWMPP) plan and a groundwater protection (GWP) plan based on the WV Department of Transportation (WVDOT) and the WV Department of Environmental Protection (WVDEP) requirements. • Option A would result in the least impact on surface waters. Post-development runoff was calculated as 55.7 ft^3/s (vs. 67.1 ft^3/s pre-development). • Option B would result in slightly higher impact on surface waters. Post-development runoff was calculated as 57.6 ft^3/s (vs. 67.1 ft^3/s pre-development). **Fuel Supply:** Temporary impacts of coal extraction on water resources would be minimized through the implementation of planned E/S control features. Reclamation of the sites under agreements with WVDEP would provide long-term benefits to water quality. The impacts from discharge of storm water runoff from coal refuse piles at the prep plant sites would be minimized through the use of storm water retention ponds at the sites. • Anjean – Although the three candidate sites for the prep plant at Anjean would have similar impacts, AN3 would be within the same sub-watershed as the existing Anjean treatment ponds. • Donegan – Although the two candidate sites for the prep plant at Donegan would have similar impacts, DN1 would be within the same sub-watershed as the existing Donegan treatment ponds. **Limestone Supply:** Impacts would be comparable to existing conditions at the active permitted commercial quarries. **Water Supply:** The diversion of up to 100% of the RSTP effluent to the WGC plant for primary water supply would have a long-term beneficial impact on Meadow River water quality because of the elimination of a biological oxygen demand (BOD) source. WGC would derive the balance of 350 to 800 gpm (1,300 to 3,000 L/min) from groundwater and/or surface water sources. To avoid adverse impacts to aquatic habitats, WGC would monitor flows in the Meadow River and limit withdrawals to avoid reductions in flow levels below a state-recommended threshold (see below). • Option A – As the tertiary source of process water supply, withdrawals from the Meadow River would occur only intermittently to make up a smaller proportion of the balance of process water required by the WGC plant during low aquifer conditions. • Option B – As the secondary source of process water supply, withdrawals from the Meadow River may reduce base flows to make up a larger proportion of the process water required by the WGC plant, but withdrawals would not be made when base flows could fall below 60% of the annually or seasonally adjusted average (i.e., below the flow rate above which water quality and aquatic habitat impacts would not be expected), or another comparable withdrawal limitation measure determined in consultation with the state. **Material Transportation:** The use of a truck or wheel wash at the power plant and prep plant to clean fuel delivery trucks prior to exiting the site would minimize potential impacts on surface water quality from runoff of contaminants released in transportation corridors. **Power Transmission:** Operation of the power transmission lines would not affect surface water quality. Short-term impacts on water quality during construction of the transmission lines would be minimized through the implementation of a SWMPP plan and a GWP plan based on WVDOT and WVDEP requirements. Power poles would not be erected within surface waters. • Option A – Widening the existing AEP ROW would require the clearing of a 103-ac (42-ha) corridor. • Option B – Upgrading existing structures along the AEP ROW would affect the least land area of the options. • Option C – The development of a new ROW would require the clearing of a 206-ac (83-ha) corridor.

Table 2.7-1. Summary Comparison of Alternatives and Potential Impacts (continued)

Resource	No Action	Proposed Action
Floodplains	No impact; no change in existing conditions.	**Power Plant Facilities:** Displacement of the floodplain for Sewell Creek would not increase the 100-year flood elevations over the Federal Emergency Management Agency (FEMA) designated height of 1 ft (0.3 m) above existing conditions in the local upstream area. • Option A would result in the least impact on the floodplain, requiring 16 ac (6.5 ha) to be filled. The greatest increase in water elevation for a 100-yr flood would be 0.48 ft (0.15 m). • Option B would result in slightly higher impact on the floodplain, requiring 20 acres to be filled. The greatest increase in water elevation for a 100-yr flood would be 0.67 ft (0.20 m). **Fuel Supply:** No impacts on floodplains would occur at any of the coal refuse sites. • Anjean – All 3 prep plant candidate sites appear to be outside of the 100-yr floodplain, but AN1 is situated in a topographic depression that could be subject to high water. Potential impacts would be avoided through effective site layout and design. • Donegan – Neither candidate prep plant site, DN1 or DN2, is within a floodplain. • Green Valley – Candidate prep plant site GV is not within the 100-yr floodplain, but it is situated near Hominy Creek and could be subject to high water. Potential impacts would be avoided through effective site layout and design. **Limestone Supply:** The increase in production to supply the WGC plant for Option A or B would occur in permitted areas within active commercial quarries and would not affect floodplains. **Water Supply:** The construction of the water supply pipeline would not alter the floodplain, and its location underground would protect it from flood impacts. • Option A – The use of a temporary intake structure on Meadow River would not affect flood flows. • Option B – The permanent intake structure and inlet pool on Meadow River would be designed to prevent an increase in the 100-yr flood elevations upstream by more than 1 foot (0.3 m). **Material Transportation:** The transport of fuel and limestone by trucks would not affect the floodplain. **Power Transmission:** The construction of power transmission facilities would not affect 100-yr floodplains in the respective corridors for Option A, B, or C. Power poles may be situated near stream banks where required but would not obstruct flood flows.

Table 2.7-1. Summary Comparison of Alternatives and Potential Impacts (continued)

Resource	No Action	Proposed Action
Geology and Groundwater Resources	No change in existing conditions; however, adverse impacts from acid mine drainage at coal refuse sites would remain.	**Power Plant Facilities:** Impacts from ground-disturbing activities would be minimized through the implementation of an E/S control plan as specified for a NPDES General Construction Permit and based on WVDOT and WVDEP requirements. Areas of competent rock encountered at the plant site may necessitate blasting, which would require a permit from the WV Fire Marshall that would outline measures to avoid or minimize short-term impacts. Fuel and material storage areas would be situated on slabs that would be drained to a lined collection pond to minimize release of pollutants to groundwater. Ammonia storage and handling would be located on top of a diked concrete area and comprise of control devices and safety procedures to minimize the potential release of aqueous ammonia to soil or groundwater. • Option A would require the least disturbance of land area for the plant footprint (17 ac [6.9 ha]). • Option B would require somewhat greater disturbance of land area for the plant footprint (20.3 ac [8.2 ha]). **Fuel Supply:** Extraction of coal refuse at all sites would cause potential impacts from accelerated erosion and acid mine drainage (AMD) generation. However, the recovery and reclamation processes would by carefully managed to minimize impacts in accordance with a NPDES General Permit and a remediation plan approved by WVDEP. Ultimately, the long-term reductions in AMD afforded by the remediation of the coal refuse sites are expected to outweigh the short-term increases in AMD generation during extraction. Although an analysis of ash samples indicated that both fly ash and bottom ash contain metals, the Toxic Characteristic Leaching Procedure (TCLP) analysis indicated that the leaching of metals from the ash in significant concentrations would not be expected. The prep plant would use a closed loop system requiring 100 gpm (380 L/min) of water, which would be supplied by new wells to be constructed on respective sites. Prep plant operations would be the same regardless of site selected. **Limestone Supply:** Option A or B would obtain limestone from existing commercial quarries. The increase in production to supply the WGC plant would be regulated under the existing operating permits for these quarries, which incorporate measures to prevent the degradation of groundwater resources. **Water Supply:** Groundwater pumping tests have indicated that withdrawals from groundwater wells could potentially draw down the local aquifer. Therefore, WGC would ensure that the power plant maintains an adequate supply of process water without adversely affecting the Rainelle water supply and local private wells. WGC would obtain permits and meet specific requirements prior to initiating additional groundwater withdrawals for supplemental process water in either Option A or B. • Option A – As the secondary source of process water supply, withdrawals from groundwater wells would make up a larger proportion of the process water required by the WGC plant, which could potentially affect aquifer drawdown. • Option B – As the tertiary source of process water supply, withdrawals from groundwater wells would make up a smaller proportion of the process water required by the WGC plant, which would not be expected to affect aquifer drawdown. **Material Transportation:** The use of a truck or wheel wash at the power plant and prep plant sites to clean fuel delivery trucks prior to exiting the site would minimize potential impacts on groundwater from the infiltration of contaminants released in transportation corridors. **Power Transmission:** Operation of the power transmission lines would not affect geology, soils, or groundwater. Short-term impacts during construction of the transmission lines would be minimized through the implementation of a SWMPP plan and a GWP plan in accordance with WVDOT and WVDEP requirements. • Option A – Widening the existing AEP ROW would require the clearing of a 103-ac (42-ha) corridor. • Option B – Upgrading existing structures along the AEP ROW would affect the least land area of the options. • Option C – The development of a new ROW would require the clearing of a 206-ac (83-ha) corridor.

Table 2.7-1. Summary Comparison of Alternatives and Potential Impacts (continued)

Resource	No Action	Proposed Action
Biological Resources (Including Wetlands)	No change in existing conditions; however, adverse impacts from acid mine drainage at coal refuse sites would remain.	**Power Plant Facilities:** The power plant site has lost most of its original ecological resource value as a result of prior land-disturbing activity. Extensive adjacent acreage of undisturbed upland offers higher quality habitat. The project is not expected to impact any protected species. • Option A would result in the clearing of approximately 15 ac (6 ha) of mostly re-growth vegetation and the loss of 0.23 ac (0.09 ha) of wetlands. • Option B would result in greater loss of vegetation and wetland acreage than Option A, including the filling of an oxbow on Sewell Creek and the potential enclosure of an unnamed tributary on the east side of the site. **Fuel Supply:** Coal refuse sites offer habitat of limited value. Recovery and reclamation processes would be carefully managed to minimize impacts in accordance with a remediation plan approved by WVDEP. Ultimately, the coal refuse sites would be reclaimed to an extent that would surpass existing conditions and improve the quality of existing habitat and wetland areas in the vicinity. • Anjean – Of the candidate sites for a prep plant, AN1 has the greatest potential for involving a wetland; but impacts would be avoided through effective site planning and design. • Donegan – Neither candidate prep plant site, DN1 or DN2, contains wetlands. • Green Valley – Candidate prep plant site GV is located near an emergent wetland area that has been vegetated by an invasive plant species. Detailed site planning and design would avoid the emergent wetland area. **Limestone Supply:** Options for obtaining limestone supply from commercial quarries would not affect biological resources. **Water Supply:** The construction of the water supply pipeline would have a temporary impact on a small emergent wetland (0.027 ac [100 m^2]) along Sewell Creek that would be restored at the end of construction. To avoid potential adverse impacts on aquatic ecosystems, WGC would monitor flows in the Meadow River and limit withdrawals to avoid reductions in flow levels below a state-recommended threshold (see below). Therefore, adverse impacts to aquatic habitat are not expected to occur, so long as the threshold is maintained. • Option A – As the tertiary source of process water supply, withdrawals from the Meadow River would occur only intermittently to make up a smaller proportion of the balance of process water required by the WGC plant during low aquifer conditions. • Option B – As the secondary source of process water supply, withdrawals from the Meadow River may reduce base flows to make up a larger proportion of the process water required by the WGC plant, but withdrawals would not be made when base flows could fall below 60% of the annually or seasonally adjusted average (i.e., below the flow rate above which water quality and aquatic habitat impacts would not be expected), or another comparable withdrawal limitation measure determined in consultation with the state. **Material Transportation:** The use of a truck or wheel wash at the power plant and prep plant sites to clean fuel delivery trucks prior to exiting the site would minimize potential impacts on aquatic ecosystems from runoff of contaminants released in transportation corridors. **Power Transmission:** The permanent loss of wildlife habitat in areas along the proposed power line corridor could displace some dependant species. However, displaced wildlife could continue to use the adjacent undisturbed areas or migrate to abundant comparable habitat nearby. The utility corridor may also create new habitat for edge-dependant species. Wetlands would be avoided during construction as practicable and wetland impacts would be temporary. • Option A – Widening the existing AEP ROW would require the clearing of a 103-ac (42-ha) corridor. • Option B – Upgrading existing structures along the AEP ROW would affect the least land area of the options. • Option C – The development of a new ROW would require the clearing of a 206-ac (83-ha) corridor and potentially affect approximately 5 ac (2 ha) of wetlands, although none would be lost.

Table 2.7-1. Summary Comparison of Alternatives and Potential Impacts (continued)

Resource	No Action	Proposed Action
Cultural Resources	No impact; no change in existing conditions.	**Power Plant Facilities:** The WV State Historic Preservation Office (SHPO) concurred with the conclusion of a Phase I survey that the proposed project would have no effect on potential archaeological resources at the plant site for Option A or B. An historic resources survey concluded that the undertaking would have no effect on National Register of Historic Places (NRHP)-eligible resources and would not alter the existing setting or character of the Rainelle Historic District. The SHPO stated that it would issue its findings about the potential for visual impacts on architectural resources after considering comments by the public and the Greenbrier County Historical Society on the Draft Environmental Impact Statement (EIS). **Fuel Supply:** All of the coal refuse sites have been extensively disturbed by previous mining operations, which would have destroyed any archaeological resources on the sites. None of the sites contain buildings or structures eligible for the NRHP. • Anjean – All three candidate sites for a prep plant (AN1, AN2, and AN3) have been disturbed extensively by prior mining operations and subsequent reclamation efforts, which would have destroyed existing archaeological resources. There are no buildings or structures located on any of the sites. • Donegan – Candidate prep plant site DN1 would be situated on previously developed land occupied by a building used during prior mining operations that is not eligible for the NRHP. DN2 contains no structures and occupies agricultural property that would be evaluated in consultation with the SHPO for the potential to affect unrecorded archaeological resources prior to construction. • Green Valley – The GV candidate prep plant site is located on the edge of the disturbed coal refuse site and contains no structures. **Limestone Supply:** The quarries that would supply limestone to WGC in Option A or B are ongoing commercial operations, and the increased production would not affect historic or archaeological resources. **Water Supply:** Most of the proposed pipeline corridor has served as a utility ROW for public service district (PSD) #2 or has otherwise been disturbed. In undisturbed segments, final adjustments in the pipeline alignment would be determined in consultation with the SHPO to avoid potential impacts on unrecorded archaeological resources. **Material Transportation:** The transport of fuel and limestone by trucks would occur on designated heavy haul routes and would not affect cultural resources. **Power Transmission:** The alignment common to all three options extending from the WGC plant site to the AEP ROW was determined not to contain any high-probability areas for archaeological resources. • Option A – The area to be widened along the AEP ROW would be surveyed and evaluated in consultation with the SHPO, and final adjustments in the alignment would be made to avoid potential resources. • Option B – Upgrading existing structures along the AEP ROW would occur in previously disturbed areas. • Option C – The proposed new corridor would be surveyed and evaluated in consultation with the SHPO and final adjustments in the alignment would be made to avoid potential archeological resources.

Table 2.7-1. Summary Comparison of Alternatives and Potential Impacts (continued)

Resource	No Action	Proposed Action
Socioeconomics	No change in existing conditions; however, the area would lose the potential for a needed stimulus to prevent further decline in the local economy and the working-aged population.	**Power Plant Facilities:** Construction and operation of the power plant would increase local employment opportunities and provide economic stimulus to area businesses without displacing existing residents or businesses or adversely affecting current trends in population growth and the demand for housing. During construction, the project is expected to employ an average of 185 individuals per month over a 29-month period. During the demonstration phase and subsequent commercial operation, the proposed project would employ approximately 126 full-time personnel and result in an additional 114 jobs from indirect economic activity. • Option A – Most adverse impacts on residential property values would affect the nearest residential properties (located within 1,500 ft (460 m) east of the plant site), including approximately 12 single-family homes, a U.S. Department of Agriculture (USDA) Rural Development property (a 52-unit apartment complex), a nursing and rehabilitation center, and approximately 12 mobile homes. • Option B – The power plant would affect the same residential properties as indicated for Option A; however, the site footprint would be larger and the eastern site boundary would be even closer to the properties. **Fuel Supply:** The reclamation of degraded coal refuse sites and remediation of AMD impacts would provide potential beneficial socioeconomic impacts to the local communities, county, and state. All six candidate prep plant sites are located in remote areas and would not affect nearby residential property values. **Limestone Supply:** The increased demand on regional quarries under Option A or B would have potential beneficial impacts on these commercial enterprises that would ultimately extend to the regional economy. **Water Supply:** The water supply pipeline would follow an existing ROW and cross other open lands. Pipeline construction would have limited, short-term adverse impacts on adjacent properties. **Material Transportation:** The transport of fuel and limestone by trucks would occur on designated heavy haul routes. Residential properties along the routes may be affected by increased truck traffic and noise. **Power Transmission:** The alignment common to all three options extending from the WGC plant site to the AEP ROW would not displace residents or businesses or affect property values. • Option A – The widening of the AEP ROW would not displace residents or businesses, and property owners would be compensated for granting an easement. • Option B – Upgrading structures along the AEP ROW would occur within an existing easement. • Option C – The proposed new power transmission corridor would not displace residents or businesses, and property owners would be compensated for granting an easement.

Table 2.7-1. Summary Comparison of Alternatives and Potential Impacts (continued)

Resource	No Action	Proposed Action
Environmental Justice	No change in existing conditions; however, the area would lose the potential for a needed stimulus to help reduce the high percentage of low-income residents.	**Power Plant Facilities:** The overall impacts of the Proposed Action on local residents generally would be favorable, although adverse impacts would affect the residents nearest the site of Option A or B as described for Socioeconomics (i.e., increased traffic and associated emissions, long-term adverse impacts on property values). As defined by the President's Council on Environmental Quality (CEQ) a "minority population" area is an area where the percentage of defined minorities exceeds 50 percent of the population. The proportion of minorities in the region of influence for the power plant site does not exceed 50%, and it is not meaningfully greater than the proportion of minorities in the larger local jurisdictions, county, and state. Therefore, the proposed power plant would not have a disproportionately high and adverse impact on minority populations. Because the general population of western Greenbrier County represents a "low-income population" compared to the county and state, the adverse impacts of the power plant would affect low-income populations regardless of where it would be sited in the region. However, the proportion of low-income residents nearest the site of Option A or B does not exceed 50%, and it is not meaningfully greater than the proportion in the general population of western Greenbrier County. Moreover, construction and operation of the power plant would increase local employment opportunities and provide economic stimulus to help reduce the high percentage of low-income residents locally. Therefore, the proposed power plant would not have a disproportionately adverse impact on low-income populations. **Fuel Supply:** The extraction and processing of fuel at any of the coal refuse sites and candidate prep plant sites would not have a disproportionately high and adverse impact on minority populations or low-income populations. **Limestone Supply:** Option A or B would obtain limestone from quarries that are ongoing commercial operations and would not have a disproportionately high and adverse impact on minority populations or low-income populations. **Water Supply:** The construction and operation of water supply features would not have a disproportionately high and adverse impact on minority populations or low-income populations. **Material Transportation:** The transport of fuel and limestone by trucks would occur on designated heavy haul routes and would not have a disproportionately high and adverse impact on minority populations or low-income populations. **Power Transmission:** None of the optional alignments for power transmission would have a disproportionately high and adverse impact on minority populations or low-income populations.

Table 2.7-1. Summary Comparison of Alternatives and Potential Impacts (continued)

Resource	No Action	Proposed Action
Land Use	No impact; no change in existing conditions.	**Power Plant Facilities:** Although the region of influence is not subject to a zoning ordinance or land use plan, the power plant would be located on disturbed land near areas used historically for industrial activities. Potential business opportunities arising from the proposed project could cause land uses surrounding the power plant to change. The three communities sponsoring the project envision the development of an industrial park (EcoPark) on adjoining vacant land that was previously designated for such use but has not been developed. • Option A – Most adverse impacts during construction and operation would occur for residential properties located within 1,500 feet (460 meters) east of the plant site, including approximately 12 single-family homes, a 52-unit apartment complex, a nursing and rehabilitation center, and approximately 12 mobile homes. In addition, the Rainelle Elementary School and Rainelle Medical Center are located 2,000 feet (610 meters) north of the proposed power plant site, although no adverse impacts are anticipated for these facilities. Option B – The power plant would affect the same residential properties as indicated for Option A; however, the site footprint would be larger and the eastern site boundary would be even closer to the properties. **Fuel Supply:** The reclamation of degraded coal refuse sites would render these sites potentially available for other uses beneficial to the local communities, county, and state. All six candidate prep plant sites are located in remote areas characterized by open lands. All sites would be subject to a property availability investigation and coordination with the property owners to ensure that impacts on land use would be avoided. **Limestone Supply:** Option A or B would obtain limestone from quarries that are ongoing, permitted commercial operations, and these existing land uses would not change. **Water Supply:** The water supply pipeline would follow an existing ROW and cross other open lands. Pipeline construction would have limited, short-term adverse impacts on adjacent land uses. **Material Transportation:** The transport of fuel and limestone by trucks would occur on designated heavy haul routes and would not alter adjacent land uses. The proposed truck storage area in Charmco is a vacant and disused former commercial property. **Power Transmission:** The alignment common to all three options extending from the WGC plant site to the AEP ROW crosses a 17-ac (7-ha) property west of WV 20 that is owned by Rainelle and reserved for recreational use. This property would be subject to a land exchange for comparable acreage along US 60 west of the AEP ROW. • Option A – The widening of the AEP ROW would affect a 103-ac (42-ha) corridor adjacent to an existing cleared power line ROW, and landowners would be compensated for granting an easement. • Option B – Upgrading structures along the AEP ROW would occur within an existing easement. • Option C – The development of a new ROW would require the clearing of a 206-ac (83-ha) corridor. The route would not traverse populated land areas and would not cross any parks, trails, or byways based on preliminary investigation. Landowners would be compensated for granting an easement.

Table 2.7-1. Summary Comparison of Alternatives and Potential Impacts (continued)

Resource	No Action	Proposed Action
Community Services and Utilities	No change in existing conditions that have resulted in the decline of the working-aged population and increased the demands on community services by an aging population.	**Power Plant Facilities:** The proposed power plant (Option A or B) would not impose excessive demands on community services and utility systems during construction and operation, nor is the project expected to induce unsupportable development locally. Impacts would be avoided by ensuring that waste products are characterized and disposed of properly. Construction activities and anticipated injuries may increase the short-term demand on medical services. **Fuel Supply:** The reclamation of degraded coal refuse sites would render these sites potentially available for other uses beneficial to the local communities, county, and state. During the processing of coal refuse at candidate prep plants, spoils would be separated into disposable aggregates and marketable (pyrite-containing) byproducts. Impacts would be avoided by ensuring that waste products are characterized, handled, and disposed of properly in accordance with a remediation plan approved by WVDEP. **Limestone Supply:** Option A or B would obtain limestone from quarries that are ongoing, permitted commercial operations and would not affect the demand for community services or utilities. **Water Supply:** The maximum water demand by the WGC power plant would be approximately 1,200 gpm (4,500 L/min), of which approximately 350 to 800 gpm (1,300 to 3,000 L/min) would be obtained from RSTP effluent based on seasonal variations in flow rate. The Rainelle Sewage Treatment Plant (RSTP) would require modifications to its National Pollutant Discharge Elimination System (NPDES) permit. The balance would be obtained from a combination of groundwater and/or surface water sources. Depending upon aquifer recharge conditions, project-related groundwater withdrawals could adversely impact the Rainelle water supply as indicated by groundwater pumping tests. Therefore, WGC would ensure that the power plant maintains an adequate supply of process water without adversely affecting the Rainelle water supply and local private wells. Final design for the power plant would require a closer evaluation of the maximum water demands and sources. WGC would obtain permits and meet specific requirements prior to initiating additional groundwater withdrawals for supplemental process water in either Option A or B. • Option A – As the secondary source of process water supply, withdrawals from groundwater wells would make up a larger proportion of the balance of process water required by the WGC plant. • Option B – As the tertiary source of process water supply, withdrawals from groundwater wells would make up a smaller proportion of the balance of process water required by the WGC plant. **Material Transportation:** The transport of fuel and limestone by trucks would occur on designated heavy haul routes and would not affect demands on community services. **Power Transmission:** WGC would provide new 138 kV transmission infrastructure from the power plant site to the Grassy Falls Substation. A feasibility study by the Pennsylvania-Jersey-Maryland Interconnection (PJM) concluded that the direct connection of the WGC facility to the Allegheny Power System (APS) grid at Grassy Falls could be accommodated with network reinforcements. • Option A would construct new power transmission infrastructure parallel to the AEP transmission lines in an expanded ROW. • Option B would upgrade the existing AEP transmission infrastructure to support the WGC load. • Option C would construct new power transmission infrastructure along a new ROW to Grassy Falls.

Table 2.7-1. Summary Comparison of Alternatives and Potential Impacts (continued)

Resource	No Action	Proposed Action
Traffic and Transportation	No impact; no change in existing conditions.	**Power Plant Facilities:** Existing roadway capacities are adequate to accommodate the additional traffic volumes during construction and operation of the proposed power plant (Option A or B) without causing adverse traffic delays at any of the intersections studied. See Material Transportation below for traffic related to fuel and limestone transport,. **Fuel Supply:** Smaller county roads (CR 1 and CR 39/14) would be affected by traffic volumes generated during construction of the prep plants at respective optional sites. However, because the construction traffic volumes are expected to be fairly low, they are not expected to degrade intersection delays beyond level of service (LOS) “C” at any of the optional prep plant sites. For traffic related to fuel transport, see Material Transportation. **Limestone Supply:** Option A would include the pairing of a quarry near- Lewisburg (25 mi [32 km] from Rainelle) with one in Mill Point (60 mi [97 km] from Rainelle). Option B would include Greystone quarry (approximately 40 miles [64 kilometers] from Rainelle) and also Mill Point. For traffic related to limestone transport, see Material Transportation. **Water Supply:** Temporary traffic volumes generated by construction of water supply facilities would not cause adverse traffic delays. **Material Transportation:** The trucking of fuels, limestone, and other materials would occur on designated heavy haul routes and would not degrade intersection delays by more than LOS “B” at any of the intersections studied. However, slower-moving heavy-haul trucks would likely increase travel times on local roads, especially CR 1, CR 39/14, US 60, and WV 20 between the prep plant sites and the power plant site. • Anjean – All three candidate prep plant sites are located along the same route. AN3 is the farthest distance (18 mi [29 km]) from the power plant site. AN1 and AN2 are both 14 mi (23 km) from the power plant site. • Donegan – Candidate prep plant sites DN1 and DN2 are 28 mi (45 km) and 21 mi (34km), respectively, from the power plant site along the same route. • Green Valley – The GV candidate prep plant site is located 13 mi (21 km) from the power plant site. **Power Transmission:** Temporary traffic volumes generated by construction of power transmission facilities would not cause adverse traffic delays for any of the three options. Operation of the power transmission lines would not affect local traffic.

Table 2.7-1. Summary Comparison of Alternatives and Potential Impacts (continued)

Resource	No Action	Proposed Action
Public Health and Safety	No impact; no change in existing conditions.	**Power Plant Facilities:** Worker safety impacts during construction of the proposed power plant (either Option A or B) would result in an estimated 23 recordable incidents, 12 lost workdays, and 0.04 fatalities per year based on national statistics. Worker safety impacts during operation of the power plant (either Option A or B) would result in an estimated 2 recordable incidents, 0.03 lost workdays, and 0.02 fatalities per year. The highest incremental carcinogenic risk from plant emissions for a sensitive receptor population would be 0.00085×10^{-4} for an adult subsistence fisher compared to an EPA acceptable risk criterion of 1.0×10^{-4}. The highest incremental non-cancer health risk for a sensitive receptor population would be 0.0179 for a resident child compared to an EPA acceptable risk criterion of 1.0. A few residential properties to the east fall near the 600-ft radius, the worst-case release impact area for aqueous ammonia. In the unlikely event of a release, people within this radius may be exposed to ammonia concentrations that are immediately dangerous to life or health. No population receptors, beyond on-site workers, fall within the 300-ft radius, the 'more likely' release impact area. Incremental increases in PM_{10} and particulate matter (<2.5 microns [$PM_{2.5}$]) concentrations would occur, but would not exceed the NAAQS. **Fuel Supply:** Worker safety impacts during operations at the coal refuse and prep plant sites would result in an estimated 2 recordable incidents, 2 lost workdays, and <0.001 fatalities per year based on national statistics. **Limestone Supply:** Option A or B would obtain limestone from commercial quarries that would not experience a change in worker safety conditions as a result of the Proposed Action. **Water Supply:** Worker safety impacts during construction of the proposed water supply facilities (Option A or B) would represent a small increment in the safety impacts indicated above for construction of the power plant. **Material Transportation:** Worker safety impacts during trucking operations for fuel and limestone would result in an estimated 3 recordable incidents and 1 lost workday per year based on national statistics. The anticipated annual accident rates for the transportation of fuel from coal refuse sites based on national statistics would be: • Anjean (and Joe Knob) – 0.41 injuries and 0.022 fatalities. • Donegan – 0.68 injuries and 0.036 fatalities. • Green Valley – 0.36 injuries and 0.019 fatalities. **Power Transmission:** Worker safety impacts during construction of the proposed power transmission facilities (Option A, B, or C) would represent a small increment in the safety impacts as indicated above for construction of the power plant.

Table 2.7-1. Summary Comparison of Alternatives and Potential Impacts (continued)

Resource	No Action	Proposed Action
Noise	No impact; no change in existing conditions.	**Power Plant Facilities:** Most adverse impacts during plant construction (either Option A or B), including blasting noise and vibration, would occur for residential properties located within 1,500 feet (460 meters) east of the plant site (see Aesthetic Resources). These impacts would be temporary and intermittent. Blasting, if required, would occur over a relatively short time period and be mitigated in accordance with a blasting plan required by the WV Fire Marshall. During operations, noise impacts from plant equipment lacking acoustic mitigation would exceed the impact criterion of a 60 dBA day-night equivalent sound level (L_{dn}) at all receptor sites modeled, including the residential properties located within 1,500 feet (460 meters) east of the plant site (68.3 dBA L_{dn}). However, WGC is agreeing to incorporate noise attenuation and mitigation measures into the final design that would ensure operational noise levels would not exceed the impact criterion of 60 dBA L_{dn} at each identified receptor site. Acoustic mitigation requirements would range from 1.5 to 11.3 dBA depending upon receptor site location. WGC would voluntarily provide post-construction monitor noise levels to ensure minimal noise impacts to sensitive noise receptors. **Fuel Supply:** Coal refuse sites and candidate prep plant sites are located in remote, sparsely populated areas where coal mining has occurred in recent times or is still occurring. Among the candidate prep plant sites, only DN2 is located in proximity to a residence (of the site owner) that could be affected by plant noise. **Limestone Supply:** Option A or B would obtain limestone from existing quarries that represent ongoing, regulated commercial operations that would not change appreciably from baseline conditions. **Water Supply:** Short-term, intermittent daytime noise impacts would occur during construction of water supply facilities. **Material Transportation:** Traffic-related noise during construction and operation is expected to fall below the impact criterion of a 10 dBA incremental increase above background conditions. The peak incremental increase in traffic noise in Rainelle caused by fuel transport from coal refuse sites would be 2.9 dBA during mid-day traffic at the WV State Police Barracks (WV 20 at Tom Raine Drive). The peak incremental increases in traffic noise associated with fuel transport from respective coal refuse sites would be: • Anjean (and Joe Knob) – 6.3 dBA increase during PM peak traffic on CR 1 at Anjean (same for fuel transport from Donegan). • Donegan – 5.7 dBA increase during PM peak traffic on CR 39 at Donegan. • Green Valley – 1.7 dBA increase during PM peak traffic on WV 20 at Quinwood. **Power Transmission:** Short-term, intermittent daytime noise impacts would occur during construction of power transmission infrastructure.

Abbreviations: ac = acres; AEP = American Electric Power; AMD = acid mine drainage; APS = Allegheny Power System; BOD = biochemical oxygen demand; CEQ = President's Council on Environmental Quality; CO = carbon monoxide; CO_2 = carbon dioxide; CR = county road; dBA = decibels (A scale); E/S = erosion and sedimentation; EIS = Environmental Impact Statement; EPA = U.S. Environmental Protection Agency; FEMA = Federal Emergency Management Agency; ft = feet; ft^3/s = cubic feet per second; gpm = gallons per minute; GWP = groundwater protection; ha = hectares; km = kilometers; kV = kilovolt; L/min = liters per minute; L_{dn} = day-night equivalent sound level; LOS = level of service; m = meters; m^2 = square meters; mi = miles; NAAQS = National Ambient Air Quality Standards; NO_x = nitrogen oxides; NPDES = National Pollutant Discharge Elimination System; NRHP = National Register of Historic Places; PJM = Pennsylvania-Jersey-Maryland Interconnection; PM_{10} = particulate matter, <10 microns; $PM_{2.5}$ = particulate matter, <2.5 microns; PSD = prevention of significant deterioration; PSD = public service district; ROW = right-of-way; RSTP = Rainelle Sewage Treatment Plant; SHPO = State Historic Preservation Office; SO_2 = sulfur dioxide; SWMPP = storm water management pollution prevention; TCLP = Toxic Characteristic Leaching Procedure; TSP = total suspended particulates; USDA = U.S. Department of Agriculture; VOC = volatile organic compound; WV DNR = WV Department of Natural Resources; WVDEP = WV Department of Environmental Protection; WVDOT = WV Department of Transportation; yr = year.

3. AFFECTED ENVIRONMENT

3.1 Chapter Overview

This chapter provides a discussion of the environmental setting as it relates to the Proposed Action and alternatives. The chapter has been prepared to address the required elements of an EIS prepared under NEPA (40 CFR 1502.15 and 1502.16) and includes information on relevant environmental resource areas identified through the scoping process and is organized into the following key sections:

- 3.2 Local Features, Aesthetics, and Light
- 3.3 Atmospheric Conditions
- 3.4 Surface Water Resources
- 3.5 Floodplains
- 3.6 Geology and Groundwater Resources
- 3.7 Biological Resources
- 3.8 Cultural Resources
- 3.9 Socioeconomics
- 3.10 Environmental Justice
- 3.11 Land Use
- 3.12 Utilities and Community Services
- 3.13 Transportation and Traffic
- 3.14 Public Health and Safety
- 3.15 Noise

The extent of information provided in each section of this chapter is commensurate with the baseline data necessary to support the impacts analysis presented in Chapter 4.

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3.2. Local Features, Aesthetics, and Light

This section summarizes the existing aesthetic attributes that characterize the region and the vicinity of the proposed project, including the characterization of glare from existing light sources. Principal aesthetic and scenic resources include National Parks, forests, nature areas, and other resources designated for preservation and management by the federal, state, and local governments.

3.2.1 National Parks and Wilderness Areas in West Virginia

West Virginia is characterized by mountainous terrain, lush valleys, and white-water rivers that offer abundant opportunities for scenic enjoyment and outdoor recreation. Greenbrier County is surrounded by national parks that offer year-round recreational activities, including the New River Gorge National River, Gauley River National Recreation Area, and Bluestone National Scenic Area. These three parks combined consist of approximately 95 miles (150 kilometers) of major rivers and 86,000 acres (35,000 hectares) (NPS, 2002). Peak visitation for the three parks occurs from July through October. There are also four designated wilderness areas in West Virginia: Otter Creek Wilderness Area, Cranberry Wilderness Area, Dolly Sods Wilderness Area, and the Laurel Creek Wilderness Area.

In the Clean Air Act (CAA) Amendments of 1977, Congress specified the initial classification of lands for the Prevention of Significant Deterioration (PSD) of air quality. Under PSD regulations, Class I areas are areas of special national or regional natural, scenic, recreational, or historic value for which the regulations provide special protection where almost no change from current air quality is allowed (EPA, 2006). Class I areas include all international parks, national memorial parks larger than 5,000 acres (2,000 hectares), and national parks larger than 6,000 acres (2,400 hectares) that were in existence when the Amendments were passed. Class II designation indicates areas where moderated change is allowed but where stringent air quality constraints are nevertheless desired. Class III designation indicates areas where substantial industrial or other growth is allowed and where increases in concentrations up to the national standards would be insignificant. With the exception of Otter Creek and Dolly Sods National Wilderness areas, the entire state of West Virginia is designated as a Class II PSD area designed for moderate growth. Table 3.2-1 and Figure 3.2-1 list the Class I and II areas closest to Rainelle. Section 3.3 (Atmospheric Conditions) discusses additional air-related resources in greater detail.

3.2.2 Greenbrier and Nicholas Counties

Greenbrier County lies within the Appalachian Plateau and the Ridge and Valley Region where elevations range from approximately 1,600 to 4,000 feet (500 to 1,200 meters) above sea level (GCPC, 1994). The county is predominantly rural in character with farms and forest comprising up to 95 percent of the county's 1,030 square miles (2,700 square kilometers) (EK, 2003a). The county consists of many small rural communities with typical populations of less than 2,500. The City of Lewisburg, which is the Greenbrier County seat, has a population of approximately 4,000 (USCB, 2004). More than 10 percent (100,000 acres [41,500 hectares]) of the Monongahela National Forest (800,000 total acres [300,000 hectares]) is situated in Greenbrier County. Greenbrier State Forest provides 5,130 acres (2,100 hectares) of recreational lands and scenic overlooks in the eastern portion of the county. Cranberry Back Country, which covers 53,000 acres [21,000 hectares] in various counties, including Greenbrier, provides wilderness area with 75 miles (120 kilometers) of recreational trails.

The western portion of Greenbrier County features mountainous terrain and rushing streams. After Interstate 64 (I-64) was completed, U.S. Route 60 (US 60) was designated as the Midland Trail National Scenic Highway because of the many unique scenic, historic and recreational features along its path.

Table 3.2-1. Class I and II Areas in Closest Proximity to Rainelle, WV

AREA	PSD CLASS	DISTANCE FROM RAINELLE*
New River	Class II	10 miles
Gauley River	Class II	15 miles
Bluestone Lake Project	Class II	23 miles
Bluestone River	Class II	25 miles
James Face Wilderness Area	Class I	75 miles
Otter Creek Wilderness Area	Class I	89 miles
Dolly Sods Wilderness Area	Class I	102 miles
Shenandoah National Park	Class I	105 miles

**To convert miles to kilometers, multiply by 1.6093; PSD - Prevention of Significant Deterioration*

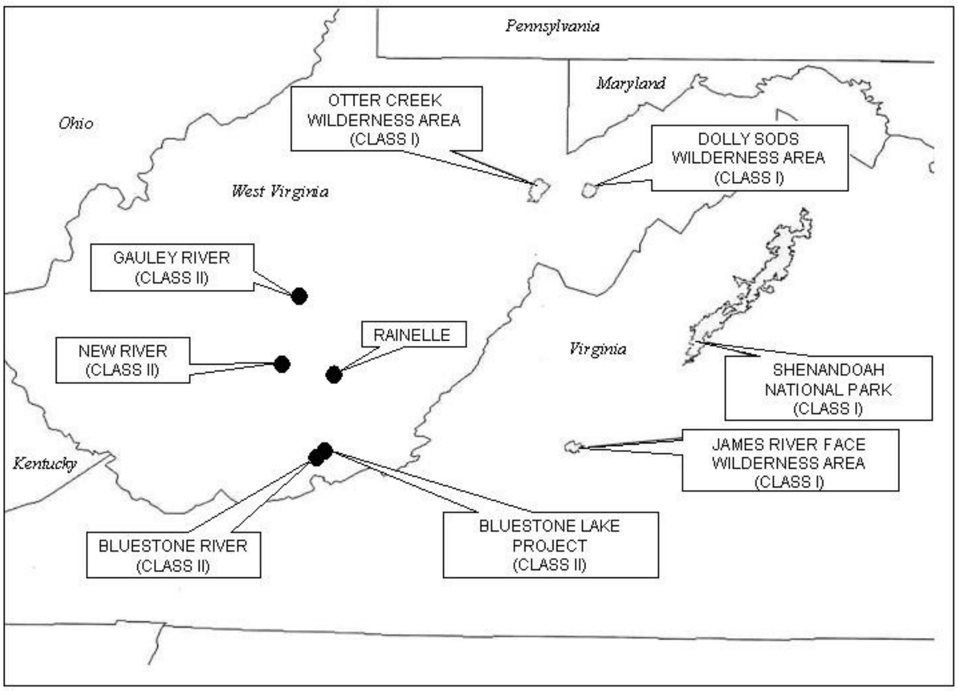

Figure 3.2-1. Class I and II Areas in Closest Proximity to Rainelle, WV

US 60 extends from Charleston to the eastern border of West Virginia, passing through Rainelle. Hawks Nest State Park is located on the Midland Trail in Fayette County, approximately 30 miles (50 kilometers) west of Rainelle and is one of West Virginia's popular state parks with its lodge, hiking trails, and a varietyof recreational activities. The closest state park to Rainelle is Babcock State Park in Fayette County, which is within 15 miles (24 kilometers) to the west via US 60 and WV 41 near Hico. This 4,100-acre (1,700-hectare) park is adjacent to the New River Gorge National River and includes a trout stream in a small canyon, as well as mountainous vistas from several scenic overlooks.

Nicholas County borders Greenbrier County to the north and is also located within the Appalachian Plateau. The topography is comprised of steep hills and narrow valleys. The county has two incorporated municipalities, Summersville, the county seat, and Richwood. Summersville Lake, the largest lake in West Virginia, comprises the majority of the 6 square miles (16 square kilometers) of water in Nicholas County, which is controlled by the Summersville Dam (EK, 2003b). The dam is on the Gauley River near the town of Summersville and is designated as one of the U.S. Army Corps of Engineer's (USACE) most scenic dams. Summersville was a major crossroads on the historic Pocahontas Trail, which connected the westward-flowing Kanawha River with the east. Nicholas County has several Civil War sites, including Carnifex Ferry State Park, and other early settlement sites, such as Richwood, which was created as a result of the lumber industry. Richwood is also the southern gateway to the Monongahela National Forest and the federally protected Cranberry Wilderness Area, and offers various recreational activities such as skiing, hiking, and trout fishing.

Grassy Falls and Hominy Falls are two small waterfalls located in Nicholas County. Grassy Creek drops approximately 20 feet (6 meters) over a ledge at Grassy Falls, 2 miles (3 kilometers) south of Nettie on WV 20 (see Figure 3.2-2). Hominy Falls is a similar fall that is located 1 mile (2 kilometers) southwest of Grassy Falls on WV 39.

Figure 3.2-2. Grassy Falls on WV 20

3.2.3 Rainelle and Local Features

The headwaters of the Meadow River, near the historic Sam Black Church on I-64, create West Virginia's second largest wetland and a home for sport fish and fowl. Near Lewisburg, which is approximately 30 miles (50 kilometers) southeast of Rainelle, there are a host of famous recreational areas including the Greenbrier State Forest and the Greenbrier Resort (National Historic Landmark). The Meadow River/Western Greenbrier Youth Park is a small park located in Charmco between Rainelle and Rupert. In Rainelle there is an approximate 77-acre (31-hectare) (9-hole) golf course, the Western Greenbrier Hills Golf Course, and a small neighborhood park located approximately 2,000 feet (600 meters) west of the project site. The Rainelle City Park is located in northern Rainelle, along Sewell Creek and includes a paved walking trail and a baseball field.

Historically, Rainelle supported an active lumber industry that was centered around the Meadow River Lumber Company (MRLC) (JMA, 2005). Since the closure of the MRLC and the opening of I-64, the town has experienced an economic downturn, but it still retains some of the architectural features from the lumber era, as described in Section 3.8 (Cultural Resources). During the initial growth of MRLC's enterprise (early 1900s), many two-storey, frame houses with clapboard siding and front porches were constructed for the MRLC's employees (PHE, 2005). The houses were constructed along the western stretch of US 60, near the intersection of US 60 and WV 20. Most of these original houses are still occupied today with few changes, except for the addition of vinyl or aluminum siding.

As the MRLC expanded and prospered, the community of Rainelle also continued to expand. During the early 1920s, the community of East Rainelle was developed and incorporated to accommodate the growing population. In 1969, East Rainelle and Rainelle were incorporated under the name Rainelle. In the past, East Rainelle served as the business and commercial center, while today it contains a mix of historic and modern homes. The well-defined commercial district that is located along the eastern stretch of US 60 in Rainelle, referred to as Main Street, also comprises a blend of old and new buildings. Main Street is dominated by one- and two-storey frame and masonry commercial buildings that date from the first decade of the twentieth century through the late 1940s (PHE, 2005). Although some alterations are evident, most of the buildings still possess a high degree of integrity of materials, workmanship, design, and association with the history of the MRLC and the subsequent general history of Rainelle.

The proposed project site and planned EcoPark area are situated on and adjacent to the site of the former MRLC on the southern outskirts of the town's city limits. The land is relatively flat in the Sewell Creek floodplain from the proposed Co-Production Facility site generally northeast to Rainelle's downtown, and north and northwest toward the Rainelle City Hall, Rainelle Medical Center, Rainelle School, and golf course. Sewell Creek to the northwest and an exposed ridge of the 3,300-foot (1,000-meter) high Sims Mountain to the southwest provide natural boundaries for the project area. Meadow River is located approximately 1.5 miles (2.4 kilometers) north of the project site.

The proposed Co-Production Facility site consists mainly of wild vegetative growth, and most of the area is disturbed land with random piles of refuse scattered around open grounds. The toe slope of the exposed ridge has been stripped of vegetation and has been mechanically truncated in much of the study area. This prominent ridge within the study area trends northeast and has its northern terminus within the footprint of the proposed Co-Production Facility. Figures 3.2-3 through 3.2-7 display views taken from vantage points of and from the proposed project site (see Appendix G for Cultural Resources Reports). Because the project site basically lies on a valley floor, the view of the project area is limited to neighboring areas within surrounding hills. The view of the proposed project site along US 60 is framed with various commercial and industrial buildings in the foreground and with vegetated rolling hills in the background. The scene along US 60 (looking in a southward direction toward the project site) provides a view of the truncated ridgeline and the distinct cut of trees that creates an obvious gap in the surrounding topography (see Figure 3.2-3).

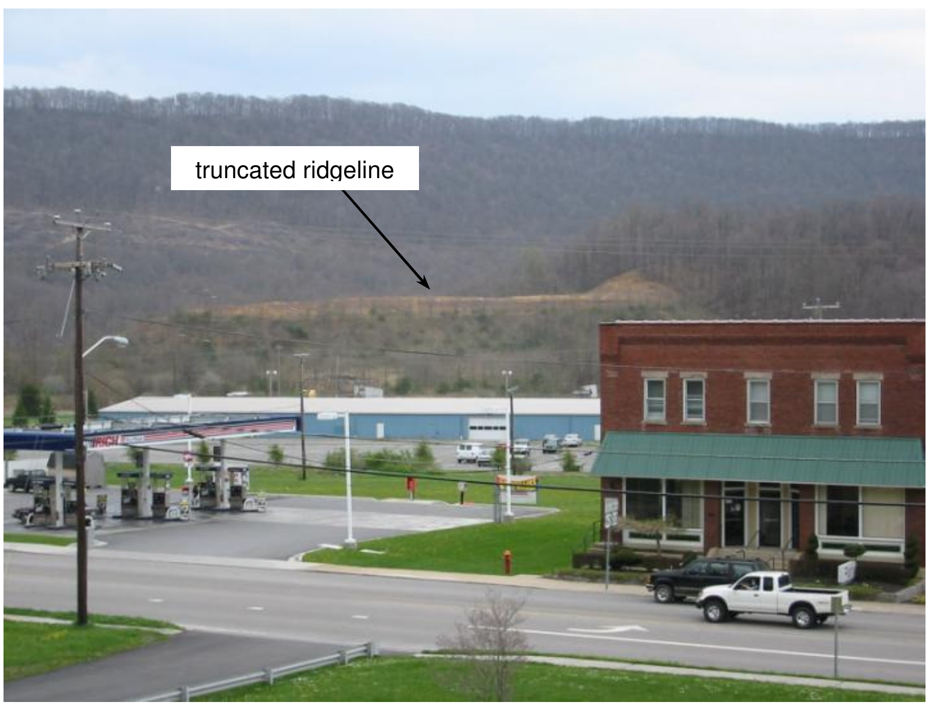

Figure 3.2-3. View toward Project Site along US 60, Facing Southeast (Truncated Ridge in Background)

ridge, the north side faces an open, grassy space for a planned industrial park (EcoPark), a U.S. Army Reserve Center, an abandoned industrial building, and the backside of a small shopping complex. Residential areas, including a nursing home and an apartment complex, are located east of the proposed site, and another residential area is located to the northwest. An old rail yard is located southwest of the project site, from which an active rail line extends through Rainelle. Additional discussions on nearby land uses are included in Section 3.11 (Land Use).

Local sources of light and glare were surveyed on Wednesday, June 15, 2005 between 10:00 p.m. and 11:00 p.m. Major and minor light sources were documented in the vicinity of the power plant and EcoPark sites. Principal sources are located east of the intersection of US 60 and WV 20, including the Dollar General Plaza, located on the north side of US 60, and the Park Center Shopping Complex, located to the south of US 60. The Park Center Shopping Complex abuts the EcoPark portion of the project area. Light at the Park Center is provided by eight lamp posts that include three lights each and produce a considerable amount of local glare as shown in Figure 3.2-8.

Figure 3.2-8. Park Center in the City of Rainelle at Night

Minor sources of light include street, security, and parking lot lighting at businesses along US 60 to the east of Park Center, as well as the U.S. Army Reserve Center located to the west of Park Center. Streetlights are located approximately every 100 feet (30 meters) along WV 20, US 60, and on most of the side streets in Rainelle. Sensitive light receptors include the residential neighborhoods located to the north and east of the Co-Production Facility site.

3.2.4 Anjean and Local Features

The Anjean coal mine, located approximately 6 miles (10 kilometers) north of the US 60 and CR 1 intersection in Rupert, was founded by the Leckie Smokeless Coal Company in 1926 and continued operations until closing in 1954. During the height of the mining period, Anjean contained 100 houses, mostly built along CR 1 (also referred to as Anjean Road or Church Street) (PHE, 2005). However, the majority of buildings and structures that were associated with the coal mining operations at Anjean no longer exist. All that remains of the structures that comprised the company buildings at Anjean are abandoned concrete block dwellings located near the entrance to the Anjean mining site.

Figure 3.2-9. View of Anjean 40-acre Strip Mine and Coal Refuse, Facing North

The Anjean site is in a mountainous region. The coal refuse in the Anjean mining site are generally pushed to the middle of the level areas that have been modified as a result of the strip mining, while the contoured margins usually have very steep slopes (JMA, 2005). Re-vegetation of these areas is difficult due to the stony nature of the soil residue, the extremely low pH values, excessive erosion, and low available soil moisture capacity. As shown in Figures 3.2-9 and 3.2-10, there is virtually no vegetation on these waste piles.

Figure 3.2-10. View of Anjean High Wall and Coal Refuse, Facing Southeast

WGC has identified three candidate sites (AN1, AN2, and AN3 – see Figures 2.2-15 and 2.2-16) for a new prep plant that would process coal refuse from the Anjean and Joe Knob coal refuse piles. AN1, approximately 10 acres (4 hectares), is located just inside the entrance to Anjean and is mostly disturbed land with a couple of treatment/settling ponds located on the site. Except for the ponds, the land cover is mostly grass and shrubs (see Figure 3.2-11). From CR 1 the view to the site is obstructed by the set of abandoned buildings in front of the entrance.

Figure 3.2-11. View of AN1, Facing Northeast

AN2, approximately 3 acres (1 hectare), is located on CR 1 and across the road from the Anjean entrance and a set of abandoned buildings as mentioned in Section 3.2.4. The site is located on developed land, which was graded to accommodate a rail line (now abandoned) and a gravel road, both of which parallel CR 1 (see Figure 3.2-12). A hill borders the site to the west and there are a couple of dilapidated and abandoned houses to the east of the site and along CR 1. Although the site is clearly visible from CR 1, the surrounding structures are reminiscent of mining activities from the past.

AN3, approximately 2 acres (1 hectare), is directly adjacent the coal refuse pile (i.e., the Buck Lilly pile) and is located on the southeast corner of the coal refuse limits. The site is located on the access haul road and is heavily disturbed and graded, with some patchy grass cover and shrubs (see Figure 3.2-13). WVDEP equipment is scattered across the site.

Figure 3.2-12. View of AN2, Facing North

Figure 3.2-13. View of AN3, Facing East

3.2.5 Joe Knob and Local Features

Joe Knob is located east of Anjean along a ridge top approximately 2 miles (3 kilometers) driving distance from the Buck Lilly pile. Its surrounding landscape could be described as being similar to Anjean (see Figure 3.12-14). The Joe Knob coal refuse site, however, is a fully reclaimed site and its land cover is mainly a grassy field with some trees. At this time it is uncertain where the coal refuse boundaries are located because of limited historical data of the site; however, based on USGS maps Joe Knob ranges from approximately 10 to 20 acres (4 to 8 hectares).

Figure 3.12-14. View of Joe Knob, Facing West

3.2.6 Green Valley and Local Features

The small community of Green Valley is located in southern Nicholas County. The Green Valley mining site is located approximately 13 miles (21 kilometers) driving distance from Rainelle. The Green Valley coal refuse is bordered by WV 20, which provides site access from the west, and Hominy Creek to the south.

Figure 3.2-15. Green Valley Coal Refuse Site

In 1996, Massey Coal Company acquired the Green Valley complex from Lady H Coal. Currently, the Green Valley complex includes two underground room and pillar mines and a coal preparation (prep) plant. The Green Valley prep plant receives coal from two mines and has a rail loading facility that services customers on the CSXT rail system with unit train shipments of up to 75 railcars (Massey, 2005).

WGC has identified a candidate site for a new prep plant to process the coal refuse from Green Valley, GV (see Figure 2.2-15). GV, approximately 8 acres (3 hectares), is located along the southern margin of the coal refuse limits. The site is heavily vegetated with grass, shrubs, and young deciduous trees (see Figure 2.2-17 and 3.2-16) and is bounded to the north by an active rail line, currently used by Massey Coal Company to haul marketable coal. The site overlooks several ponds used to treat the runoff from the coal refuse pile, and its surrounding landscape is characterized by rolling hills. Though current mining activities on the northern boundary are visible from WV

Figure 3.2-16. View of Green Valley, Facing East

20, the coal refuse site along the southern boundary are barely visible because of heavy vegetation and hilly topography.

3.2.7 Donegan and Local Features

The Donegan coal refuse site is located adjacent to the small community of Jetsville in Nicholas County, approximately 14 miles (23 kilometers) north of Anjean, near the intersection of CR 39/14 and CR 32/1. The coal refuse area is somewhere between 110 to 120 acres (45 to 50 hectares) and is fully reclaimed with trees and grassy fields (see Figure 3.2-17) (Martin, 2005). Several ponds surround and treat the runoff from the refuse pile.

Figure 3.2-17. View of Donegan Coal Refuse

Lease of the Donegan property began in 1942 by the Gauley Coal and Coke Company (GCCC). A permit for the coal preparation plant and coal refuse pile was issued to GCCC in February 1969, which was later transferred to Island Creek Coal Company (ICCC) in March 1981, and subsequently to Falcon Land Company, Inc. (FLC) in June 1995. The only mining that took place at Donegan was incidental removal of coal during reclamation activities performed by ICCC. ICCC performed most, if not all, of the grading and vegetation reclamation at the refuse site, which occurred from the late 1970s through at least the mid-1980s.

Figure 3.2-18. View of DN1, Facing South

WGC has identified two candidate sites for a new prep plant to process the fuel from Donegan, DN1 and DN2 (see Figure 2.2-15). Surrounded by rolling hills, DN1 is located on WV 39/14 (Fenwick Road) in a remote area adjacent to the entrance to the Donegan site. The site, approximately 7 acres (3 acres), is disturbed and is partially developed as a result of past mining activities as evidenced by an abandoned maintenance building on-site. The surrounding land cover is fairly vegetated with mainly grass and shrubs. To the west of the site there are a couple of ponds to manage some of the runoff from the Donegan coal refuse pile before it eventually drains into Laurel Creek.

Figure 3.2-19. View of DN2, Facing East (Candidate Site in Background)

DN2 is located on CR 1 at Beech Knob and is located on privately-owned property. Limited data is available for DN2 because of limited access; however, review of USGS topographic maps and aerial photography reveal that an 8-acre (3-hectare) patch of disturbed land exists in this area. Cursory investigations suggest that the land was previously used for agricultural purpose. The surrounding area is fairly remote. A few residential properties exist approximately half a mile (1 kilometer) north of the site, while the site is directly adjacent to a house, which is assumed to be the property owner's residence.

3.2.8 Boxley Quarry

The Boxley Quarry in Alta, near Lewisburg (see Figure 3.2-13), which is owned by the Boxley Materials Company (Boxley), is located just off of US 60 and exit 161 of I-64. The entire property is 293 acres (119 hectares) in size, with a total permitted area of 190 acres (77 hectares). The quarry operates 6 days per week; Monday through Friday from 6:00 a.m. to 5:00 p.m. and Saturdays from 6:00 a.m. to 12:00 p.m. Approximately 1.1 to 1.3 million tons per year (1.0 to 1.2 million metric tons per year) of product is mined from this quarry.

Figure 3.2-20. View of Typical Section of Boxley Quarry

Most of the limestone product required for the operation of the Co-Production Facility would come from the "Boxley New Area," a newly permitted section of the quarry. Limestone would be trucked over US 60 from the quarry, approximately 20 miles to Rainelle.

The New Area, which consists of an additional 280 acres (110 hectares) on the west side of the quarry, was purchased recently. This area consists of: (1) the remainder of the hill that is currently being quarried; (2) an adjacent valley that includes an agricultural field (presently leased to a farmer) and a stream that runs through it; and (3) the next adjacent hill to the west.

In 2004, Boxley applied for and received a permit to quarry in a 38.14-acre (15.43-hectare) area that constitutes the remainder of the hill on which they are currently quarrying. An aerial photo taken on June 30, 2004 shows the 38.14-acre (15.43-hectare) area to be wooded and undisturbed. During a site visit on August 29, 2005, it was noted that this area had been completely clear-cut and was essentially devoid of vegetation, with the exception of a thin grassy cover with some weeds and wildflowers. A small portion of this area had already begun to be excavated.

3.2.9 Mill Point Quarry

The Mill Point Quarry, which is also owned and operated by Boxley, is located near the intersection of WV 39 & US 219 in Mill Point, Pocahontas County, West Virginia. Boxley has owned and operated the quarry since 2002; however, the quarry has been in operation for over 25 years. The total permitted area is about 120 acres (50 hectares) in size. The quarry operates 7 days per week from 7:00 a.m. to 4:30 p.m. and currently produces about 400,000 tons (360,000 metric tons) of limestone per year.

The primary limestone transportation route from Mill Point to Rainelle is US 219 south to I-64 west to US 60 west, which is approximately 65 miles (105 kilometers) in driving distance. This route consists of narrow winding roads with numerous switchbacks and steep inclines. The surrounding topography is hilly with areas of heavy vegetation.

Figure 3.2-21. View of Mill Point Quarry

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3.3 Atmospheric Conditions

3.3.1 Climate and Topography

Rainelle is located in Greenbrier County, WV. The mean annual temperature in Rainelle is 51^{o}F (11 ^{o}C), with averages of 17 ^{o}F to 36 ^{o}F (-8 to 2 ^{o}C) in January and 54 ^{o}F to 75 ^{o}F (12 to 24 ^{o}C) in July. Annual precipitation of 51.8 inches (131.6 centimeters) includes an average of 4.6 inches (11.7 centimeters) in January and 4.4 inches (11.2 centimeters) in July. The annual snowfall ranges from 25 to 80 inches (64 to 203 centimeters). Prevailing winds are from the west and northwest. Average wind speeds range from 10.3 miles per hour (16.6 kilometers per hour) in March to 6.5 miles per hour (10.5 kilometers per hour) in July. During the mornings, the relative humidity is generally high, ranging from 75 percent in April to 91 percent in August and September. The afternoon humidity is somewhat lower, ranging from 37 percent in December and January to 54 percent in June.

The proposed site is located adjacent to Sewell Creek on the floor of a valley at an elevation of approximately 2,420 feet (738 meters) above mean sea level (amsl). Nearby terrain peaks exceed 3,600 feet (1,097 meters) amsl.

3.3.2 Sensitive Land Use Areas

For the purposes of air quality analysis, any area to which the general public has access is considered a sensitive receptor site. However, analyses typically focus on land uses that are especially sensitive to increased emissions of air pollutants. Examples include residences, day care centers, educational and health facilities, places of worship, parks, and playgrounds. In the vicinity of the proposed power plant, sensitive land uses include single-family homes, a nursing and rehabilitation home, and an apartment complex. Rainelle is a rural area, and sensitive land uses may also include farming operations that may be affected not only by air pollutants but also by solar radiation loss and additional water vapor deposition (i.e., fog and ice) from the cooling tower plumes.

3.3.3 Air Quality Regulations

3.3.3.1 National Ambient Air Quality Standards (NAAQS)

The EPA has promulgated National Ambient Air Quality Standards (NAAQS) for six major pollutants, deemed criteria pollutants. They are called criteria pollutants because EPA developed health-based criteria as the basis for setting permissible levels.

The NAAQS include primary standards, established to protect public health with an adequate safety margin, and secondary standards, established to protect "plants and animals and to prevent economic damage." The six criteria pollutants are:

- Sulfur dioxide (SO_2). Sulfur dioxide is a heavy gas, primarily associated with the combustion of sulfur-containing fuels such as coal and oil. Mobile sources are not considered to be significant SO_2 emitters.
- Inhalable Particulates, also known as Respirable Particulate Matter (PM). The PM10 standard covers only those particles with diameters of 10 micrometers or less, which are the ones most likely to reach the lungs. The PM2.5 standard covers particulates with diameters of 2.5 micrometers or less.
- Carbon Monoxide (CO). The primary source of CO in urban areas is from motor vehicles. It is a colorless, odorless gas produced from the incomplete combustion of gasoline and other fossil fuels.

- Ozone (O_3). This pollutant is a principal component of smog. It is not emitted directly into the air but is formed through a series of chemical reactions between hydrocarbons and nitrogen oxides in the presence of sunlight.
- Nitrogen dioxide (NO_2). NO_2 is a highly oxidizing, extremely corrosive toxic gas, formed by chemical conversion from nitric oxide (NO), which is emitted primarily by industrial furnaces, power plants, and motor vehicles.
- Lead (Pb). Lead emissions are principally associated with industrial sources. Because most vehicles produced in the U.S. since 1975, and all produced after 1980, are designed to use unleaded fuel, emissions of lead from motor vehicles have declined significantly.

Table 3.3-1. National and West Virginia State Ambient Air Quality Standards

Pollutant	Type Of Standard	Averaging Period	Standard
SO_2	Primary	12-month arithmetic mean	80 ug/m3 (0.03 ppm)
	Primary	24-hour average	365 ug/m3 (0.14 ppm)
	Secondary	3-hour average	1300 ug/m3 (.5 ppm)
Inhalable Particulates (PM_{10})	Primary & Secondary	Annual arithmetic mean	50 ug/m3
	Primary & Secondary	24-hour average	150 ug/m3
Inhalable Particulates ($PM_{2.5}$)	Primary & Secondary	Annual arithmetic mean*	15 ug/m3
	Primary & Secondary	Maximum 24-hour average *	65 ug/m3
CO	Primary	8-hour average**	9 ppm (10 ug/m3)
	Primary	1-hour average**	35 ppm (40 mg/m3)
O_3	Primary & Secondary Primary & Secondary	Maximum daily 1-hr average Maximum daily 8-hr average*	0.12 ppm (257 ug/m3) 0.08 ppm (235 mg/ m3)
NO_2	Primary & Secondary	12-month arithmetic mean	0.053 ppm (100 ug/m3)
Pb	Primary & Secondary	Quarterly mean	1.5 ug/m3

*Notes: * Included for information only. These PM2.5 and 8-hour ozone standards have not yet been implemented;*
*** Not to be exceeded more than once a year.*

Source: EPA and WVDEP, Division of Air Quality

The air quality regulations for the State of West Virginia are codified in Title 45 of the Code of State Regulations (45 CSR) – Series 1 through 38. West Virginia State Ambient Air Quality Standards may further regulate concentrations of the criteria pollutants discussed above. Table 3.3-1 lists the National and West Virginia State Ambient Air Quality Standards. The WVDEP, Division of Air Quality (DAQ), is responsible to monitor air quality for each of the criteria pollutants and assess compliance.

3.3.3.2 State Implementation Plan (SIP) and SIP Conformity

An area that does not meet (or contributes to ambient air quality in a nearby area that does not meet) the primary or secondary NAAQS for a pollutant is referred to as a nonattainment area. The CAA requires states to submit to the EPA a State Implementation Plan (SIP) for attainment of the NAAQS. The 1977 and 1990 amendments to the CAA require comprehensive plan revisions for areas where one or more of the standards have yet to be attained. Within West Virginia, various counties are in nonattainment for O_3 and/or PM10 and PM2.5. The DAQ is coordinating with neighboring states to develop air quality plans to identify and reduce emissions contributing to the pollution problem in these areas as part of its effort to attain the NAAQS. The DAQ is also working with industry to reduce emissions on a facility-wide basis, as well as expanding efforts to work with communities to identify and implement control strategies for air pollution in their neighborhoods.

The 1990 Amendments to the CAA require federal actions to show conformance with the SIP. Federal actions are those projects that are funded by federal agencies and include the review and approval of a Proposed Action through the NEPA process. Conformance with the SIP means conformity to the approved SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS, and achieving expeditious attainment of such standards. The need to demonstrate conformity is applicable only to areas that are not in compliance with the NAAQS, or that were previously in nonattainment for one or more pollutants and are currently designated as maintenance areas. Guidelines for determining conformity are found in 40 CFR, Parts 6, 51 and 93, Determining Conformity of General Federal Actions to State or Federal Implementation Plans; Final Rule. A federal action will fall under the jurisdiction of either the General Conformity Rule or the Transportation Conformity Rule. The Transportation Conformity Rule covers highway and transit projects.

3.3.4 Local Air Quality

Rainelle is located in Greenbrier County. Ambient air quality concentrations for the nearest monitoring sites are summarized in Table 3.3-2. Of the 64 air quality monitors maintained throughout the state by DAQ, only one ─ an O_3 monitor ─ is located in Greenbrier County. No air quality monitors for lead (Pb) or nitrogen dioxide are maintained in the state. The nearest NO_2 monitoring site is in Virginia (VA) and was selected for Table 3.3-2. Lead is not currently monitored in either WV or VA. Many states have ceased or reduced the monitoring of lead concentrations because of the decrease in ambient lead concentrations resulting from restrictions on the use of leaded gasoline. DAQ monitored lead in several counties through 1997, and the closest county location for that year is shown in Table 3.3-2. As shown in Table 3.3-2, the monitored values at the air quality monitoring sites are in compliance with the NAAQS; therefore, air quality concentrations at Rainelle are considered to be within the NAAQS.

Table 3.3-2. Ambient Air Quality Monitoring Data

Pollutant	Averaging Period	Nearest Relevant Monitor Location (County)	Monitor ID	Year	Monitored Concentration	NAAQS
CO	1-Hour	Hancock, WV	54-029-1004	2004	14.8 ppm	35 ppm
CO	8-Hour	Hancock, WV	54-029-1004	2004	5.3 ppm	9 ppm
SO_2	3-Hour	Kanawha, WV	54-039-0010	2004	0.098 ppm	0.50 ppm
SO_2	24-Hour	Kanawha, WV	54-039-0010	2004	0.052 ppm	0.14 ppm
SO_2	Annual	Kanawha, WV	54-039-0010	2004	0.01 ppm	0.03 ppm
O_3	8-Hour	Greenbrier, WV	54-025-0003	2004	0.074 ppm	0.085 ppm
$PM_{2.5}$	24-Hour	Summers, WV	54-089-0001	2004	29.4 $\mu g/m^3$	65 $\mu g/m^3$
$PM_{2.5}$	Annual	Summers, WV	54-089-0001	2004	9.8 $\mu g/m^3$	15 $\mu g/m^3$
PM_{10}	24-Hour	Kanawha, WV	54-039-0010	2004	50 $\mu g/m^3$	150 $\mu g/m^3$
PM_{10}	Annual	Kanawha, WV	54-039-0010	2004	22.1 $\mu g/m^3$	50 $\mu g/m^3$
NO_2	Annual	Roanoke, VA	19-A6	2004	0.014 ppm	0.053 ppm
Pb	3-Month	Hancock, WV	Not available	1997	0.01 $\mu g/m^3$	1.5 $\mu g/m^3$

Note: NAAQS – National Ambient Air Quality Standard

Sources: West Virginia Department of Environmental Protection, Division of Air Quality 2004; Virginia Department of Environmental Conservation, Office of Air Quality,2004; U.S. EPA, AirData, 1997

Although currently in attainment of the NAAQS, in previous years Greenbrier County had been designated as being in marginal nonattainment for the 1-hour O_3 standard. It was redesignated to being in attainment on September 18, 1995. The county is therefore an O_3 maintenance area and is subject to the same requirements as an O_3 nonattainment area. Because Rainelle is within the County's air quality maintenance area, federal actions within Rainelle must show conformity with the SIP, and the Proposed Action would fall under the General Conformity Rule. However, because the proposed power plant is a major new source of air pollutant emissions that must prepare permits under the Prevention of Significant Deterioration (PSD) regulations, it is exempt from the need to demonstrate SIP conformity for the EIS (subsequent section).

3.3.4.1 New Source Review Permits

New Source Review (NSR) refers to preconstruction permitting requirements for new construction of, or modifications to, industrial sources of air pollution. The permits may be termed New Source Review, Prevention of Significant Deterioration, Minor New Source Review, and/or Nonattainment Area Permits, depending on the issuing agency, the site's NAAQS attainment status, and the type and volume of pollutants potentially emitted by the source. NSR serves two purposes:

- First, it ensures that air quality is not significantly degraded from the addition of new and modified factories, industrial boilers and power plants. In areas with unhealthy air, NSR assures that new emissions do not slow progress toward cleaner air. In areas with clean air, especially pristine areas like national parks, NSR assures that new emissions do not significantly worsen air quality.
- Second, the NSR program assures people that any large new or modified industrial source in their neighborhoods will be as clean as possible, and that advances in pollution control occur concurrently with industrial expansion.
- NSR permits are legal documents with which the facility owners/operators must comply. The permit specifies what construction is allowed, what emission limits must be met, and often how the emissions source must be operated. The three types of NSR permits are:
- PSD permits which are required for new major sources or a major source making a major modification in an attainment area;
- Nonattainment NSR permits which are required for new major sources or major sources making a major modification in a nonattainment area; and
- Minor source permits.

The WVDEP is responsible for implementing federal air quality requirements, including the PSD program (40 CFR 52.21 and 45 CSR 14). A state's NSR program is defined and codified in its SIP. The proposed Co-Production Facility is categorized as a "fossil fuel-fired steam electrical generating plant," and is considered a major source. In April 2006, WVDEP DAQ issued a PSD Permit (R14-0028) to WGC for the proposed construction of the waste coal-fired steam electric co-generation facility. The PSD permit review requires a case-by-case Best Available Control Technology (BACT) analysis to determine the maximum achievable degree of reduction of each compound subject to PSD. The BACT evaluation takes into account energy and environmental issues, technical feasibility, and costs associated with each alternative technology, as well as the benefit of reduced emissions that the technology would achieve.

For the purposes of PSD review, the federal government has classified lands into Class I, Class II, and Class III areas. In Class I areas, where existing good air quality is considered to be of national importance, very little deterioration of air quality is allowed. All other areas to which the PSD provisions apply are designated as Class II. Rainelle is within a PSD Class II area. The closest PSD Class I areas to the proposed Project are the James River Face Wilderness Area (74 miles [120 km]) in Virginia, Otter Creek Wilderness Area (89 miles [143 km]) in West Virginia, Dolly Sods Wilderness Area (102 miles [164 km]) in West Virginia, and Shenandoah National Park (105 miles [169 km]) in Virginia.

3.3.4.2 Acid Rain Regulations

The overall goal of the Acid Rain Program is to achieve significant environmental and public health benefits through reductions in emissions of SO_2 and nitrogen oxides (NOx), the primary causes of acid rain. Because the Co-Production facility utilizes fossil fuel-fired combustion to generate over 25 MW of electricity for sale, it is considered an “affected unit” under the Acid Rain Program and must apply for an Acid Rain permit one year prior to initial operation of the unit. The requirements for affected units under the Acid Rain Program, established pursuant to Title IV of the Clean Air Act, are covered under 40 CFR 72 through 78. West Virginia has adopted these regulations in 45 CSR 33.

3.3.4.3 National Emission Standards for Hazardous Air Pollutants (NESHAP)

Non-criteria pollutants that can cause serious health and environmental hazards are termed hazardous air pollutants (HAPs) or air toxics. The 1970 CAA Amendments required EPA to promulgate national emissions standards for hazardous air pollutants (NESHAP) to protect the public health and welfare with an ample margin of safety. Due to the difficulty in establishing health risks for HAPS, EPA identified and regulated only 8 pollutants during the 20 years following the 1970 legislation. They are asbestos, benzene, beryllium, inorganic arsenic, mercury, radionulides, and vinyl chloride. The 1990 CAA Amendments, section 112, renewed emphasis on controlling HAPS but changed the regulatory approach, basing it instead on available control technology. Subsequently, a list of 189 compounds to be controlled as HAPS was developed. In 1996 EPA removed caprolactam from the list, and the current list contains 188 compounds including the original eight from the 1970 legislation. The NESHAP is codified in 40 CFR 61.

The 1990 CAA Amendments define two types of NESHAP emissions standards: maximum achievable control technology (MACT) and generally available control technology (GACT). The MACT standards are codified under 40 CFR 63. Unlike the health-based standards established under the initial NESHAPs, the MACT standards are technology-based emission limits that take into account available methodologies for controlling emissions of targeted HAPs from each source category. In general, a source is subject to a MACT standard if it is in a source category regulated under 40 CFR 63 and part of a facility that is defined as a major source for HAPs. A source is defined as a major source for HAPs if it emits a single HAP in excess of 10 tons (9.1 metric tons) per year or an aggregate emission rate of over 25 tons (22.7 metric tons) per year of any combination of regulated HAPs. GACTs are less stringent emission standards based on the use of more standard technologies and work practices.

In December 2000, EPA announced that it was “appropriate and necessary” to regulate and control emissions of mercury and other air toxics from coal- and oil-fired electric utilities under section 112 of the CAA Amendments (i.e., the MACT requirements). In January 2004, under the CAA, EPA was given the authority to regulate power plant mercury emissions by establishing performance standards or MACT, whichever the agency deems most appropriate. On March 15, 2005, EPA revised and reversed its December 2000 finding because it believed that the December 2000 finding lacked foundation and because recent information demonstrates that it is not appropriate or necessary to regulate coal- and oil-fired utility units under Section 112.

3.3.4.4 Clean Air Mercury Rule

On March 15, 2005, the EPA issued the Clean Air Mercury Rule (CAMR), which creates performance standards and establishes permanent, declining caps on mercury emissions from coal-fired power plants. This rule makes the United States the first country in the world to regulate mercury emissions from utilities. The CAMR establishes “standards of performance” limiting mercury emissions from new and existing coal-fired power plants and creates a market-based cap-and-trade program. New coal-fired power plants (“new” means construction starting on or after Jan. 30, 2004) will have to meet stringent new source performance standards in addition to being subject to the caps. The regulation is promulgated under Section 111 of the CAA (i.e. the NSPS). As an electric utility steam-generating unit with more than 25Mwe output, the Co-Production Facility will be subject to the CAMR. The key aspects of the regulation are that it:

- Creates Subpart HHHH of 40 CFR Part 60, which establishes the model rule provisions for the mercury budget-trading program for coal-fired utility boilers.
- Incorporates Performance Specification 12A for mercury CEMS in Appendix B of 40 CFR Part 60.
- Revises 40 CFR Part 75 to incorporate mercury monitoring, recordkeeping and reporting requirements where applicable. This includes missing data substitution procedures, QA/QC requirements, quarterly reporting, etc.
- Creates Subpart I of 40 CFR Part 75 which establishes the mercury mass emission provisions.
- Revises Subpart D of 40 CFR Part 60 by establishing stringent mercury emissions limits in addition to the trading program "cap" for new units (i.e., unit construction on or before January 30, 2004).
- Emission limits are set according to fuel type (e.g., 1.4 x 10-6 lb mercury/megawatt hour for waste coal-fired units) and compliance is determined on a 12-month rolling average basis.
- Establishes a market-based cap-and-trade approach in two phases; an initial cap for each source will be set in 2010, and then further reductions on a plant basis will take effect after 2018.

3.4 Surface Water Resources

This section describes the surface water resources at and in the vicinity of the Proposed Action, including the coal refuse locations identified for initial fuel supplies. The discussions include regional and local identifications of prominent surface water features, hydrologic characteristics, baseline surface water quality, and surface water rights and permits. Hydrogeologic characteristics of unsaturated materials and water-bearing units (aquifers); baseline groundwater quality of regional and local aquifers; onsite and offsite groundwater usage; and groundwater rights, agreements, and allocations are discussed in Section 3.6 (Geology and Groundwater Resources). Municipal water and wastewater services are discussed in Section 3.12 (Community Services and Utilities).

3.4.1 Hydrology

3.4.1.1 Regional Setting

The project site and its associated components are located within the Appalachian Plateau and the Kanawha-New River Basin where streams generally follow a dendritic drainage pattern (i.e., similar to the branching pattern of tree roots). The New River begins in North Carolina, and flows north to Gauley Bridge in West Virginia. The Gauley and New Rivers converge to form the Kanawha River, which flows into the Ohio River, and subsequently into the Mississippi River. The Kanawha-New River Basin drains 12,223 square miles (31,657 square kilometers) in the southern half of West Virginia, and parts of Virginia and North Carolina (Paybins, 2000). In general, the area within the basin can be described as mountainous, forested, humid, and rural. The basin drains areas in three physiographic provinces: Blue Ridge (17 percent), Valley and Ridge (23 percent), and Appalachian Plateaus (60 percent). The climate within the basin is primarily continental with mild summers and cold winters. The annual mean temperature ranges from 48°F to 55°F (9° C to 13°C) within the basin (Paybins, 2000). The basin precipitation patterns are affected by orographic lifting (i.e., influenced by mountains) and rarely suffer from dry spells. The basin generally sees maximum precipitation May through July and minimum precipitation November through January with the annual average precipitation being 43.5 inches (111 centimeters) (Paybins, 2000). Summer vegetation uses a large fraction of the precipitation, and as a result, maximum streamflow does not coincide with the maximum precipitation. On average, streamflow throughout the basin is greatest February through March and least in September through October (OWR, 2000). Localized flooding on tributaries can result from intense thunderstorms from late spring through the summer months.

The Gauley River's mouth is immediately upstream of the falls of the Great Kanawha River. The Gauley River watershed, which comprises 15 subsheds, drains over 1,400 square miles (3,600 square kilometers) and includes areas in Kanawha, Clay, Fayette, Nicholas, Summers, Greenbrier, Webster, Pocahontas and Randolph Counties. Predominant land cover in the watershed is deciduous forest (NLCD, 1999). Significant public lands within the watershed include portions of the Monongahela National Forest, Summersville Reservoir, Gauley River National Recreation Area, Meadow River Wildlife Management Area (WMA), and the Carnifex Ferry Battlefield State Park. The Gauley River watershed includes the Upper Meadow River subshed in which Rainelle and Anjean/Joe Knob lie, the Hominy Creek subshed in which Green Valley lies, and the Cherry River subshed in which Donegan lies (see Figure 3.4-1).

As one of the major and direct tributaries of the Gauley River, the Meadow River begins above Grassy Meadows in Greenbrier County and flows generally northwest for approximately 60 miles (100 kilometers) to its mouth on Gauley River. The Meadow River winds through an undeveloped wildlife-management area, the Meadow River WMA, which comprises 2,272 acres (919 hectares) of protected wetlands habitat, also used for recreational hunting, and then further downstream flows through the Gauley River National Recreation Area for the last several miles of its course.

Meadow River flow (discharge) data, dating from October 1979 through September 1982, was made available through a U.S. Geological Survey (USGS) gaging station located in McRoss, WV, approximately 2 miles (3 kilometers) upstream the confluence of Sewell Creek and Meadow River. Since only three years of river flow data were available at this location, this data was compared to 33 years of annual precipitation data (1956 through 1988) to assess whether the Meadow River flow during these years were representative of a typical year. Based on the average annual precipitation over the 33-year period (49.6 inches), the period of October 1981 through September 1982 (50.7 inches) was considered to be representative of a typical year from a precipitation perspective. Because the flow rates within the Meadow River are directly related to precipitation, this year is also considered representative of flow conditions in the Meadow River for a typical or average year.

Figure 3.4-2 shows the Meadow River flow for the sample year, October 1981 through September 1982. Flow in the Meadow River varies from season to season and generally follows a similar pattern as other streams in the Kanawha-New River Basin. On average, discharge is greatest January through March and lowest August through October. The peaks in Figure 3.4-2 are most likely a result of precipitation events, while the troughs represent drier periods.

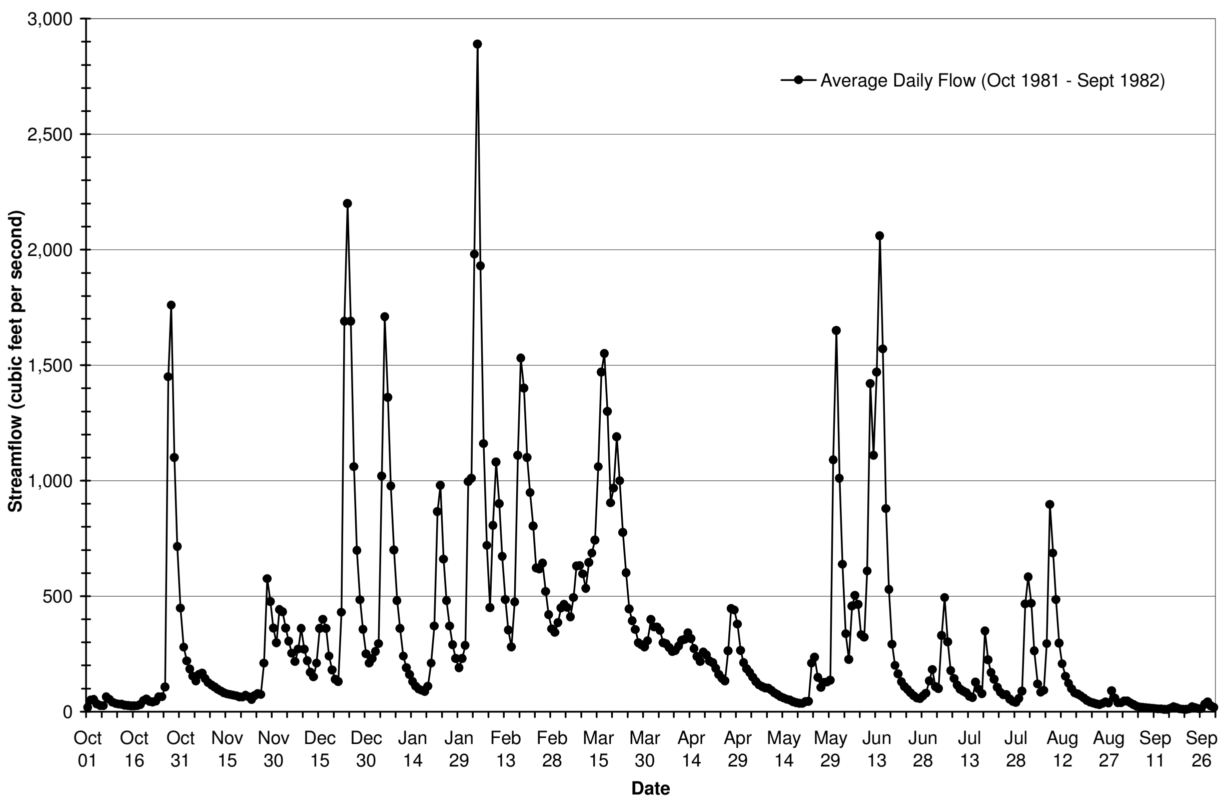

Figure 3.4-2. Meadow River Streamflow (October 1981 through September 1982) (USGS, 2006)

3.4.1.2 Power Plant Site

Sewell Creek is the primary receiving water for the power plant site's drainage and is a direct tributary of the Meadow River (see Figure 3.4-3). The proposed power plant site is south of Sewell Creek and slopes downward from the base of a ridgeline along Sims Mountain to Sewell Creek in a northwest direction. As Sewell Creek winds through Rainelle it receives water from Wolfpen Creek, Little Sewell

Creek, and an unnamed tributary before draining into the Meadow River, located approximately 1.5 miles (2.4 kilometers) downstream. Sewell Creek flows from southwest to northeast.

Sewell Creek's sinuous path has created a natural meander neck cutoff in the project area that has begun to erode and has nearly resulted in an oxbow lake. Sewell Creek's channel meanders within highly erodable silty sand alluvium that makes up the floodplain along the west and north sides of the power plant site. A study of Sewell Creek meandering was performed to determine past migration of the stream and to predict potential future migration (see Figure 3.4-4 and Appendix F, Stream Studies). Future positions of Sewell Creek were estimated using a mathematical model that incorporated stream parameters ascertained from digitized historical images of the creek. The prediction displays the creek's past meander movement for the years of 1940, 1970, 1996, and 2004. Based on the creek's modeling, and assuming that no floods would significantly impact the area, it is estimated that the large meander loop will likely cut off by the year 2060, because the neck is predicted to become smaller and smaller in each successive year (Edwards, 2005). The exact date of the cutoff depends on the extent of flooding each spring, during which most erosion and resulting migration occurs.

The vegetation at the project site can be characterized as a wild growth of grass, brush, and relatively young deciduous trees, part of which lies in wetlands areas (see Section 3.7.2 for wetlands discussion); however, the northern tip of the ridge has been stripped and graded flat due to previous site development efforts. As a result, this disturbed area is currently exposed and lacks vegetation and topsoil. The EcoPark area that is located north of Sewell Creek was formerly owned by the Meadow River Lumber Company (MRLC) and is now intended for industrial land use development. The EcoPark site will be developed independently of the Proposed Action by a third party and its discussion is presented only as conceptual terms. The EcoPark study area includes two former log ponds which have since been filled and converted into an open grassy field.

Highlights of the hydrologic features of the project site are presented in Figure 3.4-3. Wolfpen Creek flows under WV 20 and the rail tracks through a culvert, and drains portions of the EcoPark area before its confluence with Sewell Creek 1,000 feet (300 meters) west of the proposed power plant site. A small portion of the power plant site drains east into an unnamed tributary located east of the ridge. This unnamed tributary is an intermittent stream that is mostly dry during the summer months and has a defined bed and bank. During past development efforts, the material from the ridge was deposited on the surrounding floodplain, which resulted in the relocation of the unnamed tributary to the east. This intermittent stream drains into Sewell Creek and both streams function as a natural boundary around the main project site. Sewell Creek subsequently flows in a general northeast direction and merges with Little Sewell Creek a half mile (1 kilometer) downstream from the project site before it flows into the Meadow River. Section 3.5 (Floodplain) provides discussion on other hydrological and flooding aspects for this area.

3.4.1.3 Anjean and Joe Knob

Figure 3.4-5 illustrates the existing site conditions at the Anjean mining facilities and Joe Knob. The Little Clear Creek and South Fork of Big Clear Creek, both of which flow generally south and eventually empty into the upper reaches of the Meadow River and its associated wetlands, provide surface drainage for the Anjean mining operations. Surface water runoff from the coal refuse piles is diverted through established channels and into treatment ponds before draining into the local streams. A small tributary, referred to by WVDEP as Buck Lilly Branch, receives the treated water from Buck Lilly pile and drains into Little Clear Creek. The hydrology and water quality issues at the Anjean coal refuse site are discussed in greater detail in Section 3.4.2.3.

Several sites having the potential to serve as coal processing facilities (for beneficiation of the coal refuse) have been identified by WGC (AN1, AN2, and AN3). AN1 is situated east of Big Clear Creek and south of Briery Creek. A couple of ponds that appear to have been excavated lie in the vicinity of the AN1. It is assumed that the ponds function as settling basins or stormwater retention basins.

AN2 is situated west of Big Clear Creek. Several riprap-lined channels were observed near the gravel road accessing the site. It is assumed that these channels were constructed to manage the runoff from the gravel road. No surface water bodies, such as ponds were observed on the site.

AN3 is situated south of the Buck Lilly pile. This area is partially vegetated and heavily disturbed. Abandoned trailers, PVC pipes and a container for hydrochloric acid are present on-site. No surface water body features were observed on the site during the site reconnaissance.

The Joe Knob coal refuse pile drains to Joe Knob Branch and Wallace Creek, which are tributaries to Little Clear Creek. Both streams possess a steep gradient profile, with the headwaters having an elevation that roughly ranges from approximately 3,500 to 3,600 feet (1,170 to 1,100 meters) above mean sea level (amsl) to an estimated elevation below 3,000 feet (900 meters) amsl at their confluence with Little Clear Creek. Slopes bordering the streams are steep and vegetated by forests typical for that region of West Virginia.

3.4.1.4 Green Valley

The Green Valley coal refuse site is located in the Hominy Creek subshed (within the Gauley watershed). The site is situated on a ridge between Hominy Creek and Colt Branch (see Figure 3.4-6). Hominy Creek has been identified by the state as a stream with reproducing native trout (EQB, 2004). The coal refuse disposal area slopes in a south and easterly direction, directing surface water runoff into water treatment settling ponds before entering Hominy Creek. The hydrology and water quality issues at the Green Valley coal refuse site are discussed in greater detail in Section 3.4.2.4.

A portion of the Green Valley site was evaluated for its feasibility to function as a location for a coal prep plant. As shown in Figure 2.2-17, the candidate site GV would be located somewhere along the southern border of the coal refuse pile that parallels Hominy Creek. Several settling ponds that treat runoff from the coal refuse are located in the southeast corner of the site.

3.4.1.5 Donegan

The Donegan coal refuse site is also located in the Gauley watershed and drains into Laurel Creek, a tributary to the Cherry River. Drainage from the site is directed to the north and then drains into Laurel Creek (see Figure 3.4-7). Water quality issues at the Donegan site are discussed in Section 3.4.2.5.

Two candidate prep plant sites have been identified as potential locations for processing the coal refuse from Donegan (DN1 and DN2). The land bordering the DN1 site is primarily vegetated with herbaceous and woody trees common to the region. DN1 drains into Laurel Creek of the Cherry River. One sediment/treatment pond is located to the west of DN1.

The DN2 site is situated in the Long Branch and Elija Branch Watersheds and contains several sediment ponds and other forms of storm water management infrastructures (Green 2006). Long Branch and Elija Branch are characterized as first or second order streams with a well-defined bed and bank drainage morphology located down slope of the proposed area. The riparian corridor of both streams (Long Branch and Elija Branch) is vegetated by woody and herbaceous plants common to the region. No jurisdictional bodies of water (streams or wetlands) were observed within the proposed beneficiation site.

3.4.2 Surface Water Use and Quality

3.4.2.1 Regional Water Use and Quality

Within the Kanawha-New River Basin the National Park Service manages the New River Gorge National River, the Gauley River National Recreation Area, and Bluestone National Scenic River. New River and Gauley River are considered world-class whitewater rafting locations and are used heavily by whitewater kayakers and rafters. The only major industrial area within the Kanawha-New River Basin is located within 20 miles (30 kilometers) of Charleston, along the terraces of the Kanawha River. Based on 1990 data most of the population within the Kanawha River Basin lived in rural areas (Paybins, 2000). Industrial and residential areas had accounted for less than 5 percent of the basin's total area in 1990.

Between the years 1996 and 1998, the USGS National Water-Quality Assessment (NAWQA) program conducted a water quality assessment of the Kanawha-New River Basin. The NAWQA report found that, overall, the basin's river system contained low concentrations of nutrients and pesticides most likely owing to the relatively low population and low intensity of agriculture and urban development in the basin. Between the years 1980 and 1999 it was discovered that the streams within the coal regions of the Appalachian Plateaus Physiographic Province generally improved with respect to pH, total iron, total manganese, and sedimentation; however, the effects of mining-related activities were reflected in high sulfate concentrations and impaired biological communities (Paybins, 2000). In general, waters affected by mine drainage exhibit high acidity and/or high metals content, which includes iron, aluminum, and manganese. Although mine drainage is mainly discussed with respect to metals, sulfate concentrations greater than 50 mg/l may also signify mine drainage influence. The NAWQA report cited coal mining, improper disposal of human and animal wastes, and past industrial activities as the major influences on water quality for the streams and rivers within the Kanawha-New River Basin.

As with most states in the U.S., West Virginia has enacted clean water legislation, which at a minimum, includes the requirements of the federal Clean Water Act (CWA). The principal water quality law in the state is the West Virginia Water Pollution Control Act (WPCA). The WPCA designates the Division of Water and Waste Management (DWWM) as the primary water pollution control agency for the state. The Environmental Quality Board (EQB), a Governor-appointed board comprising members with expertise in various water resources backgrounds, promulgates West Virginia's water quality standards.

West Virginia has adopted an anti-degradation policy pursuant to the federal CWA, which complements the water quality standards by limiting additional degradation to the state's water bodies. The Anti-Degradation Implementation Rule is essentially a preventive maintenance measure for protecting existing uses and high quality standards for the state's waters. The implementation rule provides more protection for state waters by assigning different levels or tiers of protection. In general, there are four tiers of protection, with Tier 1 protection (lowest level) applying to all waters and Tier 2 protection being the default level of protection for most waters in West Virginia. Tier 2 waters are high quality waters where pollution levels fall below the water quality standards and degradation is permissible (up to the level of the standard) if deemed necessary by the state. Tier 2.5 protection signifies high-quality waters of "special concern" where no significant degradation is allowed and the existing water quality effectively becomes the standard. Little Clear Creek near Anjean and Hominy Creek, Price Fork, and South Fork near Green Valley are considered trout-reproducing streams and are currently listed as Tier 2.5 streams (DWWM, 2005b). For Tier 3 waters no permanent lowering of existing water quality is allowed. Tier 3 waters are to be maintained, protected and improved. All streams and their tributaries within the state's wilderness areas are considered Tier 3 streams. There are currently no Tier 3 streams within the Gauley watershed.

Under the CWA, two federal strategies have been developed to deal with polluted streams: the Total Maximum Daily Load (TMDL) and the listing of 'impaired' streams. Section 303(d) of the CWA requires a routine listing of streams determined by WVDEP to be "impaired" and TMDL development for these listed streams. A stream is considered impaired when it does not meet the state's water quality standards or does not meet its designated use. A designated use has associated criteria that describe specific standards that must be met to ensure that a stream can support its use. The TMDL is essentially a plan of action to clean up an impaired stream and involves calculating the total load of pollutants that a segment of a stream can accept without violating the water quality standard. Under the recommendations of the EPA, West Virginia classifies a stream into one of the following categories:

- Category 1 – Stream is attaining water quality standards and no use is threatened (i.e., fully supporting all designated uses);
- Category 2 – Stream is attaining some of the designated uses, but no or insufficient information is available to determine if the remaining uses are attained or threatened;
- Category 3 – Currently, there is insufficient or no data and information to determine if any designated use is attained;
- Category 4 – Stream is impaired or threatened but does not need a TMDL;
  - Category 4a – Stream is impaired or threatened for one or more designated uses and TMDL has been completed;
  - Category 4b – Stream is impaired or threatened for one or more designated uses but does not require the development of a TMDL. Other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future;
- Category 5 – Water quality standards are not attained. Stream is impaired.

In summary, if all uses are attained (i.e., all water quality standards are being met for each designated use), the water is unimpaired and is listed as a Category 1. At the other end of the spectrum, Category 5 waters are in violation of water quality criteria and must obtain a TMDL. Categories 2 through 4 are waters which either have insufficient data to make assessments, no data, or TMDLs have already been completed or are not required. Table 3.4-1 lists the streams draining Rainelle and the coal refuse piles in Anjean, Green Valley, and Green Valley and their assigned categories. Table 3.4-2 lists the streams near Rainelle, Anjean, and Green Valley that were included in the 2004 Section 303(d) List (i.e., identified as an impaired stream).

3.4.2.2 Rainelle Water Quality & Use

As shown in Table 3.4-1, Sewell Creek's designated uses include Agriculture and Wildlife (no impairment currently exists for this use); Public Water Supply (use is currently impaired); Warm Water Fishery (use is currently impaired); and Water Contact Recreation (insufficient data at this time to determine whether or not stream is impaired for this particular use). In addition to Sewell Creek, Little Sewell Creek and Meadow River are also currently included in the 303(d) listing of impaired streams with the latest projected TMDL year of 2006 (see Table 3.4-2).

Table 3.4-1. Stream Designated Use and Category (Rainelle, Anjean, Green Valley, Donegan, Joe Knob Branch, Beech Knob, and Wallace Branch)

Stream	Designated Use					Category	Location	Length (miles)**
	Agriculture and Wildlife	Public Water Supply	Trout Waters	Warm Water Fishery	Water Contact Recreation			
Meadow River	F	N	X	F	N	5	Entire Length	68.8
Sewell Creek	F	N	X	N	I	5	Entire Length	14.1
Little Sewell Creek	NA	NA	X	NA	NA	5	Entire Length	6.1
Boggs Creek	F	F	X	I	F	2	Entire Length	6.3
Wolfpen Creek	NA	NA	X	NA	NA	3	Entire Length	2.8
Big Clear Creek	F	I	F	X	I	2	Entire Length	16.6
South Fork*	NA	NA	X	F	F	2	Entire Length	6.3
Little Clear Creek*	I	N	N	X	I	5	Entire Length	16.3
Hominy Creek*	F	F	F	X	F	1, (5)	Mouth to MP17.3 and MP19.1 to headwaters, {MP17.3 to MP19.1})	24.6, 1.8
Price Fork*	I	I	NA	I	I	3	Entire Length	3.0
Colt Branch	F	N	X	N	F	5	Entire Length	2.2
Laurel Creek*	NA	NA	NA	NA	NA	-	-	-
Joe Knob Branch	X	X	I	X	X	3	Entire Length	3.9
Wallace Branch	X	X		X	X	5	Entire Length	3
Long Branch	X	X		X	X	3	Entire Length	2.6
Elijah Branch	F	F		F	F	1	Entire Length	

*Note: *Tier 2.5 Streams; F – Fully Supporting (use is being fully met and no impairment exists for that use); N – Not Supporting (use is impaired); I – Insufficient Data; NA – Not Assessed; X – Not Considered a Designated Use; **To convert miles to kilometers, multiply by 1.609 (Source: DWWM, 2004a, 2006)*

Table 3.4-2. 303(d) Listed (Impaired) Streams near Rainelle, Anjean and Green Valley

Stream	Criteria Affected	Cause	Impaired Length (miles)*	Reach Description
Meadow River	Fecal Coliform	Unknown	68.8	Entire length
Sewell Creek	Fecal Coliform, Iron	Unknown, Mine Drainage	14.1	Entire length
Little Sewell Creek	Fecal Coliform, Iron	Unknown, Unknown	6.1, 0.3	Entire Length, Mouth to MP 0.3
Little Clear Creek	Iron, pH	Mine Drainage, Unknown	16.3	Entire length
Hominy Creek	Iron	Mine Drainage	1.8	From MP17.3 to MP 19.1
Colt Branch	Iron	Mine Drainage	2.2	Entire length
Wallace Branch	pH	Unknown	1.6	Entire Length

** To convert miles to kilometers, multiply by 1.609 (Source: DWWM, 2006)*

An aquatic survey of Wolfpen Creek and Sewell Creek was conducted in June 2004 to assess the water quality of the streams (see Appendix F, Stream Studies). Figure 3.4-8 displays the sampling points and Table 3.4-3 summarizes the resulting physical and chemical parameters estimated for the streams. In general, the survey determined that both streams could be described as similar in both physical and chemical characteristics (Jones et al, 2005). However, due to the relatively larger upstream flow of Sewell Creek, it was determined that Sewell was largely responsible in determining the water quality near the project area. The report noted that the contamination amounts and contributing flow of the unnamed intermittent tributary (Site 4 in Figure 3.4-8) are likely too small to affect Sewell Creek. The survey also determined that Wolfpen and Sewell Creeks exhibit reasonable water quality, but both are too habitat- and flow-limited to support diverse aquatic communities. Further discussions on the biological conditions of the stream can be found in Section 3.7 (Biological Resources) and in Appendix F (Stream Studies).

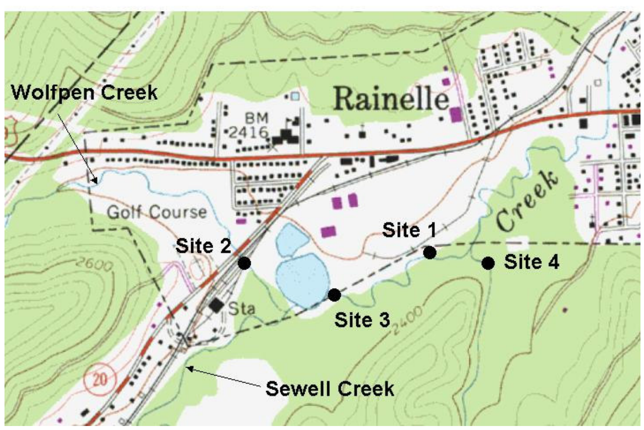

Figure 3.4-8. Sampling Sites for Wolfpen Creek and Sewell Creek Stream Parameters

Table 3.4-3. Existing Water Quality Analytical Results

PARAMETER	SITE 1* Sewell Creek downstream	SITE 2 Wolfpen Creek	SITE 3 Sewell Creek upstream	SITE 3 DUP Sewell Creek upstream	SITE 4 UNT**	UNITS
Flow	13.0	2.0	15.0	15.0	0.219	cfs
Conductivity	90.7	109.5	90.7	90.7	33.3	umhos
pH	6.9	7.4	7.3	7.3	7.0	
Temperature	16.4	16.8	16.4	16.4	17.9	°C
Total Suspended Solids	<1	2	3	1	4	mg/l
Alkalinity	26	44	26	34	8	mg/l
Acidity	<1	<1	<1	<1	6	mg/l
Hot Acidity	<1	<1	<1	<1	<1	mg/l
Sulfate	17	3	18	19	4	mg/l
Turbidity	4	4	5	4	7	mg/l
Iron	0.43	0.17	0.39	0.48	0.4	mg/l
Manganese	0.08	0.05	0.07	0.08	0.1	mg/l
Aluminum	0.087	0.036	0.156	0.081	0.115	mg/l
Selenium	<2	<2	<2	<2	<2	ug/l
Zinc	<10	<10	<10	<10	<10	ug/l
Dissolved Iron	0.23	0.1	0.17	0.24	0.2	mg/l
Dissolved Aluminum	<0.02	<0.02	<0.02	<0.02	<0.02	mg/l
Dissolved Copper	2	2	2	1	1	ug/l
Dissolved Zinc	<10	<10	<10	<10	<10	ug/l
Nitrite/Nitrate	2.64	1.76	2.2	1.76	1.76	mg/l
Phosphate	<0.05	<0.05	<0.05	<0.05	<0.05	mg/l
Total KJELDAHL Nitrogen	<0.14	<0.14	<0.14	<0.14	<0.14	mg/l

**Refer to Figure 3.4-8 for site locations; **UNT – unnamed tributary*

Source: Jones et al, 2005

3.4.2.3 Anjean Site and Water Quality

Anjean is a small coal town, approximately 13 miles (20 kilometers) outside of Rainelle and located along Anjean Road (CR 1). It began mining operations almost 80 years ago and closed in 1999 when Royal Scot Minerals, the final operator of the Anjean mines, went bankrupt. The Anjean mines reside on the Sewell and Fire Creek coal seams, which are located within the Greenbrier coalfield. The Anjean mining location occupies approximately 400 acres (162 hectares) of land and includes an abandoned preparation plant and load out facility. Past mining operations utilized both deep and surface mining methods to extract coal along Big Clear Creek. In 1972 a surface mine permit on top of Little Clear Creek Mountain was issued to Leckie Smokeless Coal Company.

Drainage for the Anjean site is provided by Little Clear Creek and the South Fork of Big Clear Creek, both of which flow generally south and drain into the upper reaches of the Meadow River. As Anjean's operations expanded, several coal refuse piles, including the Buck Lilly coal refuse pile, began to emerge. At approximately 40 acres (16 hectares) and 4,000,000 tons (3,600,000 metric tons), the Buck Lilly pile, also referred to as Anjean Mountain, contains the majority of the available coal refuse at Anjean. Drainage from this area is provided by a small tributary, referred to by WVDEP as Buck Lilly Branch, that directly drains into Little Clear Creek. Figure 3.4-5 illustrates the existing site conditions at the Anjean mining facilities. Little Clear Creek is currently included in the 303(d) listing of impaired streams with the latest projected TMDL year of 2006 (see Table 3.4-2).

The 400-acre (162 hectares) property is divided between the Little Clear Creek and Big Clear Creek watersheds. Both of these creeks, which include several features of associated tributaries, are known for trout fishing. There are four specific treatment sites within the Big Clear Creek watershed, referred to as Three Ponds, Crescent Pond, AMD treatment equipment, and Red Dog Pond and one treatment site in the Little Clear Creek watershed known as Buck Lilly (see Figure 3.4-5). WVDEP has been overseeing the treatment sites since Royal Scot Minerals became bankrupt in 1999. A coal screening facility that was built in the Big Clear Creek watershed resulted in dry refuse that was stored over the hill and adjacent to the plant. Subsequently, the screening facility was converted to a wash plant, which generated its own coal refuse that was also stockpiled in the same location as the screened refuse. As a result of coal refuse disposal, acid mine drainage (AMD) began to emerge from the coal refuse and was collected and diverted just below the preparation plant to Three Ponds. Other AMD was being generated by other coal and refuse piles on the opposite side of the preparation plant and was diverted into the pond referred to as Crescent Pond. Water from Three Ponds and Crescent Pond was treated and discharged to South Fork. AMD resulting from fine slurry refuse from an unreclaimed pit was also detected in seepage at the toe of the surface mine spoil and was diverted to Red Dog Pond where it was treated and discharged into South Fork. In the early 1980's (post-Surface Mining, Control, and Reclamation Act (SMCRA)) coal refuse began to be stored at the Buck Lilly site and after a couple of years AMD was detected in Little Clear Creek.

Over the past 20 years, water treatment (including treatment with sodium hydroxide), has been continuous within both watersheds in the hopes of maintaining the water quality needed to support the native and stocked trout population. Only recently was Little Clear Creek re-stocked with trout. A report was conducted for WVDEP, "Evaluation of the Analytical Effects of Acid Mine Drainage from Royal Scot Permit 31-72 (Buck Lilly) on Receiving Streams, and Little Clear Creek of Meadow River," that assessed the water quality upstream and downstream of the Anjean sites. The assessment analyzed untreated effluent plus stream water both upstream and downstream of the treated effluent discharge points on South Fork and Little Clear Creek. The results are presented in Table 3.4-4.

Table 3.4-4 indicates that water quality of the runoff from the coal refuse on the South Fork drainage basin is significantly degraded; however, water quality of the treated effluent is comparable to that of South Fork upstream of the Anjean site, if not better. The untreated effluent downstream of the Buck Lilly refuse pile also indicates significant water quality degradation, but treatment results show considerable improvement. Although treatment at Anjean obviously plays an important role in maintaining water quality in both the Big Clear Creek and Little Clear Creek watersheds, Little Clear Creek has been listed in the federal CWA Section 303(d) List of Impaired Streams due to acid mine drainage (see Table 3.4-2).

3.4.2.4 Green Valley Site and Water Quality

Approximately 12 miles (19 kilometers) from Rainelle, the Green Valley Coal Company (GVCC) operates a coal preparation plant and an associated active "sidehill" refuse disposal facility located along route WV 20 in Green Valley, Nicholas County. The majority of the Green Valley coal refuse pile sits on the active side hill fill permit owned by GVCC. The active fill lies on a ridge between Blue Branch and Colt Branch, both of which are direct tributaries of Hominy Creek, a subshed of the Gauley watershed (see Figure 3.4-6). Hominy Creek and Colt Branch are currently included in the 303(d) listing of impaired streams with the latest projected TMDL year of 2006 (see Table 3.4-2). Hominy Creek has been identified by the state as a native reproducing trout stream (EQB, 2004). The storm water runoff from the disposal facility is collected by perimeter drains and routed into sediment control ponds that discharge into Blue Branch under NPDES permit regulations. Directly underneath the active fill area are old underground mine workings in the Sewell coal seam, which effectively capture any downward infiltration of water from the fill. Part of the captured infiltration discharges within the permitted disposal area and into Blue Branch, while the other part discharges outside the permitted area and into Hominy Creek. There is some underground mine drainage that enters Blue Branch from the Sewell seam. Overall, the main flow elements for Hominy Creek are surface runoff and extensive Sewell underground mine drainage throughout the watershed (MMA, 2001).

Table 3.4-4. Water Quality in South Fork and Little Clear Creek Watersheds

Location	Acidity (mg/L)	Iron (mg/L)	Aluminum (mg/L)	Manganese (mg/L)
South Fork of Big Clear Creek				
South Fork of Big Clear Creek – Upstream mining permit (i.e., no influence from Anjean)	6.10	0.50	0.84	1.19
Untreated/Raw Effluent (before treatment ponds)	185.12	5.83	16.87	11.49
South Fork of Big Clear Creek – Downstream mining permit (after treatment)	4.11	0.13	0.15	0.14
Little Clear Creek				
Little Clear Creek – Upstream mining permit (i.e., no influence from Anjean)	0.02	0.49	0.16	0.08
Untreated/Raw Effluent into Buck Lilly Stream (before treatment ponds)	101.10	29.59	6.54	4.77
Little Clear Creek – Downstream mining permit (after treatment)	5.00	0.46	0.29	0.21

Source: WOPEC, 2003

The remainder of the Green Valley coal refuse (also referred to as the "old fill" in Figure 3.4-6), which would be used by WGC for fuel, is located on non-permitted land that is maintained by WVDEP. The coal preparation plant and its associated facilities are located near the mouth of Colt Branch, and are underlain by old mine and plant refuse material that extend some distance downstream beyond the boundaries of the preparation plant permit area. The old refuse fill, often referred to as Abandoned Mine Lands or old AML fill, exists as a result of past operations not associated with current operations and is thought to contain refuse from several different mines and seams in the region. The old AML fill sits south and east of the active sidehill fill area and overlies the lower reaches of Colt Branch, resulting in the relocation of the branch and, perhaps, parts of Hominy Creek (see Figure 3.4-6)). Coal refuse and spoil material has been detected in Hominy Creek's streambed at this location, as well as at numerous points upstream of the site, which is believed to be originating from historical mining operations near the headwaters of the creek (MMA, 2001).

Although the plant's operational activities take place approximately 2,000 feet (610 meters) from Hominy Creek, there are a series of settling ponds (Ponds 2 through 7 in Figure 3.4-6) that accept and treat the surface runoff from the permitted area. Pond 1 does not have a surface inlet point; however it receives infiltrated groundwater from the AML fill through a buried drain. There are a number of seepages discharging from both the AML fill along the north side of the stream and from undisturbed (and possibly disturbed) ground along the south side of the stream. Iron-rich seepages have been detected where the old AML fill material sits along the immediate banks of Hominy Creek.

WVDEP has issued several investigations at the old AML refuse fill to characterize the natural background water quality and potential sources of iron seeps at and around the site to determine whether or not the iron content was arising from the AML fill or from the active sidehill fill. At the request of WVDEP, two investigations were made regarding iron-laden seepages detected in Hominy Creek: "Results of Monitoring Well Installation, Ground Water Analyses, and Acid Base Accounting Analysis, Green

Valley Coal Company, Nicholas County, West Virginia" dated April 2001, and "Evaluation of Iron-Laden Seepage to Hominy Creek near Mouth of Colt Branch, Nicholas County, West Virginia" dated July 2002. In the April 2001 report it was claimed that the water discharging from the active fill from the two known points was low in iron and manganese, and the study concluded that the overall water quality from the active fill was good (MMA, 2001). The report indicated that other groundwater in the area was naturally high in iron. The old AML fill had the highest levels of pyritic sulfur, and groundwater from the fill material also displayed the highest level of sulfates among the groundwater analyses. The report concluded that although high iron concentrations were evident in groundwater throughout the project area, including groundwater apparently not contaminated by flow from either the active refuse disposal area or the old AML fill, "the existing, active refuse disposal activity does not impact Hominy Creek, but the old, AML fill marginal to and locally lying within the streambed does exert water quality impacts" (MMA, 2001). Hence, the report indicates that the active fill is not directly or indirectly contaminating Hominy Creek (i.e., proposed area for WGC fuel source).

WVDEP issued a Notice of Violation (NOV) to GVCC on November 7, 2001 on the basis of failing to minimize hydrologic impacts by allowing iron-laden seepage to discharge into Hominy Creek without passing through a sediment control structure. As a result, the July 2002 report was generated with the purposes of determining: 1) if Pond 1 was causing the seepage; 2) whether or not the seeps exerted significant adverse impact upon the creek; and 3) whether or not the GVCC's activities were causing the creek to deteriorate. The report claimed that the source of the seeps in question appeared to be coming from waters running through flow paths in the old AML fill that discharged at the toe of the fill (MMA, 2002). Based on hydrogeologic characteristics of the area, the report further concluded that the seeps could exist despite the GVCC ponds and that there seemed to be no significant interaction between the seeps and the ponds. In support of this finding, the study's results showed that the iron concentration of most of the seeps was much greater than that detected in the ponds. It was also discovered that although iron concentrations exceeded the 0.5 mg/L "trout waters" water quality level at some instances, the mean annual iron concentrations were within the standard, even in the "low flow" season when concentrations are generally highest, and seemed to be diminishing with time.

Another important result from the July 2002 study was that in addition to the AML fill, natural seeps and/or disturbed ground (not associated with GVCC's activities nor the old AML fill) were also sources of iron, and that these sources were now the principal influences regarding iron levels in Hominy Creek. A significant outcome of this study is the realization that re-disturbance and exposure of the old AML fill to oxygen through exposure to air and creation of new flowpaths through the fill could potentially release iron at higher than current rates (MMA, 2002). However, disturbance of the coal refuse for the Co-Production Facility's use would in effect be temporary and its negative short-term impacts would be outweighed by the long-term benefits of using, and ultimately depleting, the main source of water quality degradation.

3.4.2.5 Donegan Site and Water Quality

The coal refuse at the Donegan site drains into Laurel Creek, a tributary to the Cherry River, which drains directly into the Gauley River (see Figure 3.4-7). Total drainage area of the Donegan coal refuse site is approximately 61.107 hectares and runoff is collected in several treatment ponds along the perimeter of the pile. According to WVDEP, the coal refuse site is fully reclaimed with grading and vegetation (Martin, 2005). In April 2005 a mining permit continuation application was submitted by Falcon Land Company, Inc., but the permit was revoked for failing to continue water treatment and failing to submit the required water quality data. Recent WVDEP water quality readings found that the pH is 3.60 and the iron and manganese concentrations are at 9.13 and 3.97 mg/L, respectively. Discussions with WVDEP reveal that high iron levels and AMD are the two main water quality issues (Martin, 2005). Currently there are several seeps from the refuse site that are not being treated. However, WVDEP has plans to install more treatment facilities for these seeps in the future.

3.4.2.6 Joe Knob Site and Water Quality

The Joe Knob site is disturbed from previous coal mining activities, and has undergone reclamation efforts after the coal mining activities ceased in 1999 (Green 2006). Tributaries draining portions of the site are identified as Joe Knob Branch and Wallace Creek, both of which are tributaries to Little Clear Creek. The headwater of Joe Knob Branch is located northeast of Joe Knob and is associated with ponds located in a disturbed area. Joe Knob Branch drains generally south and into Little Clear Creek. Wallace Branch is situated southwest of Joe Knob, and drains into Little Clear Creek.

A review of the 2006 WVDEP's list of 303(d) impaired streams indicates Joe Branch is not listed as an impaired stream. Wallace Branch is listed as a 303 (d) impaired stream. The stream use and category are presented in Table 3.4-1.

3.4.3 Storm Water and Industrial Wastewater Permits

Water pollution control for point source discharges in West Virginia is primarily achieved through the NPDES permitting program that is administered by DWWM. These permits include effluent limits and requirements for facility operation and maintenance, discharge monitoring, and routine reporting. The State's NPDES stormwater management program is closely modeled after the federal NPDES program, which requires stormwater to be treated to the maximum extent practicable. The state's stormwater management program also establishes permitting requirements for construction sites disturbing more than 1 acre (0.40 hectare) and industrial sites and requires proper best management practices. All stormwater treatment devices, as required by DWWM's review process, are to be designed based on the 2-year, 24-hour rain event and all proposed outlets must be designed to ensure that discharges occur at non-erosive velocities (DWWM, 2005c). In addition, West Virginia regulations include a pretreatment program for regulating proposed industrial wastewater connections to publicly owned treatment works (POTW). This program allows the DWWM to review proposals and make requirements for the installation of pretreatment facilities where necessary, or issue approval if compliance with required conditions is met.

A search of WVDEP's Water Resources Permit database shows that the following NPDES permits are issued in Rainelle, as of March 2005 (DWWM, 2005d):

- Greenbrier County PSD No. 2 (POTW) with a design flow capacity of 1.3 MGD;
- Meadow River Hardwood Lumber Company (formerly Georgia-Pacific Corp.) (industrial) with an average flow of 0.0286 MGD;
- Rainelle Water Department with an average flow of 0.014 MGD;
- Miscellaneous Water System Improvement Project (storm water construction) servicing 3.5 disturbed acres of land.

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3.5 Floodplains

This section discusses the existing floodplain conditions in the vicinity of the proposed Co-Production Facility site and the city of Rainelle. Information on the 100-year recurrence interval flood elevation and baseline hydrologic modeling of the proposed project area is provided. In addition, general assumptions on floodplain conditions at the coal refuse sites and the candidate prep plant sites are discussed.

3.5.1 Local Hydrology Features

Flooding can be a very costly natural disaster and can cause significant human suffering. West Virginia has encountered many flooding incidents in the past, and federal flood disasters have been declared at least once in every county in West Virginia during the period of 1967 to 2003, and as many as 10 times in some counties. The Federal Emergency Management Agency (FEMA) has disbursed over $300 million in assistance payments to individuals and communities for property damages in West Virginia. FEMA, through the National Flood Insurance Program (NFIP), enables property owners to purchase insurance protection against losses from flooding. The prerequisite for eligibility of the NFIP is that the community adopts and enforces a floodplain management ordinance to reduce future flood risks, particularly with respect to new construction (Haestad Methods, 2003).

The Meadow River is a major tributary of the Gauley River and flows within the Gauley River National Recreation Area. Sewell Creek flows in a northeasterly direction and then drains into the Meadow River. Sewell Creek is, for the most part, shallow 8 to 12 feet (2 to 4 meters), as measured from streambed to floodplain level, and is 30 to 35 feet (9 to 11 meters) wide, as measured at top of channel. Water depths, as measured along the center of the stream, range from about 6 inches (15 centimeters) over sand bars to about 4 feet (1 meter) in scour holes. As the creek flows in a northeast direction and along the northwest perimeter of the city of Rainelle, Wolfpen Creek, Boggs Creek, and Little Sewell Creek flow into Sewell Creek. Sewell Creek has been channelized from approximately the US 60 Bridge to its confluence with Meadow River. Stream slopes are approximately 2 feet per mile (0.4 meters per kilometer) on Meadow River and 16 feet per mile (3 meters per kilometer) on Sewell Creek and Little Sewell Creek (see Figure 3.5-1).

3.5.2 Floodplains

3.5.2.1 Flooding in Rainelle

Rainelle has had significant flood disasters in recent years, with the most recent flood occurring in November 2003. The November 2003 flood event resulted from 4 inches (10 centimeters) of rain in such a short timeframe that it caused creeks to rise and overflow, damaging more than 300 homes and 50 businesses in Rainelle. Flooding in downtown Rainelle principally occurred due to overflows of Sewell Creek and Little Sewell Creek. As a result of the flooding, Rainelle has been working with USACE to initiate a flood mitigation study to determine what may be done to reduce the possibility of future floods. It is suspected that a railroad bridge that crosses the mouth of Sewell Creek at the confluence with the Meadow River resulted in a damming effect that may have contributed to the extent of flooding.

Signs of high water (e.g., depressed vegetation) were present in floodplain areas on the E&R property, EcoPark, and immediately adjacent properties.

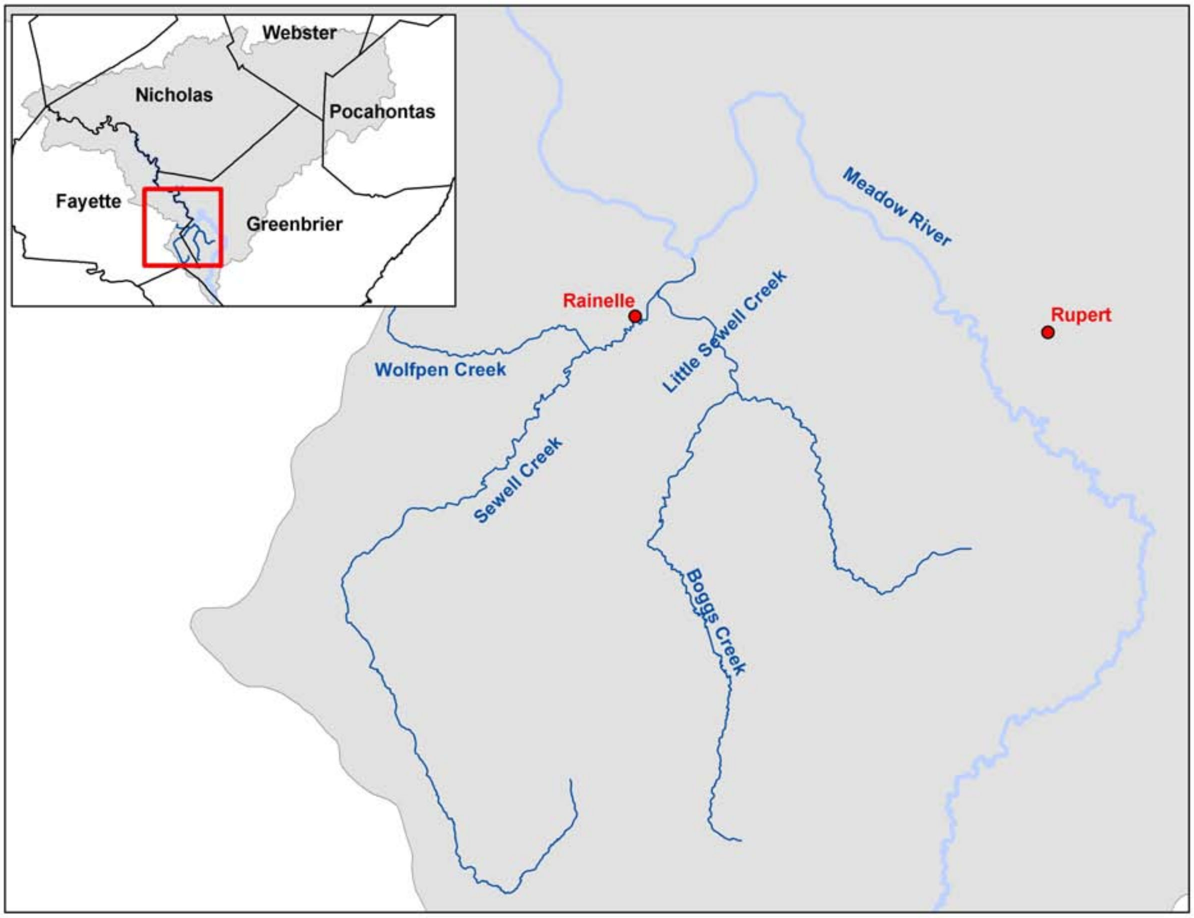

Figure 3.5-1. Streams in the Vicinity of Rainelle

3.5.2.2 Floodplain Management

Floodplain management is the implementation of programs to ensure that flooding problems do not increase and to work toward the reduction in the risk of flood damage. These corrective and preventative measures take a variety of forms and generally include zoning ordinances, subdivision and building requirements, and other types of ordinances. One of the principle tools for a community's floodplain management is the designation of floodways and active floodplains as a basis for zoning ordinance enforcement and for establishing land uses ordinances (Haestad Methods, 2003). The floodway is the area around a stream that should remain free of obstructions to allow passage of large flood discharges. It consists of the stream channel plus that portion of the over-banks that must be kept free of encroachment to discharge the 100-year flood without increasing the flood level over the 100-year water surface elevations by more than an allowable height. FEMA has adopted a maximum allowable increase of water surface elevation of 1.0 foot (0.3 meter) for a 1.0 percent annual chance (100-year recurrence interval) flood event as the national standard for floodplain management purposes (Haestad Methods, 2003). Several states and municipalities, however, have adopted more stringent criteria with less than 1.0 foot (0.3 meter) allowable increase of water surface elevations.

As the basis for floodplain management activities of the NFIP, Flood Insurance Rate Maps (FIRMs) have been developed by FEMA for flood insurance rating purposes. A FIRM is a map that outlines flood risk zones within communities (see Figure 3.5-2) for insurance purposes. FIRMs are issued, published and distributed by FEMA to a wide range of users, including private citizens, community officials, insurance agents and brokers, lending institutions, and other federal agencies. A FIRM is usually issued following a flood insurance study (FIS), which is a report prepared by FEMA that summarizes the analyses of flood hazards in the community.

FISs include a detailed engineering study to map predicted flood elevations at specified flood recurrence intervals. Generally, FISs are concerned with the peak discharges in streams for the 10-year, 50-year, 100-year, and 500-year storm events and includes engineering analysis of flood elevations for each flood recurrence interval. Based on the results of the engineering analyses, flood risk zones are assigned for insurance purposes.

3.5.2.3 Flood Insurance Rate Map (FIRM) for Rainelle

The FIRM map for Rainelle and the project area is presented in Figure 3.5-2, which is based on a FIS completed by FEMA in 1987. The FIS covered a detailed study of Sewell Creek from the confluence of the Meadow River to the confluence with Little Sewell Creek. A detailed study determines the water-surface elevations on streams and Base Flood Elevations (BFEs) for 10-year, 50-year, 100-year and 500-year flood events. The remaining portion of Sewell Creek and Wolfpen Creek were studied by approximate methods (FEMA, 1987). The approximate method study does not establish BFEs and does not designate floodways.

3.5.2.4 Power Plant Site and EcoPark

Floodplains, floodways, and BFEs were delineated for Sewell Creek and Little Sewell Creek within the corporate limits of the city of Rainelle as part of the FIS. However, around the proposed power plant site only the floodplain was delineated. According to the previous FIS (FEMA, 1987), part of the proposed site falls under flood insurance Zone A. Zone A is the flood insurance rate zone that corresponds to the 100-year floodplain that is determined in the FIS by approximate methods. Because detailed hydraulic analyses were not performed for such areas, no BFEs or depths are shown around the proposed power plant site. Thus, for this area no floodway has been designated. Generally in these types of areas, the local community will require that project owners submit engineering analyses before permits are approved for development in the floodplain. The 100-year flood elevation from the FIRM was overlaid on a 1-foot contour topographic map that was developed as part of project efforts to estimate the elevation of the floodplain around the project area. Based on the overlay, the FEMA 100-year flood elevation is approximately 2,398 feet (731meters) at the proposed project site and covers approximately 300 feet (91 meters) above mean sea level (amsl) on either side of Sewell Creek (see Figure 3.5-3). However, because this estimate only approximates the extent of the 100-year flood elevation, modeling was employed to estimate flood risk at the project site as described in the following subsection.

3.5.2.5 Anjean

Three candidates sites for the coal processing prep plant were identified by WGC at Anjean (AN1, AN2, and AN3). AN1 is located south of the South Fork of Big Clear Creek, and southeast of the confluence of Big Clear Creek and the South Fork of Big Clear Creek. AN2 is situated northwest and upstream from the confluence of Briery Creek and Big Clear Creek. Neither site lies in the 100-year FEMA floodplain. However, the Quinwood USGS topographic shows several intermittent streams draining northwest that have the potential to affect AN1 during high magnitude, low frequency storm events.

Neither the Anjean coal refuse pile nor the AN3 candidate site (located at the southeast corner of the Buck Lilly pile) is located within the 100-year floodplain.

3.5.2.6 Donegan

The 100-year floodplain has not been mapped by FEMA in the area immediately adjacent to Laurel Creek and in the area of the Donegan coal refuse site; however, the topographic elevation above Laurel Creek suggests that it would be unlikely for DN1 to be flooded. There are no 100-year floodplains associated with Beech Knob, Long Branch and Elijah Branch in the vicinity of the DN2 prep plant candidate site; however, flooding is unlikely because the site is situated on relatively elevated ground.

3.5.2.7 Green Valley

The Green Valley coal refuse pile is not within a mapped 100-year floodplain, nor is the candidate site (GV) for the coal prep plant. The GV site is located within an area along the southern border of the coal refuse pile and parallel Hominy Creek. Though the site is not mapped within a floodplain, potential flooding would need to be investigated due to its proximity to Hominy Creek.

3.5.2.8 Joe Knob

There are no 100-year floodplains associated with the Joe Knob coal refuse site.

3.5.3 Baseline Modeling & Analysis

As part of baseline characterization, floodplain boundaries were determined by detailed hydraulic modeling around the proposed project site. The streams that were studied included the stretch of Sewell Creek from the confluence of Wolfpen Creek to US 60, Wolfpen Creek from the WV 20 (South Street) Bridge to the confluence with Sewell Creek, and an unnamed tributary approximately 2,300 feet (700 meters) downstream on Sewell Creek from the confluence with Wolfpen Creek.

Expected flood flows for 100-year, 100-year + 1Standard Error Estimate (SEE), and 100-year + 2SEE storm events were calculated based on techniques presented in U.S Geological Survey (USGS) Open-File report 80-1218, "Runoff Study on Small Drainage Areas in West Virginia." This technique provides a method of estimating the magnitude of peak discharges of 100-year, 100-year + 1SE, 100 year +2SE frequency for unregulated, virtually natural streams in West Virginia. The method is applicable for drainage areas between 0.3 and 2,000 square miles (0.5 and 3,200 square kilometers). Discharge data was also cross-referenced to previous FISs in the city of Rainelle. Discharge volumes calculated from this method are presented in Table 3.5-1.

Table 3.5-1. Summary of Stream Flow Data

Streams	Drainage Area (mi^2)*	100-yr Peak Discharge (cfs)**	100-yr + 1SE Peak Discharge (cfs)**	100-yr + 2SE Peak Discharge (cfs)**
Sewell Creek	18.55	3,568	5,138	6,708
Wolfpen Creek	2.84	926	1,333	1,740
Unnamed Tributary	0.88	399	574	749
Little Sewell Creek	6.39	1,658	2,388	3,117

*Notes: SE – standard error; *To convert square miles to square kilometers, multiply by 2.59; **To convert cubic feet per second to cubic meters per second, multiply by 0.0283*

Based on the calculated discharge rates and detailed site mapping, a hydraulic model of the project area was developed. The model, developed in HEC-RAS, was then used to estimate base flood elevations for the calculated discharge rates. Estimated floodplains that correspond to values in Table 3.5-1 are graphically depicted in Figure 3.5-4. The following parameters were used in the development of the HEC-RAS model:

- Field surveyed cross-section data for the proposed bridge location on Sewell Creek, WV 20 Bridge on Wolfpen Creek, a railway culvert downstream of WV 20 Bridge, and US 60 Bridge on Sewell Creek.
- Cross sections of the streams developed from a 1-foot (0.3-meter) interval topographic map. Elevations of the topographic map are referenced to North American Vertical Datum 1988 (NAVD88). The longitude and latitude data are referenced to North American Datum 1983 (NAD 83).
- Manning's equation is a mathematical formula used in HEC-RAS that evaluates the relationship of stream velocity, slope, area, wetted perimeter and frictional resistance. Frictional resistance, known as Manning's "n," is an established value that ranges from 0.011 to 0.25 and can assume a variety of physical forms. The type of frictional resistance associated with Manning's "n" can vary from the surface roughness of a concrete lined channel to the frictional resistance associated with grassy areas, or densely vegetated or woody areas of a riparian zone. Channel and over bank roughness factors (Manning's "n") for the site were chosen from field observations, aerial mapping and previous studies. The channel's "n" value used for Sewell Creek and Wolfpen Creek is 0.04 and the overbank's "n" value is 0.075.
- Geometric data of existing bridges and culverts from field surveys.
- Coefficients for expansion and contraction losses at the bridges adopted from "rules of thumb." Generalized expansion and contraction coefficients have been used, 0.3 and 0.1 respectively.
- The 100-year flood elevation has been determined to be at an elevation of 2,400 feet (732 meters) amsl and extends 300 feet (91 meters) on either side of Sewell Creek. The 100-year + 1SE flood elevation at 2,401 feet (732 meters) amsl and the 100-year + 2SE flood elevation is at 2,402 feet (732 meters) amsl.

3.6 Geology and Groundwater Resources

This section presents the regional and local geology, soils, and hydrogeology for the proposed Co-Production Facility site, as well as for the coal refuse and quarry sites.

3.6.1 Geology

The proposed Co-Production Facility and ancillary facilities are located within the Appalachian Plateau Physiographic province. The local topography is characterized by flat to rolling hills varying in elevation from 2,360 to 2,550 feet (719 to 777 meters) above mean sea level (amsl). This province consists of steep to moderately sloped ridges separated by narrow to moderate width stream valleys. The proposed power plant site is located on a flat-topped point of a ridge adjacent to the valley bottom of Sewell Creek and an unnamed tributary.

The geology in the vicinity of the E&R Property and the EcoPark sites consists of 11 to 35 feet (3.6 to 11 meters) of Quaternary alluvial deposits (see Figure 3.6-1 and 3.6-2) made up of clays, silts, and clayey sands in the stream bottoms along with some fill material consisting of clay, bricks, and wood. The ridges adjacent to the stream bottoms contain rocks of the New River and Pocahontas Formations of Pennsylvanian Age unconformably underlain by the Mississippian Age Mauch Chunk Group (Price and Heck, 1939). The rocks in this area have strikes that vary from N 15^{o} E to N 75^{o} E and dip from 1 to 2 degrees to the NW.

The New River Formation occurs on the side and tops of the nearby ridges while the underlying Pocahontas Formation crops out on the sides of the nearby ridges. These formations consist of interbedded gray sandstones, gray shales, sandy shales, and coal beds. According to the USGS 7 ½ minute topographic map for Rainelle and field observations, contour surface mining has occurred in the Pocahontas 6 Coalbed on the ridges northwest and northeast of Rainelle. In addition, underground mining was also reported in this seam starting in 1914 (Price and Heck, 1939). The extent of this mining is unknown and mine maps are not likely to exist. All of the mining that has occurred in the Rainelle area was located at elevations above the plant site.

The proposed power plant site is located on a flat-topped point of a ridge that consists of red and brown shales and siltstones of the Bluestone Formation. The Bluestone Formation of the Mauch Chunk Group, which occurs on the lower ridges, lies below the Pocahontas Formation and underlies the alluvial deposits in the valley bottoms. This unit is approximately 300 to 330 feet (90 to 100 meters) thick and consists of red, green, and brown shales, sandy shales, and siltstones interbedded with brown to greenish sandstones, and occasionally thin coals. No coal mining has been reported for any of the thin coals that occur in this formation. This unit was intersected below the colluvial and alluvial deposits in some of the borings drilled for the hydrologic testing of water wells proposed for use as source water.

The Princeton Formation underlies the Bluestone Formation. This 20- to 60-foot (6.1- to 18-meter) thick unit consists of sandstones and conglomerates containing pebbles and cobbles of quartz and rock fragments. This unit was also encountered in some of the borings drilled at the E&R Property and EcoPark as part of hydrogeologic investigations prepared in support of the EIS.

The limestone quarry sites are all located in the Valley and Ridge Physiographic Province. This province consists of moderate sloped hills separated by narrow to wide valleys. The topography in the area of the quarries is karstic in character, consisting of isolated hills separated by valley bottoms containing sinkholes, streams and disappearing streams. The valley bottoms contain limestone, weathered limestone, and red and brown clays and silts formed from the weathering of the limestone.

The Boxley Quarry lies on the west limb of the Pleasant Anticline and the rocks dip at 1 to 5 degrees to the northwest. The Greystone and Savannah Quarries lie on the west limb of the Sinks Grove Anticline and the rocks dip to the northwest at 1 to 5 degrees. The rocks at the three quarry sites consist of dolomitic and argillaceous limestone of the Greenbrier Group (Price and Heck, 1939). On some of the adjacent hills, rocks of the basal part of the Mauch Chunk Group overlie the Greenbrier Group. These rocks consist of red and brown shales, siltstones with some interbedded sandstone, and occasionally calcareous shales.

The Mill Point Quarry lies in Pocahontas County north of WV 39 and north of Stamping Creek. Tributary drainage to Stamping Creek in the vicinity of the quarry flows southwesterly. The rocks dip at 1 to 5 degrees to the northwest and consist of limestones, dolomitic limestone, and argillaceous limestone of the Greenbrier Group. On some of the adjacent hills, rocks of the basal part of the Mauch Chunk Group overlie the Greenbrier Group. These rocks consist of red and brown shales, siltstones with some interbedded sandstone, and occasionally calcareous shales.

The Anjean and Donegan coal refuse sites lie in the Appalachian Plateau physiographic province. This province consists of steep to moderately sloped ridges separated by narrow to moderate width stream valleys. The geology consists of Quaternary alluvial deposits of clays, silts, and clayey sands in the stream bottoms. The ridges adjacent to the stream bottoms contain rocks of the New River and Pocahontas Formations of Pennsylvanian Age unconformably underlain by the Mississippian Age Mauch Chunk Group (Price and Heck, 1939). The New River and Pocahontas Formations consist of interbedded gray to black shales, sandy shales, sandstones, and numerous thin to thick coal beds. These rocks dip to the northwest at 1 to 2 degrees and strike to the northeast.

The New River Formation, in the area of the Anjean coal refuse pile site, contains the following coal seams in stratigraphically descending order: Hughes Ferry, Castle, Sewell A, Sewell, Welch, Little Raleigh, Beckley, Firecreek, and Pocahontas 8. The underlying Pocahontas Formation contains the following coal seams in stratigraphically descending order: Pocahontas 7 and 6. Underground mining has occurred in the Sewell, Beckley, Firecreek, and Pocahontas 6 coal seams. Acid mine drainage (AMD) may be associated with the Little Raleigh seam; however, the primary source of AMD is associated with the waste products produced during the processing of the coal from the mining operations. The waste products from these mining activities have been placed in coal refuse piles on the sides of some of the ridges and in the stream valleys. The Bluestone and Princeton Formations of the Mauch Chunk Group lie near the base of the ridges at the Anjean site. The Bluestone Formation consists of red to brown shales and siltstone. The underlying Princeton Formation is principally a conglomerate composed of sandstone with pebbles and cobbles of quartz and rock fragments.

The Green Valley coal refuse site, located in Nicholas County, is also in the Appalachian Plateau physiographic province. The geology consists of Quaternary alluvial deposits of clays, silts, and clayey sands in the stream bottoms while the ridges adjacent to the stream bottoms contain rocks of the New River Formation. These rocks dip to the northwest at 1 to 2 degrees. The rocks of the New River Formation consist of interbedded gray to black shales, sandy shales, sandstones, and numerous thin to thick coal beds (Reger, et al, 1921). The Sewell coal seam has been the primary seam mined at this site. It has been mined on or adjacent to the property since the early 1900s by underground methods and locally by surface mining techniques. The Beckley and Firecreek seams have also been mined less extensively by underground mining methods. The waste products from these mining activities have been placed in coal refuse piles on the sides of some of the ridges and in the stream valleys.

3.6.2 Seismic Activity

The proposed Co-Production Facility and ancillary facilities lie in a low seismic risk zone as shown on Figure 3.6-3. The estimated peak horizontal acceleration (%g) with a 10 percent probability of exceedance in 50 years is 3 to 4 %g (USGS, 2002). In addition, there are no known quaternary faults or reported earthquakes in this area.

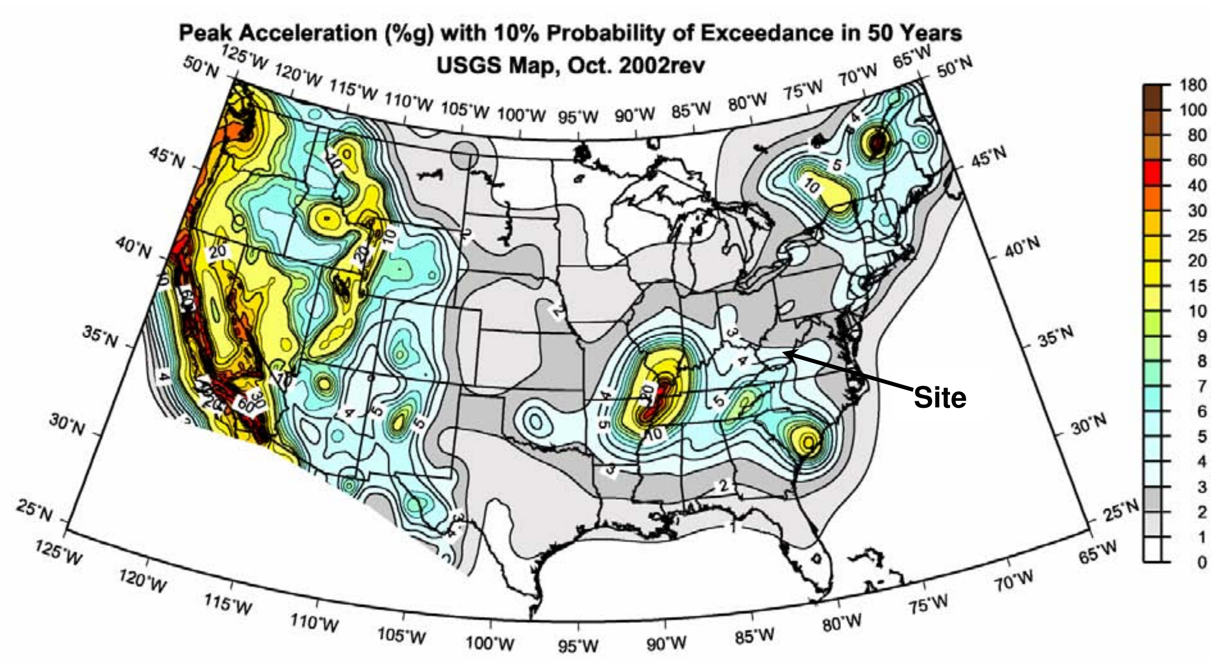

Figure 3.6-3. Seismic Map of the U.S.

3.6.3 Soils

Soils within Greenbrier County, as is typical in most areas, reflect the lithology of the underlying rock formations and the respective physiographic provinces. Western Greenbrier County, which includes the project site, is part of the Appalachian Plateau and contains generally deep, easily eroded soils that formed in material weathered from shale. Drilling in this area has shown that the soil is underlain by saturated alluvial sand of variable thicknesses that lies above the bedrock. As described in the Phase I Archeological Report (John Milner Associates, 2005) produced in support of the EIS, three major soil associations are found within the project area vicinity. These are:

- Atkins-Teas-Monongahela association along Sewell Creek and other lowlands in the area;
- Teas-Calvin-Gilpin-Litz association in the upland ridges east of Sewell Creek and south of US 60; and
- Dekalb-Gilpin-Laidig-Cookport association in the upland areas west of WV 20 and south of US 60.

These general soil associations are further broken down into more specific individual soil map units, as depicted in the Soil Survey of Greenbrier County, West Virginia (1972). According to the Soil Survey, there are four soil map units present on the site as indicated in Figure 3.6-4 and described in Table 3.6-1. Soil types present at the Anjean Coal refuse pile and Green Valley Coal refuse Pile are described in Table 3.6-2 and the following text.

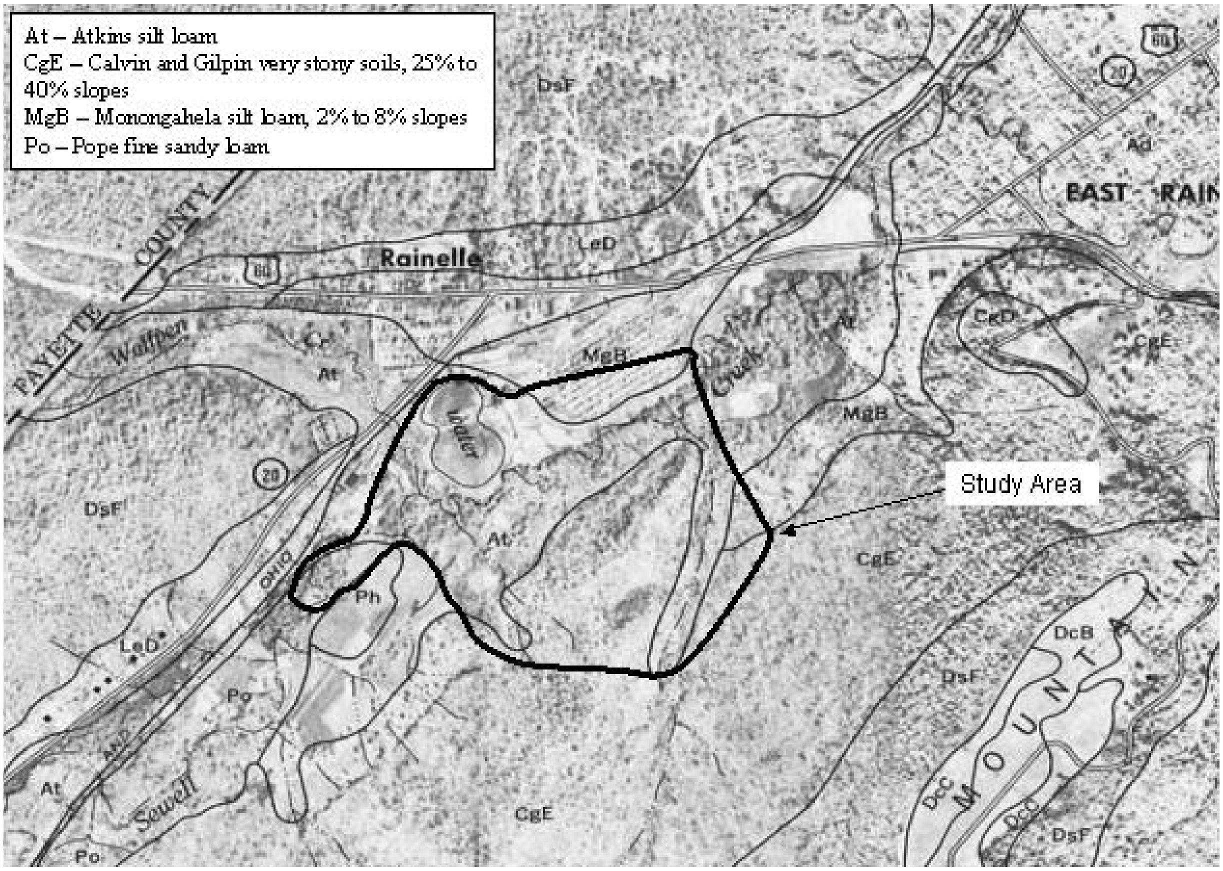

Figure 3.6-4. Soil Survey, Rainelle, WV

Table 3.6-1. Soil Units Present on Rainelle Site

Soil Units	Description
Atkins silt loam (At)	The Atkins silt loam soil type is classified as a hydric soil (i.e., that soil typically found in wetlands) based on information obtained from the U.S. Department of Agriculture, Natural Resources Conservation Service (12/27/04). The Atkins series consists of deep, poorly drained, nearly level soils. These soils are on bottom lands, generally near the base of the hills, but in certain places they occupy the entire bottom. They are commonly along streams that drain the upland areas. These soils formed in alluvium derived from upland soils that are underlain by acid sandstone and shale. They are subject to flooding, as slopes typically range from 0 to 3 percent.

Table 3.6-1. Soil Units Present on Rainelle Site (continued)

Soil Units	Description
Calvin and Gilpin very stony soils, 25 to 40 percent slopes (CgE);	The Calvin and Gilpin soils are very stony and have moderate permeability. The available moisture capacity and fertility of both series are low to moderate. Generally, these soils are better suited to trees than to other uses. They are difficult to manage because of the large stones. These soils may consist of the Calvin or Gilpin series alone or in combination. The Calvin series consists of moderately deep, well-drained, reddish-brown stony soils. These soils are on dissected uplands common in the west-central part of the county. They formed in material weathered from reddish, acidic siltstone and shale. In a typical profile of the Calvin series in a wooded area, a thin mat of dark-colored organic matter covers the surface. The surface layer, below this mat, is dark-reddish brown silt loam in the uppermost 2 inches (5.1 centimeters) and reddish-brown silt loam in the next 5 inches (13 centimeters). The subsoil extends to a depth of about 23 inches (58 centimeters). The upper part is dark reddish-brown heavy silt loam, and the lower part is dark reddish-brown very channery silt loam. Siltstone fragments make up 60 to 70 percent of the lower part. Red siltstone bedrock begins at a depth of 23 inches (58 centimeters). The Gilpin series, which is commonly found with the Calvin series, consists of moderately deep, well-drained, strongly sloping to very steep soils. These soils are also on dissected uplands in the western portion of the county and formed in residuum weathered from gray acid siltstone and shale and some interbedded sandstone. In a typical profile of the Gilpin series in a wooded area, a thin mat of organic matter covers the surface. The surface layer, below this mat, is very dark grayish-brown silt loam in the uppermost 2 inches (5.1 centimeters) and brown silt loam in the next 6 inches (15 centimeters). The subsoil extends to a depth of 22 inches (56 centimeters). The upper part is yellowish-brown, friable, shaly silty clay loam, and the lower part is yellowish-brown, shaly heavy silt loam. Shale fragments are common in the subsoil and increase in volume with increasing depth. Below the subsoil is yellowish-brown very shaly silt loam that is about 75 percent shale fragments. Gray shale bedrock begins at a depth of 28 inches (71 centimeters).
Monongahela silt loam, 2 to 8 percent slopes (MgB);	The Monongahela series consists of deep, moderately well drained, gently sloping to strongly sloping, silty soils. These soils formed in old alluvium washed from uplands that are underlain principally by acid sandstone and shale. In a typical profile, the surface layer is dark grayish-brown and pale-brown silt loam about 10 inches (25 centimeters) thick. The subsoil extends to a depth of 57 inches (145 centimeters). The upper part is light olive-brown, firm silty clay loam. The middle part is yellowish-brown, firm heavy silt loam. The lower part is yellowish brown, very firm and compact silt loam that is mottled with light gray and yellowish red. The very firm layer begins at a depth of about 27 inches (69 centimeters). Below the subsoil is light yellowish-brown, yellowish-red, and gray, firm light silty clay loam that contains some sandstone fragments. This layer extends to a depth of 65 inches (165 centimeters) or more. Permeability is moderate above the fragipan, but slow within it. The available moisture capacity is moderate. The water table is high in winter and spring and seepy spots are common. The use of these soils is limited mainly by the seasonal high water table and the slowly permeable fragipan. The usefulness of these soils for building sites is also limited by the high water table.
Pope fine sandy loam (Po).	The Pope series consist of deep, well-drained, moderately coarse textured soils. These soils are on bottom lands, generally near stream banks. They formed in recent alluvium washed from upland areas underlain by gray, acid sandstone and shale. These soils are flooded at intervals ranging from once a year to once in 3 or 4 years; the length varies by location. In a typical profile of the series, the surface layer is dark grayish-brown fine sandy loam about 10 inches (25 centimeters) thick. The subsoil extends to a depth of 40 inches (102 centimeters). The upper part is dark yellowish-brown, friable fine sandy loam, and the lower part is dark yellowish-brown, very friable sandy loam. Below the subsoil is loose, stratified silty, sandy, and gravelly material to a depth of 60 inches (152 centimeters) or more. Permeability is moderately rapid and the available moisture capacity is moderate to moderately low. The use of these soils is limited by flooding and by their tendency to be droughty.

Table 3.6-2. Soil Units Present at Anjean

Soil Units	Description
Dekalb or Gilpin Series on slopes that range from 20 to 65 percent	The Gilpin soils consist of a brown silt loam that is underlain by a yellowish brown silt loam that contains abundant fragments of shale and/or siltstone. This soil type overlies bedrock of either shale or siltstone. The Dekalb soils are a channery sandy loam. Channery soil contains fragments of sandstone or other rock fragments that are at least 6 inches (15 centimeters) in length. This type of soil generally overlies bedrock of sandstone. Both of these soil types have a moderate permeability.
Laidig very stony loam on slopes that range from 5 to 15 percent,	The Laidig soil is a deep, up to 60 inches (152 centimeters), well drained, very stony to channery soil that lies at the base of the slopes (Gorman, et al, 1972). A typical soil section consists of a thin upper organic mat that is underlain by brown to yellowish brown channery or stony loam that shows increasing sand content and rock fragments with depth.
Laidig-Ernest complex of extremely stony complex adjacent to the stream bottoms	The combined Laidig-Ernest complex consists of Laidig soils intertwined with Ernest soils. The Ernest soils consist of up to 60 inches (152 centimeters) of well-drained, yellowish brown silt loam with some rock fragments and channery zones. These soils formed in colluvium derived from the upland slopes (Gorman, et al, 1972). This complex generally lies at the base of the slopes and adjacent to the stream channel
Strip mine spoil	The strip mine spoil is located on and down slope of areas that had been surface mined. This material consists of intermixes of shale, siltstone, sandstone and coal that were removed during the mining process. This material may be acidic and produce acid mine drainage.
Mine dump material	The mine dump material consists of waste material derived from the processing of material that was deep mined. This material generally contains a mixture of coal, shale, siltstone and sandstone. If the material has burned, zones of red burned rock “red dog” may exist on or within the pile. Mine dump material is frequently acidic and produces acid mine drainage.

The soils at the Green Valley site consist of Gilpin silt loams with varying mixtures of stones and channery on the slopes and hill tops, to Buchanan stony to channery sandy loam that occurs on colluvial material at the base of slopes (Carpenter, 1992). Also present are the Itmann and Kaymine series in areas where previous surface mining and coal processing have occurred.

The Gilpin silt loams are similar to those found at the Anjean site. The amount of stony and channery material increases with increasing percent of slope, and also with the amount of sandstone present in the underlying bedrock.

The Buchanan series soils consist of deep (up to 65 inches [165 centimeters]), well-drained, yellowish brown silt loam with some rock fragments and channery zones. These soils formed in colluvium derived from the upland slopes (Carpenter, 1992). This complex generally lies at the base of the slopes and adjacent to the stream channels.

The Itmann Series developed on areas where coal waste from coal processing was placed on the surface. This soil type is similar to the mine dump material at the Anjean site. The Kaymine series occurs in areas where surface mine spoil was placed and is similar to the mine spoil of the Anjean site. Both of these soils types may be acidic and produce acid mine drainage.

3.6.4 Groundwater and Hydrogeology

Hydrogeologic investigations were completed to assess the potential impacts to local groundwater resources from the proposed use of groundwater wells for the operation of the power plant. These studies consisted of a groundwater modeling effort and three pump tests that were supported by the construction of 13 monitoring wells installed around the proposed power plant site. The groundwater modeling report is included in Appendix D (Groundwater Pump Study).

Groundwater is currently the sole source of drinking water for the city of Rainelle. The Rainelle Water Department operates the water system that services a population of approximately 2,000 people. The Water Department obtains drinking water from two city-owned wells (CW) within the city limits of Rainelle, which provide an average daily production of 201,310 gallons per day (140 gpm [530 liters per minute]). Groundwater from the city wells often contains elevated levels of barium, sodium, iron, and manganese. Water treatment consists of disinfection with chlorine gas, pH adjustment, greensand filtration, fluoridation, and mineral sequestration. Finished water is stored in a 126,000-gallon (477-cubic meter) holding tank (WVDHHR, 2003).

In addition to effluent from the Rainelle Sewage Treatment Plant (RSTP), groundwater is proposed as a source of cooling water for the Co-Production Facility on days where the Meadow River cannot meet the daily requirement. There are several wells that are under consideration for use as production wells (PW) by WGC, including two wells within the EcoPark that were associated with the former Meadow River Lumber Company (PW-1 and PW-2) and a newly drilled well near the RSTP, the "Snake Island" well (PW-3). These potential production wells and the city drinking water wells are all installed in the same groundwater system (aquifer).

The groundwater system in Rainelle and around the proposed site consists of three components (as shown on Figure 3.6-2):

- a surficial-alluvial aquifer (approximately 5 to 15 feet [2 to 5 meters] in thickness),
- an intervening aquitard of interbedded red to green shales and sandstone (approximately 25 to 50 feet [8 to 15 meters] in thickness),
- and a deeper fracture-controlled confined sandstone aquifer (at least 100 feet [31 meters] thick).

This interpretation is based on observations made in the field during the drilling of wells and during the pump tests conducted in support of the EIS. Pump tests were conducted on PW-1, PW-3, and PW-4 to evaluate the hydrogeologic conditions at the site and the characteristics of the wells. As part of these efforts, 13 observation wells were installed at areas surrounding the site. Two private wells and two city drinking water wells were also monitored as part of these studies. The locations of all of the production and monitoring wells are depicted in Figure 3.6-5.

Within the shallow aquifer, which consists of 4 to 13 feet (1.2 to 4.0 meters) of saturated silty sand that locally contains thin beds of clay, groundwater appears to flow toward Sewell Creek. The saturated zone is overlain by 5 to 15 feet (1.5 to 4.6 meters) of red, green and/or tan plastic to semi-plastic clay that extends to the ground surface. Recharge to the shallow aquifer is expected to occur primarily near the base of the adjoining hills as a result of infiltration during and after precipitation events.

The aquiclude that separates the shallow aquifer and the deep aquifer is made up of red to green shales and sandy shales. The aquiclude essentially blocks the downward flow of water from the shallow aquifer to the deep aquifer. This conclusion is supported by the fact that no vertical or horizontal water-bearing fractures were encountered or observed in the groundwater wells installed through this unit. In addition, during pump tests conducted at the site, no drawdown was observed in the shallow aquifer when WGC production wells, which draw groundwater from the deep aquifer, were pumped at high flow rates for a period of three days.

The deep aquifer consists of near horizontal fractures in sandstone beds within the Mississippian Age Mauch Chunk Group that underlies the valleys in this area. The deep aquifer is under a confined artesian state and is characterized as having high transmissivity and low storativity. During the pump tests that were conducted in support of the EIS, drawdown was observed in all of the wells that were monitored.

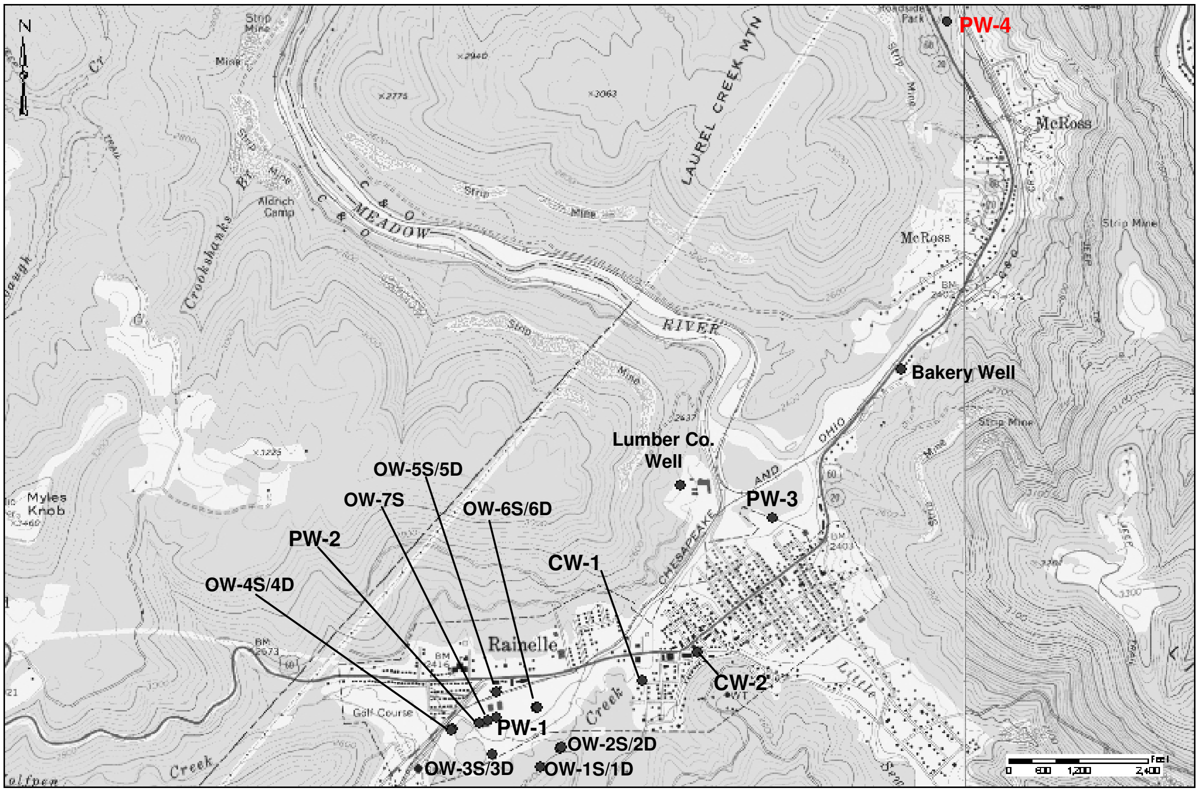

Figure 3.6-5. Groundwater Well Locations

The immediate and significant drawdown observed in the deep observation wells during each pump test indicates that there is a significant direct hydraulic connection between the near horizontal fractures in all of the deep wells, including the city production wells.

According to a study by Wyrick and Borchers (1981), groundwater movement in the valleys of the Appalachian Plateau physiographic province of West Virginia is the result of stress relief fracturing. Stress relief, the removal of compressional stresses on underlying rocks by erosion of overlying rocks, results in predictable fracture patterns in valleys; fractures are generally horizontal under valley floors and are generally vertical along valley walls. The horizontal fractures beneath the valley floor typically develop along the bedding plane partings. Horizontal fracturing is limited beyond the valley walls and thus the valley walls essentially act as low permeability barriers. Recharge to the fracture-controlled aquifer primarily occurs via the vertical fractures along the valley walls. Another potential source of recharge to the deep aquifer may be located near the outcrop of this unit, 3 to 10 miles (5 to 16 kilometers) south of the study area.

The boundary for the deeper fracture-controlled aquifer is expected to be located under the valley walls surrounding the Sewell Creek, Little Sewell Creek, and Meadow River. There does not appear to be a significant connection within the valley between the deeper fractures and the surficial-alluvial sands based on the results of the pump tests. This is supported by the fact that no drawdown was observed in any of the shallow surficial-alluvial aquifer wells during the 72-hour pumping test at PW-1. However, it is likely that vertical stress-relief fractures at the valley walls provide a conduit for water to flow from the shallow regolith aquifer into the deep fracture-controlled aquifer.

Groundwater flow in the deep fracture-controlled aquifer is more poorly defined than for the shallow aquifer. Based on groundwater levels measured in deep wells at the site, it does not appear that Sewell

Creek is the discharge (or recharge) point for the deeper aquifer. The deep aquifer may discharge into the Meadow River, located north and east of the study area; however, it is also possible that the deeper aquifer does not discharge to any of the nearby surface water bodies. This interpretation of the discharge area is based on the elevation of the potentiometric surface and the approximate elevations of the water levels in Sewell Creek and Meadow River.

The recharge rate to the aquifers is unknown in this area; however, rates from a similar geologic area with similar rock types, but slightly higher precipitation levels indicate ground-water recharge rates of 0.737 to 0.745 Mgal/d/mi^2. These rates are based on stream hydrograph separations that were used to partition stream flow into its surface-runoff and ground-water-discharge components (Hjelmfelt and Cassidy, 1975).

3.6.5 Groundwater Contamination

Most of the monitoring wells on the site were sampled in support of a Phase II Environmental Assessment of the study area (Appendix D, Groundwater Pump Study). The Phase II groundwater sampling revealed contamination in one of the shallow wells located on the E&R Property, OW-1S. Several chlorinated solvents (see Table 3.6-3) were detected in this shallow well; however, they were not detected in any of the other wells on the site or any of the soil samples collected from the site. Only two samples exceeded the West Virginia Groundwater Standards (Title 46, Series 12, Requirements Governing Groundwater Standards).

Table 3.6-3. Monitoring Well Results for OW-1S

Analyte	Concentration April 2005 (µg/L)	Concentration November 2005 (µg/L)	West Virginia Groundwater Standard (µg/L)
1,1-Dichloroethane	384.0	298	*NA*
1,2-Dichloroethane	3.5	1.6	5.0
1,1-Dichloroethene	**54.6**	**31.4**	7.0
Methylene Chloride	8.0	5.9	*NA*
Toluene	2.0	ND	1000
1,1,1-Trichloroethane	25.6	ND	200
Vinyl Chloride	**3.0**	ND	2.0

Notes: NA – Not Applicable; bold typeface indicates exceedance of standard

3.7 Biological Resources

This section provides a detailed discussion on the existing biological resources in the vicinity of the proposed Co-Production Facility, the power line corridor, water line and intake structure location, and coal refuse sites.

3.7.1 Vegetation and Wildlife

Several site visits were conducted as part of EIS data collection efforts to evaluate and characterize the existing vegetative communities and wildlife, including wetlands (see Section 3.7.2), aquatic habitats, and endangered and/or threatened species (see Section 3.7.4). Visits to the project area included several trips in 2004 (April 19-23, June 21-24, September 13-16, and October 18-21), two trips in 2005, (April 26-28 and June 14-17, 2005) and one trip in 2006 (March 14-16, and March 30-31). Site visits were conducted in July 2004 to various parts of the project area for the purpose of conducting field studies related to protected mammalian species.

The project area consists of several vegetative cover types and wildlife utilization areas. Components of the project area are described below, and primary areas subject to detailed field investigations are presented in Figure 3.7-1 (also see Figure 2.2-3 for property areas). Additional investigations were conducted along power transmission corridor routes as new routes were developed. For purposes of describing the environment for the various corridor segments, the preferred corridor has been divided into three major segments as presented in Chapter 2, Figure 2.4-9. Table 3.7-1 provides a combined list of all vegetative species and Table 3.7-2 provides a combined list of all wildlife species observed at all of the areas evaluated as part of the overall project.

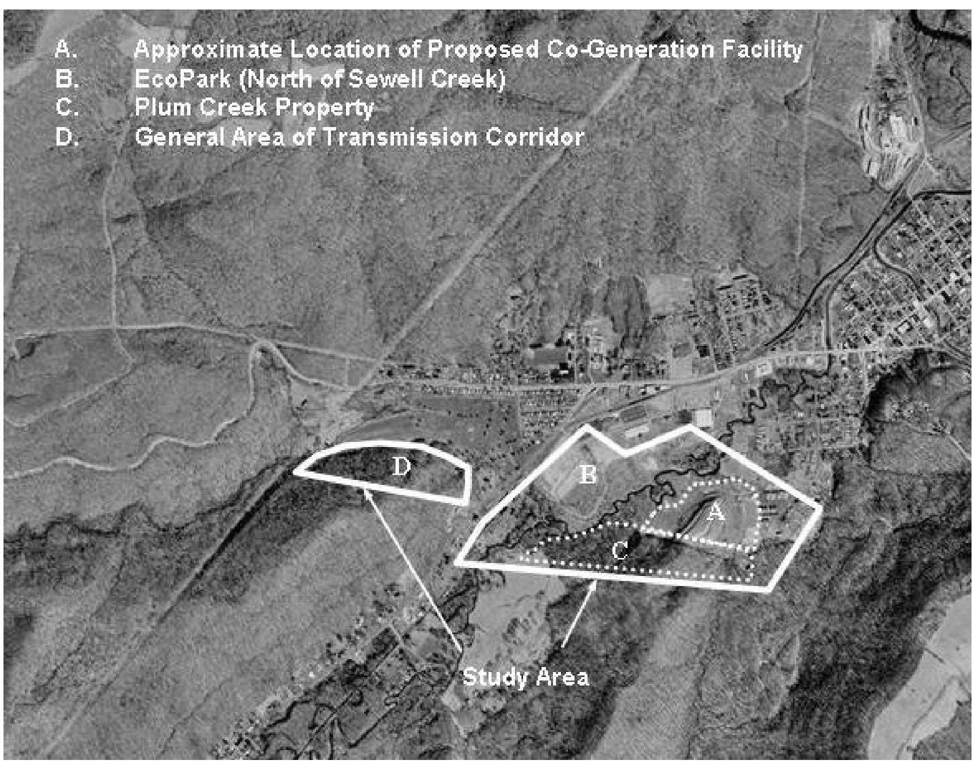

Figure 3.7-1. Principal Field Investigation Areas in Rainelle

The project area consists of several vegetative cover types and wildlife utilization areas. Components of the project area are described below, and primary areas subject to detailed field investigations are presented in Figure 3.7-1 (also see Figure 2.2-3 for property areas). Additional investigations were conducted along power transmission corridor routes as new routes were developed. For purposes of describing the environment for the various corridor segments, the preferred corridor has been divided into three major segments as presented in Chapter 2, Figure 2.4-9. Table 3.7-1 provides a combined list of all vegetative species and Table 3.7-2 provides a combined list of all wildlife species observed at all of the areas evaluated as part of the overall project.

Table 3.7-1. Vegetation Observed Throughout the Project Area

Common Name	*Scientific Name*	Common Name	*Scientific Name*
TREES			
Red maple	*Acer rubrum*	Apple	*Malus sp.*
Striped maple	*Acer pennsylvanicum*	Hop-hornbeam	*Ostrya virginiana*
Norway maple	*Acer platanoides*	Sourwood	*Oxydendrum arboreum*
Tree-of-heaven	*Ailanthus altissima*	Virginia pine	*Pinus virginiana*
Sweet birch	*Betula lenta*	Quaking aspen	*Populus tremuloides*
Paper birch	*Betula papyrifera*	Pin cherry	*Prunus pensylvanicum*
Ironwood	*Carpinus caroliniana*	Black cherry	*Prunus serotina*
Shagbark hickory	*Carya ovata*	Pear	*Pyrus sp.*
Mockernut hickory	*Carya tomentosa*	White oak	*Quercus alba*
Flowering dogwood	*Cornus florida*	Red oak	*Quercus rubra*
Hawthorn	*Crataegus sp.*	Pin oak	*Quercus palustris*
American beech	*Fagus grandifolia*	Swamp white oak	*Quercus bicolor*
Green ash	*Fraxinus pennsylvanica*	Scarlet oak	*Quercus coccinea*
Red cedar	*Juniperus virginiana*	Black locust	*Robinia pseudoacacia*
Tulip tree	*Liriodendron tulipifera*	Black willow	*Salix nigra*
Cucumber-tree	*Magnolia acuminata*	Sassafras	*Sassafras albidum*
Mountain magnolia	*Magnolia fraseri*	American linden	*Tilia americana*
SHRUBS/VINES			
Smooth alder	*Alnus cf. serrulata*	Multiflora rose	*Rosa multiflora*
Common barberry	*Berberis cf. vulgaris*	Pussy willow	*Salix discolor*
Swamp dogwood	*Cornus amomum*	Elderberry	*Sambucus canadensis*
Autumn Elaeagnus	*Elaeagnus umbellata*	Bristly greenbrier	*Smilax hispida*
Witch hazel	*Hamamelis virginiana*	Roundleaf greenbrier	*Smilax rotundifolia*
Spicebush	*Lindera benzoin*	Maple-leaf viburnum	*Viburnum acerifolium*
Bush honeysuckle	*Lonicera sp.*	With-rod	*Viburnum cassinoides*
Staghorn sumac	*Rhus typhina*	Southern Arrow-wood	*Viburnum dentatum*
Raspberry	*Rubus spp.*	Grape	*Vitis sp.*
HERBACEOUS SPECIES			
Yarrow	*Achillea millefolium*	Shining clubmoss	*Lycopodium lucidulum*
Wingstem	*Actinomeris alterniflora*	Purple loosestrife	*Lythrum salicaria*
Ragweed	*Ambrosia artemisiifolia*	Evening primrose	*Oenothera biennis*
Wood anemone	*Anemone quinquefolia*	Sensitive fern	*Onoclea sensibilis*

Table 3.7-1. Vegetation Observed Throughout the Project Area (continued)

Common Name	*Scientific Name*	Common Name	*Scientific Name*
Jack in the pulpit	*Arisaema atrorubens*	Cinnamon fern	*Osmunda cinnamomea*
Common mugwort	*Artemisia vulgaris*	Long-styled sweet cicely	*Osmorhiza longistylis*
Asters	*Aster spp.*	Fall panicum	*Panicum dichotomiflorum*
Beggar ticks	*Bidens cf. frondosa*	Virginia creeper	*Parthenocissus quinquefolia*
False nettle	*Boehmeria cylindrica*	Pokeweed	*Phytolacca americana*
Sedge	*Carex crinita*	English plantain	*Plantago lanceolata*
Sedge	*Carex intumescens*	May apple	*Podophyllum peltatum*
Blue-cohosh	*Caulophyllum thalictroides*	Japanese knotweed	*Polygonum cuspidatum*
Oxeye daisy	*Chrysanthemum leucanthemum*	Pennsylvania smartweed	*Polygonum pensylvanicum*
Bugbane	*Cimicifuga racemosa*	Christmas fern	*Polystichum acrostichoides*
Spring beauty	*Claytonia cf. caroliniana*	Curly dock	*Rumex crispus*
Virgin's bower	*Clematis virginiana*	Woolgrass sedge	*Scirpus cyperinus*
Crown vetch	*Coronilla varia*	Golden ragwort	*Senecio aureus*
Umbrella sedge	*Cyperus strigosus*	Star flowered Solomon's seal	*Smilacena stellata*
Orchard grass	*Dactylis glomerata*	Golden rod	*Solidago spp.*
Jimson weed	*Datura stramonium*	Skunk cabbage	*Symplocarpus foetidus*
Queen Anne's lace	*Daucus carota*	Dandelion	*Taraxacum officinale*
Deertongue grass	*Dichanthelium clandestinum*	Poison ivy	*Toxicodendron radicans*
Field horsetail	*Equisetum arvense*	Red clover	*Trifolium pratense*
Trout lily	*Erythronium umbilicatum*	Nodding trillium	*Trillium cernum*
Gill-over-the-ground	*Glechoma hederacea*	Purple trillium	*Trillium erectum*
Bluets	*Hedyotis caerulea*	Common cattail	*Typha latifolia*
Jewelweed	*Impatiens capensis*	Common mullein	*Verbascum thapsus*
False Rue anemone	*Isopyrum biternatum*	Violet	*Viola sp.*
Soft rush	*Juncus effusus*	Common blue violet	*Viola papilonacea*
Everlasting pea	*Lathyrus latifolius*	Wooly blue violet	*Viola sororia*
Lily	*Lilium sp.*	Cocklebur	*Xanthium chinense*

• *Observations based on field investigations conducted during April, June, July, September and October 2004, and April and June 2005.*

Table 3.7-2. Wildlife Observed Throughout the Project Area

Common Name	***Scientific Name***
MAMMALS OBSERVED	
Eastern cottontail	*Sylvilagus floridanus*
White tailed deer	*Odocoileus virginianus*
Chipmunk	*Tamias striatus*
Eastern gray squirrel	*Sciurus carolinensis*
Raccoon	*Procyon lotor*
Groundhog	*Marmota monax*
Black bear	*Ursa americanus*
Big brown bat	*Eptesicus fuscus*
Northern bat	*Myotis septentrionalis*
Red bat	*Lasiurus borealis*
BIRDS OBSERVED	
American robin	*Turdus migratorius*
Bank swallow	*Riparia riparia*
European starling	*Sturnus vulgaris*
Red-winged blackbird	*Agelaius phoeniceus*
Mourning dove	*Zenaida macroura*
Belted kingfisher	*Ceryle alcyon*
Killdeer	*Charadrius vociferus*
Black-capped chickadee	*Parus atricapillus*
Turkey vulture	*Cathartes aura*
Northern cardinal	*Cardinalis cardinalis*
Gray catbird	*Dumetella carolinensis*
American goldfinch	*Carduelis tristis*
Eastern towhee	*Pipilo erythrophthalmus*
Ovenbird	*Seiurus aurocapillus*
Red-eyed vireo	*Vireo olivaceus*
Wild turkey	*Meleagris gallopavo*
REPTILES OBSERVED	
Spring peeper	*Pseudacris crucifer*
Eastern garter snake	*Thamnophis sirtalis sirtalis*
Box turtle*	*Terrapene carolina carolina*

** Observed only on the power line corridor*

During the summer of 2004, students from the Greenbrier West High School participated in an educational outreach effort as part of National Environmental Policy Act community outreach for the WGC project. Interested students were assembled into small teams and asked to collect samples, analyze various environmental issues, and make presentations about their work at local public meetings. A local science teacher coordinated this effort with the help of other local teachers and volunteers. The students earned valuable experience in basic ecological theory, ecological field methods, taxonomic identification of selected organisms, data analysis, report preparation, and public presentation. The student teams analyzed various environmental issues of importance to the project, including the following:

- Estimation of the relative dominance and importance values of herbaceous and shrub plants in non-forested areas near the proposed power plant site using the line intercept method. The average relative dominance and the average importance value were calculated for the local vegetation that consisted of mostly grasses and forbs.
- Collection of herbaceous plants in the area of the proposed power plant to identify any endangered or threatened species. Plant specimens collected included grasses, sedges, rushes, mosses, lichens, ferns, legumes, forbs, shrubs, and trees.
- Determination of the relative dominance and importance value of forest trees in areas likely to be impacted by the proposed power plant using the random pairs method. Results indicated that beech, maple, and cherry ranked highest in both average relative dominance and average importance value.
- Estimation of the number of bat species located in the areas of two proposed timber sales in Seneca and Calvin Price State Forests using mist nets. No endangered species of bats were found. Although this work was not directly applicable to the proposed power plant site, it illustrated the methodology for analyzing an issue applicable to other projects in the region.
- Analysis of benthic macro-invertebrates communities (stream insect larvae, etc.) and water quality parameters in small streams impacted by coal mining activities and acid mine drainage (AMD). This work provided a baseline for later analysis of stream conditions after coal waste piles have been removed to see if conditions have improved.

Wetlands in the project area were identified as jurisdictional and non-jurisdictional. Jurisdictional wetlands are water resources that are adjacent to or have a hydrological connection to streams that cross state boundaries. Non-jurisdictional wetlands are water resources that are not hydrologically connected to streams (intermittent or perennial) that cross state boundaries. In general, non-jurisdictional wetlands may occur as isolated topographic depressions that are characterized as vernal pools.

3.7.1.1 E&R Property and EcoPark

Development of the EcoPark site is not associated with the WGC Proposed Action, but would be developed as a third action party independent of WGC actions. Consequently, references to the EcoPark are presented for analysis and conceptual purposes only. The EcoPark component of the project is situated on the north side of Sewell Creek and includes the former location of the Meadow River Lumber Company (MRLC). The entire mill and lumberyard, including two former log ponds, were razed by 1975 and woody and herbaceous vegetation currently covers the site. Most of the EcoPark site is characterized as mowed and maintained grassy fields, abandoned vacant land consisting of tall herbaceous plants and small clusters of trees and shrubs on the north side of Sewell Creek. The E&R (see Figure 2.2-1 and 2.2-3) component of the project area, southeast of Sewell Creek consists of a disturbed area associated with previous earth moving activities, and approximately 15 acres (6 hectares) of woodlands. Portions of the wooded area are wetland, and the remainder is upland, with some areas of the wooded uplands occurring on the hillside slopes and along the base of the mountain.

The following vegetative communities are present within the overall project area, which includes the areas north and south sides of Sewell Creek:

- Open field areas, with only small areas of trees and shrubs, located on the north side of Sewell Creek;

- Forested areas, both upland and wetland, present as small patches of woods along the north side of Sewell Creek and as larger, contiguous wooded areas on the south side of Sewell Creek; and
- Disturbed areas with only small amounts of vegetation located on the south side of Sewell Creek.

Currently, the upland areas within the open fields north of Sewell Creek are vegetated primarily herbaceous species, including wingstem, various grasses, goldenrod, Indian hemp and milkweed. Parts of these fields are mowed occasionally, while other areas are not mowed and shrubs and young trees have become established. Species observed in the shrubby upland areas include sumac, black cherry, multiflora rose, and blackberry in addition to the herbaceous species listed above. Sections of the field south of Sewell Creek, such as near the eastern edge of the site and in the western part of the site near the CSXT Railroad yard, contain small, wooded areas. A part of these wooded areas is upland and the remainder is wetland. The dominant species observed in the upland section of the eastern wooded area include American beech, ironwood, hawthorn, black cherry, jack-in-the-pulpit, May apple and blackberry. Table 3.7-1 summarizes plant species observed throughout the project area, and Table 3.7-2 lists the wildlife species observed.

Wetland areas at this location are vegetated with swamp dogwood, black willow, sedges, sensitive fern and skunk cabbage. The wooded area near the CSXT Railroad yard is vegetated with black cherry, flowering dogwood, black willow, May apple, sensitive fern and skunk cabbage. Along the banks of Wolfpen Creek near this wooded area, young specimens of these trees as well as poison ivy, goldenrod, blackberry and evening primrose are found.

South of Sewell Creek, wooded areas occupy most of the ridgeline that extends into the E&R property and into parts of the adjacent, lower elevation areas. Most of the wooded area north of the ridgeline is a forested wetland with several channels leading to Sewell Creek. The dominant plant species observed in the wooded wetland are red maple, pin oak, spicebush, swamp dogwood, cinnamon fern, jewelweed, sensitive fern, and skunk cabbage. The wooded upland areas are dominated by red maple, American beech, red oak, hawthorn, ironwood, Christmas fern, witch hazel and Virginia creeper. Heading east along the base of the hillside, the wooded area transitions into the disturbed area associated with the earth disturbance begins. Additionally, part of the hillside has been disturbed by heavy equipment and portions of the hilltop have been graded flat. Many of the disturbed areas lack topsoil and are unvegetated. In the parts of the disturbed areas that are vegetated, wingstem, grasses, sedges, soft rush and goldenrod form the dominant herbaceous community, while other parts are dominated by early seral/pioneer shrubs and young trees, such as sumac, black cherry and black locust.

East of the ridgeline, near the eastern edge of the E&R site, an unnamed tributary drains into Sewell Creek (see Section 3.4, Surface Water Resources). Based on reviews of historical aerial photographs and topographic maps, this stream was relocated during previous site grading activities. Hence, the relocated portion of the unnamed tributary runs through part of the disturbed area. Undisturbed sections to the south and west consist of wooded areas of similar vegetation types as mentioned above. Within the disturbed area, the tributary's channel banks are vegetated with sedges and soft rush and some shrubs including elderberry and arrow-wood. These two shrubs are also common in other parts of the site.

The March 2006 field investigation addressed the proposed relocation of the water line south of US 60 and Sewell Creek. The relocation of the water line was proposed as an attempt to minimize and avoid impacts to the environment. The new alignment for the waterline would use the peripheral edge of existing roads within the modular home community and a mowed grassy field. Consequently, the field investigations identified a small emergent wetland situated along the eastern limits of the E&R property, and within the proposed water line right-of-way (ROW). Vegetation along this wetland consists of soft rush, sedges, deer tongue grass and dogbane. The emergent wetland transitions into an early to mid-sucessional forested east of where the water line crosses the emergent wetland.

Observations of wildlife noted during the wetland delineation and subsequent visits to the project area include: Eastern cottontail, white tailed deer, raccoon, big brown bat, American robin, swallows, European starlings, red-winged blackbird, Eastern towhee, American cardinal, belted kingfisher, American goldfinch, killdeer, mourning dove, finches, black-capped chickadee, spring peepers, garter snake, an unidentified dog, snake, and salamander.

3.7.1.2 Meadow River and Sewell Creek

The description of Meadow River and Sewell Creek in this section discusses the area in close proximity of the confluence of these two streams and the Rainelle Sewage Treatment Plant (RSTP).

The Meadow River and Sewell Creek are perennial streams characterized by well-defined bed and bank channel morphology. The channel banks of Sewell Creek has been modified and redirected by human activities to lower the risk of potential flooding., where as Meadow River appears to have been minimally altered by human activities. The stream channel banks for both streams have steep to moderately steep vegetated channel bank slopes and the ordinary high water mark is easily discernable. No exposed roots of woody riparian plants were observed along the channel banks. However, undercut channel banks could occur in portions of Meadow River that lay outside of the limits of study. Occasional woody debris (trees, logs) deposited during high stream flows were observed in the Meadow River and Sewell Creek. The woody debris functions in providing habitat for fish and macroinvertebrates. The floodplain of Meadow River contains a noticeable levee on the southern western stream bank. The levee is vegetated with non-wetland plants such as black cherry, iron wood, and Canada goldenrod.

The riparian vegetation hanging over both streams functions in moderating surface water temperature from the warming effects of direct sunlight, and is a source of detritus for the aquatic vertebrate and invertebrate life. The riffle in the Meadow River can function as spawning substrate for fish, provide habitat for macroinvertebrates such as caddisflies and help aerate the water column of the stream. During periods of low flow, the riffles function in preventing larger fish from migrating in portions of the stream reach, whereas deeper pools habitat for larger fish during the summer.

Portions of the riparian zones are vegetated by non-native plants such as Japanese stilt grass. However, the herbaceous riparian plant community generally consists of deer tongue grass, yellow nut sedge, iron weed, clover, Timothy grass, clear weed, false nettle, winged stem, mana grass, and soft rush. The woody riparian community consists of silver maple, cucumber tree, red maple, iron wood and black willow. An unnamed vegetated drainage swale is situated south of the rail road track and west of Sewell Creek. Section of the unnamed vegetated drainage swale area bordering Sewell Creek appears to be vegetated by non-wetland, such as lespedeza and broom sedge. However, approximately 100 feet west from the confluence with Sewell Creek, vegetation in the drainage swale transitions from an upland field into a palustrine emergent wetland dominated by woolgrass, iron weed, boneset and other types of persistent and non-persistent wetland plants. The vegetated drainage swale functions filters sediments carried by seasonal water and provides a substrate for microbes that affect the nitrogen and carbon cycle.

The area of the proposed cooling intake water structure (see Figure 2.2-3), along the Meadow River, is situated approximately 4 to 6 feet (1 to 2 meters) above the normal surface water elevation. Vegetation is dense and the diameter of trees in this portion of the floodplain varies from 2 to 14 inches (5 to 36 centimeters) in diameter and the floodplain can function as a transportation corridor for a variety of avifauna and wildlife.

3.7.1.3 Anjean

Anjean is highly disturbed from past mining activities (see Figure 2.2-4). Some remediation efforts have been undertaken at this site, but many areas consist of coal refuse piles and unvegetated areas, some with exposed rock outcrops. Runoff from the coal refuse pile is collected at the base of the site and directed into a series of ponds used to treat the acidic leachate. A few abandoned buildings associated with previous mining activities are also present on the site. WVDEP maintains a field office in a trailer near the entrance from Anjean Road (CR 1).

Along the edge of the mining and coal refuse areas, wooded areas are present and are dominated by relatively young black locust and pin cherry trees. Other tree species observed include hop hornbeam, a few red and white oaks, red maple and quaking aspen. Goldenrod, crown vetch, virgin's bower, Japanese knotweed, yarrow and curly dock are common in the herbaceous layer observed in different parts of the Anjean site.

Briery Creek and Big Clear Creek are present at the base of the Anjean site (see Figure 3.4-4). The channels of these two creeks are very rocky and mostly unvegetated, except for a few black willows. The black willow trees are more common along the banks of these creeks. Wildlife at the Anjean site is somewhat limited due to the overall conditions of the property. The following species or evidence of these species were observed at the Anjean site during the site visits: chipmunk, groundhog, black bear, white tailed deer, American crow, swallow, and turkey vulture.

Several sites were identified as candidates for the coal prep plant (AN1, AN2, and AN3). AN1 is situated just south of the Big Clear Creek and South Fork confluence. AN1 is characterized as disturbed, steeply sloping to moderately flat landscape. Most of the disturbed area is grassy field vegetated with a sod forming grass such as Kentucky fescue. Most of the grassy fields appear maintained and mowed on a regular schedule. Wooded portions of the area are vegetated by trees having an estimated diameter at breast height (DBH) of 6 to 10 inches (15 to 25 centimeters) trees, and could qualify as an early seral forest community. Ponds were observed at the site and it is assumed that these ponds were constructed to manage some of the runoff from the coal refuse pile, and therefore, are probably not subject to jurisdictional wetlands review by the regulatory agencies.

AN2 is west of Big Clear Creek and the community of Anjean. Most of the site is vegetated by herbaceous grasses. Several riprap lined drainage swales were observed within the candidate site. Topography of the site is mostly flat and is bordered by a hillside along the western periphery of the site.

AN3 is a highly disturbed area situated near the base of the Anjean coal refuse (Buck Lilly pile). A large portion of the site is characterized as an unimproved dirt access road. The remainder of the site contains abandoned facilities such as a holding container for hydrochloric acid, discarded PVC pipes and an old trailer. Vegetation is sparse, but where it does occur the vegetation can be characterized as persistent and nonpersistent plants common to disturbed areas. Topography is mostly flat.

3.7.1.4 Donegan

The Donegan coal refuse site, approximately 132 acres (53 hectares), drains into Laurel Creek of the Cherry River, a direct tributary of the Gauley River. Drainage of the site is directed to the north and then east where it empties into Laurel Creek (see Figure 3.4-6). Water quality issues at the Donegan site are discussed in Section 3.4.2.5.

Two candidate sites for the fuel processing prep plant were identified, DN 1 and DN2. DN1 is characterized by a grassy field with scattered clusters of shrubs. The herbaceous plants typically consisted of Lespedeza, broom sedge, fescue and autumn or Russian olive (*Elaeagnus sp.*). Topography of the site is mostly flat. DN2 is characterized as an early seral to mid-sucessional forest. Portions of the site are vegetated with a dense understory of saplings in the 2- to 4-inches (5- to 10-centimeters) DBH size class, and several larger trees in the 10 to 14 inches (25 to 36 centimeters) DBH size class occur intermittently in the wooded areas. No wetlands or other water bodies were observed at the site.

3.7.1.5 Green Valley

The coal refuse site at Green Valley is over 1,000 feet (300 meters) in length and up to 200 feet (60 meters) in height. In the past the site was used for coal refuse disposal. The coal refuse was capped with topsoil gathered from other portions of the site and surrounding areas. While the intent was to blanket the coal refuse with 3 to 4 feet (0.9 to 1 meter) of soil, coverage in most areas is less than 2 feet (0.7 meter) and is several inches in certain portions of the pile.

Leachate from the coal ash has caused the soil to become very acidic across the coal refuse area. As a result, the hill was planted with various pine tree species, which thrive in acidic soil conditions. The predominant pine species appeared to be Virginia pine. The majority of the trees range in height from approximately 8 to 20 feet (2 to 6 meters). A few widely scattered young hawthorn, sassafras, red maple, and tree-of-heaven saplings are also present. The hawthorn and tree-of-heaven are slightly more numerous on the north and west sides of the pile. Isolated shrub species include maple-leaved viburnum, multiflora rose, sumac, and greenbrier. A few privet and honeysuckle shrubs are present at the north end of the pile. Grasses and wildflowers fill the herbaceous layer between the trees, including goldenrod, several species of asters, blackberry, soft rush, sedge species, switch grass, reed canary grass, deer-tongue grass, and purple loosestrife. Some of the plants mentioned above (tree of heaven-hawthorn) are typical of non-native or invasive plants that colonize disturbed areas that form monocultures and lower the quality of wildlife habitat.

A general area has been identified as the candidate site (GV) for the coal prep plant that would beneficiate the coal refuse from Green Valley. The plant community at the GV site is characterized as having a moderate to densely vegetated shrub layer over a moderate to steeply sloping topography.

3.7.1.6 Joe Knob

The Joe Knob coal refuse is situated along the summit of Little Clear Creek Mountain at an elevation of approximately 3,600 feet (1,100 meters) above mean sea level (amsl). The area encompassing Joe Knob and immediate surrounding area is characterized as a disturbed landscape, which has undergone reclamation efforts after previous coal mining activities. A mining permit was issued in 1987 to Leckie Smokless, Inc. by WVDEP. In 1999, the permit was forfeited by the applicant, and reclamation efforts were performed and competed by WVDEP in 2003 (Green 2006). Much of the vegetation colonizing the site is typical of pioneer, early seral plant species that vegetate nutrient poor, disturbed areas. Some of the vegetation occurring at the coal refuse consists of Kentucky fescue and orchard grass. The high uplands bordering Joe Knob consist of species commonly encountered at high elevations. Typical species include hickory, sugar maple, black cherry and oaks. The reclaimed coal refuse area is characterized as a moderately sloping grassy field.

3.7.1.7 Transmission Corridor

Segment A - WV 20 to the AEP Easement

The initial power line corridor considered by WGC (Segment A – see Figure 2.4-9) extends from near the existing CSXT property on the south side of WV 20, over WV 20, into the wooded area on the ridge of Sewell Mountain and then ties into the existing AEP power line easement. This corridor is adjacent to a golf course. Also, a section of Wolfpen Creek intersects the existing power line in this area. At this location, Wolfpen Creek has a very rocky channel, but various sedges, goldenrod and young striped maple trees are growing in some areas near the channel bank. A few specimens of mountain magnolia were observed near Wolfpen Creek in the vicinity of the existing power line.

The wooded ridge is dominated by American beech, black cherry, and tulip tree. Hickory, red maple and striped maple are also present. The canopy of this area is relatively closed, with between 80 and 90 percent coverage. The understory consists of young specimens of the above mentioned tree species as well as witch hazel, maple leaf viburnum, a few arrow-wood and some grape vines. Christmas fern is the predominant herbaceous species.

During the field investigations of this corridor, gray catbird, ovenbird, red-eyed vireo, white tailed deer, chipmunk, Eastern cottontail rabbit, big brown bat and northern bat were observed.

Segment B – Rainelle to Laurel Creek Mountain

A walk-through inspection of a 100-foot (30 meter) -wide corridor, along and directly adjacent to an approximately 3-mile (5-kilometer) section of an existing power line corridor was conducted on April 27-28 and June 14-16, 2005. The purpose of the inspection was to evaluate the feasibility of constructing a power line in an easement immediately adjacent and parallel to the existing easement within this 3-mile (4-kilometer) section. The existing easement within the 3-mile (4-kilometer) segment investigated is currently owned and maintained by American Electric Power (AEP). The portion of the easement that was the focus of this investigation begins immediately south of US 60, near the golf course just west of the incorporated area of Rainelle and runs northeasterly to a point approximately 3,000 feet (910 meters) north of the Meadow River. The existing AEP transmission line corridor consists of consecutively numbered poles; the area inspected for this investigation and anticipated to be paralleled by WGC extends from pole 321-108 (southernmost) to pole 321-132 (northernmost). A few areas of herbaceous species, including saplings (5 to 6 feet [1.5 to 2.8 meters] high), were encountered during the site investigation.

Section B1 – For purposes of this biological resources discussion, the segment beginning from the southernmost point of the power line easement near the golf course (intersection of Segment A and B in Figure 2.4-9) to the Meadow River is identified as Segment B1. This area is the southernmost section of the power line corridor and varies in elevation from approximately 2,400 feet (730 meters) amsl adjacent to the Meadow River, to nearly 3,200 feet (980 meters) amsl at the top of a mountain located near the center of this area. The area adjacent to the easement in Segment A consists of primarily a closed canopy forest located on steep hillsides. In general, the forest consists of mixed deciduous hardwoods. Predominant tree species in this area consist of American beech, paper and gray birch, and ash. Very few shrub or herbaceous species exist in this area, especially on the northern half of Section A. Hemlock is abundant on the northern half. Where any understory vegetation did exist, it consists primarily of saplings of the above-mentioned tree species, as well as ferns and mosses. One white-tailed deer was observed in this section, and evidence of turkey, bear, frogs, and salamanders was found.

Section B2 – For purposes of this biological resources discussion, Section B2 is identified as the segment between the northern end of Section B1 to Laurel Creek Mountain (intersection of Segment B and C in Figure 2.4-9). This section varies in elevation from approximately 2,400 feet (730 meters) amsl along the Meadow River at the southernmost point, to approximately 3,100 feet (950 meters) above msl at the top of a ridge in the center of the section. Poles 321-124 to the south, adjacent to the Meadow River, and pole 321-132 to the north, located at the top of Laurel Creek Mountain, bound the area. On Laurel Creek Mountain, a relatively small wetland area was observed in a depression at the top of the ridge. Further south, another former strip mine was encountered. This area contained a large area of clear-cutting outside of the strip mine area, possibly from logging operations. The clear-cutting is much more pervasive on the northwest side of the easement. Ponded water was observed in several disturbed areas resulting from the former strip mine and/or logging operations. The remainder of this section, to the Meadow River, contained hardwood forest, with oak, red maple, and a few ironwood trees.

Segment C – New Corridor from Laurel Creek Mountain to Grassy Falls

WGC conducted an ecological evaluation of the proposed corridor segment that extends from the AEP ROW to the Grassy Falls Substation (see Appendix L, Transmission Line Corridor Study). This evaluation consisted of a site walkover of the proposed corridor alignment and a review of aerial photography. The majority of wetlands along the AEP ROW were emergent, or characterized as a wetland complex containing emergent/open water components or emergent and scrub-shrub components. Vegetation in the emergent wetlands was typically represented by soft rush, jewel weed, and sensitive fern, the scrub-shrub wetlands were typically vegetated by black willow, slippery elm, and silver maple. One emergent/forested wetland occurred along the proposed ROW and was vegetated by the plant species occurring in the emergent or scrub-shrub wetlands. In addition to the wetlands, the field reconnaissance identified 24 perennial streams, seven intermittent streams and one stream possessing intermittent and perennial characteristics. More intensive surveys were not undertaken because the corridor had not been professionally surveyed, mapped and flagged. The evaluation estimated that approximately 50 percent of the segment consists of forested lands, and substantial portions of the segment traverses lands that have been subject to mining and timber activities. As part of the evaluation efforts, field biologists conducting the survey assessed the suitability for T/E species habitat as described in Section 3.7.4.

3.7.1.8 Exchange Property

The exchange properties consist of two areas of land along opposite sides of a residential property (see Figure 2.2-3). The area along the east and southeast side of the residence is the smaller of the two areas. These two parcels meet at a point south of the residence along the power line easement.

The smaller portion of the exchange site is a landscaped and developed area associated with the adjacent golf course. This area is bordered to the north by US 60, to the southeast by the power line easement, and to the northwest by the residential property. This area includes an entrance road extending south from US 60, which splits in two directions shortly after entering the site. One portion of the road extends toward some buildings associated with the country club, while the other leads to a parking lot. The landscaped areas between the entrance roads and adjacent to the residence include domestic grasses, ornamental spruce and fir trees, and large red and white oaks. An unnamed tributary to Wolfpen Creek drains from north to south and runs adjacent to the eastern boundary of the western portion of the exchange property, between it and the residential property. This tributary also crosses the far southwest corner of the eastern portion of the exchange site at the power line easement. The banks of this tributary are well defined and rocky, and the immediate areas along the stream are vegetated with rushes and various species of sedges (*Carex spp*.), goldenrod, wildflowers, and a few tulip tree saplings.

The larger western portion of the site is generally a closed canopy, deciduous hardwood tree forest. The canopy layer consists primarily of American beech and oak trees, as well as some tulip trees, red and Norway maple and hickory trees. The trees were becoming seasonally leafless at the time of the survey, but the canopy coverage is estimated to be approximately 90 percent or more during the midst of the growing season. The shrub layer (approximately 50 percent coverage) consists almost solely of saplings of the above-mentioned tree species, with a few witchhazel. The herbaceous layer coverage is estimated to be 10-15 percent or less, and include Christmas fern, cinnamon fern, and sphagnum moss.

Throughout the western portion of the site, the topography rises generally from south to north. Broad swales and narrower erosional channels oriented in a north-south direction are scattered across the western portion of the exchange site. Within these features, which may contain freshwater wetlands, are areas of soils containing muck and ponded water. In these areas, the larger trees are absent and the vegetative community is dominated by grasses and shrubs, including rhododendrons.

A few piles of large rocks were observed along the eastern side of the western portion of the exchange site. These piles contain numerous small openings and fissures that may serve as habitat for certain bat species. However, few (if any) trees across the exchange site possessed the shaggy bark that would be suitable for additional bat habitat.

The highest point of the site is near the north-central area of the western portion of the site. Topography slopes downward sharply toward the southwest, south, southeast, and east. A slight depressional area between US 60 and the high point of the site contains an area of cattails, switch grass, soft rush, and other typical wetland grasses.

Wolfpen Creek crosses the far southwest portion of the western area of the exchange site, immediately north of the power line easement. This rocky stream also contains well-defined channels. The vegetation is noticeably denser adjacent to the stream.

3.7.1.9 Plateau on Plum Creek Site

A plateau that extends from the tree line on the E&R property, on the northern side of the ridge, has been considered for project purposes (see Figure 2.2-3). This area is located within a hardwood, deciduous forested mountainside. The area is approximately 2 to 3 acres (0.8 to 1 hectares) in size and is located on a small plateau. The vegetation consists primarily of large beech trees, as well as some Norway and red maples, red and black oaks, and hawthorn. There are also tulip trees scattered throughout the area, as well as a few barberry shrubs. Some of the largest trees are over 12 inches (30 centimeters) DBH. The large trees create a nearly closed canopy layer that has limited the understory vegetation in this area. The shrub layer consists primarily of saplings of the above-mentioned trees, with a few grape vines. The herbaceous layer is nearly non-existent, consisting largely of Christmas fern and mosses.

3.7.1.10 Proposed Water Line Corridor

The proposed water line would begin at the power plant site and end at the RSTP adjacent the Meadow River. Starting from the power plant site the proposed water line corridor would run north through a small emergent wetland and a grassy mowed field until it meets 15th Street. Upon meeting 15th Street, the water line would then head east along the road to a back alley between modular homes leading north to the US 60 bridge and beyond. Upon crossing US 60, the water line would continue northeast along the east side of Sewell Creek towards the waste water treatment plant. This segment of the corridor consists of previously disturbed landscaped areas consisting of various grasses and other herbaceous species. The proposed corridor route would continue across Little Sewell Creek to the 7th Street Bridge. The water line ROW corridor extends across Sewell Creek at the 7th Street Bridge and parallels WV 20 to the gravel road accessing the RSTP. The water line would be placed within or adjacent to the gravel road accessing the wastewater treatment facility. Areas adjacent to the access road are characterized as a field of various grasses and other herbaceous species and a small wooded area, dominated by shagbark hickory, white oak, American beech, red maple, spicebush, black cherry and jewelweed in the understory. A potential corridor location along the CSXT rail line was also surveyed as part of the EIS efforts. This potential corridor lies adjacent to the existing railroad tracks through areas that have already been developed. However, there is a portion of the corridor where natural vegetation exists on both sides of the existing railroad tracks and includes wetlands. This vegetated area is located along that portion of the railroad tracks between US 60 and the RSTP. From US 60 to the existing Meadow River Hardwood Lumber Company, the vegetated area is primarily wooded with species such as red maple, American beech, black locust, ironwood and black cherry trees. Between the lumber yard and the RSTP, the area includes a field of various grasses and other herbaceous species, and a small wooded area, dominated by shagbark hickory, white oak, American beech, red maple, spicebush, black cherry and jewelweed in the understory.

Wildlife observed along the proposed water line corridor includes gray catbird, an unidentified woodpecker, turkey feathers, European starlings, and a chipmunk.

3.7.1.11 Proposed Truck Storage Area

The proposed truck storage area is located on the north side of WV 20/US 60 in the small town of Charmco. The site, which measures approximately 9 acres (4 hectares) in size, is located approximately 3 miles (5 kilometers) northeast of the proposed power plant site and was formerly the site of a drive-in movie theater. The majority of the site has been disturbed and cleared of vegetation, with the exception of areas along the perimeter of the property, and consists of bare soil and gravel.

Wooded areas exist along the northern, western, and eastern property boundaries. The eastern portion of the site contains the broadest area of vegetation. Both upland and wetland areas are found. Narrow drainage channels with water exist within the tree lines along the northern and eastern property line, and a slightly broader stream channel was observed within the wooded area of the eastern portion of the site. These channels would likely be considered regulated wetland features by the U.S. Army Corps of Engineers (USACE).

Tree species observed at the site include hemlock, cherry, maple, tulip tree, black locust, hickory, American beech, and white and red oaks. Shrub and herbaceous species include saplings of the above-mentioned species, as well as witch hazel, barberry, arrow-wood, multiflora rose, jack-in-the-pulpit, May apple, golden rod, clover, milkweed, asters, and thistle. Some sections of the wetland features also contained cattails, sensitive fern, and rush species.

Wildlife observed onsite in June 2005 includes nesting killdeer and white-tailed deer.

3.7.2 Wetlands

An extensive wetland delineation was conducted within the potential project areas referred to in Section 3.7.1 and Figure 3.7-1. Because the potential areas for project activities expanded as site planning efforts proceeded, the wetland delineation was conducted in several stages including April 19-23, September 13-16 and October 18-21, 2004, and March 14-16, 2006. The purpose of the field delineations was to identify and delineate the limits of jurisdictional freshwater wetlands and *Waters of the U.S.* in areas that could be impacted by project activities. The delineation was based upon the Routine On-Site methodology outlined in the USACE Wetlands Delineation Manual (1987), which uses the three-parameter approach (i.e., an evaluation for the presence of hydrophytic [wetland] vegetation, hydric [wetland] soils and wetland hydrology). This methodology is described in the Wetland Delineation Report in Appendix C. Areas that are disturbed are considered atypical or problematic, and consequently the presence of all three wetland criteria may not always be required.

3.7.2.1 E&R Property and EcoPark

Jurisdictional waters and wetlands delineated for this project include Sewell Creek, unnamed tributaries to Sewell Creek, low-lying vegetated areas adjacent to the north and south sides of Sewell Creek, and Wolfpen Creek. Indicators of wetland hydrology in the areas delineated include defined bed and bank channels, standing water, saturated soils, and/or mottling observed in the soil profiles. In the vegetated wetlands, the types of vegetation and the characteristics of the soil were evaluated and determined to be representative of wetland conditions. The Wetland Delineation Report (Appendix C) includes detailed information about the various wetlands, along with photographs and data points recorded throughout the delineation area.

The open fields on the north side of Sewell Creek (EcoPark) are the site of a former lumber mill and yard, which included two log ponds. Subsequent to the demolition of the lumber company's facilities in

1975, the field became vegetated. The discussion of EcoPark is presented for analysis purposes and on conceptual terms as the site will be developed by an independent third party. The following is a list of all wetlands delineated on the north side of Sewell Creek beginning from a point on the western edge of the EcoPark and heading east:

(1) A small, emergent wetland area vegetated primarily with cattails located adjacent to Sewell Creek 0.05 acres [0.02 hectares]);

(2) A short ditch* adjacent to the dirt roadway within the CSXT Railroad property (0.02 acres [0.01 hectares]);

(3) A section of wooded wetland near the CSXT Railroad property and west of Wolfpen Creek (0.48 acres; [0.19 hectares]), vegetated with swamp dogwood, willows, sedges, sensitive fern and some skunk cabbage;

(4) Wolfpen Creek from the railroad crossing south to its confluence with Sewell Creek (0.44 acres [0.18 hectares]);

(5) A ditch* that runs parallel to the railroad tracks and enters Wolfpen Creek near the railroad crossing (0.11 acres [0.04 hectares]);

(6) A two-part ditch*, connected via a culvert, within the open field part of the site (0.2 acres [0.08 hectares]);

(7) An isolated, emergent wetland vegetated with cattails and sedges located within the open field part of the site (0.23 acres [0.09 hectares]);

(8) Topographically low areas adjacent to a ditch within the open field and adjacent to Sewell Creek (2.36 acres [0.96 hectares]);

(9) A ditch* beginning within the open field that widens into a back channel area as it approaches Sewell Creek (0.39 acres [0.16 hectares]); and

(10) A narrow wetland that exists within a portion of the wooded area and the adjacent open field (0.71 acres [0.29 hectares]).

*These ditches are primarily vegetated with cattails, sedges, and soft rush. Some swamp dogwood, arrow-wood and multiflora rose shrubs are present along the banks in some areas of these ditches.

The areas delineated south of Sewell Creek, include many back channels that are separated from Sewell Creek by small upland areas. Some of these back channels are also separated from a larger wetland system that is located adjacent to the bottom of the hillside on the southern edge of the site. This larger, wetland system is a wooded area where standing water was observed in some locations and a small, unnamed tributary provides runoff from the adjacent hillside. Most of these features occur in the western half of the E&R project area south of Sewell Creek.

Most of the eastern half of the E&R project area, and south of Sewell Creek has been disturbed from previous earth moving activities. In this area, Sewell Creek is the primary watercourse feature delineated. However, there is also an unnamed tributary located near the eastern edge of the project area, which has several smaller tributaries of its own. Some of the areas along the unnamed tributary are primarily open water, while other areas are wooded wetlands or narrow drainage features without defined drainage channels.

Maps of the wetland boundaries delineated for this project are provided in Appendix C. These boundaries represent only those wetlands observed within the site. Many of the features delineated extend beyond the limits of the site, such as Sewell Creek, Wolfpen Creek, and the unnamed tributary on the southern side of Sewell Creek. Wetland boundaries are illustrated in Figure 3.7-2.

3.7.2.2 Anjean

A site investigation for the presence of wetlands was conducted on March 15, 2006, at the Anjean coal refuse project area. The field reconnaissance identified one isolated emergent wetland within a pond where coal fines have been deposited. Vegetation in the emergent wetland consists of soft rush, woolgrass and sedge. The substrate consists of coal fines. As an isolated wetland this feature is not subject to regulation by the USACE because it is not adjacent to or connected to *Navigable Waters of the U.S*. Because the wetland is developed within a pond for coal fines, the water quality functions would be characterized as poor (i.e., leachate permeates through and out of the wetland).

There are several topographic depressions on and around AN1 could be considered non-jurisdictional wetlands. These features appear related to past grading and earth moving activities (e.g., potential sediment basins). AN2 contains several riprap lined drainage channels that is assumed to convey heavy runoff away from the roads (i.e., CR 1 and on-site gravel road). AN3 has no wetlands or streams occurring on-site.

3.7.2.3 Donegan

An investigation for the presence of wetlands was not conducted at the Donegan site because the extraction of the gob from Donegan for use at the site facility is not anticipated within the next five years.

Consequently, a wetland boundary determination was not performed because USACE verified wetland boundary confirmations are valid for only a five-year period. USACE Jurisdictional confirmations that exceed the five-year lifespan of a confirmation period are invalid and would require an additional site visit to see if conditions have changed and to re-establish the wetland boundary line if needed. Runoff is directed to several treatment ponds along the perimeter of the pile. Since these ponds function in treating AMD, they would probably not qualify as a jurisdictional water resource. However, a wetland investigation and a jurisdictional confirmation from the USACE would be required to evaluate the regulatory status of these water resources. Because the Donegan coal refuse is situated adjacent to Laurel Creek, wetland impacts could occur and an investigation for potential jurisdictional waters would be required at the site.

DN1 is characterized as a moderately sloping grassy field and no wetlands are present on this site. In addition, no wetlands were observed at DN2.

3.7.2.4 Green Valley

An investigation for the presence of wetlands was not conducted at the Green Valley coal refuse site because the extraction of coal refuse from Green Valley would not be anticipated within the next five years.

Consequently, a wetland boundary determination was not performed because USACE verified wetland boundary confirmations are generally valid for only a five-year period. USACE Jurisdictional confirmations that exceed the five-year longevity of the confirmation period are invalid and would require an additional site visit to determine if site conditions have changed and to re-establish the wetland boundary line for verification. Storm water runoff generated by the disposal facility is collected by perimeter drains and routed into sediment control ponds that discharge into Blue Branch under NPDES permit regulations. Since these ponds function in treating AMD, they would most likely not qualify as a jurisdictional water resource. However, a wetland investigation and a jurisdictional confirmation from the USACE would be required to evaluate the regulatory status of these water resources. Because the Green Valley coal refuse site is situated near surface waters, wetland impacts might occur and an investigation for potential presence of jurisdictional waters would be required at the site prior to moving the prep plant to this location.

Portions of the candidate prep plant site, GV, are characterized as a palustrine emergent/scrub-shrub wetland. Soils in the wetland are black and a drainage pattern with perennial flow slope was observed. The drainage pattern is characterized as a slightly meandering first-order intermittent stream bordered by a herbaceous plant community. Several corrugated metal pipes occur within the stream channel and function in conveying surface water down stream. The remainder of the prep plant site is characterized as a scrub-shrub upland and contains no wetlands.

3.7.2.5 Joe Knob

Tributaries draining portions of the site are identified as Joe Knob Branch and Wallace Creek, both of which are tributaries to Little Clear Creek. The USGS topographic map shows several ponds are located within the project area. These ponds probably function in treating AMD, and consequently would not be considered jurisdictional water resources. These ponds are generally 25 feet (8 meters) wide and range in length up to 100 feet (30 meters). Two forms of AMD treatment are currently occurring at Joe Knob, passive and active treatment. Active treatment consists of applying sodium hydroxide to AMD. The passive form of treatment consists of constructed wetlands for AMD. All of the treatment wetlands are hydrologically connected to each other and provide water quality functions through phytoremediation. Phytoremediation is the process by which contaminants are remediated through adsorbtion, translocation into the plant biomass, transformed into a less concentrated form of the pollutant, volatized or precipitated into a less mobile form. Typical AMD contaminants that can be controlled include iron, sulfur, magnesium and aluminum. The depth and duration of the water also influences the rate of the phytoremedition process. Wetlands at Joe Knob coal refuse site are vegetated by plants such as broad-leaved cattail, woolgrass and similar species. Regardless of whether the wetlands are constructed or naturally occurring, a wetland investigation and a jurisdictional confirmation from the USACE would be required to evaluate the regulatory status of these water resources. Extraction of the gob from Joe Knob site is not anticipated within the next five years. Therefore, a water resource boundary determination was not performed because USACE verified wetland boundary determinations are valid for a five-year period. Projects possessing a USACE wetland boundary confirmation exceeding the five-year period are not valid and would require an additional site visit to re-establish the wetland boundary line and determine if site conditions have changed.

3.7.2.6 Power Line Corridor

Segment A – WV 20 to the AEP Easement

North of WV 20, Segment A (see Figure 2.4-9) consists of upland areas with no wetland features. A portion of this segment of the power line corridor will traverse Wolfpen Creek in the vicinity of the EcoPark, and wetland features in this portion of the project area were described in the previous section.

Segment B – Rainelle to Laurel Creek Mountain

Field surveys were conducted to evaluate the presence of wetland-related features along the 100-foot (30 meter)-wide corridor for Segment B. The results of these surveys are for two distinct sections of this segment including Section B1 (south of the Meadow River) and Section B2 (north of the Meadow River).

Section B1 – For purposes of this biological resources discussion, the segment beginning from the southernmost point of the power line easement near the golf course (intersection of Segment A and B in Figure 2.4-9) to the Meadow River is identified as Segment B1. A total of eight wetland features (including the Meadow River) were identified and delineated within Section B1. Two former strip mines were encountered, and the mining activities produced areas of ponded water and numerous ephemeral streams. In several of the small ponds, frog and salamander egg masses were observed. The ground surface in the strip mine areas consists of gravel and coal fragments; no vegetation or hydric soils are typically found in these areas. Around the fringes of the former strip mine areas, where the trees were cleared but the soil was less disturbed, shrub and herbaceous vegetation such as multiflora rose and assorted species of rush and lily are present. Two intermittent stream channels were also observed within the northern portion of this section. A depression approximately 200 feet wide by 200 feet long (60 by 60 meters) is also located atop the ridge, and areas of hydric soils and ponded water are located throughout the area. Additional intermittent streams were observed on the southern portion of this section, between the top of the ridge and US 60.

Section B2 – For purposes of this biological resources discussion, Section B2 is identified as the segment between the northern end of Section B1 to Laurel Creek Mountain (intersection of Segment B and C in Figure 2.4-9). Three wetland features were identified and delineated within this section of the proposed corridor. A relatively small wetland area was observed in a depression at the top of the ridge on Laurel Creek Mountain. Further south, another former strip mine exists that contains a large area of clear-cutting outside of the strip mine area. The clear-cutting is much more pervasive on the northwest side of the easement. Ponded water was observed in several disturbed areas resulting from the former strip mine and/or logging operations. The remainder of the section, to the Meadow River, contains hardwood forest, with oak, red maple and a few ironwood trees.

Segment C – New Corridor from Laurel Creek Mountain to Grassy Falls

As part of the ecological evaluation conducted by WGC (see Appendix L, Transmission Line Corridor Study), potentially regulated wetland features were assessed. A total of 14 wetlands were identified within Segment C of the power line corridor including an estimated total of 2.79 acres (1.13 hectares) of wetland habitat. The majority of the wetlands occurring along Segment C are emergent wetlands and open water, and only a small portion of the wetlands identified along the corridor were characterized as scrub-shrub, or forested. In addition to the wetlands identified, 32 intermittent and perennial streams also occur along the proposed ROW.

3.7.3 Aquatic Ecosystems

An aquatic sampling program was conducted on portions of Sewell Creek and Wolfpen Creek within the project study area on June 21 and 22, 2004 (see Appendix F – Aquatic Biota and Habitat Survey of Two Streams in Rainelle, WV). The purpose of the aquatic sampling was to obtain an inventory of the animal life within the waterways. The sampling program consisted of electro fishing; taxonomic identification of finfish and macroinvertebrates, such as crayfish, and benthic (bottom dwelling) organisms; and a collection of various water quality parameters, such as flow, conductivity, pH, temperature, turbidity, and metal content. The sampling locations were also described in accordance with the West Virginia Stream Classification System.

Water Quality Sampling: Water quality samples were collected at four sampling sites; sampling technique details may be found in Appendix F. Because the drainage area of Sewell Creek was much greater than Wolfpen, it was determined that Sewell Creek was the greater influence of water quality conditions in the project site area. The chemical and physical results from this survey are summarized and discussed further in Section 3.4 (Surface Water Resources).

Benthic Macroinvertebrate Sampling: Overall, two sections of Sewell Creek and one section of Wolfpen Creek were sampled designated as Sites 1, 2 and 3. For Sites 1 and 2, both an upstream and downstream location were sampled for benthic organisms, thus producing labels of Site 1A, Site 1B, Site 2A, Site 2B and Site 3, as described below and depicted in Figure 3.7-3:

- Site 1A just downstream of railroad crossing on Wolfpen Creek, described as the upstream sample of Wolfpen Creek;
- Site 1B on Wolfpen Creek just upstream of confluence with Sewell Creek, described as the downstream sample of Wolfpen Creek;
- Site 2A on Sewell Creek, described as the Upper Sewell Creek site;
- Site 2B further downstream on Sewell Creek in the oxbow portion of channel, described as the Middle Sewell Creek sampling location; and
- Site 3 on Sewell Creek near the eastern edge of the project study area, described as Lower Sewell Creek.

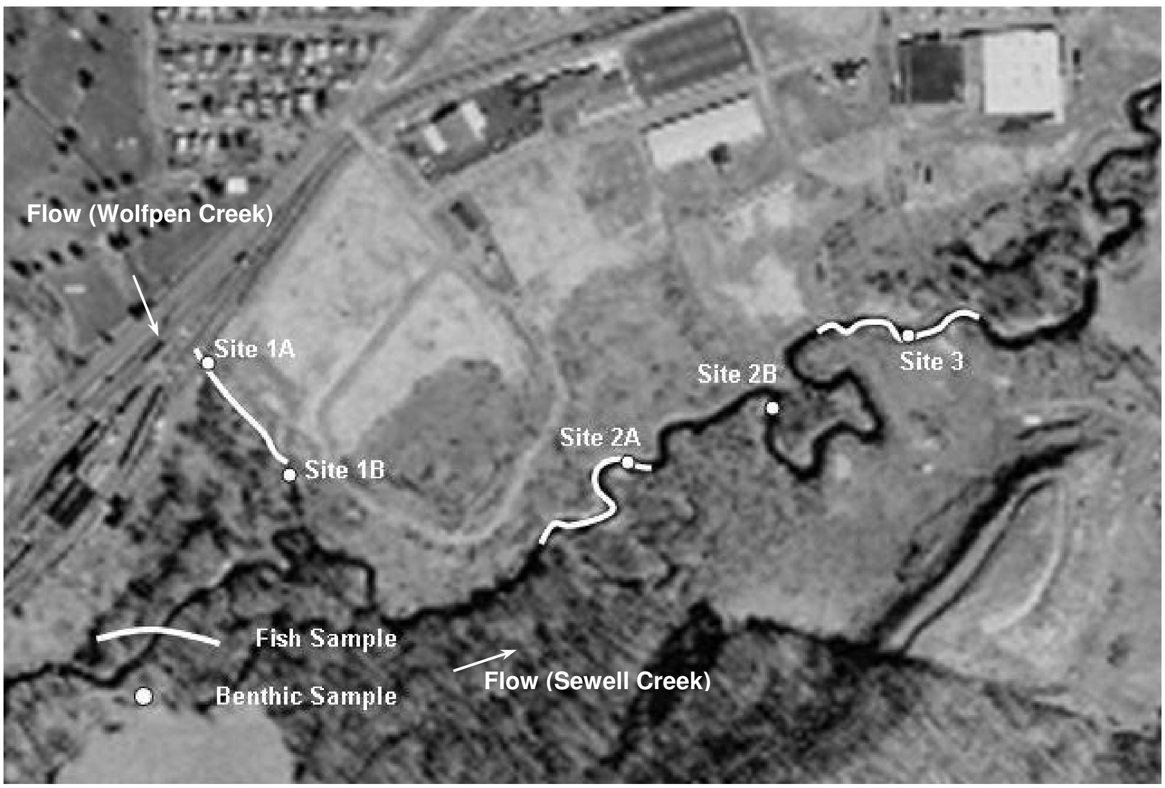

Figure 3.7-3. Benthic invertebrate sampling sites and fish sampling transects at Wolfpen Creek (Sites 1A, 1B) and Sewell Creek (2A, 2B, and 3)

The benthic sampling techniques used for this study followed the WVDEP's West Virginia Stream Index Protocol. Further details on the sampling methodology may be found in Appendix F. Results of the benthic sampling are shown in Table 3.7-3. The following lists a series of biologic metrics that were calculated for each sample to determine the condition of the site:

- Total taxa - measures the total number of macroinvertebrate taxa (diversity or different kinds) collected in the sample. Total taxa generally decrease with increasing stream degradation. In a

200-organism subsample, it is not uncommon for healthy streams to have 17 or more taxa at the family level of identification;

- EPT Index - measures the total number of distinct taxa within the generally pollution sensitive groups *Ephemeroptera* (mayflies), *Plecoptera* (stoneflies) and *Trichoptera* (caddisflies). In general, this index increases with improving water quality. This index is widely used because it is very sensitive to changes in water quality. In a 200-organism subsample, healthy streams commonly have 9 to 12 EPT taxa at the family level of identification;

Table 3.7-3. West Virginia stream condition index data in Rainelle, WV

Site Name	Total taxa	EPT Index	EPT%	CHIRO %	DOM2 %	HBI SCORE	WVSCI	Condition
Site 3 Lower Sewell Creek	13	6	45	39	64	5.0	66.3	Gray
Site 1A Wolfpen Creek Upstream	16	8	56	33	64	4.3	73.7	Good
Site 1B Wolfpen Creek Downstream	15	9	54	26	63	4.4	73.6	Good
Site 2A Upstream Sewell Creek	15	7	26	67	74	5.1	56.3	Fair
Site 2B Middle Sewell Creek	16	9	34	58	77	5.1	60.9	Gray

Source: Jones et al, 2005

- Percent EPT – measures the relative abundance of mayfly, stonefly, and caddisfly individuals to the total number of organisms in the sample. In general, this metric increases with improving water quality. It is common in healthy streams that at least 70 to 90% of the total organisms are in these sensitive orders;
- Percent Chironomidae – measures the relative abundance of chironomid (midges) individuals to the total number of individuals in the sample. Chironomids are considered to be tolerant to many pollutant sources. This metric generally increases in value with decreasing water quality. In healthy streams, it is not uncommon that less than 10% of the organisms in a sample belong to the family Chironomidae;
- Percent Contribution of 2 Dominant Taxa - measures the relative abundance of the 2 numerically dominant taxa to the total number of organisms in the sample. In healthy streams, there are generally several taxa, with the individuals being relatively evenly distributed among the different taxa. As stream water quality decreases, more individuals are concentrated in fewer, more tolerant taxa, and this metric increases. It is not uncommon for healthy streams to have as few as 40-60% of the total individuals in a sample in the 2 dominant taxa;
- HBI (Hilsenhoff's Biotic Index - modified) - summarizes tolerances of the benthic community to organic pollution. Tolerance values are assigned to each taxon on a scale of 0 to 10, with 0 identifying the organisms that are least tolerant (most sensitive), and 10 identifying the most tolerant (least sensitive) organisms. The HBI metric score can be thought of as an average organic pollution tolerance value for a sample, weighted by the abundance of organisms. As water quality of a stream decreases, the HBI increases. This is especially true where organic enrichment is present. Because many of the organic pollution tolerant organisms are also tolerant to other stressors, the HBI is often used as a general indicator of stress. It is not uncommon for healthy streams with good water quality to have HBI scores in the 3 to 4 range; and

- West Virginia Stream Condition Index (WVSCI) - The six benthic community metrics were combined into a single multimetric index, the WVSCI. The WVSCI was developed by Tetra Tech, Inc. using WVDEP data collected from riffle habitats in wadeable streams. In general terms, all metric values were converted to a standard 0 (worst) to 100 (best) point scale. The six standardized metric scores were then averaged for each benthic sample site to come up with a final index score that ranges from 0.0 to 100.0. If a stream site received a WVSCI score greater than 78.0, it is considered in *very good* condition. A WVSCI score greater than 68.0, but equal to or less than 78.0 indicates *good* conditions. The *gray zone* ranges from 60.6 to 68.0. If a site has a WVSCI score within the gray zone, a single kick sample is considered insufficient for classifying it as impaired. If a site receives a WVSCI score equal to or less than 60.6, the agency is highly confident that the site is truly biologically impaired based on a single benthic macroinvertebrate sample. Thus, scores greater than 45.0 and equal to 60.6 indicate *fair* conditions. Scores between 22.0 and 45.0 indicate *poor* conditions, and between 0.0 and 22.0 indicate *very poor* conditions.

A habitat evaluation was conducted utilizing a modified version of the Rapid Bioassessment technique. This approach focuses on integrating information from specific parameters on the structure of the physical habitat that are important to the survival and maintenance of benthic macroinvertebrate populations. Ten parameters were evaluated and given a score on a scale of 0 to 20. The scoring is broken down into four categories: 1) 0 to 5 = *Poor*; 2) 6 to 10 = *Marginal*; 3) 11 to 15 = *Suboptimal*; and 4) 16 to 20 = *Optimal*. The ten scores were summed to provide a total habitat score for each station (maximum score = 200). The sampling results are shown in Table 3.7-4.

Table 3.7-4. Rapid Bioassessment habitat data collected in Rainelle, WV

Habitat Metrics	Lower Sewell Creek Site 3	Upper Sewell Creek Site 2A	Middle Sewell Creek Site 2B	Wolfpen Creek Upstream Sample 1A	Wolfpen Creek Downstream Sample Site 1B
Epifaunal Substrate	5	11	12	12	14
Embeddedness	5	2	3	14	14
Velocity/Depth Regime	4	5	5	13	15
Sediment Deposition	5	2	1	12	14
Channel Flow Status	12	9	8	10	9
Channel Alteration	18	18	17	13	14
Frequency of Riffles	2	2	1	15	16
Bank Stability (LB+RB)	8	5	6	4	3
Vegetative Protection (LB+RB)	15	16	15	8	9
Riparian Vegetative Zone Width (LB+RB)	20	18	17	16	14
Total	**94**	**88**	**85**	**117**	**122**

Source: Jones et al, 2005

Electro fishing efforts were also conducted along sections of the creeks in the vicinity of the benthic sampling sites, thereby producing sampling locations 1, 2 and 3 for finfish collection (See Figure 3.7-3). Sampling details may be found in Appendix F. Tables 3.7-5 and 3.7-6 summarize the results.

Table 3.7-5. Fish metrics data collected in Rainelle, WV.

Fish IBI Metrics	Site 1A	Site 2A	Site 3
Total Number of Species	11	8	9
Number of Darter Species	0	1	0
Number of Sunfish Species	2	2	2
Number of Sucker Species (Catostomids)	0	0	1
Number of Intolerant Species (Trout)	0	0	0
% Green Sunfish	0.016	0.034	0.1
% Omnivores (Golden Shiner)	0.008	0	0
% Insectivorous (Cyprinids)	0.94	0.72	0.74
% Top Carnivores (*rupestrus & cyanellus*)	0.044	0.206	0.24
Number of Individuals (or catch per effort)	247	29	50
% Hybrids	0	0	0
% Diseased Individuals (deformities, lesions, and tumors)	0	0	0

Table 3.7-6. Finfish Collected in Sewell Creek & Wolfpen Creek

Common Name/ *Scientific Name*	Site 1*	Site 2*	Site 3*
Rock Bass/ *Ambloplites rupestris*	X	X	X
Nocomis platyrhinchus		X	X
Central Stoneroller / *Campostoma anomalum*	X	X	X
Greenside Darter / *Etheostoma blennioides*	X	X	
Green Sunfish / *Lepomis cyanellus*	X	X	X
Bluntnose Minnow / *Pimephales notatus*	X	X	X
Silverjaw Minnow / *Ericymba buccata*	X	X	X
White Shiner / *Luxilus albeolus*		X	X
Telescope Shiner / *Notropis telescopus*	X	X	
Northern Hog Sucker / *Hypentelium nigricans*			X
Creek Chub / *Semotilus atromaculatus*	X		X
Rosy-side Dace / *Clinostomus funduloides*	X		
Eastern Blacknose Dace / *Rhinichthys atratulus*	X		
Golden Shiner / *Notemigonus crysoleucas*	X		

**See Figure 3.7-3*

Aquatic sampling conclusions: A general survey of water quality found that Wolfpen and Sewell Creek sites are similar in both physical and chemical characteristics. Because of Sewell Creek's larger volume of flow upstream of the confluence with Wolfpen Creek, as compared to Wolfpen Creek, it was determined that Sewell Creek would dictate the water quality in the project site area. Wolfpen Creek was found to have higher quality stream habitat and benthic invertebrate communities. Both sites ranked "good" with the WVSCI. The three Sewell Creek sites had a mean habitat score of 89 out of 200. Their benthic index scores ranked from "fair" to "grey zone." This suggests an intermediate level of impact. Fish communities in both streams are dominated by tolerant, pioneering species. Metric values all suggested either a fish community highly impacted in the recent past and recovering or a system with repeated impacts such as periodic very low flows.

No dead shells or living unionid mussels were observed at any of the sites. Small stream size for Wolfpen Creek and poor habitat/flow characteristics in Sewell Creek would make the presence of any federally listed mussel species extremely unlikely. Overall Wolfpen and Sewell Creeks exhibited reasonable water quality, but the sampling results indicated that both streams are too habitat- and flow-limited to support diverse aquatic communities. No rare or endangered aquatic species were identified at any of the five sampling locations.

3.7.4 Protected Species and Habitats

Consultation letters (Appendix B) were sent to the U.S. Fish and Wildlife Service (USFWS) on April 27, 2004 and to the West Virginia Natural Heritage Program within the Division of Natural Resources (WVDNR) on April 28, 2004, requesting a list of any existing or proposed federally protected and/or other special status species for Greenbrier County. Currently, the WVDNR does not have a state-mandated level of protection to special status species and only provides a ranking of species with regard to rarity. Therefore, protection for species of special status is provided under the federal Endangered Species Act. Regional species occurrence that was identified is presented in Table 3.7-7.

Table 3.7-7. Protected Species Potentially Present Within the Project Area

Common Name	Scientific Name	Status	Habitat Requirements
WITHIN RAINELLE PROJECT AREA (USFWS)			
Indiana bat	*Myotis sodalis*	E	As per USFWS, species typically uses riparian, bottomland, or upland forest and old fields or pastures with scattered trees for summer foraging. Roosting/maternity habitat consists of live or dead hardwood trees, with exfoliating bark, tree cavities, crevices, splits or hollow portions of tree boles and limbs.
Virginia northern flying squirrel	*Glaucomys sabrinus fuscus*	E	As per USFWS, species typically uses a high elevation (greater than 3,280 feet or 1,000 meters) northern hardwood forest with a conifer component. Often large, woody debris present on forest floor, and cool temperatures and higher humidity to promote lichen growth and presence of moss, fern, liverwort or clubmoss groundcover.
WITHIN GREENBRIER COUNTY (WVDNR)			
Indiana bat	*Myotis sodalis*	E	See above.
Virginia northern flying squirrel	*Glaucomys sabrinus fuscus*	E	See above
Shale barren rockcress	*Arabis serotina*	E	Found in soil that contains many hard, small shale fragments, usually associated with south or east facing hillsides of Devonian-aged shale exclusively in the Valley and Ridge Geographic Province of the Allegheny Mountains.
Small-whorled pogonia	*Isotria medeoloides*	T	Generally known from open, dry, deciduous woods with acid soil, typically with high shrub coverage or high sapling density. Also known from shaded openings among hardwoods and pines.
Virginia spiraea	*Spiraea virginiana*	T	As per WVDNR, this species is a colonial shrub typically found in rocky, flood scoured banks of high-energy streams or rivers. Flood scouring seems to be important to this species by preventing canopy closure and decreasing competition from larger trees.
WITHIN 30-MILE RADIUS (USFWS)			
Indiana bat	*Myotis sodalis*	E	See above.

Table 3.7-7. Protected Species Potentially Present Within the Project Area (continued)

Virginia northern flying squirrel	*Glaucomys sabrinus fuscus*	E	See above.
Northern riffleshell mussel	*Epioblasma torulosa rangiana*	E	Occurs in a wide variety of streams, large and small, preferring runs with bottoms composed of firmly packed sand and fine to coarse gravel.
Pink mucket pearly mussel	*Lampsilis abrupta*	E	Typically inhabits medium to large rivers with strong currents, but has also been able to survive & reproduce in areas of impounded reaches with river/lake conditions without standing water. Usually prefers sand and gravel substrate, or pockets between rocky ledges in high velocity areas and mud & sand in slower moving waters
Fanshell mussel	*Cyprogenia stegaria*	E	Inhabits medium to large rivers and has been reported primarily from relatively deep water in gravelly substrate with moderate current.
Virginia spiraea	*Spiraea virginiana*	T	See above.
Small-whorled pogonia	*Isotria medeoloides*	T	See above.
Running buffalo clover	*Trifolium stoloniferum*	E	Originally known from areas of rich soils in the ecotone between open forest and prairie. Also known from shaded lawn and open woodland areas, with some evidence of disturbance present, such as mowing, grazing, or the presence of trails.
WITHIN 30-MILE RADIUS (WVDNR)			
Shale barren rockcress	*Arabis serotina*	E	See above.
Also includes all species identified by USFWS within 30-mile radius			

NOTES: Habitat information extracted from a letter provided by the USFWS, dated 7/8/04 and from websites http: endangered.fws.gov and http://ecos.fws.gov. Additional information was extracted from WVDNR website regarding Endangered Species (http://www.dnr.state.wv.us/wvwidlife), http://2bnthewild.com/plants and ESI, 2005.

Source: Potomac-Hudson Engineering, Inc., based on response letters from USFWS dated 7/8/04 and from WVDNR dated 5/25/04.

Of the species identified through consultation efforts, the following species were identified to be of particular concern for the project areas:

- Indiana Bat (*Myotis sodalis*) -The federally endangered Indiana bat is known from the region that includes central West Virginia and western Virginia, and has been reported in Greenbrier County. Winter hibernacula occur along the eastern and southern border of West Virginia, including Greenbrier, Hardy, Mercer, Monroe, Pendleton, Pocahontas, Preston, Randolph, and Tucker counties. In western Virginia, winter hibernacula have been reported from Bath, Bland, Craig, Giles, Dickenson, Highland, Lee, Montgomery, Tazewell, and Wise counties. Summer records for the area consist primarily of adult males, with sites in Clay and Nicholas counties, West Virginia. Two reproductive female Indiana bats were captured during the summer of 2003 in Boone County, West Virginia, indicating the presence of a summer maternity colony. These captures, located approximately 50 miles (80 kilometers) west of the project area, represent the first confirmed reproductive records for Indiana bats in West Virginia (Linda Smith, USFWS, pers. comm., 2003).

- Virginia Big-eared Bat (*Corynorhinus townsendii virginianus*) - The federally-endangered Virginia big-eared bat is the subspecies of Townsend's big-eared bat that occurs in Kentucky, North Carolina, Virginia, and West Virginia. It inhabits caves during both summer and winter. In winter, the species hibernates in clusters in cool portions of caves, while summer maternity colonies are formed in warmer portions of caves. WVDNR (Craig Stihler, pers. comm., 2002) and USFWS (2001) have been monitoring Virginia big-eared bat populations in West Virginia since 1983. Eleven summer colonies (including eight maternity colonies) and nine winter colonies are surveyed by WVDNR on a regular basis (annually in summer, biannually in winter). In addition to those caves, Virginia big-eared bats have been found in 29 additional caves. Usually these records are for occasional or sporadic occurrences, transients, and historic records. Caves used by the species are concentrated in the northeastern portion of the state: Grant, Tucker, Pendleton, Hardy, Preston, and Randolph counties. The largest single colony is approximately 90 miles (145 kilometers) to the northeast in Pendleton County. In Virginia, two active Virginia big-eared bat maternity colonies are currently known (Rick Reynolds, VDGIF, pers. comm., 2002); both are over 60 miles (97 kilometers) away from the project area in Tazewell County.

- Virginia Northern Flying Squirrel (*Glaucomys sabrinus fuscus*) - The federally-endangered Virginia northern flying squirrel is known only from the Appalachian Mountains in West Virginia and Virginia. In West Virginia, it has been captured in Greenbrier, Pendleton, Pocahontas, Randolph, Tucker, and Webster counties (USFWS 1990). Known locations in Virginia include Highland, Smyth, Grayson, and Montgomery counties (USFWS 1990). The closest known population is in Cranberry Wildlife Management Area on Monongahela National Forest, about 15 miles (24 kilometers) northwest of the project areas. This species is closely associated with higher elevations (>1000 m; >3,280 ft) and coniferous forests of spruce and fir (USFWS 1990). Recent, detailed studies in the southern Appalachians, however, have demonstrated that this squirrel occasionally uses lower elevations (down to approximately 710 m; 2,330 ft) and hardwood forests in proximity to spruce or hemlock (C. Stihler, pers. comm.).

A habitat assessment and summer mist netting survey for the endangered Indiana bat and Virginia big-eared bat, and a habitat assessment for the Virginia northern flying squirrel was conducted within proposed project development areas. Surveys were conducted in the vicinity of the proposed power plant and transmission line corridor that extends from the Co-Production site to the existing AEP ROW (Segment A), and at the Anjean coal refuse. In coordination with USFWS (see Appendix B, Consultation Letters), an appropriate level of effort for these areas was determined. Based on the habitat assessment, a total of two net sites were selected and netted. The net sites included a wooded area adjacent to the E&R property, as well as a site along the proposed transmission line corridor. Results of the survey indicate the following for each species (for survey details see Appendix E, *Habitat Assessments and Surveys for Endangered Mammals at Proposed Development Areas for Western Greenbrier Co-Gen, Greenbrier County, West Virginia*):

- Indiana Bat - Netting efforts provided no evidence that Indiana bats use the project area during summer months. The species complement, diversity, and number of bats captured in the project area were very low, which could be indicative of relatively poor habitat in this geographic location. Habitat at the Rainelle location is of moderate value for the Indiana bat, due to the presence of large trees and snags that could serve as potential roosts. This suitable habitat is only located off-site (in a nearby wooded area on the south side of Sewell Creek known as the Plum Creek Property), outside of the E&R property and the EcoPark. Roosting and foraging potential is low to moderate in the vicinity of the transmission corridor that extends from the proposed site to the AEP ROW, and varies depending on aspect and position. Possible roosting areas are located on the west side and ridge top of the mountain, due to the presence of some larger trees and snags. Roosting and foraging potential at the Anjean facility is low, due to the disturbed nature of the area and lack of suitable vegetation. Based upon the known presence of the Indiana bat in Greenbrier County, presence of reproductively active females in nearby (approximately 50 miles (80 kilometers) west) Boone County, but the apparent absence of the Indiana bat in the survey area, a May Affect – Not Likely to Adversely Affect determination is anticipated from the USFWS.

- Virginia Big-eared Bat - Netting efforts provided no evidence that Virginia big-eared bats use the project area during summer months. Unlike Indiana bats, these bats are usually found in association with caves that are required for summer roosting (as well as winter hibernation). Foraging potential for these bats is considered low to moderate at all sites in the project areas. Roosting potential is low due to the apparent absence of suitable caves. Man-made structures and rock outcrops at the Anjean site contained no signs of use by bats, including the Virginia big-eared bat. Occasional occurrence of this species is possible due to migratory and foraging behavior; however, based upon the closest occurrence of the Virginia big-eared bat being at least 60 miles (97 kilometers) south, a May Affect – Not Likely to Adversely Affect determination is anticipated from the USFWS.

- Virginia Northern Flying Squirrel - Visual searches and subsequent mist netting efforts provided no evidence that Virginia northern flying squirrels are present in the project areas; however, these animals are shy, secretive, and rarely encountered. Habitat assessments of squirrel habitat were therefore performed in all areas. The Virginia northern flying squirrel is known from the region, although the closest known population is approximately 15 miles (24 kilometers) northwest of the project areas, in Cranberry Wildlife Management Area, Pocahontas County, West Virginia. Most of the project areas contain poor to moderate roosting and foraging potential at elevations below that most frequently used by the species, in hardwood habitat, which is also less frequently used by the squirrel than conifers. Only approximately one-third of the transmission line corridor, on the western slope of Sewell Mountain, is hardwood habitat with good foraging and roosting potential, although it is at an elevation below that most frequently used by the Virginia northern flying squirrel. In total, the transmission line includes only about 3.5 acres (1.5 hectares) and the portion of the corridor on the west side of the mountain is only about one-third of this, or less than 1.2 acres (0.48 hectares) In addition, mist netting and visual inventories failed to document the presence of any flying squirrels within the project areas. Based on these criteria, a May Affect – Not Likely to Adversely Affect determination is anticipated from the USFWS.

In addition, concerns relating to the presence of Virginia spirea along portions of the Meadow River were identified during the scoping process. Field surveys for Segment B indicate that portions of the Meadow River within the vicinity of the existing AEP power line corridor, which is also the same area as the proposed power line corridor for the Proposed Action, do not provide habitat suitable for Virginia spirea, a federally-listed endangered plant species. As described in Table 3.7-7, Virginia spirea is typically found in rocky, flood scoured banks where the tree canopy is relatively open. In June 2005 (a month when the species is known to flower), both sides of the Meadow River within the project study area were investigated to determine the presence or absence of Virginia spirea. During this evaluation, it was observed that the banks of the Meadow River in this area are sandy, not rocky or flood scoured, and that trees are growing very close to the water's edge. No specimens of Virginia spirea are present.

3.8 Cultural Resources

This section establishes the context for considering cultural resources, including historical and archeological resources in the EIS, and lays the foundation for assessing the potential impacts associated with the proposed alternatives. It provides a definition of cultural resources, a summary of relevant laws, regulations and directives, and a brief characterization of archaeological and historical resources in the area of the Proposed Action, focusing on Rainelle and the immediate surrounding area.

3.8.1 Definition of Cultural Resources

Cultural resources are those aspects of the physical environment that relate to human culture and society, and those cultural institutions that hold communities together and link them to their surroundings. They consist of prehistoric and historic districts, sites, structures, artifacts, and other physical evidence of human activities considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Prehistoric and historic archaeological resources are locations where human activity measurably altered the earth or left deposits of physical remains. Typical environments in which archaeological resources can be found include rock shelters, terraces, floodplains, Native American burial mounds, and ridgetops. Architectural resources, which may include dams, bridges, and other structures having historic or aesthetic importance, generally must be older than 50 years to be considered for protection under existing federal cultural resource laws.

More formally, cultural resources are defined as historic properties covered by the National Historic Preservation Act (NHPA); as cultural items covered by the Native American Graves Protection and Repatriation Act (NAGPRA); as archaeological resources covered by the Archeological and Historic Preservation Act (ARPA); as sacred sites (to which access is provided) under the American Indian Religious Freedom Act (AIRFA) and under Executive Order 13007; as collections and associated records covered by 36 CFR Part 79, *Curation of Federally Owned and Administered Collections*; and as paleontological specimens (i.e., fossils) covered by the Antiquities Act and, if found in association with archeological resources, by ARPA.

3.8.2 Relevant Laws, Regulations and Directives

The ***National Historic Preservation Act (NHPA) of 1966, as amended,*** is the overarching law concerning the management of cultural resources in the United States. The law requires that each state appoint a State Historic Preservation Officer (SHPO) to oversee the management of cultural resources in that state, and it creates the Advisory Council on Historic Preservation (ACHP), which provides national oversight and dispute resolution. The SHPO is also designated as the repository for all cultural resource information in each state.

Under the NHPA, cultural resources undergo an evaluation process to determine whether a resource is eligible for listing on the National Register of Historic Places (NRHP). Resources that are already listed, determined eligible for listing, or are undetermined are afforded a level of consideration under the NHPA Section 106 review process. Undetermined resources are those for which eligibility cannot be determined based on current knowledge of the resource and where further work is needed to make an evaluation. In order to be determined eligible for listing on the NRHP, a resource must meet one or more of the following criteria (36 CFR 60):

- **Criterion A** – Associated with events that have made a significant contribution to the broad patterns of our history.
- **Criterion B** – Associated with the lives of persons significant in our past.

- **Criterion C** – Embodies the distinctive characteristics of a type, period, or method of construction.
- **Criterion D** – Yielded or may be likely to yield information important in prehistory or history. The resource must also retain most, if not all, of the seven aspects of integrity: location, design, setting, workmanship, material, feeling, and association.

The identification and evaluation of cultural resources for NRHP eligibility is the responsibility of the lead federal agency with the concurrence of the SHPO. The ACHP is an independent federal agency that administers the provisions of Section 106 of the NHPA regarding cultural resources, and has review and oversight responsibilities as defined in 36 CFR 800. Section 106 of the NHPA also addresses the appropriate process for mitigating adverse effects. The NHPA applies to federal undertakings and undertakings that are federally permitted or funded. It should be noted that the provisions of the NHPA refer only to cultural resources that are tangible properties, and that federal agencies are required by other statutes to consider impacts on traditional cultural and religious practices.

In addition to the NHPA, several federal laws and related policies have been enacted to protect and manage the Nation's cultural resources. These include:

- Antiquities Act of 1906
- Archeological Resources Protection Act (ARPA) of 1979
- Archeological and Historic Preservation Act (AHPA) of 1974
- Native American Graves Protection and Repatriation Act (NAGPRA) of 1990
- American Indian Religious Freedom Act of 1978 (AIRFA)
- Curation of Federally-Owned and Administered Archaeological Collections (36 CFR Part 79)
- Protection and Enhancement of the Cultural Environment (Executive Order No. 11593)
- Indian Sacred Sites (Executive Order No. 13007)
- Consultation and Coordination with Indian Tribal Governments (Executive Order No. 13175)
- Preserve America (Executive Order No. 13287)

DOE P 141.1, Department of Energy Management of Cultural Resources, aims at ensuring that cultural resource management is integrated into DOE's missions and activities, and to raise the level of awareness and accountability among DOE contractors concerning the importance of DOE's cultural resource-related legal and trust responsibilities. Specifically cited are DOE's responsibilities under all of the above referenced requirements (viz., NHPA, AHPA, ARPA, NAGPRA, and Executive Orders 11593, 13175 and 13007) as well as the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation, Standards and Guidelines for Federal Agency Historic Preservation Programs*, and *Standards for Rehabilitation* and *Guidelines for Rehabilitating Historic Buildings.* The policy states that DOE will uphold these laws by preserving, protecting and perpetuating cultural resources for future generations in a spirit of stewardship, and will implement management accountability for compliance with all applicable laws, treaties, orders and guidance.

3.8.3 Regional Context

This section characterizes relevant factors associated with the prehistoric and historic development of the region. Information contained in this section is summarized from two reports prepared in association with this EIS--the *Phase I Archaeological and Geomorphological Investigation of the Proposed Western Greenbrier Co-Production Plant* and the *Historic Resources Determination of Eligibility and Assessment* *of Effects, West Greenbrier Co-Production Demonstration Project* (see Appendix G, Cultural Resources Reports, for complete copies of these reports).

3.8.3.1 Prehistoric Context

The prehistory of West Virginia reflects the developmental patterns established for eastern North America. It shares similar cultural manifestations and demonstrates affinities with the general Appalachian region, but cultural relationships are most similar to those that characterize the Middle and Upper Ohio River zone.

The Paleo-Indian Period (10,000 To 8,000 B.C.)

Research to date indicates that the early prehistoric peoples did not extensively occupy the Central Appalachian Uplands. Therefore, it is unlikely that Paleo-Indian sites or artifacts, other than random surface finds, would be identified. Evidence of Paleo-Indian occupations in other areas of West Virginia (e.g., along the Kanawha and Ohio rivers) and surrounding states is more extensive.

The Archaic Period (8,000 To 1,000 B.C.)

The Archaic period is commonly divided into three subdivisions: the Early Archaic (8,000 to 6,000 B.C.), the Middle Archaic (6,000 to 3,000 B.C.), and the Late Archaic (3,000 to 1,000 B.C.).

Cultural developments during the *Early Archaic* period illustrate responses to dramatic climatic changes. Hunters and gatherers demonstrated their ability to adapt to these changes as witnessed by the emergence of a more broad-based subsistence economy and the development of new tool and projectile point technologies. Although significant quantities of Archaic artifacts have been recovered from the uplands of West Virginia, including sites in Kanawha and Braxton Counties, no stratified sites have been recorded or excavated in the western Greenbrier County area.

The *Middle Archaic* in West Virginia is generally placed between about 6,000 and 3,000 B.C. The period is characterized by a more intensive exploitation of diverse habitats (e.g., uplands, valleys, rivers, etc.) accompanied by the utilization of a wider variety of raw materials for tool production. The toolkit is also characterized by a dramatic increase in woodworking and plant-processing tools, including axes, adzes, celts, choppers, nutting stones, mortars, and pestles. The Hansford Site (46FA104), located on the Kanawha River in Fayette County, West Virginia, produced a series of projectile points that are considered typical of the Middle Archaic in the region.

The range for the *Late Archaic* in West Virginia extends from approximately 3,000 to 1,000 B.C. Hunting and gathering strategies similar to those of the Early and Middle Archaic continued through this period, but evidence suggests a shift toward more intensive exploitation of certain wild floral species. Diagnostic artifacts identified with the Late Archaic in West Virginia include a wide variety of notched and stemmed points. The Burnsville Reservoir surveys produced a substantial quantity of Late Archaic stemmed points.

The Woodland Period (1,000 B.C. To A.D. 1000)

Distinguished from the Archaic period by the appearance of ceramics and by an economy increasingly dependent on the exploitation of cultivated plants, the Woodland period represents a dramatic change from the broad-spectrum hunter/gatherer populations of the preceding period.

The Early Woodland period in West Virginia, dated between 1,000 B.C. and A.D. 100, is distinguished by the emergence of the Adena complex, which was centered in the Middle Ohio Valley and extended into the Kanawha River Valley of West Virginia. No Early Woodland mounds or sites are reported from the immediate vicinity, although several mound sites and rockshelters have been found in the New and Greenbrier valleys.

The Middle Woodland period lasts from approximately 100 B.C. to A.D. 600, while the Late Woodland period persisted between A.D. 600 to A.D. 1200. The Middle Woodland period is best known for the Hopewell Culture, which evolved from and superseded the Adena Culture. Hopewell is identified with the construction of extensive earthworks, large burial mounds, and elaborate mortuary practices. The distribution of goods indicates the presence of a sophisticated trade network and widespread stylistic influences. In West Virginia, the Upper Ohio Valley has the best-documented cultural sequence during these time periods. In southeastern West Virginia, a comparable sequence occurs in the Kanawha Valley and extends into southern and central West Virginia.

The Late Prehistoric and Contact Period (A.D. 1000 to A.D. 1780)

The Late Prehistoric period is characterized by the emergence of a fully horticultural subsistence system, augmented by seasonal hunting and gathering, the manufacture of shell-tempered pottery and the utilization of small triangular arrow points. The developmental trend to a nucleated settlement pattern is manifested in permanently occupied villages, which demonstrate a tendency to be fortified through time. However, the dominant Late Prehistoric groups of this region, the Monongahela and Fort Ancient cultures, lacked the complex settlement hierarchy that is characteristic of more culturally complex Mississippian populations to the south and west.

The Contact Period is marked by the presence of trade goods at Late Prehistoric archaeological sites. The presence of trade goods often only indicates limited, if not indirect, contact with European populations. Sites from this period reflect a continuation of Fort Ancient village patterns (i.e., fortified villages along major rivers) and a subsistence based on plant domesticates such as maize, squash, beans, and other cultigens, supplemented by hunting, fishing, and gathering. Principal trade items included glass beads, iron axes and ploughs, knives, and copper and metal ornaments.

3.8.3.2 Historic Context

Early Settlement and Frontier Forts (1700–1783)

During the early 1700s, central West Virginia, including present-day Greenbrier County, was used as a hunting ground by the Mingo, the Delaware, and other members of the Iroquois Confederacy, especially the Seneca, which was one of the largest and most powerful members of the Iroquois Confederacy. Along with the Seneca and other members of the Iroquois Confederacy, the Cherokee, headquartered in western North Carolina and eastern Tennessee, also claimed part of southern West Virginia.

The earliest European explorers to reach Greenbrier County was an expedition organized by Colonel Abraham Wood, a fur trader, and led by Captain Thomas Batts and Robert Fallum in 1671. The Batts-Fallum expedition reached present-day Alderson via a series of Indian trails and proceeded to cross the New River. European settlement of what is now Greenbrier County began in the 1720s and 1730s as immigrants from Pennsylvania and Virginia were encouraged by the British government and the Virginia assembly to settle in the fertile valleys west of the Allegheny Mountains.

In 1744, Virginia officials purchased the Iroquois title of ownership to West Virginia in the Treaty of Lancaster. The treaty reduced the presence of the Iroquois Confederacy in the state. In 1745, portions of present-day Greenbrier, Monroe, and Pocahontas counties were opened for settlement by the Greenbrier Land Company, which received a land grant for 100,000 acres (40,469 hectares). Settlers quickly moved westward, including Henry Baughman, namesake of Baughman's Fort, who received a grant for 780 acres (320 hectares) south and west of Alderson, near the mouth of Muddy Creek. Stephen Sewell (namesake of

Sewell Creek and Sewell Mountain) and Jacob Marlin founded Marlinton along the Greenbrier River in what is now Pocahontas County in 1749, and settlers moved into the Meadow River valley as early as 1758.

Between 1750 and the end of the Revolutionary War, western Virginia was marked by unceasing hostilities between the Euro-American settlers and various Indian tribes, which were either supported or encouraged by the French. Despite their defeat in the French and Indian War, many Indians continued to fight. The Shawnee chief Keigh-tugh-qua, or Cornstalk, led attacks on western Virginia settlements in present-day Greenbrier County. In order to secure their western defenses and continue to encourage settlement in the area, the Colonial government constructed a series of forts along major drainages. Only two forts were constructed in the vicinity of Greenbrier County during the French and Indian War. Baughman's Fort (or stockade), constructed near Alderson in Summers County at the mouth of Muddy Creek, was attacked by Indians during the summer of 1755. The other fort constructed at this time was Marlin's Fort, in present-day Marlinton (Pocahontas County), near the confluence of Knapp Creek and Greenbrier River.

Greenbrier County, Formation and Prosperity (1778–1860)

Greenbrier County was formed from Botetourt County in 1778. Initially, Greenbrier County extended from the present-day Virginia-West Virginia state line on the east to the Ohio River on the west, and included all or parts of Greenbrier, Monroe, Summers, Pocahontas, Fayette, Nicholas, Webster, Clay, Kanawha, Putnam, Roane, Jackson, and Mason Counties. As settlement continued and population increased, other counties were formed from the original county. The first courthouse was erected in Lewisburg in 1782, and it remains the county seat today.

Improved transportation routes were critical for moving the county's agricultural products to markets in the east. The fertile valleys of the area proved to be conducive to the growth of corn and other grain crops, and along with dairy cattle, sheep, and horses, the region quickly became an important source of food to support the ever-increasing industrial population along the east coast. In 1821, construction began on the James River and Kanawha Turnpike, and the route between Lewisburg and Charleston was completed by 1824. Today, US 60 closely follows the route of the old turnpike. The James River and Kanawha Turnpike helped to promote commerce, and Thompson's Tavern (Inn) was built in the 1830s just west of Rainelle.

The development of steam locomotion and the construction of railroads, beginning in the 1840s, proved to be the demise of overland turnpikes and canals. In 1855, Virginia authorized the construction of the Covington and Ohio Railroad across the Allegheny Mountains. It was decided that the railroad would be routed through Greenbrier County to serve White Sulphur Springs. Railroad construction was halted during the Civil War.

Civil War Years (1861–1865)

At the outbreak of the Civil War, Greenbrier County immediately raised troops for the defense of Virginia and the Confederacy. Although small skirmishes occurred in the eastern valleys, the whole of the county was largely untouched. However, by the winter of 1861 and 1862, more than 1,500 wounded Confederate soldiers were hospitalized at White Sulphur Springs. Between the spring of 1862 and late summer of 1863, Greenbrier County was the site of three battles. By June of 1863, Greenbrier County and the western counties of Virginia seceded from the Commonwealth of Virginia and formed the State of West Virginia, which maintained allegiance to the United States. The final battle within Greenbrier County is known as the Battle of White Sulphur Springs, or the Battle of Dry Creek, and occurred in August 1863.

Reconstruction Years (1865–1890s)

By 1873, the Chesapeake and Ohio Railroad had been constructed through Greenbrier County and other roads were rebuilt. During the first half of the reconstruction era, the county remained largely agrarian. Many farmers began the transition from grain crops to dairy farming and market gardening, in part as a response to infrastructural improvements. By 1880 the population in the county had grown to 15,000.

Despite efforts to rebuild the infrastructure of the region, economic recovery was slow. The farmers in Greenbrier County and elsewhere in the region sought alternative methods of income. The solution for many was to sell off their timber or their land to timber moguls. The timber industry began on a large scale as early as 1882 in some parts of the county, but within the project area the timber industry did not begin until the first decade of the twentieth century. Despite these new endeavors, Greenbrier County was still more than 80% agrarian into the 1890s.

The Economic Boom Years (1890s–1930s)

The industrial period from the late 1880s to the early 1910s saw a major transformation throughout the eastern United States. The initial transformation in West Virginia was triggered by a change in the lumber industry from small-scale local or portable saw mills that selected only the finest timber for cutting, to a huge factory-based industry that consumed entire forests within a few years and employed 100 people or more. The expansion of the railroad industry provided the impetus.

As the steel industry continued to grow rapidly in cities like Pittsburgh, Detroit, and Chicago, the demand for coal also increased, and as coalfields in Ohio and Pennsylvania were exhausted, new mines opened in West Virginia and Kentucky. To tap these new, high-quality coal reserves, it was necessary to expand the railroad network throughout the area. Consequently, numerous railroad and/or coal companies began to lay rail lines into West Virginia. This in turn allowed the timber industry to exploit the vast stands of yellow pine and mixed hardwoods that covered most of the Appalachian Plateau and the Allegheny Mountains.

The Chesapeake and Ohio Railroad (C&ORR) was the first company to construct new lines in the county. In 1896 and 1897, the C&ORR began surveying possible rail lines up the Greenbrier Valley, and construction began in the summer of 1899 for a line running from Caldwell in Greenbrier County to Marlinton in Pocahontas County. Rail service began in October of 1900, and by May of 1902 the line extended to Durbin at the north end of the valley. With the railroad infrastructure in place, the timing was right for the timber industry to take advantage of the virgin forests that covered much of the county. Within Greenbrier, Nicholas, and Fayette Counties, coal was not exploited on a widespread basis until the 1920s and early 1930s.

Rainelle and the Meadow River Lumber Company (1906–1970)

The early histories of Rainelle and the Meadow River Lumber Company (MRLC) are intertwined with the lives of Tom and John Raine. Tom Raine (1851-1933) and John Raine (1863-1940), both born in southern Ohio, had experience in both logging and railroads prior to starting the MRLC and the Meadow River Coal and Land Company (MRC&L) in 1906. The Raine's purchased 32,000 acres (12,950 hectares) of virgin hardwood forest (the Beury Tract) on Meadow River. The former owners believed the timber was inaccessible and did not envision any railroads extending service to the area for many years.

The MRLC and the MRC&L were chartered on June 6, 1906. The Raine brothers selected the site for the new mill and the town at the confluence of Wolfpen Creek and Sewell Creek, just upstream from the mouth of Sewell Creek and the Meadow River. Initially, the charter members were hopeful that the C&ORR would extend a railroad up the Kanawha Valley to the Meadow River basin that would connect with Ronceverte or Alderson, but after two years of waiting, the organization realized that it would be up to them to build a railroad into the middle of nowhere. Thus, their first order of business was to build a railroad feeder line to connect the mill to the existing C&ORR in Summers County. The feeder line, which extended about 21 miles (34 kilometers), was initially known as the Sewell Valley Railroad (SVRR). The feeder line ran from Meadow Creek Station, to Springdale, over Wallow Hole Mountain, and down Sewell Creek to Rainelle. Tom Raine undertook the construction of the railroad, while John worked a tract of land near Hillsboro Academy in Pocahontas County. Tom Raine also began work on the construction of the mill and the town. The Sewell Valley railroad was completed to Rainelle in 1910.

Construction of the town began in 1908 with the utilization of hemlock trees cut in proximity to the town site, and construction of the mill began in 1909. The mill, which had three six-foot bandsaws, was completed in 1910, and the first logs were cut on September 10, 1910. The principal tree species on company tracts included red and white oak, chestnut, hickory, poplar, maple, hemlock, bass, beech, cherry, and ash. Initially, the principal stock was rough lumber, but with time the mill expanded to accommodate stock of ties, flooring, siding, lath, and chair stock.

Eventually, the MRC&L land holdings grew to more than 125,000 acres (50,600 hectares) or nearly 200 square miles (500 square kilometers). Tom Raine later formed the Raine Lumber Company in 1916 and built a sawmill at Honeydew in Fayette County, which operated until 1923 under the supervision of his son J. W. Raine. The Raine Lumber Company also purchased a sawmill in Pocahontas County that operated between 1923 and 1928 on what is now Seneca State Park.

During the 1920s Tom Raine also became interested in the developing coal industry, and in 1921 he bought the Loop and Lookout railroad (L&LRR) and the SVRR from MRLC. He then proceeded to extend the SVRR to Glencoe and Duo, north of Rupert, and later extended lines to Nallen and Swiss to meet the New York Central (NYC). At the time he sold the SVRR to NYC in 1924, the Sewell Valley railroad was more than 100 miles (160 kilometers) in length. Eventually this rail line was operated as the Nicholas, Fayette, and Greenbrier railroad (NF&GRR). At the time of the sale, Tom Raine realized a profit of $3.75 million.

The town of Rainelle, which was incorporated in 1913, quickly earned a reputation for being one of the best hardwood mill towns in the United States. John Raine studied George Pullman's efforts to create a "model town" and reportedly built some of the finest company housing in the state. At the time the first houses were built, beginning around 1908-1910, each house was built with an eye toward comfort and sanitation. All the residences were two-story, frame houses with clapboard siding, a front porch and an enclosed rear porch/storage room. The houses were plastered and papered on the interior, and painted white on the exterior. The houses contained a living room, dining room, and kitchen downstairs, and two bedrooms and a bathroom upstairs. Each house had running water and most of the houses also had modern bathrooms, steam heat, and electricity. Each house had a lawn and garden, including a fruit tree, and in later years each was provided with a garage. The initial worker's houses were constructed in the area opposite the mill, south of US 60 and north of Wolfpen Creek. Housing for the foremen and officers of the company was constructed on the north side of US 60 opposite the worker's housing. Most of these original houses are still occupied today with few changes, save for the addition of vinyl or aluminum siding.

During the early 1910s, the company constructed a number of buildings in the original downtown area of Rainelle. The original downtown area started at the railroad depot, located on the south side of the intersection of Route 20 and US 60, and extended eastward along US 60. Adjacent to the railroad depot were the main corporate offices and company bank (owned by the Raine brothers), and next to the bank was the company store, which was razed within the last 20 years for construction of a gas station. The company also constructed the United Methodist Church at what was the east end of town in 1914. The Raine brothers built their personal homes on small hills on either side of the church. Tom Raine's house was built on the west side of the church and was torn down to construct the Rainelle Medical Center. John Raine's house, located on the east side of the church, is still occupied and little changed from the original.

With the growth of the various business enterprises, the company built more workers' housing on the hillside immediately east of John Raine's house and north of where the railroad tracks cross US 60. These houses, which are still occupied and relatively unchanged from the original, were very similar in style and size to the initial workers' houses on the west end of town. During the 1920s the company also built a hotel and restaurant, a post office, and a movie theater; and in 1923-1924, the company provided the land and the bricks to build a new high school, which today is used as the elementary school. By the end of the 1920s, MRLC employed nearly 500 workers, and production had increased from about 3 million board feet in 1910 to an average of over 30 million board feet in the late 1920s, or the equivalent of cutting nearly 3,000 acres (1,200 hectares) of virgin forest every year. By 1929, the MRLC shipped products to 26 states and several foreign countries, and was renowned as the "largest hardwood lumber mill" in the world.

However, mismanagement, inattention to shrinking markets, the lack of technological updates, and two labor strikes (1963 and 1969) proved too much for the company to overcome. In 1970 MRLC was sold to Georgia-Pacific, which operated the plant for about one year before it closed the mill, and the last lumber was shipped out of town in 1971. At the time the mill was sold, the number of board feet produced had dropped to 18,000 per year. The mill was razed by 1975, and cultural resource documentation was completed in 1984.

Growth of the "Smokeless" Coal Industry (1920–1960s)

Beginning in the 1920s, interest in the coal industry reached Greenbrier County and the surrounding region. Tom Raine extended the Nicolas, Fayette and Greenbrier (NF&G) Railroad to his property on Big Clear Creek, north of Rupert, in 1929, but the onset of the depression precluded mining the coal reserves in this area until 1932. In 1932 he formed the Raine Coal Company, and the company, under family ownership and supervision, continued to operate until 1959, when the company and property was sold to the Gauley Coal and Land Company.

The community of East Rainelle, which was founded in the 1910s and incorporated in 1921, was developed to accommodate the growing population of Rainelle. In the early years, East Rainelle, also referred to as "Slabtown" because the first houses were temporarily sided with "slabs" from a portable sawmill," was located east and south of Sewell Creek, primarily along US 60. During this time East Rainelle served as the business and commercial center for Rainelle and the surrounding area.

Beginning in 1921, the Greenbrier and Eastern (G&E) Railroad extended rail service to the Meadow River Valley area to exploit the low volatile, or 'smokeless,' coal supplies in the region. Many mines were opened in the Meadow River region after construction of this railroad, and additional mines were opened in the vicinity of Charmco, Quinwood, Duo, Clearco, and Anjean after the railroad was extended to the Big Clear Creek area in 1928-1929.

East Rainelle benefited from the development of the coal industry in the 1920s and 1930s, and the town's population eventually surpassed Rainelle. Between 1921 and 1950, the population of East Rainelle more than tripled from nearly 450 people in 1921 to nearly 1,700 people in 1950, whereas the population of Rainelle in 1950 was about half at 850 people. In 1969, Rainelle and East Rainelle were joined under the name of Rainelle. Today East Rainelle contains a mix of historic and modern homes, as does the well-defined commercial district along US 60, also referred to as Main Street in this area.

Leckie Smokeless Coal Company founded the town of Anjean and the Anjean coalmine in 1926. The coal company was founded by William S. Leckie and his brother Andrew F. Leckie, sons of Colonel William Leckie, who moved from Scotland to West Virginia in 1870. Anjean was named after Colonel

Leckie's wife Anna, and Andrew Leckie's daughter, Jean. The Leckie Smokeless Coal Company operated mines in West Virginia and Kentucky for 30-40 years, including the Anjean mine that operated from 1926 to 1954. During the height of the mining period, Anjean contained 100 houses and supported a mixed population of European Americans (67 percent) and African Americans (33 percent). Many of the mines in the area were re-opened in the late 1950s and 1960s under the name of the Royal Scot Coal Company.

End of an Era (1970–Present)

Prior to its sale to Georgia-Pacific, MRLC had sold many of its assets such as the railroads, the power plant and the Pioneer Hotel. When Georgia-Pacific purchased the remaining assets from MRLC in 1970, it also acquired the company housing. Georgia-Pacific immediately allowed the families to purchase their homes rather than continue to pay rent. Reportedly, over 80 homes were sold in this manner in the first year. Georgia-Pacific sold over 200 acres (81 hectares) of land on the fringes of town to prospective homeowners and developers, and they also sold many of the outdated businesses, such as the company bank, company store, and post office. Thus, the purchase of the MRLC by Georgia-Pacific turned a "company town" into just a "plain town." By 1975, the lumber mill was razed, the millpond was filled, and the railroad tracks serving the mill were removed.

Except for the company housing that still dominates the residential area west of WV 20 in Rainelle and on either side of US 60 west of the WV 20/US 60 interchange, only a few buildings remain from the original company town. Extant buildings include the former Fire Pump House (Greenbrier County Public Service District #2), the abandoned railroad depot, the former company bank (American Electric Power Company offices), the former high school (currently the elementary school), the United Methodist Church, and the John Raine house. Within recent years the company store, located next to the bank, has been razed, the Tom Raine house was torn down to build the Rainelle Medical Center, and in 1982 the Pioneer Hotel (formerly a theater) was closed and torn down due to a lack of clientele.

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3.9 Socioeconomics

This section describes the demographic and socioeconomic context of the project area in western Greenbrier County, including recent trends in population, housing, employment and income, and business and economy.

3.9.1 Population

The project area consists of small, rural communities scattered throughout valleys surrounded by mountainous terrain. The population of Greenbrier County was 34,453 in the 2000 Census (Table 3.9-1) with a density of 34 persons per square mile. Collectively, the municipalities of Rainelle, Rupert, and Quinwood contain 9 percent of the county population. Although the national population grew by 13 percent from 1990 to 2000, population growth in West Virginia and Greenbrier County remained essentially level, and each of the three municipalities in the project vicinity lost population during the decade. West Virginia ranked 37th in 2000 among all 50 states in population and 49th in population growth rate from 2000 to 2004.

Table 3.9-1. Comparative Population (1990 – 2000)

Area	2000 Population	1990 Population	Numeric Change 1990-2000	Percent Change 1990-2000
Rainelle	1,545	1,681	-136	-8.1%
Rupert	940	1,104	-164	-14.9%
Quinwood	453	559	-106	-19.0%
Greenbrier County	34,453	34,693	-240	-0.7%
State of West Virginia	1,808,344	1,793,477	14,867	0.8%
United States Total	281,421,906	248,709,873	32,712,033	13.1%

Source: U.S. Census Bureau, 2005a

Estimates of population change in Greenbrier County by the West Virginia University Regional Research Institute (RRI) from 2000 to 2010 range from a loss of 2 percent to a gain of less than 3 percent, depending upon whether conditions follow current trends or growth factors improve. The RRI's projections for population change from 2000 to 2020 range from a loss of 2 percent to a gain of 7 percent (RRI, 2005).

Population in the three municipalities has continued to decline since the 2000 Census. Although RRI does not prepare estimates below county level, the population in western Greenbrier County is projected to remain essentially stable or decline through at least 2010 due to the absence of strong commercial and economic centers nearby. The project area is located approximately 30 miles (50 kilometers) northwest of Lewisburg, the county seat, which had a population of 3,624 in 2000 and grew by only 26 people in the preceding decade. Charleston, WV, the closest Metropolitan Statistical Area (MSA) with a population of 251,662 in 2000, is located more than 75 miles (120 kilometers) to the northwest over mountainous terrain. The Charleston MSA ranked 147th by population among the 170 largest U.S. metropolitan areas in 2003 and grew by less than 1 percent from 1990 to 2000 (U.S. Census Bureau, 2005b).

The Greenbrier County Planning Commission (GCPC) indicated its concern about the trend toward an aging population in the county (GCPC, 1994). Between 1990 and 2000, the median age of the population in Greenbrier County increased from 37.3 years to 41.6 years. The median ages in Rainelle, Rupert, and Quinwood were 45.9, 42.0, and 39.8 years, respectively, in 2000, which were considerably higher than the median ages for West Virginia (38.9 years) and the United States (35.3 years) at that time. The three communities collectively lost 42 percent of their populations aged 20 to 29, while they gained 21 percent of their populations aged 60 to 69, between 1990 and 2000 (Koebel, et al., 2004). The GCPC attributed these trends both to an outflux of employment-aged individuals, due to the lack of suitable employment, and the influx of retirement-aged individuals attracted by the scenic resources, calm pace of life, and low cost of living in the region.

3.9.2 Housing

Housing characteristics in the project area and larger region are summarized in Table 3.9-2. Although local vacancy rates and the percentages of owner-occupied and renter-occupied housing units generally compared favorably with county and state statistics, the rates of housing construction since 1990 were generally lower in the three local municipalities than in the county as a whole. Also, except for Rupert, each of the local communities has a higher percentage of housing stock constructed before 1940 than the state and county averages. Local housing values and rental rates were considerably lower than in the county and state. Furthermore, average household sizes in the three local municipalities and in the county correlate inversely with median population age, such that the higher the median age, the lower the average household size. These factors point to the likely effects of the current trend in population aging, namely smaller households, fewer new homes built, and lower housing prices and rents.

Table 3.9-2. Housing Characteristics, 2000

Characteristic	West Virginia	Greenbrier County	Rainelle	Rupert	Quinwood
Housing Units	844,623	17,644	802	482	193
Vacancy Rate%	12.8%	17.4%	13.2%	16.6%	12.4%
Owner Occupied %	75.2%	76.6%	64.2%	76.1%	78.7%
Renter Occupied %	24.8%	23.4%	35.8%	23.9%	21.3%
% Units Built Since 1990	15.5%	17.6%	4.2%	7.8%	12.0%
% Units Built Before 1940	19.3%	18.9%	31.9%	10.8%	35.3%
Median Value (Owner-Occupied)	$66,000	$67,300	$37,700	$48,300	$30,000
Median Contract Rent	$311	$275	$192	$240	$210
Average Household Size	2.40	2.32	2.14	2.27	2.57

Source: U.S. Census Bureau, 2005a

With respect to housing characteristics, the Greenbrier County Strategic Comprehensive Development Plan update concluded that the overall availability of housing and rate of new construction appeared to be meeting current demand, but that significant increases in economic growth could affect housing demand in certain areas (GCPC, 1994). The plan also noted the increasing utilization of mobile homes and the need for greater regulation of this source of housing. Furthermore, the plan expressed concerns about housing stock that lacked adequate water and sanitary facilities. Among the housing goals and objectives for Greenbrier County, the plan called for:

- Encouraging major rehabilitation or demolition of substandard housing;
- Establishing uniform standards for mobile home parks and encouraging the replacement of existing single-wide mobile homes with more attractive units, including modular or manufactured housing, as practical;
- Retaining quality traditional residential neighborhoods;

- Encouraging development of planned housing communities, including multi-family housing in areas adjacent to potential economic development sites; and
- Encouraging development of public water and sewer services to meet current and future housing needs.

A recent study by the Virginia Tech Center for Housing Research reviewed housing issues in the western Greenbrier area. The study noted that much of the developed land is located in floodplains, and severe flooding damaged local homes and businesses in Autumn 2003. Following that incident, a total of 27 counties in West Virginia were considered eligible for assistance from the Federal Emergency Management Agency and Small Business Administration, and 6,131 applications were submitted. Applicants in Rainelle, Quinwood, and Rupert submitted 359 of the 470 applications that originated from Greenbrier County (Koebel, et al., 2004).

The Virginia Tech study investigated developable lands in the area and identified several sites in Rainelle and Rupert that may provide opportunities for future housing construction. The amount of developable land in Quinwood, however, was considered negligible. The study concluded that the slow demand for housing, coupled with affordability issues posed by limited local incomes as described further below, would make speculative housing construction unlikely. The study also noted that Rainelle has expressed an interest in pursuing grant funds from the U.S. Department of Housing and Urban Development for the construction of affordable housing, because the town does not have the resources to fund such projects independently. The study further concluded that the local communities inevitably must address the housing needs of an aging population by providing affordable independent and assisted living opportunities.

3.9.3 Employment and Income

Table 3.9-3 summarizes employment data for the local communities in comparison to the nation, state, and county. Although the local distribution by sector is generally comparable to the larger jurisdictions in diversity of employment, a few differences are notable. First is the significantly higher local employment in retail trade compared to the nation, state, and county. Second is the fact that the local communities are not participating in the higher employment by the entertainment sector (including tourism) experienced elsewhere in Greenbrier County. Third is the fact that the county and local communities rely less on mining for employment than does the state on average. Finally, as representative of the rural character of the region, the local communities have substantially less employment in professional and scientific fields than do the nation, state, or county. Furthermore, lower percentages of workers are employed in manufacturing for the state and region than nationally. The ten largest employers in Greenbrier County as of March 2004 (WVBEP, 2005) were:

- CSX Hotels, Inc. (The Greenbrier)
- Greenbrier County Board of Education
- Greenbrier Valley Medical Center
- Wal-Mart Stores, Inc.
- West Virginia Department of Highways
- ABB, Inc.
- Greenbrier Resort Management
- West Virginia School of Osteopathic Medicine
- Mullican Flooring
- Panhandle Support Services, Inc.

Table 3.9-3. Employment, 2000

Sector	United States	West Virginia	Greenbrier County	Rainelle, Rupert, Quinwood
Agriculture, Forestry, Hunting	1.5%	1.3%	4.1%	1.9%
Mining	0.4%	2.8%	1.5%	1.6%
Construction	6.8%	7.0%	8.0%	6.3%
Manufacturing	14.1%	11.9%	10.2%	10.0%
Wholesale Trade	3.6%	2.8%	2.4%	3.3%
Retail Trade	11.7%	13.1%	12.9%	17.1%
Transportation, Utilities	5.2%	6.0%	4.8%	7.7%
Information	3.1%	2.2%	1.2%	3.2%
Finance, Insurance	6.9%	4.6%	3.4%	3.9%
Professional, Scientific	9.3%	6.7%	4.0%	2.6%
Education, Health, Social	19.9%	23.0%	22.4%	22.7%
Arts, Entertainment, Food	7.9%	7.9%	14.4%	8.6%
Other Services	4.9%	5.0%	5.0%	7.3%
Public Administration	4.8%	5.8%	5.9%	3.8%
Total	100.0%	100.0%	100.0%	100.0%

Source: U.S. Census Bureau, 2005a

Virginia Tech researchers concluded that a key factor in the employment characteristics and future prospects of the western Greenbrier area is the limited educational attainment of the local population (Koebel, et al., 2004). Only 11 percent of the population aged 25 or older held associate's degrees or higher in 2000, while 35 percent had not completed high school .

As of March 2005, West Virginia had a seasonally adjusted unemployment rate of 5.2 percent, which was the 18th highest among all 50 states and the District of Columbia (BLS, 2005). The average unemployment rate for West Virginia in 2004 was the 23rd highest at 5.3 percent. Over the past 10 years, the unemployment rate in West Virginia has generally declined from a high of 8.3 percent in January 1996 to a low of 4.7 percent in January 2005. The rate rose above 6 percent in both 2002 and 2003.

Table 3.9-4 lists labor force statistics from the 2000 Census for the nation, state, county, and local communities. Of particular interest is the fact that a majority of the adult population in the local communities is out of the labor force. This condition emphasizes the trend toward local population aging. Also, the percentage of unemployed in the labor force was substantially higher locally than in the county, state, or nation. The Virginia Tech study further noted that approximately 35 percent of the working aged individuals in the local communities have disabilities affecting their employment (Koebel, et al., 2004).

Table 3.9-5 summarizes the commuting characteristics of local workers in comparison to those of the larger jurisdictions. The statistics indicate that commuters in the local communities tend to be more reliant on carpooling given the absence of public transport options. Also, the local communities have higher percentages of employees who do not commute. For those individuals who commute, the distributions of travel times indicate that individuals in the local communities generally have either shorter or longer commutes on average than workers in the larger jurisdictions. These statistics highlight the remoteness of the local communities and the fact that most individuals work close to home, but some travel very long distances to reach their places of employment.

Table 3.9-4. Labor Force Statistics, 2000

Characteristic	United States	West Virginia	Greenbrier County	Rainelle, Rupert, Quinwood
Population Aged 16 Years and Over	217,168,077	1,455,101	27,914	2,426
% In Labor Force	63.9%	54.5%	52.9%	41.0%
% Not in Labor Force	36.1%	45.5%	47.1%	59.0%
Labor Force	138,820,935	792,344	14,755	994
% Employed or in Armed Forces	94.3%	92.7%	91.5%	88.1%
% Unemployed	5.7%	7.3%	8.5%	11.9%

Source: U.S. Census Bureau, 2005a

Table 3.9-5. Commuting Statistics, 2000

Characteristic	United States	West Virginia	Greenbrier County	Rainelle, Rupert, Quinwood
Means of Commuting				
Drove Alone	75.7%	80.3%	80.6%	75.5%
Carpool	12.2%	12.7%	12.9%	16.4%
Public Transport	4.7%	0.8%	0.2%	-
Other Transport	1.2%	0.8%	0.6%	-
Walked or Worked at Home	6.2%	5.4%	5.7%	8.1%
Total	100.0%	100.0%	100.0%	100.0%
Travel Time				
Less than 15 min	29.4%	31.9%	35.8%	40.9%
15 min to 29 min	36.1%	35.3%	33.0%	20.0%
30 min to 44 min	19.1%	16.7%	16.1%	14.6%
45 min to 59 min	7.4%	7.1%	7.8%	12.6%
60 min or More	8.0%	9.0%	7.3%	11.9%
Total	100.0%	100.0%	100.0%	100.0%

Source: U.S. Census Bureau, 2005a

Incomes in the project area are generally low. Median incomes for individuals, families, and households in western Greenbrier County communities for the 2000 Census were lower than in the county as a whole, which had median incomes below those of the State (Table 3.9-6). Moreover, West Virginia ranked last among all 50 states in median household income in 1995 (U.S. DOC, 1998). Correspondingly, the region has very high poverty rates led by Rainelle, where nearly 29 percent of individuals had incomes below the poverty level compared with a state average of 18 percent and a national average of less than 13 percent. West Virginia ranked 8th among all states in the percent of individuals with incomes below the poverty rate in 1995 (U.S. DOC, 1998).

Table 3.9-6. Income, 1999

Characteristic	United States	West Virginia	Greenbrier County	Rainelle	Rupert	Quinwood
Income						
Median Family	$50,046	$36,484	$33,292	$26,528	$26,932	$24,196
Median Household	$41,994	$29,696	$26,927	$19,491	$20,250	$21,705
Per Capita	$21,587	$16,477	$16,247	$14,069	$11,554	$11,911
Below Poverty Level %						
Families	9.2%	13.9%	14.5%	23.8%	19.9%	22.9%
Households	11.8%	18.0%	19.6%	29.6%	25.7%	24.9%
Individuals	12.4%	17.9%	18.2%	28.7%	25.2%	26.9%

Source: U.S. Census Bureau, 2005a

3.9.4 Business and Economy

The Greenbrier County Strategic Comprehensive Development Plan update recognized the economic challenges in the region but concluded that the county had shown significant economic growth from 1970 to 1990 (GCPC, 1994). The plan acknowledged the trend in retail trade growth in the county and the fact that the retail trade sector generally provides low-wage jobs. The plan also envisioned that opportunities in manufacturing would hold the greatest potential for growth among all sectors. Growth in the manufacturing sector was viewed as offering the greatest potential for improvement in the local quality of life. Among the economic goals and objectives for Greenbrier County, the plan called for:

- Actively promoting the development of areas that are attractive for commercial ventures;
- Supporting the further development of the wood products industry throughout the county;
- Strongly encouraging the development of public infrastructure improvements as necessary to support economic development;
- Encouraging the conversion of existing buildings and the construction of new facilities to support manufacturing and other employment-generating operations.
- Encouraging the development of high technology manufacturing operations to increase the county's economic base.
- Strongly supporting the efforts of the Greenbrier Valley Economic Development Corporation to promote economic development throughout its service area.

The Region 4 Planning and Development Council (R4PDC), which serves five West Virginia counties including Greenbrier, concluded in its 2003-2007 Comprehensive Economic Development Strategy that the lack of marketable industrial and technology parks is the largest constraint to economic development in the region (R4PDC, 2003). Among the seven primary economic development centers identified in the strategy, two are located in Greenbrier County:

- Greenbrier Valley Economic Development Center
- Greenbrier Valley Airport Industrial Park

Both centers are initiatives of the Greenbrier Valley Economic Development Corporation. However, both of these economic development centers are located in the vicinity of Lewisburg, approximately 30 miles (50 kilometers) from the WGC project area. The R4PDC plan did not specifically address the potential for economic development in western Greenbrier County.

The Greenbrier Valley Economic Development Corporation (GVEDC) is a nonprofit organization created under Section 501(c)(6) of the Internal Revenue Code that aims to assist the needs of the business communities of Greenbrier, Monroe, and Pocahontas Counties, West Virginia. The GVEDC provides a variety of services to new and existing businesses, including business financing, general and technical assistance, site selection, and workforce development. In Greenbrier Valley Progress 2000+ (GVEDC, 2002), the GVEDC presented its vision for a public-private partnership to promote economic development in the three-county region and outlined the following key strategies:

- Retaining and expanding existing businesses through needs assessments and financial, technical, and marketing assistance;
- Recruiting new industries through promotional efforts, trade shows, I-64 corridor development initiatives, and developing site locations for buildings and technology parks;
- Developing the regional workforce in partnership with colleges and universities to attract new industries by establishing the training programs that can provide skilled workers;
- Cultivating private and corporate investors by providing investor relations, newsletters, and reports;
- Improving and showcasing quality of life by promoting local tourism and by supporting the implementation of a multi-county road infrastructure plan to upgrade transportation corridors; and
- Supporting the development of master planned residential communities and quality housing developments in partnership with real estate agencies and developers, and by enhanced relationships with regional planning and zoning authorities.

GVEDC owns the Western Greenbrier Industrial Park in Rainelle, which includes a 30,000-square foot (3,000-square meter) building on 34 acres (14 hectares) in proximity to the proposed WGC site. Funding for the park was obtained from sources including USDA Rural Development, a Governor’s Community Partnership Grant, and the Greenbrier County Commission (GVEDC, 2002).

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3.10 Environmental Justice

This section describes the context of minority and low-income populations in the planning area as a basis for determining whether the project might have a disproportionately high and adverse effect on such populations.

3.10.1 Background

Executive Order 12898 provides that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations" (The White House, 1994). In its guidance for the consideration of environmental justice under NEPA, the Council on Environmental Quality (CEQ) defines a "minority" as an individual who is American Indian or Alaskan Native, Black or African American, Asian, Native Hawaiian or Pacific Islander, Hispanic or Latino. CEQ characterizes a "minority population" as existing in an affected area where the percentage of defined minorities exceeds 50 percent of the population, or where the percentage of defined minorities in the affected area is meaningfully greater than the percentage of defined minorities in the general population or other appropriate unit of geographic analysis. The CEQ guidance further recommends that low-income populations in an affected area should be identified using data about income and poverty from the U.S. Census Bureau (CEQ, 1997).

With respect to environmental justice analysis for the WGC project, the "affected area" is considered to include the neighborhoods closest to proposed sites for facilities. The "appropriate units of geographic analysis" for the project are considered to be the smallest census units for which demographic data about minorities and incomes are available from the Census Bureau. Also, the "general population" is considered to include the local communities in the vicinity of proposed facilities, as well as Greenbrier County, West Virginia, and the United States.

3.10.2 Minority Populations

Table 3.10-1 summarizes the minority compositions of the local communities, Greenbrier County, West Virginia, and the United States from the 2000 census. The table indicates that the populations in the county and state are far more homogeneous ethnically than the population of the United States; the populations in the local communities are even more so. The potential Co-Production Facility site is located in Census Tract 9503, Block Group 3, Block 3078. The minority composition of this block (less than 5 percent) is essentially the same as that of the larger Block Group 3. The minority compositions of these smaller census units are also comparable to the compositions in the local jurisdictions. Therefore, a "minority population" as characterized by CEQ does not exist in the affected area of the project.

3.10.3 Low-Income Populations

A comparison of incomes in the WGC project area and in the local jurisdictions is described in Section 3.9 (Socioeconomics). Table 3.10-2 summarizes the poverty rates in the local communities, Greenbrier County, West Virginia, and the United States from the 2000 census. The table indicates that the state and county have significantly higher percentages of families, households, and individuals with incomes below the poverty level than does the United States as a whole. Furthermore, the poverty rates in Rainelle, Rupert, and Quinwood are even higher than those in Greenbrier County, but the poverty rates in the proposed project area (Census Tract 9503, Block Group 3) are comparable to the rates in the three communities. Therefore, in comparison to the state and county, the local communities in western Greenbrier generally have relatively large low-income populations. However, the population in the smallest census unit for which poverty data is available and in which the proposed power plant would be located has poverty rates that are comparable to those of the larger local communities in the vicinity.

Table 3.10-1. Composition of Populations

Area	White Alone	Black or African American	Hispanic or Latino	Other Defined Minorities
Tract 9503, BG 3, Block 3078	96.2%	0.0%	1.0%	2.8%
Tract 9503, BG 3	96.6%	0.8%	0.5%	2.1%
Rainelle	96.6%	0.7%	0.6%	2.0%
Rupert	96.9%	1.3%	0.7%	1.1%
Quinwood	94.5%	2.5%	0.9%	2.1%
Greenbrier County	94.7%	3.0%	0.7%	1.5%
State of West Virginia	94.6%	3.1%	0.7%	1.6%
United States	69.1%	12.1%	12.5%	6.1%

Source: U.S. Census Bureau, 2005

Sewell Landing is a USDA Rural Development apartment complex on Pennsylvania Avenue in Rainelle that contains 52 rental units (36 one-bedroom units and 16 two-bedroom units) located within 1,500 feet (460 meters) east of the proposed power plant site. USDA has classified the complex as a moderate-income housing facility with income limits to qualify for tenancy ranging from $28,250 for an individual to $34,750 for a family of three to $48,350 for a family of eight (USDA RD, 2005). As indicated in Table 3.9-6 previously, the median incomes of individuals and families in Rainelle and throughout Greenbrier County are below the qualifying income limits for Sewell Landing Apartments. Hence, the majority of individuals and families in Rainelle and throughout Greenbrier County could qualify for tenancy in the complex.

Table 3.10-2. Poverty Rates

Area	Percentage of Incomes in 1999 Below Poverty Level		
	Families	Households	Individuals
Tract 9503, BG 3	21.8%	27.9%	27.3%
Rainelle	23.8%	29.6%	28.7%
Rupert	19.9%	25.7%	25.2%
Quinwood	22.9%	24.9%	26.9%
Greenbrier County	14.5%	19.6%	18.2%
State of West Virginia	13.9%	18.0%	17.9%
United States	9.2%	11.8%	12.4%

Source: U.S. Census Bureau, 2005

3.11 Land Use

This section describes land uses that may be affected by Proposed Action. The regions of influence for assessing the potential impacts on land uses include the communities and local environs of Rainelle, Anjean, Green Valley, and Donegan. Existing land uses were determined from aerial photography and site visits. Planned land uses were assessed from discussions with local government officials and by using information available in the Greenbrier County Strategic Comprehensive Development Plan (1994), the 2003-2007 Comprehensive Economic Development Strategy for Region 4, and a housing analysis prepared by Virginia Tech for the Greenbrier Housing Authority.

3.11.1 Existing Land Use

3.11.1.1 Rainelle

Rainelle is located near the western border of Greenbrier County in southeastern West Virginia, within the Appalachian Plateau Physiographic Province. The surrounding topography varies from narrow valleys, to rolling hills, to wooded ridges and rocky terrain. Greenbrier County is predominantly rural with principal development located along US 60 and I-64, especially in and around Lewisburg, which is the most populous city in the county, located approximately 30 miles (50 kilometers) southeast of Rainelle.

The proposed power plant site comprises approximately 23 acres (9 hectares) of undeveloped land south of Sewell Creek, which includes a ridge associated with Sims Mountain (see Figure 2.2-3). A planned EcoPark for industrial use is located immediately northwest of the project site and north of Sewell Creek. The EcoPark area consists of approximately 20 acres (8 hectares) of vacant land formerly owned by the Meadow River Lumber Company (MRLC). When the MRLC was running, operations consisted of a sawmill and lumberyard on the site, including former log ponds that have been filled and are now grassy fields. A rail line owned by CSX Transportation (CSXT) parallels WV 20 and Sewell Creek southwest of Rainelle and continues northeast through the town. A former railroad engine maintenance facility is located southwest of the planned EcoPark between WV 20 and Sewell Creek. The proposed power plant site can be accessed from the east through a gate at the end of Glinton Avenue. The planned EcoPark can be accessed via a side road from WV 20 and Tom Raine Drive.

The project site slopes gently toward Sewell Creek, which flows in a northeasterly direction and drains into the Meadow River, approximately 1.5 mile (2.4 kilometers) downstream (floodplains are described in Section 3.5). The majority of the power plant site drains to the northwest into Sewell Creek, while a smaller portion drains to the east into an unnamed tributary of the creek. The power plant site consists of vacant upland areas with smaller wetland areas along Sewell Creek (wetlands are described in Section 3.7). The north end of the adjacent ridge was truncated during a prior aborted development project and is now mostly devoid of trees.

Rainelle supports a variety of recreational, industrial, commercial, and residential land uses. Most of the residential and commercial uses are located along the US 60/WV 20 corridor, including Main Street in Rainelle. Figure 3.11-1 illustrates the land uses in the vicinity of the proposed power plant site. Residential uses, including a mobile home park, an apartment complex, and a nursing home, are located along or near (within 1,000 feet [300 meters]) the proposed power plant site's eastern boundary. Commercial land uses, including a small shopping center and a US Army Reserve Center, border the site to the north. A small cluster of homes is located approximately 2,000 feet (600 meters) northwest of the site and includes a small neighborhood park in the southern corner of the cluster. The Rainelle Elementary School and Rainelle Medical Center are located north of the juncture of US 60 and WV 20 approximately 2,000 feet (600 meters) of the site.

An existing power transmission corridor generally parallels the edge of Greenbrier County along the border with Fayette County. The corridor traverses undeveloped wooded ridges northwest of Rainelle. The Rainelle Sewage Treatment Plant (RSTP) is situated at the confluence of Sewell Creek and Meadow River, in the northern part of Rainelle.

3.11.1.2 Anjean/Joe Knob

The Anjean coal refuse site (see Figure 2.2-16) is located just east of the small community of Anjean (approximately 14 miles east of Rainelle) and is situated in a mountainous area off of CR 1. A few miles north of Anjean, CR 1 becomes a narrow and hilly single-lane road; hence, the community is relatively isolated from commercial areas. The community consists of a few scattered residential properties along CR 1. The coal refuse site is surrounded by essentially undeveloped land that was historically used for coal mining.

Joe Knob is located east of Anjean along a ridge top approximately 2 miles (3 kilometers) driving distance from the Buck Lilly pile, and is therefore, even more isolated from any residential or commercial areas (see Figure 2.2-16) than Anjean. Joe Knob is accessed through the same haul road that is used to access the Anjean mining area. Because Joe Knob is in close proximity to Anjean, both of these areas exhibit similar traits, including mountainous terrain and isolation from any sensitive receptors. Joe Knob has been fully reclaimed and is currently managed by Mead-Westvaco.

WGC has identified three candidate sites for a new prep plant to process the coal refuse from Anjean and Joe Knob (see Figure 2.2-15 and Section 2.4.4.2). As shown in Figure 2.2-16, AN1, AN2, and AN3 are all located within or adjacent to the Anjean mining area. The general area description for these sites is similar to that used to describe the Anjean coal refuse site – namely, isolated with only a few scattered residential areas on CR 1. AN1 is located inside the Anjean entrance, near CR 1. The property is currently managed by WVDEP and is being used for treatment/settling ponds to manage some of the runoff from the Anjean site. AN2 is located on CR 1, across the road from the Anjean entrance and from a set of abandoned buildings associated with mining activities in the past. The property is owned by Mead-Westvaco and is located on disturbed land that includes an abandoned rail line and a gravel road, most likely a maintenance road used for the rail line in the past. CR 1 and a small hill abut the site to the east and west, respectively. AN3 is located on the access haul road in the southeastern corner of the Buck Lilly coal refuse pile. The site is heavily disturbed and graded and is owned by Western Greenbrier Business Development Corporation (WGBDC). WVDEP equipment was observed to be scattered across the site.

3.11.1.3 Green Valley

The Green Valley coal refuse site (see Figure 2.2-17 in Chapter 2) is located in southern Nicholas County off of WV 20. The site is situated just northeast of the small community of Green Valley, approximately 12 miles (20 kilometers) driving distance from Rainelle, and is surrounded by essentially undeveloped land that was historically used for coal mining. The Green Valley community consists of a few houses.

At this time only one candidate site (GV) has been identified for a new prep plant to process the coal refuse from Green Valley (see Figure 2.2-15 and Section 2.4.4.2). As shown in Figure 2.2-17, GV is located along the southern border of the coal refuse pile and parallel to Hominy Creek. The land is disturbed and heavily vegetated. Colt Branch is located in the southeast corner of the pile and was purposely diverted to go around the toe of the coal refuse pile. The property is owned by a subsidiary of Massey Energy, which is still actively mining parts of the Green Valley mining area. An active rail line, used to haul coal, borders the property to the north.

3.11.1.4 Donegan

The Donegan coal refuse site (see Figure 2.2-9) is located in southeastern Nicholas County approximately 26 miles (42 kilometers) driving distance from Rainelle and 13 miles (21 kilometers) north of Anjean on a single-lane road, CR 39/14 (CR 1 in Greenbrier County). The site is situated just east of the small community of Jetsville and is surrounded by essentially undeveloped land that was historically used for coal mining. The Jetsville community is characterized by a few houses.

Two candidate sites (DN1, DN2) have been identified for a new prep plant to process the coal refuse from Donegan (see Figure 2.2-15 and Section 2.4.4.2). As shown in Figure 2.2-18, DN1 is located on CR39/14, near the northwest corner of the coal refuse pile. Most of the land is heavily disturbed and graded and includes a gravel road and an abandoned building. The property is currently being held by the state for tax recovery. Two settling/treatment ponds are located east and north of the site. The Donegan site is in a highly remote area and no residential properties were observed within at least a mile (1.6 kilometers) of the site. DN2 is located on private property and aerial photography indicates that the land is disturbed. It is assumed that this property may have been used for agricultural purposes in the past. A few residential properties are located on CR1, approximately half a mile (1 kilometer) north of DN2, while the site is directly adjacent to a house, which is assumed to be the property owner's residence.

3.11.2 Local Zoning

3.11.2.1 Rainelle

Rainelle does not have a municipal zoning ordinance, and there is no zoning ordinance applicable to the Meadow Bluff District of Greenbrier County in which Rainelle is located. However, properties in Rainelle are subject to the Greenbrier County floodplain ordinance, which requires a building permit and the completion of a floodplain determination before any building or structure is constructed, improved, or relocated in the county. The ordinance also establishes minimum standards for structures to be located within a floodplain.

3.11.2.2 Anjean, Green Valley, and Donegan

Anjean is an unincorporated area in Greenbrier County for which there is no zoning ordinance. Green Valley and Donegan are located in unincorporated areas of Nicholas County for which there are no zoning ordinances.

3.11.3 Local and Regional Land Use Plans

In Greenbrier County, land use plans and zoning regulations are in effect only in the tax districts of Lewisburg and Fort Springs. The Greenbrier County Planning Commission (GCPC) is comprised of public officials and volunteers from the community who are appointed by the Planning Commission. The commission updated the Greenbrier County Strategic Comprehensive Development Plan in 1994, which addressed the topics of population, housing, transportation, economic development, community facilities, and land use (GCPC, 1994). The plan outlined broad goals and objectives relative to these topics, but it did not establish objectives for specific locations within the county. With respect to land use, the goals and objectives of the plan include:

- Encouraging the development of reasonable land use regulations that are compatible with local character and accurately reflect the desires of the citizenry.
- Discouraging development patterns that are incompatible with local character and that reduce the quality of life.

- Promoting economic growth and efficient land use.
- Utilizing land use planning to encourage consistency and positive growth patterns, and to discourage haphazard growth patterns.
- Encouraging planned zoning areas to promote positive development, while ensuring environmental protection.
- Promoting the utilization of scarce and limited lands to provide employment opportunities, while protecting the rural quality and natural beauty of the county.

The plan also proposed the following land use categories for future planning in the county, although these categories have not yet been mapped to particular land areas:

- The RC-1 category was proposed for areas that do not have full development potential due to topographic limitations or lack of public utilities. Such areas would be suitable for low density residential and convenience commercial uses that preserve the rural character of the lands.
- The RC-2 category was proposed for areas that are slightly more suitable for development than RC-1.
- Residential districts were proposed for areas within reasonable proximity of population centers that can support single family and multi-family housing.
- Commercial districts were proposed for areas that can meet local and regional needs for safe and convenient commercial uses and the creation of employment opportunities.
- Industrial districts were proposed for areas suitable to provide orderly economic development and employment opportunities by expanding the industrial bases.
- Industrial Unlimited districts were proposed for areas that can support more intensive industrial uses, such as quarries and mining.
- Planned Unit Development districts were proposed for areas that have unique development potential and can offer flexibility from traditional regulatory mechanisms applicable to individual lots.

Greenbrier County is also included among five counties in the 2003-2007 Comprehensive Economic Development Strategy (CEDS) by the Region 4 Planning and Development Council (R4PDC) based on research financed under the Appalachian Regional Development Act of 1965. CEDS was intended to comply with the West Virginia Regional Planning and Development Act of 1971 and to meet the United States Economic Development Administration's requirement for a Comprehensive Economic Development Plan. The plan was developed from studies on economic, social, environmental, physical and governmental conditions in the region and is intended to guide economic development activities for the region. Within Greenbrier County, the Greenbrier Valley Economic Development Center and the Greenbrier Valley Airport Industrial Park were identified as primary growth/economic development centers due to increased economic activity around I-64 near Lewisburg (R4PDC, 2003). CEDS' Development Council works in conjunction with other local economic development authorities, including the Greenbrier Valley Economic Development Corporation (see Section 3.9 "Socioeconomics").

Another development plan that could potentially affect Greenbrier County is the Master Land Use Plan currently being developed for each of West Virginia's counties. Based on Senate Bill 603 enacted in 2001 by the West Virginia Legislature, this plan proposes to give counties the opportunity for input on how post-mining land is reclaimed. The master plan is a voluntary plan created by the county with the support of the Office of Coalfield Community Development through the Nick J. Rahall II Appalachian Transportation Institute at Marshall University. Its intended purpose is to provide an analytical tool for land development by determining land and infrastructure needs within jurisdictions, with the focus on surface mine sites as potential locations for economic development. In Greenbrier County, a steering committee was appointed by the county's Planning Commission to study mining sites within the county and to rate their potential for future development. The committee studied over 50 mining sites and selected ten that were best suited for future development based on criteria such as accessibility for transportation and proximity to floodplains, waterways, and public lands.

3.11.3.1 Rainelle

Rainelle does not have a municipal planning commission. Planning commissions are not required under West Virginia law, and they are not common in small municipalities such as Rainelle. Instead, planning issues and land use development projects are initiated through the town council.

The Center for Housing Research at Virginia Tech completed a housing study for the Greenbrier Housing Authority in May 2004. The report noted that Rainelle has identified two main sites for new housing in anticipation of the proposed project (Koebel, 2004). The first site is located just north of Rainelle's elementary school and is owned by the city. The site consists of an 8.5-acre (3.4-hectare) tract that lies at the foot of a hill with gentle slopes. The second site is located on the east side of the ridge that abuts the project site and is privately owned. The report indicated that for this site to be developable, significant blasting of the ridge would be required and construction of a bridge may be needed to provide access to the housing. The report also identified smaller areas for potential housing opportunities in other areas of Rainelle and various locations in the vicinity of Rupert.

3.11.3.2 Anjean, Green Valley, and Donegan

Comprehensive land use plans have not been prepared for the lands surrounding the coal refuse areas. However, any development of the areas would most likely be facilitated by removal of the coal refuse.

3.12 Utilities and Community Services

This section describes the utilities and community services within the vicinity of the proposed Co-Production Facility and coal refuse sites, including public utilities for water, wastewater, electric, and communication and services for solid and hazardous wastes, emergency response services, education, and health.

3.12.1 Water Supply

The Rainelle public water supply system serves approximately 2,000 people and is comprised of two active wells, one inactive well, a finished-water storage tank, treatment works, and approximately 870 service connections (BPH, 2003a). The Rainelle Water Department is located south of US 60, as shown in Figure 3.12-1. Well No. 6, which was constructed in 1984, is the primary source of drinking water and is located approximately 500 feet (150 meters) west of the treatment plant. The well is approximately 200 feet (60 meters) deep and is cased and grouted to approximately 75 feet (23meters). A pump, rated at 450 gallons per minute (gpm) (1,700 liters per minute), delivers water to the plant (BPH, 2003a). Well No. 3, which was constructed in the 1950s, is the secondary well and is located approximately 700 feet (200 meters) east of the treatment plant. This well is approximately 130 feet (40 meters) deep with a 230 gpm (1,000 liters per minute) pump that delivers water from the well to the plant.

According to a Susceptibility Report issued in April 2003 by the West Virginia Bureau for Public Health (BPH), the water supply wells are pumped an average of 200,000 gallons per day (800,000 liters per day), and the overall integrity of the wells meet the Safe Drinking Water Act (SDWA) standards (BPH, 2003b). The aquifer is determined not to be Ground Water Under the Direct Influence (GWUDI) of surface water. GWUDI is defined as any water beneath the surface of the ground that has: (1) significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as Giardia lamblia; or (2) significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to weather or surface water conditions.

Within the estimated 1,588 acres (643 hectares) that lie in the wellhead area, approximately 24 land uses exist that are considered high threats for ground water contamination (BPH, 2003b). In general, the 2003 BPH report determined that the wells that supply the drinking water to the Rainelle Water Department are deemed to have a "moderate susceptibility to contamination" due to the sensitivity of the aquifer from which the drinking water wells are located, and the existence of several potential contamination sources within the protection zone (BPH, 2003b).

In May 2002, the Source Water Assessment and Protection Program (SWAPP) report was submitted to BPH, in accordance with the SDWA. The SWAPP report evaluated water quality data from treated drinking water and the untreated water at the source for years 1982 through 2000. The report concluded that "regulated inorganic, nitrate, and radiological finished water quality results were within the acceptable levels;" however, the SWAPP assessment noted that barium levels have been sporadically elevated since the 1980s, and that sodium, iron, and manganese levels have been elevated, especially from the late 1980s through the late 1990s (GFI, 2002). No speculation was made on the cause of rising sodium, iron, and manganese levels in the SWAPP report.

In November 2003, a sanitary survey of the drinking water treatment conducted by BPH indicates that Well No. 6 has shown a fluctuation in iron and manganese content over the past couple of years prior to publication of the report (BPH, 2003a). The iron content in Well No. 3 was reported as being considerably lower than in the primary well; however, the sanitary survey report indicated that Well No. 3 is used primarily as an emergency backup for the drinking water supply, and a consistent long-term supply from this well was not available (BPH, 2003a).

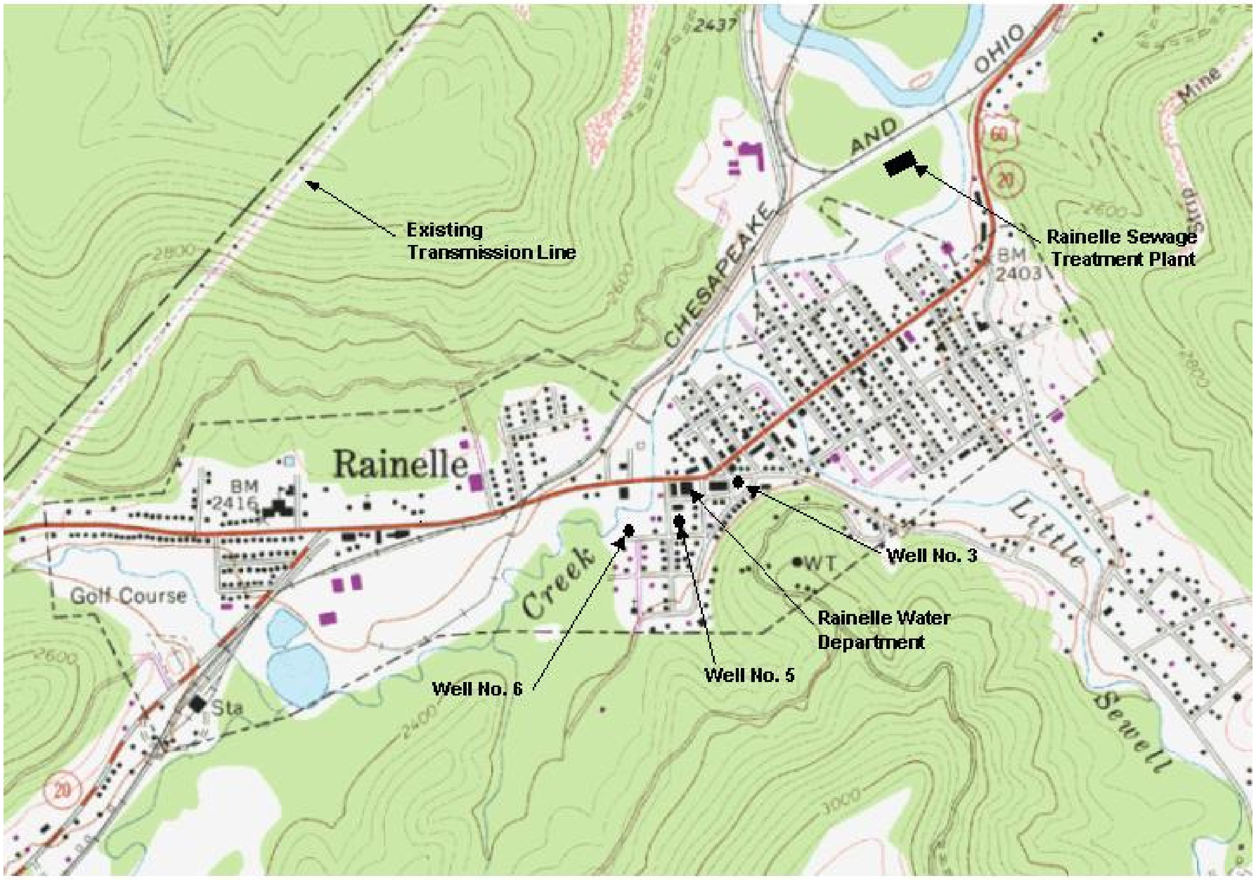

Figure 3.12-1. Utility Services – Rainelle, WV

Raw water from the two primary water supply wells enter the treatment plant. Treatment consists of disinfection with chlorine gas, pH adjustment, greensand filtration, and fluoridation. Water quality monitoring at the treatment plant includes analyses for iron, manganese, pH, hardness, alkalinity, fluoride, and free chlorine residual, as well as various contaminants for the analyses of finished water quality. The sanitary survey concluded that the Rainelle water plant was in compliance with SDWA requirements (BPH, 2003a).

3.12.2 Wastewater

The Rainelle Sewage Treatment Plant (RSTP), also referred to as Greenbrier County P.S.D. #2, collects and treats Rainelle's wastewater and discharges the treated effluent into the Meadow River. The RSTP has a hydraulic design capacity of 1.3 million gallons per day (MGD) (5 million liters per day) and routinely processes between 0.6 and 1.0 MGD (2 to 4 million liters per day) of municipal waste (RSTP, 2004a). Flows that would exceed the design flow capacity of 1.3 MGD (5 million liters per day) would be by-passed directly to the receiving stream to prevent solids washout or damage to the treatment system.

The RSTP's outflow varies seasonally, and is generally at its lowest flow rate during the mid to late summer season and at its highest between late fall and early spring. Fluctuations in seasonal flow rates are related to seasonal variations in precipitation that affect the rates of infiltration/inflow into the sewage collection system. The average daily flows during the summer vary from 0.4 to 0.6 MGD (1.5 to 2 million liters per day) and flows during the winter vary from 0.8 to 1.0 MGD (3 to 4 million liters per day) (RSTP, 2004a). Figure 3.12-2 exhibits available effluent data provided by the RSTP and illustrates the plant's monthly average flow rates for the years 2001, 2002, and 2003 (RSTP, 2004b). During this period, the lowest average flow rate occurred in September 2002, with a monthly average of 0.525 MGD (2.0 million liters per day), and peaked in November 2002 with a monthly average of 1.147 MGD (4.3 million liters per day).

The RSTP process consists of extended aeration oxidation ditches, mechanical aerators, and clarifiers to separate the solids from the wastewater and then return the effluent to the aeration for additional oxidation. An aerobic digester is used for additional reduction of biodegradable solids and to increase the percentage of solids that are dewatered in a belt filter press. The sewage sludge is applied to WVDEP-approved land application sites.

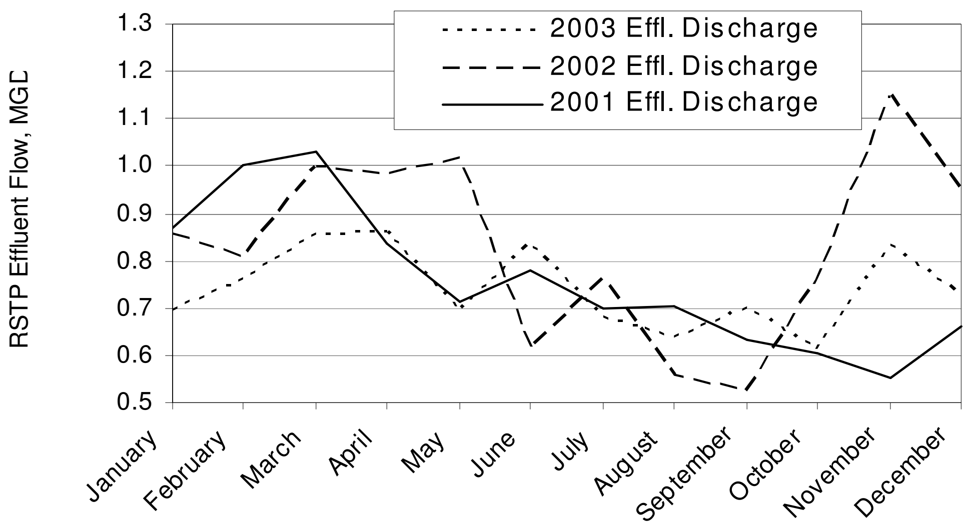

Figure 3.12-2. RSTP Monthly Average Effluent Discharge for 2001, 2002, and 2003

Source: RSTP, 2004b

In order for WVDEP to establish allowable daily levels for the plant's effluent discharge, effluent metals monitoring was performed May 1, 2000 through August 31, 2000 and is summarized in Table 3.12-1. Currently, the RSTP's discharge permit requires only copper and lead to be monitored and reported.

Table 3.12-1. RSTP Effluent Metals Monitoring (May 1, 2000 to August 31, 2000)

Metal	Average (mg/L)	Min (mg/L)	Max (mg/L)	Permit Limits Daily Max (mg/L)
Zinc	0.059	0.0171	0.38	N/A
Copper	0.0094	0.0053	0.017	0.0166
Lead	0.00095	0.0006	0.0038	0.0033
Silver	0.0003	0.0003	0.0004	N/A
Arsenic	Not Detected			N/A
Cadmium	Not Detected			N/A
Mercury	Not Detected			N/A

Source: REI Consultants, Inc., 2000

Based on data provided by the RSTP, Table 3.12-2 summarizes the monthly averages of flow parameters over a five-month period (September 2003 through January 2004). The copper limit was exceeded on June 26, 2000, and lead on May 1, 2000.

Table 3.12-2. RSTP Flow Characteristics - Monthly Averages (Sept 2003- Jan 2004)

Month	Plant Flow (MGD)	Influent BOD_5 (mg/L)	Effluent BOD_5 (mg/L)	Influent TSS (mg/L)	Effluent TSS (mg/L)	Effluent pH	Effluent Temperature (^oC)
September	0.70	122	2.3	113.0	4.8	7.16	17.8
October	0.61	146.2	2.6	156.4	6.6	7.11	14.6
November	0.83	59.0	2.8	104.3	4.5	7.14	13.0
December	0.73	87.2	3.6	84.2	6.2	7.08	9.5
January	0.73	85.5	4.3	98.0	8.0	7.16	6.3

Note: BOD_5 – 5-day biochemical oxygen demand, TSS – total suspended solids; Source: RSTP, 2004c

3.12.3 Electric

West Virginia is among one of several states represented in the East Central Area Reliability Coordination Agreement (ECAR), which is one of ten Regional Reliability Councils comprising the North American Electric Reliability Council (NERC). NERC was formed by the electric utility industry in 1968 to promote the reliability of bulk power supply in the electric utility systems of the United States and Canada. PJM is the regional transmission organization that operates the transmission system in the Mid-Atlantic area in which the subject transmission lines are located.

There are 15 regulated private electric utilities in the state of West Virginia, three of which generate electric power, while the rest are solely transmission and distribution companies. American Electric Power (AEP) is one of the electric companies providing services in the part of Greenbrier County that includes Rainelle. In January 2001 the Public Service Commission of West Virginia (PSC) issued a report that forecasts the supply-demand for electrical energy during a 10-year period (winter 2000-2001 through summer 2010) in the ECAR area. The report concluded that neither the utility companies nor the PSC anticipate that demand will exceed installed capacity or planned supply purchases in the forecast period; however, the report indicated that the projected gap between planned capacity and demand is decreasing both regionally and nationally, which could result in an increase in the probability of electrical shortages (PSC, 2001). The report projected that, in general, peak electric demand is anticipated to increase over the forecasted period at approximately 1.7 percent per year.

As shown in Figure 3.12-1, a power transmission right-of-way (ROW) for an existing 69 kV transmission line extends from Rainelle in a northeastern direction along the western boundary of Greenbrier County. The ROW is approximately 4,000 feet (1,200 meters) northwest of the plant site. The ROW is currently owned and operated by AEP and consists of wooden utility poles that, depending on the topography, vary from 40 to 45 ft (12 to 14 meters) in height (Neely, 2005). The transmission line continues northeast for approximately 7 miles (11 kilometers) from the project area before it reaches the McClung substation just south of Quinwood (see Chapter 2, Figure 2.4-9 – Corridor Options). The line then continues north for approximately 11 (18 kilometers) before it reaches the Grassy Falls substation. The total length of the transmission corridor, from Rainelle to the Grassy Falls substation, is approximately 18 miles (29 kilometers).

3.12.4 Telecommunications

Verizon West Virginia, Inc. and Frontier Communications of West Virginia are the two main telecommunication providers for Greenbrier County. Verizon WV, Inc. serves approximately 813,000 customers in the state and provides 250,000 miles (400,000 kilometers) of fiber optic lines and digital equipment that link nearly 150 communities in West Virginia, including the community of Rainelle.

3.12.5 Solid & Hazardous Waste Management

In response to a 1988 EPA report predicting that 45 percent of all U.S. landfills would be filled to capacity by 1991, the state of West Virginia authorized the creation of regional and county solid waste authorities, established "wasteshed" areas, and implemented other legislative requirements for more stringent control on solid waste management. In West Virginia, the Solid Waste Management Board (SWMB) is the coordinator between the Solid Waste Authorities (SWA) and other state agencies involved in solid waste management, and is mainly responsible for providing technical assistance in the preparation, review, implementation and update of solid waste control plans and facility siting plans.

Table 3.12-3. Projected Monthly Municipal Solid Waste Tonnage for Wasteshed F

County	2005	2010	2015	2020	2025
Greenbrier	2,045	2,014	1,999	1,998	2,005
Nicholas	1,590	1,572	1,562	1,559	1,559
Pocahontas	541	533	530	530	530
Webster	563	542	526	514	504
Wasteshed F Totals	4,739	4,661	4,617	4,601	4,598

Source: SWMB, 2005

Due to a variety of demographic and geographic factors, the number and capacity of solid waste management facilities varies from region to region. For this reason, West Virginia has been divided into seven zones, or "wastesheds," determined on the basis of demographic characteristics and local needs for waste management. Greenbrier County is part of Wasteshed F, which also includes Nicholas, Pocahontas and Webster Counties (see Table 3.12-3). In January 2005 the SWMB released the West Virginia Solid Waste Management Plan that includes descriptions and analyses for each of the State's wastesheds. Based on historical data from submitted landfill tonnage reports and demographic projection studies, the SWMB projects the amounts of solid waste that would be generated in each county. Table 3.12-3 summarizes the solid waste projections.

Each of the counties in Wasteshed F has an approved solid waste facility. The Greenbrier County Landfill is a Class B publicly owned-facility located in Lewisburg. The city of Rainelle hauls its solid waste to the Greenbrier County Landfill, approximately 30 miles (50 kilometers) away, and hauls its recyclables to the Rainelle Recycle Center. The Greenbrier County SWA operates the Greenbrier facility, which has a permitted capacity limit of 9,999 tons (9,071 metric tons) per month. Based on 2003 solid waste data, the Greenbrier County Landfill received an average quantity of 3,660 tons (3,320 metric tons) of waste per month, of which 8.3% was generated outside the wasteshed. Although a schedule is uncertain at this time, the SWA has plans to expand the Greenbrier County landfill to a state-of-the-art facility that will also serve as a construction/demolition debris landfill, a recycling center, and a composting site (SWMB, 2005).

The EPA separates hazardous waste generators into three categories, based on the quantity of waste generated per month:

- Conditionally exempt small quantity generators (CESQGs) generate less than 220 lbs (100 kg) per month;
- Small quantity generators (SQGs) generate between 220 lbs (100 kg) and 2,200 lbs (1,000 kg) per month; and
- Large quantity generators (LQGs) generate more than 2,200 lbs (1,000 kg) per month.

Specific rules apply to each category of generator. For example, CESQGs must comply with three basic waste management requirements to remain exempt from the full hazardous waste regulations that apply to generators of larger quantities (SQGs and LQGs). They must: (1) identify all hazardous wastes that are generated; (2) not store more than 2,200 lbs (1,000 kg) of hazardous waste on site at any time; and (3) ensure delivery of hazardous waste to an off-site treatment or disposal facility. LQGs and SQGs must obtain and use an EPA identification number. EPA and states use these 12-character numbers to monitor and track hazardous waste activities. SQGs cannot accumulate more than 2,200 lbs (1,000 kg) of waste on-site before properly disposing of the material either on-site or delivering waste to a permitted Treatment, Storage and Disposal (TSD) Facility. In order to maintain this status, a facility must make a hazardous waste determination and document the amount of hazardous waste generated each month.

3.12.6 Public School System

The Greenbrier County Public School System maintains 14 public schools, including 10 elementary schools, two middle schools, and two high schools (see Figure 3.12-3 and Table 3.12-4). Based on U.S. Department of Education (DOED) statistics, the Greenbrier County school district serves an approximate student population of 5,492 in pre-kindergarten through 12th grade (DOED, 2002).

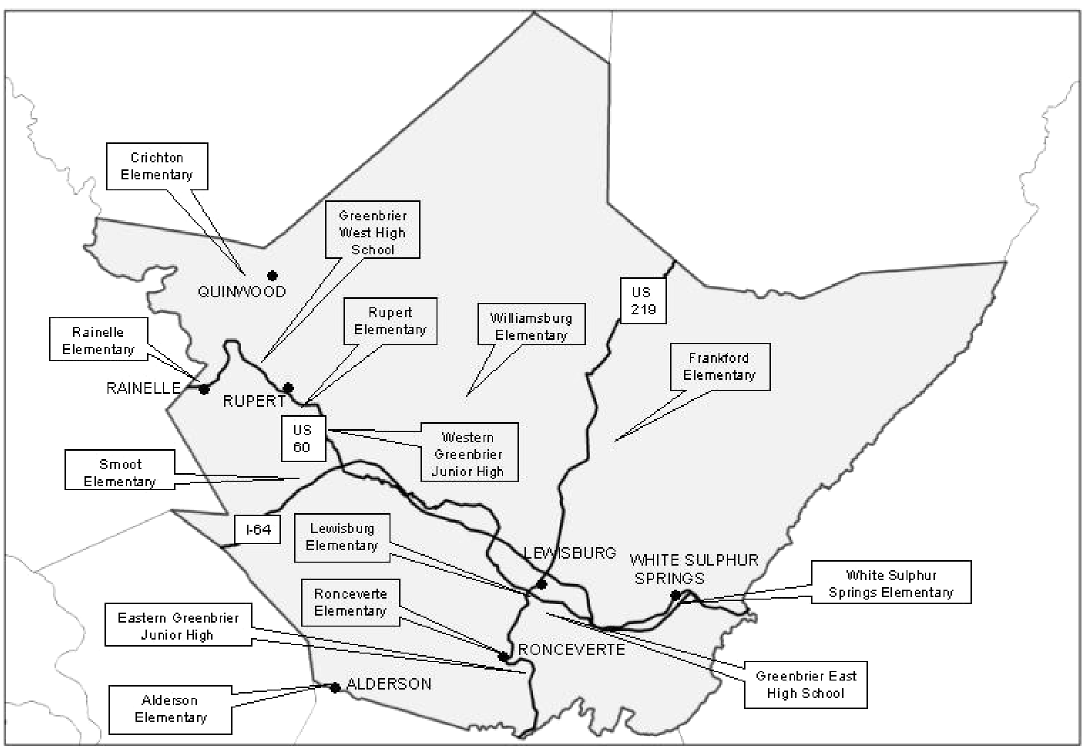

Figure 3.12-3. Greenbrier County Public School System

Table 3.12-4. Greenbrier County Public School System (2002)

Key Statistics		Resources	
Grade Levels	Pre-K to 12	Pre-K Teachers	5
Number of Students	5,492	Kindergarten Teachers	22
Full-Time Teachers	370	Elementary Teachers	149
Student/Teacher Ratio	14.9:1	Elementary Counselors	5
Per Pupil Expenditure	$4,662	Middle/High School Teachers	153
		Middle/High School Teachers	10
		Librarians	5

Source: National Center for Education Statistics, 2002

Figure 3.12-3 and Table 3.12-4 provide an overview of the county's educational resources. Two schools are located within the Rainelle city limits: Rainelle Elementary School (public) and Rainelle Christian Academy (private). The Rainelle Elementary School offers pre-kindergarten to sixth-grade level education. Based on the 2001-2002 school year, the school had 241 students enrolled, 15 full-time teachers, and an average student-to-teacher ratio of 15.6 to 1 (DOED, 2002). Western Greenbrier Middle School in Crawley (grades 6 through 8) and Greenbrier West High School in Charmco (grades 9 through 12) serve surrounding rural communities, including Rainelle.

3.12.7 Law Enforcement

The law enforcement agencies that serve Greenbrier County are listed in Table 3.12-5. The Greenbrier County Sheriff's Department is responsible for law enforcement and public safety in the unincorporated areas of the county. The law enforcement departments that serve Rainelle are the West Virginia State Police-Rainelle detachment (Troop 6), Rainelle Police Department, Greenbrier County Sheriff's Department, and West Virginia State Police-Lewisburg detachment. The West Virginia State Police-Rainelle detachment (Troop 6) is located in Rainelle on John Raine Drive and is on call for emergencies throughout the state. There are currently four officers assigned to the Rainelle detachment, with vehicles assigned to each officer.

Table 3.12-5. Greenbrier County Law Enforcement Agencies

Agency	City
Alderson Police Department	Alderson
Greenbrier County Sheriff's Department	Lewisburg
Lewisburg Police Department	Lewisburg
Rainelle Police Department	Rainelle
Ronceverte Police Department	Ronceverte
White Sulphur Springs City Police Department	White Sulphur Springs

3.12.8 Fire Protection

The Rainelle Fire Department is located just south of the Rainelle city limits. The department comprises one station and its members are on a voluntary basis. The department serves a population of approximately 5,500 and covers an area spanning 70 square miles (110 square kilometers). Although their primary response district includes the communities of Rainelle, Charmco, McRoss, Lilly Park, Bellwood, and Springdale, the department also provides aid to surrounding departments in Greenbrier and Fayette counties, and along major transportation routes such as US 60 and I-64. There are also voluntary fire departments located in the cities of Quinwood and Rupert.

3.12.9 Health and Emergency Services

Greenbrier County is served by one hospital, the Greenbrier Valley Medical Center located in Ronceverte, which is approximately 30 miles (50 kilometers) southeast of Rainelle. The facility is a 122-bed hospital with 400 employees, including a medical staff of more than 90 physicians. Triad Hospitals acquired the hospital in 2000, and from 2001 through 2005 the facility was rebuilt and expanded into a 135,000 square-ft (41,000 square-meter) facility. There are also five community clinics across the county providing internal medicine and general healthcare services, including the Rainelle Medical Center located at the intersection of US 60 and WV 20. The medical center is a Federally Qualified Health Center providing health and treatment services through its 30,000 square-foot (9,000 square-meter) main site in Rainelle and two smaller satellite clinics in Rupert and Meadow Bridge, which mainly provide community-oriented primary care, immunization, and preventive programs.

The Rainelle Medical Center’s service area covers the western half of Greenbrier County, which includes the cities of Rainelle, Rupert, Meadow Bridge, and several unincorporated communities, as well as adjoining portions of Nicholas, Fayette and Summers Counties. The staff includes six physicians, several nurses, one pharmacist, and miscellaneous staff support. Currently, the main medical center in Rainelle has enough capacity to expand to two more physicians, if needed. The medical center has three ambulance vehicles, and its property also houses additional ambulance vehicles for a separate satellite emergency services company that is headquartered in Quinwood. According to local officials, in addition to the Rainelle Medical Center, the residents of the Rainelle community usually visit the Greenbrier Valley Medical Center.

3.13 Transportation and Traffic

This section describes the existing transportation system within the vicinity of the proposed Co-Production Facility and coal refuse sites, including the regional intermodal infrastructure. In addition, current traffic volumes and transportation safety issues are presented in this section. Discussions on road safety and vehicular accidents are presented in Section 4.14 (Public Health and Safety).

3.13.1 Regional Transportation System

Figure 3.13-1 illustrates the significant roadways that serve the project region, which include I-64, US 60, US 219, WV 20, CR 1, and WV 12. I-64 is one of the main east-west arterials that serve West Virginia, as well as the bordering states of Virginia and Kentucky. I-64 traverses the southern portion of Greenbrier County and major cities along its route include Richmond, Charleston, Lexington, and St. Louis. US 60, a designated scenic byway, also provides a major east-west alternative. Many of the smaller rural county and State routes that run north-south, for example WV 20, connect to US 60. As a consequence, US 60 provides the main access route to Rainelle as it passes through the center of town. US 219 is a significant north-south arterial for West Virginia, which runs from Canada to Princeton, WV, and crosses Greenbrier County.

Greenbrier Valley Airport is located 5 miles (8 kilometers) north of Lewisburg and is the closest public airport to Rainelle, approximately 30 miles (50 kilometers) driving distance from Lewisburg. The Rainelle Airport is a privately owned airport located 3 miles (5 kilometers) southeast of Rainelle. Public transit services in Greenbrier County are provided by the Mountain Transit Authority (MTA), which provides general public bus transportation to Greenbrier, Fayette, Nicholas, and Webster Counties. Currently there is no local commuter transit system serving Rainelle. The closest MTA transit link is located in Summersville, located about 35 miles (56 kilometers) northwest of Rainelle.

Approximately 420 miles (680 kilometers) of navigable waterways exist in West Virginia, including the Port of Huntington/Tri-State, which is 155 miles (250 kilometers) northwest of Rainelle. There are no navigable waterways in Greenbrier County.

West Virginia is served by two major Class I railroads: CSX Transportation (CSXT) and Norfolk Southern (NS). Railroads are categorized by size, and Class I railroads are those with an annual operating revenue of $250 million or more (BTS, 2005). The CSXT and Nicholas, Fayette & Greenbrier (NF&G) rail lines are the commercial freight lines that operate in Greenbrier County. The closest passenger rail station to Rainelle is Amtrak's station located at Prince, approximately 25 miles (40 kilometers) south of Rainelle.

3.13.2 Regional and Local Roadway Network

The roadway network in Greenbrier County consists primarily of rural (less than 16 feet [5-meter] wide) two-lane roads. As shown in Figure 3.13-1, I-64 and US 60 provide the primary east-west access in the county and US 219 provides the primary north-south access. The major arterials are mainly two-lane asphalt roads, except for I-64, which is a four-lane divided highway. Primary roadways into Rainelle include US 60 and WV 20, which provide the town's main link to the regional highway system.

3.13.2.1 Regional Roadway Network

Over the past several decades, several major roadway improvements have occurred in Greenbrier County, including the completion of I-64, which marked the connection of Greenbrier County with the rest of the interstate system. I-64 is a major east-west, four-lane divided highway that connects the major cities of Huntington, Charleston and Beckley, and the adjoining states of Kentucky and Virginia. Traffic en route to Rainelle from I-64 westbound can take the US 60 Midland Trail/Sam Black Church interchange (exit 156), while I-64 eastbound traffic can take the WV 20-Sandstone/Hinton interchange (exit 139). Boxley Quarry is located on WV 12 off of US 60, which can be accessed from I-64 at the Alta interchange (exit 161), 5 miles (8 kilometers) east of exit 156. Mill Point Quarry is located approximately 30 miles (50 kilometers) north of the I-64 interchange at US 219-Lewisburg/Ronceverte (exit 169). There are several planning councils that envision the development of a technology corridor on I-64 between White Sulphur Springs/Lewisburg (Greenbrier County) and Beckley (Raleigh County). The I-64 High Technology Corridor program proposes to develop recommendations on the expansion and development of technology assets in the southern region of West Virginia. The I-64 High Technology Corridor program proposes to develop recommendations on the expansion and development of technology assets in the southern region of West Virginia, and would impact seven counties, including Greenbrier County (R4PDC, 2003).

Before the development of I-64, US 60 was the main east-west route through the West Virginia mountains for trucks and automobiles. With the completion of I-64, US 60 was designated a State Scenic Byway, often referred to as the Midland Trail National Scenic Highway. This byway is part of a historic route connecting the Ohio River with the tidewater area in Virginia. In West Virginia, the Midland Trail begins at the State capital, Charleston, and continues southeast through Rainelle for 120 miles (190 kilometers) to the preserved colonial town of Lewisburg and past White Sulphur Springs to the eastern border of the State. From Rainelle to the Virginia border, US 60 runs in a general southeast direction through mostly flat, rural land and gently rolling hills providing scenery and access to historical and recreational attractions.

3.13.2.2 Local Road Network

US 60 and WV 20 provide the main access to Rainelle, Quinwood, Rupert, and other rural towns in western Greenbrier County. US 60 is an important road, regionally and locally, as it is a designated byway, part of the Coal Resources Transportation System (CRTS), and a primary road that connects the county to the interstate. As US 60 and WV 20 enter Rainelle from the west, they merge and continue through town as the same road (US 60/WV 20). The majority of Rainelle's roads and businesses converge on US 60/WV 20, referred to as Kanawha Avenue in the western part of Rainelle and Main Street in the east. US 60/WV 20 provides access points to minor roads that lead into residential or business areas, which are laid out in small clusters of conventional grid-like patterns on either side of US 60/WV 20. An active CSXT rail line cuts across US 60/WV 20 near the center of town. Access to the project property is via Tom Raine Drive on WV 20, just south of its junction with US 60.

WV 20 and CR 1 are considered a minor arterial and collector, respectively. WV 20 traverses in roughly a north-south manner from Nicholas County to Summers County, providing access to Green Valley in the north and various recreational facilities near Bluestone and New River Gorge National River Park in the south. In the western part of Rainelle, WV 20 joins with US 60 and then separates from US 60 in Charmco, continuing northward into Green Valley, Nicholas County (add distance). Anjean Rd (CR 1) originates in Rupert where it intersects US 60, and approximately 5 miles (8 kilometers) north of Anjean, CR 1 becomes a single-lane road, approximately 10 feet (3 meters) in width with a 3-foot (1-meter) gravel shoulder. The route from Anjean to Donegan consists of taking CR 1 (turns into CR 39 north of Nicholas-Greenbrier County border) and an abandoned access road that was used in the past for hauling coal. The route to Donegan on this access road continues north for approximately 10 miles (16 kilometers) to Donegan. The coal refuse sites are in remote areas and several scattered residential properties are encountered along the roads near these sites.

3.13.2.3 Legal Limits

Senate Bill 583, which reorganized and revised West Virginia's weight enforcement laws and resources pertaining to heavy trucks and commercial motor vehicles, went into effect in July 2003. The new law transferred weight enforcement responsibility from the WVDOH to the West Virginia Public Service Commission (PSC). As a result of the bill, the CRTS was established, which allows coal trucks to obtain PSC permits for hauling loads heavier than load limits otherwise allowed on State-maintained public highways. A CRTS-designated road is a road designated by the WVDOT as safe and sufficient to allow vehicles hauling coal to carry a greater gross and axle weight of up to 120,000 lbs (60 tons [54 metric tons]) with a 5 percent allowance. All shippers and receivers of coal transported by truck over any CRTS road are now required to report truck weights electronically to the PSC. CRTS permits are required for annual renewal, with permitting fees funding the maintenance of CRTS roads.

The CRTS applies to almost 2,000 miles (3,000 kilometers) of roadway and 691 bridges throughout 15 southern counties in West Virginia, including Greenbrier County. The maximum allowable weights permitted on the CRTS are determined on a road-by-road basis by WVDOT. Figure 3.13-2 displays the CRTS routes in Greenbrier County that have been established as of March 2005 and the load limits associated with the different types of coal trucks. Figure 3.13-2 also depicts the bridges that are located on the CRTS routes in Greenbrier County. As of March 2005, there are only two bridges on the CRTS within Greenbrier County having weight restrictions, neither of which is on US 60. The maximum load weight that the bridges listed in Figure 3.13-2 can accommodate is 120,000 pounds (54,400 kilograms) with a 5 percent tolerance (WVDOH, 2005b).

The length of US 60 between Rainelle and I-64 (exit 156) runs 14 miles (23 kilometers) as part of the CRTS and encounters six bridges. The route from Rainelle and Green Valley runs 12 miles (19 kilometers) as part of the CRTS and encounters five bridges, while Rainelle to Anjean, also within the CRTS, runs 14 miles (23 kilometers) and encounters four bridges. The route to the Donegan site (approximately 14 miles north of Anjean on CR 1), which partially includes an abandoned access road that was used in the past to haul coal, is currently not part of the CRTS. From Anjean to Donegan there are a few concrete bridges, which are deteriorated and may require upgrades prior to the introduction of new truck traffic. Any consideration for CRTS inclusion would require an application and permit fee paid to the PSC. The miscellaneous allowable limits for vehicles in Greenbrier County are also summarized in Table 3.13-1.

Table 3.13-1. Maximum Allowable Limits for Roads in Greenbrier County, WV

Gross Weight Load Limit	
Limits for Roads (excluding those included in the CRTS*)	
I-64	80,000 lbs (40 T)
Routes 12, 63, 92, 60, 219	80,000 lbs (40 T)
Route 1	65,000 lbs (32.5 T)
Limits for Roads included in the CRTS* (see Figure 3.13-2)	
2-axle Dump Truck (for coal)	80,000 lbs (40 T), plus 5% tolerance
3-axle Dump Truck (for coal)	90,000 lbs (45 T), plus 5% tolerance
5-axle Tractor – Semi-trailer (for coal)	110,000 lbs (55 T), plus 5% tolerance
6-axle Tractor – Semi-trailer (for coal)	120,000 lbs (60 T), plus 5% tolerance

Table 3.13-1. Maximum Allowable Limits for Roads in Greenbrier County, WV (continued)

Vehicle Width	
Non-designated highways (lanes under 10' wide)	8 ft
Designated highways	8 ft 6 in
Vehicle Length	
Single Unit (inclusive of front and rear bumper)	45 ft
Semi-trailer (non-designated highways)	48 ft
Semi-trailer (designated highways) – Measurement from tractor rear axle to trailer first axle cannot exceed 37')	53 ft

Note: To convert pounds to kilograms, multiply by 0.454. To convert tons (US) to metric tons (Metric), multiply by 0.907. To convert feet to meters, multiply by 0.305. To convert inches to centimeters, multiply by 2.54.
**CRTS – Coal Resource Transportation System*

Source: WVDOH, 2005b

3.13.3 Regional and Local Traffic

3.13.3.1 Existing Regional Traffic Volumes

Figure 3.13-3 is based on WVDOH's Average Daily Traffic (ADT) data for the year 2003 and provides a general overview of regional traffic volumes at various locations on or near US 60. The ADT is a typical measure of traffic volume and is defined as the number of vehicles that pass a particular point on a roadway during a period of 24 consecutive hours, averaged over a period of 365 days. These counts were recorded using automatic traffic recorders (ATR). WVDOH has converted the ATR volumes to ADT values using adjustment factors to reflect variations in the season, day-of-the-week, functional class of the road, and number of axles in a truck (WVU, 2002).

Based on conversations with WVDOH and an examination of the adjustment factors, historically there has been more traffic movement in the summer months than winter months for Greenbrier County due to the increased recreational and agricultural traffic in the summer (WVDOH, 2004a). The months of June, July, and August usually witness the highest traffic volumes, especially US 60 due to its scenic byway designation and the many industrial hauling trucks, including coal and lumber transport (WVDOH, 2004b).

On February 4 and 5, 2004 and November 17, 2004, WVDOH also performed nine-hour traffic counts of four intersections key to the project (Intersections 1, 2, 3, and 4 in Figure 3.13-3). Table 3.13-2 summarizes the traffic volumes collected and the percentage of trucks during the nine-hour period for key intersections on US 60 in Rainelle, Charmco, and Rupert; and on US 219 in Mill Point. The ADT values were adjusted from the nine-hour counts.

Although these counts were recorded up to only two days out of the year, they provide general insight on the truck volumes and traffic patterns on US 60 and US 219 in the region. These four intersections essentially act as T-intersections and are controlled by stop signs on the minor streets, with US 60 being the major street for Intersections 1, 2, and 3 and US 219 for Intersection 4. The nine-hour counts at each intersection reflect relatively low automobile and truck volumes, which is expected given the rural nature of the region.

Table 3.13-2. Nine-Hour Traffic Counts*, Key Intersections (February 4 and 5, 2004)

	Total # of Vehicles (9-hr count)	# of Commercial Trucks** (9-hr count)	% Commercial Trucks
Intersection 1: US 60 and WV 20 (Rainelle) – 3,624 ADT* **			
US 60 Eastbound	907	78	8.6%
US 60 Westbound	1,936	92	4.8%
WV 20 Northbound	1,142	47	4.1%
Intersection 2: US 60 and WV 20 (Charmco) – 2,828 ADT			
US 60 Eastbound	1,339	67	5.0%
US 60 Westbound	1,341	100	7.5%
WV 20 Southbound	705	60	8.5%
Intersection 3: US 60 and CR 1 (Rupert) – 5,541 ADT			
US 60 Eastbound	1,583	81	5.1%
US 60 Westbound	1,412	100	7.1%
CR 1 Southbound	612	7	1.1%
Intersection 4: US 219 and WV 39 (Mill Point) – 4,888 ADT			
US 219 Northbound	623	68	10.9%
US 219 Southbound	693	112	16.2%
WV 39 Eastbound	311	122	39.2%

**9-hour counts occurred between the hours of: 7am-10am, 11am-1pm, and 2pm and 6pm.*
***Commercial Trucks include: single unit trucks (2- to 4-axle); tractor trailer combinations (3- to 6-axle); and multi-trailer combinations (5- to 6-axle and buses).*
****ADT – Average Daily Traffic is a 24-hour average adjusted from the 9-hour count. ADT has been adjusted using the monthly, daily, functional class, and truck adjustment factors.*

Source: WVDOH, 2004c

3.13.3.2 Existing Local Traffic Conditions – Study Intersections & Methodology

Traffic counts were taken during 15-minute intervals within a prescribed 1.5- to 2-hour timeframe for morning (AM), mid-day (MID), and early evening (PM) traffic hours. The timeframes were chosen by assuming typical rush hour schedules that capture peak hour scenarios. For example, morning counts usually included the 6:30 a.m. through 8:30 a.m. time period, because most commuting and school traffic occur during this period. Counts were collected on a Tuesday, Wednesday, or Thursday during the months of May and October 2004. The peak hour traffic volumes for each turning movement at each intersection are shown in Figures 3.13-4 and 3.13-5. Levels of service (LOS) (see Section 3.13.3.3) were calculated based on these traffic counts.

Shortly after US 60 crosses the Fayette-Greenbrier County Line, it enters the municipality of Rainelle and joins WV20 going eastward (see Figure 3.13-4). The project site lies just beyond this intersection, south of a U.S. Army Reserve Center and Sewell Creek. US 60/WV 20 (Kanawha Avenue) provides the main access to the majority of the town's businesses and neighborhood roads, and carries the main flow of local traffic. This route also serves regional industrial and recreational transportation. Currently, US 60/WV 20 in Rainelle operates at an LOS of A and B depending on the time of the day. At the present time, there is only one traffic signal in Rainelle, located at the intersection of 7th Street and US 60/WV 20 (Main Street).

Traffic data on key roads and intersections were obtained through field studies to analyze and describe the baseline traffic conditions in key areas of Rainelle, Charmco, and Rupert. All of the studied intersections are two-way stop-controlled (TWSC) intersections, with the exception of Intersection D, which uses traffic signal lights. Figures 3.13-4 and 3.13-5 display the locations and the existing turning movements for each of the following intersections (photos of the intersections can be found in Appendix J, Traffic Modeling Output and Intersection Photos).

Intersection A – WV 20 and Tom Raine Drive (in Rainelle)

Tom Raine Drive is a two-lane road with no curbing, sidewalk, or shoulders. It is considered the minor street at this intersection and is controlled by a stop sign, with available width to support separate right and left turn movements onto WV 20. The road is a short dead-end street that provides access to a U.S. Army Reserve Center, the main office of the Greenbrier County Public Service District #2, the Rainelle Industrial Park and the proposed plant site (see Section 3.11, Land Use). Tom Raine Drive also provides access to John Raine Drive, a through street providing a direct route to the Park Center Shopping Complex. Immediately east of the intersection there is an entrance driveway to the U.S. Army Reserve Center. Although there are no posted speed signs, the speed observed for most of the vehicles remained more or less at 15 miles per hour (mph) (24 kilometers per hour [kph]). A rail line that runs parallel to WV 20 intersects Tom Raine Drive approximately three car lengths (30 to 40 feet [9 to 12 meters]) behind the stop sign. The rail cars that pass through are generally infrequent and slow. Only railroad crossing signs are posted to serve as a warning. WV 20, also referred to as South Sewell Street, is considered the major street for this intersection and is a minor arterial for Greenbrier County. It is a two-lane road with no curbing or sidewalk at this intersection. The posted speed limit is 40 mph (64 kph). Fayette Avenue is a one-way westbound residential street located across Tom Raine Drive.

Intersection B – WV 20 (South Sewell Street) and US 60 (in Rainelle)

Intersection B is located 600 feet (180 meters) north of Intersection A and is where WV 20 merges with US 60 as it enters Rainelle from the west. This intersection also corresponds to Intersection 1 in Figure 3.13-3 and Table 3.13-2. The Rainelle Medical Center is accessed from a one-way driveway at this intersection. The Rainelle Elementary School is located just west of the medical center, and a gas station is located on the southwest corner of this intersection. Intersection B essentially acts as a T-intersection; however, some minor through-traffic from WV 20 (northbound) accessing the medical center driveway was observed. WV 20 is the minor street, and is controlled by stop signs. US 60 is a two-lane road and is the major road at this intersection. The posted speed limit is 35 mph (56 kph); however, in front of the school there are yellow-flashing lights for both directions on US 60 to indicate a 15-mph (24 kph) school zone. The warning lights are set to flash from 7:30 a.m. through 8:15 a.m. and from 2:30 p.m. to 3:15 p.m. There is a yellow-striped area on the west side of the intersection and a separate left-turn lane for westbound traffic on the east side of the intersection.

Intersection C – US 60/WV 20 (Kanawha Avenue) and Locust Street and access road to the Park Center Shopping Complex (in Rainelle)

From Intersection B to Intersection C, US 60 and WV 20 run as the same route (US 60/WV 20), which is also referred to as Kanawha Avenue. The minor streets at this intersection are Locust Street and a road leading to the Park Center Shopping Complex. Both of the minor streets are controlled by stop signs. Locust Street branches north into a residential area, while the Park Center's road branches southwest, and provides access to a shopping center and eventually becomes John Raine Drive adjacent the proposed power plant site. The rail line crosses this intersection and cuts diagonally across Kanawha Avenue and across Locust Street. The intersection implements passive security measures for train crossings - only warning lights, painted lines, and signs alert vehicles and pedestrians of train traffic. East of the railroad tracks, Kanawha Avenue begins a quick descent into a 20 percent slope for about 500 feet (150 meters), which creates a poor line of sight for both eastbound and westbound traffic. Westbound traffic making a left turn into the Park Center road has to reach the railroad tracks before obtaining clear visibility of on-coming traffic. There is an 11-foot- (3-meter-) wide middle lane for left turns on Kanawha Avenue from both directions.

Intersection D – US 60/WV 20 (Main Street) and 7th Street (in Rainelle)

This intersection uses a pre-timed traffic signal and is the only signalized intersection in Rainelle. 7th Street is a two-lane road and has approximately 30 feet (9-meter) of pavement. The posted speed limit is 25 mph (40 kph). For southbound traffic on 7th Street there is a "No Turn On Red" sign at the traffic light. The Meadow River Hardwood Lumber Company is located approximately half a mile (1 kilometer) north of this intersection on 7th Street. US 60/WV 20 in this area is also referred to as Main Street. Although Main Street comprises mainly commercial properties, most of the areas extending from either side of Main Street are residential. The posted speed limit is 35 mph (56 kph). There is a separate left turn lane for eastbound traffic on Main Street.

Intersection E – US 60 and CR 1 (in Rupert)

Intersection E is located in Rupert, approximately 8 miles (13 kilometers) east of Rainelle on US 60. This intersection also corresponds to Intersection 3 in Figure 3.13-3 and Table 3.13-2. CR 1 is also referred to as Anjean Road or Church Street, and further north, as McClung Avenue. It extends 6 miles (10 kilometers) from this intersection before encountering the location of the Anjean mining area. Intersection E is essentially a T-intersection, with CR 1 as the two-lane minor road. CR 1 has available width to support separate right and left turn lanes onto US 60. As of May 2006, there was no stop sign for southbound traffic on CR 1. The posted speed limit is 35 mph (56 kph). There is a parking lot for a bank located on US 60, across from CR 1. The lot introduces minor traffic onto US 60. US 60 is a two-lane road and is considered the major street at this intersection. The posted speed limit is 35 mph (56 kph).

Intersection F – US 60 and WV 20 (in Charmco)

Intersection F is located in Charmco, halfway between Rainelle and Rupert. This intersection also corresponds to Intersection 2 in Figure 3.13-3 and Table 3.13-2. At this intersection, WV 20 (eastbound) separates from US 60 and runs north through Quinwood. It continues toward the location of the Green Valley coal refuse resource, located 8 miles (13 kilometers) north of this intersection. Intersection F, like Intersection E, is essentially a T-intersection, where WV 20 is the two-lane minor road. WV 20's southbound lane has available width to support separate right and left turn lanes onto US 60, controlled by a yield sign and a stop sign, respectively. The posted speed limit is 35 mph (56 kph). There is a post office located on US 60 across from WV 20, which introduces minor traffic onto US 60. US 60 is a two-lane road with that includes a median for which eastbound traffic turning left can queue.

3.13.3.3 Level of Service (LOS)

All references to levels of service (LOS) are defined by the 2000 Highway Capacity Manual (HCM2000) published by Transportation Research Board. For analysis purposes, HCM2000 defines six levels of service (LOS) that reflect the level of traffic congestion and qualify the operating conditions of an intersection. The six levels are given letter designations ranging from "A" to "F," with "A" representing the best operating conditions (free flow, little delay) and "F" the worst (congestion, long delays) (TRB, 2000). Various factors that influence the operation of an intersection include speed, delay, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

The quantifying value that is computed and used to qualify signalized and unsignalized intersections is the 'average control delay.' Control delay for TWSC intersections, which have stop signs on only the minor street approaches, is per vehicle, but is only determined for the stop-controlled or minor street movements because, theoretically, the through movements on a major street are not experiencing any delay. Consequently, there is no intersection LOS as a whole for TWSCs, instead only an LOS for the individual minor movements. The minor movements are generally the separate lefts on the major street approaches and all movements on both minor street approaches. For signalized intersections, "the average control delay per vehicle is estimated for each lane group and aggregated for each approach and for the intersections as a whole" (TRB, 2000). Therefore, the LOS for a signalized intersection is based on the aggregated intersection delay, and the LOS qualifies the intersection as a whole. Table 3.13-3 summarizes the operating conditions associated with each LOS designation and the corresponding ranges of average control delay for both unsignalized and signalized intersections.

Table 3.13-3. Intersection Level of Service (LOS) Criteria

LOS	Operating Conditions	Unsignalized* - Delay (s/veh)**	Signalized - Delay (s/veh)
A	Very short delays; progression is extremely favorable and most vehicles arrive during the green light phase.	≤ 10	≤ 10
B	Generally good progression, short cycle lengths, or both; but more vehicles stop than with LOS A.	> 10.0 to 15.0	> 10.0 to 20.0
C	The number of vehicles stopping is significant, although many still pass through the intersection without being required to stop.	> 15.0 to 25.0	> 20.0 to 35.0
D	Many vehicles must stop, and the proportion of vehicles not stopping declines; individual cycle failures are noticeable.	> 25.0 to 35.0	> 35.0 to 55.0
E	Poor progression, long cycle lengths, and/or high volume to capacity (v/c) ratios; individual cycle failures occur frequently; considered by many agencies to be the limit of acceptable delay.	> 35.0 to 50.0	> 55.0 to 80.0
F	Intersection over-saturation; high v/c ratios with many individual cycle failures; poor progression and long cycle lengths may also be contributing causes; considered to be unacceptable to most drivers.	> 50.0	> 80.0

**s/veh = seconds per vehicle; **Unsignalized includes TWSC (two-way stop-controlled)*

Source: TRB, 2000

Intersection LOSs were calculated using the 2000 Highway Capacity Software (HCS2000), which is an industry standard for traffic analysis. The HCS2000 software is based on the HCM2000 methodology, which is also an industry standard. The intersection LOS modeling output for existing conditions is included in Appendix J. Table 3.13-4 summarizes the LOSs determined for the intersections of concern.

Table 3.13-4. Intersection Level of Service (LOS) during Peak Hours – Existing Conditions (2004)

Intersection	AM LOS	MID LOS	PM LOS
A: WV 20 (S. Sewell Street) & Tom Raine Drive	A	A	A
B: US 60 & WV 20 (S. Sewell Street) in Rainelle	A	A	A
C: US 60 & Locust Street & Park Center Shopping Complex	B	B	B
D: US 60 & 7th St	B	B	B
E: US 60 & CR 1 (Anjean Rd)	A	A	B
F: US 60 & WV 20 in Charmco	A	A	B

Note: All intersections are two-way stop-controlled (TWSC), except for Intersection D which is signalized.

In general, Rainelle's traffic can be described as relatively slow due to the rural nature of the region. Multiple trips for a single vehicle were often observed. Although traffic was fairly busy for the size of Rainelle, no distinct peak hours were detected during the field studies. Traffic volumes steadily increased at the beginning of the day, with general peaks during typical rush hour periods, and steadily decreased after the PM rush hour. In general, peak periods were observed to be from 7:30 a.m. through 8:30 a.m., 11:45 a.m. through 12:45 p.m., and 4:45 p.m. through 5:45 p.m. Very little, if any, pedestrian traffic was observed at any of the study intersections.

Because Rainelle is characteristically a small rural town, it has not adopted any comprehensive LOS standards. Generally, outside the spheres of influence for cities, roadways in characteristically rural communities operate at LOS C or better. In Rainelle, the major streets (US 60) for all of the intersections are currently operating at LOS A or B as summarized in Table 3.13-4. US 60 plays an important role in the regional transportation network, as it provides an important access route to the southeastern region of West Virginia for various industries. Consequently, this adds to the very minor congestion of US 60 in Rainelle during its peak periods. Traffic on US 60 was considerably heavier during the lunch and PM rush hours, especially during train crossings.

Intersection A received relatively little traffic onto Tom Raine Drive. However, peak traffic activity was observed from approximately 6:30 a.m. through 7 a.m., 12 p.m. through 1 p.m., and 3:30 p.m. through 4 p.m., as a result of personnel exiting and entering the U.S. Army Reserve Center. Approximately 50 feet (15 meters) north of Intersection A, there is a driveway to AEP facilities on WV 20, which also houses its facility trucks that periodically enter and exit throughout the day.

Intersection B was characterized by steady streams of traffic in between lengthy gaps of no traffic during the early mornings. Because Rainelle Elementary School is located nearby this intersection, there were several school buses observed on US 60, and vehicles entering and leaving the school to drop off children during morning school hours, approximately 7:45 a.m. to 8:15 a.m. Minor traffic derived from school also occurred during the afternoons from 2:30 p.m. through 3 p.m. The Rainelle Medical Center contributed some minor traffic, as its driveway entrance (one-way northbound) is part of Intersection B.

Intersection C was the busiest in this study owing to the commercial land uses that center around this area. The Park Center Shopping Complex produced the majority of the turning movements on and off US 60/WV 20 (Kanawha Avenue). Although a steady stream of traffic slowly increased from the morning and remained fairly busy during the day, there were no significant traffic delays observed on a regular basis. Congestion occurred during train crossings, with the crossings lasting approximately 10 to 15 minutes at a time. The most difficult turning movement at this intersection was the left turn movement from Locust Street, which is a small residential road; however, few vehicles were observed making this turn during the traffic counts.

Intersection D, like Intersection C, saw a steady stream of traffic slowly increase from the morning and remained fairly busy during the day. There are a few businesses located near this intersection; however, most of the traffic slowdown was caused by the traffic light. Some of the heavier trucks that crossed this intersection came from Meadow River Hardwood Lumber Company, located 1 mile (2 kilometers) north on 7th Street. According to a company representative, between 7 a.m. and 4 p.m. (Monday through Friday), approximately six to eleven flatbed or container trucks leave daily with lumber and logs. Consequently, the company's trucks go through the signalized intersection.

The traffic patterns at Intersections E and F were comparable due to their similarity. Both intersections were observed to have a steady rise in traffic from morning to late afternoon, with typical peaks at noon and late afternoon. No significant traffic congestion was observed at either of these intersections. At Intersection E, the route to the Anjean/Joe Knob and Donegan sites continues north on CR 1 and there are very few scattered residential properties near the coal refuse sites. The same situation occurs for the Green

Valley site – from Intersection F, the route to Green Valley continues north on WV 20 and very few residential areas exist near the coal refuse site.

Rail Access

West Virginia is served by NS and CSXT, both Class I railroads. CSXT is the predominant rail carrier in southern West Virginia and operates over 1,500 miles (2,400 kilometers) of track throughout West Virginia. CSXT provides service to the port of Huntington and Charleston. The CSXT lines going through West Virginia connect to Baltimore, Norfolk and Newport News. The CSXT lines from West Virginia also connect with Toledo to the north and New Orleans to the south. Both CSXT and NS have numerous branch lines running into coal producing areas.

Figure 3.13-6 illustrates the rail network that exists in and around Rainelle. There is an active rail line in the southwest corner of Rainelle that parallels WV 20 and cuts across town as it continues northeast and passes through the Meadow River Hardwood Lumber Company (formerly Georgia-Pacific Corp.), located on the northern outskirts of town. The rail line in Rainelle is owned and operated by CSXT and only carries light rail traffic at the present time. The line runs west and north of the project site. Approximately 2,000 feet (600 meters) west of the site area, and just north of Sewell Creek, there is a CSXT rail yard that is sometimes used as a holding station for passing railcars transporting coal. Railcar speeds were observed to be approximately 15 to 20 mph. As shown in Figure 3.13-6, the rail line continues north out of Rainelle and approaches Meadow River and branches into two lines. One line travels north and includes a rail line to the Green Valley coal mine, while the other line follows the sinuous path of the Meadow River to the east, and provides rail spurs to the Anjean and Rader Run coal mines.

Currently, the rail lines in Rainelle serve two coalmines and a lumberyard. The two coalmines are Massey Energy's Green Valley Coal Mine and Midland Trail Resource's Rader Run Mine near Rupert. Coal is transported through Rainelle from Green Valley. As coal is transported from Green Valley, the rail cars either park in a rail yard located a half mile (1 kilometer) west of the project site, or continue south to Meadow Creek's interchange yard in Summers County. Based on conversations with a representative at Green Valley, they schedule on average three roundtrip runs per day. However, it should be noted that the coal transport does not operate on a fixed schedule; rather it is based on meeting mining production rates. The rail line from Rader Run to Rainelle is approximately 13 miles (21 kilometers) in distance with rail transport scheduling also being highly variable due to mining production rates. In general, Rader Run delivers four to five roundtrip runs per month. For both Green Valley and Rader Run, coal-loaded trains are typically made up of 75 railcars at 100 tons (90 metric tons) each. The Meadow River Hardwood Lumber Company property includes a rail spur; however, rail usage has been limited to only three to five fully loaded log cars per year, as hauling trucks provide most of their lumber transport at this time. The lumber is transported by rail through Rainelle and continues west. Approximately 10 miles (16 kilometers) of rail line owned by CSXT exists between the project site and Anjean. Transportation on the rail line from Rupert to Anjean has been abandoned since 2002; however, part of the rail line may be upgraded transporting coal from new mining operations at Anjean that is not associated with the WGC project. The rail line from Rupert to Anjean ends at the bottom of Anjean Mountain – there is no rail spur for transferring coal from the source to the railcars.

3.14 Public Health and Safety

The region of influence for public health and safety consists of the persons residing within a 30-mile (50-kilometer) radius of the proposed Co-Production Facility site in Rainelle, West Virginia. The area encompasses the towns of Rainelle, Quinwood, and Rupert, as well as several other smaller communities that are located in portions of Greenbrier and Nicholas County. However, the area in and around Rainelle, and those areas in the immediate vicinity of other routine project activities (e.g., coal refuse sites and transportation routes) are more likely to be affected by the Proposed Action. Therefore, the focus of discussions in this section is on baseline data in these areas including locations of sensitive receptors and cancer incidences that are specific to Greenbrier County.

3.14.1 Health Profiles

Information from health profiles for Greenbrier County were compiled by the West Virginia Department of Health and Human Resources (WVDHHR), Bureau for Public Health (BPH), Office of Epidemiology and Health Promotion in the 2000 edition of the West Virginia County Health Profiles. The health profiles comprise an overview of the health status of West Virginia residents on the state and county levels. For Greenbrier County, Table 3.14-1 presents county indicators that are categorized as better than, similar to, or worse than the U.S., on average.

As indicated in Table 3.14-1, Greenbrier County had a higher incidence of lung cancer and chronic obstructive pulmonary disease when compared to the remainder of the U.S. As presented in Table 3.14-2, West Virginia had the highest median age at 38.0 years when compared to the median of all states combined in the year 2000. As is the case with the remainder of the U.S., heart disease is the number one cause of death for people over the age of 65, but the cancer death rate for West Virginia was 10.9 percent higher than the national rate for 1999. Among both men and women during 1996-2000, the leading cause of cancer-related mortality was, by far, cancer of the lung and bronchus. According to the American Cancer Society, tobacco use accounts for 87 percent of lung cancers (WVDHHR, 2004).

In 2000, West Virginia was the leading state in age-adjusted mortality for chronic lower respiratory disease (CLRD), which is a significant contributing cause of death in older age groups. Chronic bronchitis and emphysema (collectively referred to as chronic obstructive pulmonary disease or COPD) are also notably higher for West Virginia. Tobacco smoking is the most important risk factor for COPD, accounting for approximately 80 percent of the cases. Other factors include occupational exposures from dusts, fumes, and molds, as well as other environmental air pollutants (WVDHHR, 2004). Cancer incidences specific to Greenbrier County between 1994 and 1998 are presented in Table 3.14-3.

3.14.2 Receptors

Exposure to certain chemicals, or chemicals of potential concern (COPCs), can adversely affect human health through either toxic and/or carcinogenic effects. Chemical exposure can occur as a result of a variety of human activities ranging from the use of household chemicals and products to the fueling of a motor vehicle. In addition, exposure can result from chemicals that could be present in the air, water, soil, or the food chain through air emissions or other discharges from industrial sources to the environment.

The USEPA has developed cancer and non-cancer toxicity values for COPCs that serve as the basis for many of the regulatory standards for emission and exposure limits that have been established to protect human health and the environment. In addition, EPA has established standards for evaluating risks of exposure to chemicals related to specific project and site conditions. For a chemical exposure to occur at a specific site, several conditions must be met, including: (1) a chemical or exposure source, (2) a release mechanism, (3) a migration pathway, (4) an exposure route, and (5) a receptor population. Consequently, there is no unacceptable carcinogenic risk (or non-carcinogen hazard) if either a chemical-specific (toxic) effect or exposure pathway is not present.

Table 3.14-1. Greenbrier County –Health Profiles Overview (In Comparison to the U.S)

Better*	Similar	Worse*
Breast Cancer	Diseases of the Heart	Lung Cancer
Births to Unwed Mothers	Cancer - All Causes	Chronic Obstructive Pulmonary Disease
Late (3rd Trimester)/No Prenatal Care	Colon Cancer	Unintentional Injuries
	Prostate Cancer	Motor Vehicle Accidents
	Cancer - All Other Causes	Years of Potential Life Lost - All Causes
	Diabetes	Physical Inactivity
	Cerebrovascular Disease	Seatbelt Non-use
	Pneumonia and Influenza	Smokeless Tobacco Use
	Non-Motor Vehicle Accidents	Difficulty Seeing Doctor Because of Cost
	Suicide	
	Homicide**	
	Teen Fertility Rate	
	Low-Birthweight Births	
	Infant Deaths**	
	Fetal Deaths**	
	Obesity	
	Hypertension	
	Cigarette Smoking	
	Binge Drinking**	
	No Health Insurance, Ages 18-64	

**A statistically significant difference from the U.S.*
*** Number is too small for a valid comparison*

Table 3.14-2. Median Age by Gender, West Virginia and the U.S., 1950-2000

Year	Total		Male		Female	
	WV	US	WV	US	WV	US
1950	25.1	25.2	25.2	24.9	25.0	25.5
1960	28.5	29.5	27.6	28.7	29.2	30.3
1970	30.0	28.1	28.4	27.5	31.5	28.8
1980	30.4	30.0	29.1	28.8	31.7	31.2
1990	35.4	32.9	34.0	31.7	36.7	34.1
2000	38.0	35.3	37.5	34.0	40.2	36.5

Table 3.14-3. Cancer Incidence Specific to Greenbrier County[a]

Site	1994		1995		1996		1997		1998		Total, 1994-98	
	Number	Rate[b]	Number	Rate[b]	Number	Rate[b]	Number	Rate[b]	Number	Rate[b]	Number	Rate[b]
Total, All Sites	190	364.9	217	401.7	195	382.4	213	392.2	188	345.9	1,003	376.6
Lung and Bronchus	28	53.0	41	77.0	42	81.3	36	60.3	45	83.1	192	70.7
Prostate[c]	25	104.5	41	169.7	21	88.3	30	129.3	24	99.3	141	118.1
Female Breast[d]	30	108.8	35	116.6	23	92.1	33	111.9	20	69.3	141	99.5
Colon and Rectum	18	29.8	20	41.9	24	42.0	17	29.3	20	34.8	99	35.5
All Other Sites	89	178.7	80	146.3	85	171.6	97	185.8	79	148.1	430	165.8

a. Data supplied by the West Virginia Cancer Registry.
b. Rates are per 100,000 and are adjusted by age to the 1970 U.S. population.
c. Based upon the male population.
d. Based upon the female population.

For the project area, the primary receptor population is located in and around Rainelle; however, due to the nature of the project and the potential for air dispersion of contaminants, the receptor population includes populations within a 30-mile (50-kilometer) radius of the project. The general location of the proposed Co-Production Facility is on the outskirts of town, and is in close proximity to several residential areas and an elderly care facility (see Figure 3.11-1, Land Uses Within the Vicinity of the Project Site, in Section 3.11). Residential areas also exist along the primary transportation corridors between the coal refuse sites and the proposed Co-Production Facility location. However, there are few receptors in the immediate vicinity of the coal refuse sites, as these sites are in fairly remote areas.

To calculate potential risks associated with chemical exposures, categories of sensitive receptor populations are defined. These populations reflect persons with potentially high exposure rates due to the frequency and duration of exposure, or increased sensitivity due to health or age. For the Proposed Action, risk calculations were performed (and presented in Section 4.14) for the following most susceptible populations to ascertain potential health impacts: Resident/home gardener (adult and child), subsistence farmer (adult and child), nursing infants, subsistence fishers, school/day care child, and hospital patient/extended care residents. All these populations (i.e., receptors) are expected to be present in the region of influence.

3.14.3 Safety

3.14.3.1 Worker Safety

Worker fatalities and injuries are generally a concern in construction and in industrial facility operation. The Occupational Safety and Health Administration (OSHA) regulates worker safety in both construction and industrial settings. OSHA has promulgated a number of regulations that are codified under Title 29 of the Code of Federal Regulations (CFR) that are designed to protect workers from potential construction and industrial accidents, as well as to minimize exposure to work place hazards (e.g., noise, chemicals, etc.). Although these regulations and protections exist, work place injuries can and still do occur. Table 3.14-4 summarizes safety statistics from the Bureau of Labor for industry categories that are relevant to the Proposed Action.

The highest rate of recordable injury cases is in the construction field followed closely by the trucking industry. However, mining activities result in the highest rate of fatalities. The rates of injuries and lost workdays in the utility sector are much lower than the other listed categories.

Table 3.14-4. Statistics for Work Place Hazards

<table>
<tr><th>Industry</th><th>Total recordable incidents (rate per 100 FTEs*)</th><th>Lost workday cases (rate per 100 FTEs)</th><th>Fatalities (rate per 100,000 FTEs)</th></tr>
<tr><td>Construction</td><td>8.4</td><td>4.2</td><td>14.0</td></tr>
<tr><td>Mining</td><td>6.7</td><td>5.5</td><td>21.7</td></tr>
<tr><td>Trucking</td><td>7.0</td><td>3.1</td><td rowspan="2">12.7*</td></tr>
<tr><td>Utilities</td><td>1.8</td><td>0.3</td></tr>
</table>

**FTE – full-time-equivalent workers*

***This fatality statistic is found under the sector "Transportation and Public Utilities." Most fatalities in this group are in the truck driver category.*

Source: BLS, 2005

Although power plants are much safer than they once were, plant employees can still encounter workplace hazards. Among the most common hazards to power plant workers are electrical shocks, burns, boiler fires and explosions, and contact with hazardous chemicals (Hansen, 2005). According to the National Board of Boiler and Pressure Vessel Inspectors, between 1999 and 2003 there were 1,477 reported boiler accidents, resulting in 143 injuries and 26 deaths (power boilers include utility boilers as well as boilers used by other industries for cogeneration and on-site power production) (Hansen, 2005). Many power plant workers are also routinely exposed to dangerous chemicals such as corrosives (acids and bases), oxidizers and solvents. Comprehensive training, detailed pre-job planning, and proper and well-maintained safety equipment are key to accident prevention, regardless of the hazard (Hansen, 2005).

3.14.3.2 Road Safety

The West Virginia Division of Highways (WVDOH) provided a listing of reported vehicle accidents in Rainelle and Rupert over a five-year period (1999-2003). Table 3.14-5 highlights the accidents that occurred on roads relevant to the project. As indicated in Table 3.14-5, the number of accidents on key roads remained fairly steady or declined as the years progressed.

During this five-year period, 1.5 percent and 3.2 percent of these accidents in Rainelle and Rupert, respectively, involved trucks greater than 8,000 pounds. This indicates that during the five-year span approximately two accidents that involved trucks greater than 8,000 pounds occurred for each town, which is relatively low in that US 60 is a major thoroughfare for haul trucks. There were no recorded fatal accidents during this five-year period for either town.

Table 3.14-5. Five-Year Traffic Accident History for Rainelle and Rupert in Key Areas

Street	1999	2000	2001	2002	2003	Average Number of Accidents per Year
Rainelle (Total # of Accidents 1999-2003 = 107)						
Kanawha Ave (US 60)	6	13	8	6	3	7.2
Main St (US 60)	8	12	8	6	5	7.8
S. Sewell Street (WV 20)	2	1	0	0	0	0.6
Total	16	26	16	12	8	21.4
Rupert (Total # of Accidents 1999-2003 = 64)						
Nicholas St (US 60)	15	11	12	3	12	10.6
Greenbrier St (US 60)	0	0	0	0	2	0.4
Anjean Rd (CR 1)	0	0	1	1	0	0.4
Total	15	11	13	4	14	12.8

Source: WVDOH, 2004d

Table 3.14-6 summarizes citations that were given to overweight trucks over an 18-month period (January 2000 – June 2002). The table includes Greenbrier County and its surrounding areas. As mentioned in Section 3.13.2.3, the West Virginia Public Service Commission (PSC) is responsible for commercial truck weight enforcement on roads included in the Coal Resources Transportation System (CRTS). Since then, the PSC has developed a reporting system for tracking coal loads hauled on the CRTS. The PSC has also established a citizen's hotline to report speeding and reckless driving by haulers.
According to more recent truck citation records obtained from the PSC, there were 52 commercial truck citations in Greenbrier County during a one-year period (October 2003 through October 2004). Of the 52 citations, 45 were related to over-weight truck issues, and of these 45, three involved coal trucks and 16 were cited on US 60 (PSC, 2004).

Table 3.14-6. Citations Issued to Overweight Trucks by Weight Range and Coal Production in Greenbrier and Surrounding Counties (Jan 2000-June 2002)

County	Number of Overweight Trucks (non-coal) Cited	Number of Overweight Coal Trucks Cited	Coal Trucks 80,000 lbs or less	Coal Trucks between 80,000 lbs and 100,000 lbs	Coal Trucks between 100,000 lbs and 120,000 lbs	Coal Trucks over 120,000 lbs	Avg Weight of Coal Trucks Cited (lbs)
Greenbrier	47	14	3	3	7	4	117,221
Nicholas	59	35	0	6	7	16	116,977
Raleigh	110	69	6	6	20	43	133,270
Fayette	43	76	0	5	19	49	136,216

Note: To convert pounds to kilograms, multiply by 0.454.

Source: WVDOH, 2003

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3.15 Noise

This section presents the current noise conditions at and in the vicinity of the proposed Co-Production Facility and coal refuse sites. It provides background information about noise principles, noise measurement methods and criteria, and noise regulations and guidelines. Existing noise levels and sources for Rainelle and the project region are also provided. In addition, information about blasting activities and regulations is presented.

3.15.1 Noise, Blast, and Vibration Principles

3.15.1.1 Noise Principles

Noise is defined as any unwanted sound. The human ear experiences sound as a result of pressure variations or vibrations in the air. If the variations, or oscillations, in pressure occur between 20 and 20,000 times per second, then they are audible to humans. This rate of variation or oscillation per second is called frequency and the unit of measurement is called Hertz (Hz). Sound pressure is the physical force from a sound wave that affects the human ear, and is typically discussed in terms of decibels (dB), which is a logarithmic unit of the sound pressure level (SPL). Zero dB represents the threshold of hearing.

The human ear is designed to function in the frequency range of 20 to 20,000 Hz. Humans are less sensitive to low frequencies (less than [<] 250 Hz) than mid-frequencies (500-1,000 Hz) and most sensitive to higher frequencies in the 1,000 to 5,000 Hz range. High frequency noise is generally more annoying to people than low or mid frequency noise. To account for variations in the way humans perceive noise, a weighted scaling system is often used (referred to as the A-weighted scale and expressed as dBA) to give less importance to the low frequencies. Typical noise levels for a variety of indoor and outdoor noise sources expressed on the A-weighted scale are presented in Table 3.15-1.

The SPL that humans experience typically varies from moment to moment. Therefore, a variety of descriptors are used to evaluate noise levels over time. Some typical descriptors are defined below:

- Leq is the continuous equivalent sound level. The sound energy from the fluctuating sound pressure levels is averaged over time to create a single number to describe the average energy or intensity level. High noise levels during a monitoring period will have greater effect on the Leq than low noise levels. The Leq has an advantage over other descriptors because Leq values from different noise sources can be added and subtracted to determine cumulative noise levels.
- L_{dn} is the day-night equivalent sound level. It is similar to a 24-hour L_{eq}, but with 10 dBA added to SPL measurements between 10 pm and 7 am to reflect the greater intrusiveness of noise experienced during these hours. L_{dn} is also termed DNL.
- L_{min} is the lowest SPL measured during a given period of time and L_{max} is the highest.
- L_{10} is the SPL exceeded 10 percent of the time. Similar descriptors are the L_{50}, L_{01}, and L_{90}.

Table 3.15-1. Sound Pressure Level and Loudness of Typical Noises

Noise Level (dBA)	Subjective Impression	Typical Sources: Outdoor	Typical Sources: Indoor	Relative Loudness (Human Response)
120-130	Uncomfortably loud	Air raid siren at 50 feet (threshold of pain)	Oxygen torch	32 times as loud
110-120	Uncomfortably loud	Turbo-fan aircraft at take-off power at 200 feet	Riveting machine, Rock band	16 times as loud
100-110	Uncomfortably loud	Jackhammer at 3 feet		8 times as loud
90-100	Very loud	Gas lawn mower at 3 feet, Subway train at 30 feet, Train whistle at crossing, Wood chipper shredding trees, Chain saw cutting trees at 10 feet	Newspaper press	4 times as loud
80-90	Very loud	Passing freight train at 30 feet, Steamroller at 30 feet, Leaf blower at 5 feet, Power lawn mower at 5 feet	Food blender, Milling machine, Garbage disposal, Crowd noise at sports event	2 times as loud
70-80	Moderately loud	Typical turnpike at 50 feet, Truck idling at 30 feet, Traffic in downtown urban area	Loud stereo, Vacuum cleaner, Food blender	Reference loudness (70 dBA)
60-70	Moderately loud	Residential air conditioner at 100 feet, Gas lawn mower at 100 feet, Waves breaking on beach at 65 feet	Cash register, Dishwasher, Theater lobby, Normal speech at 3 feet	1/2 as loud
50-60	Quiet	Large transformers at 100 feet, Traffic in suburban area	Living room with TV on, Classroom, Business office, Dehumidifier, Normal speech at 10 feet	1/4 as loud
40-50	Quiet	Bird calls, Trees rustling, Crickets, Water flowing in brook	Folding clothes, Using computer	1/8 as loud
30-40	Very quiet		Walking on carpet, Clock ticking in adjacent room	1/16 as loud
20-30	Very quiet		Bedroom at night	1/32 as loud
10-20	Extremely quiet		Broadcast and recording studio	
0-10	Threshold of hearing			

Note: To convert feet to meters, multiply by 0.305.

Sources: Noise Assessment Guidelines Technical Background; Highway Noise Fundamentals; Handbook of Environmental Acoustics

Noise levels for combinations of sounds are added and subtracted based on a logarithmic scale. As a result, the addition of two noises, such as a garbage truck (100 dBA) and a lawn mower (95dBA), would result in a cumulative sound level of 101.2 dBA, not 195 dBA. In most cases, where the addition of decibels only needs to be accurate by +/- 1 dB, the following rule of thumb can be used to add decibels:

When two decibel values differ by:	Add the following amount to the higher value:
0 or 1 dB	3 dB
2 or 3 dB	2 dB
4 or 9 dB	1 dB
10 dB or more	0 dB

Because the decibel scale is logarithmic, a relative increase of 10 decibels represents a sound pressure level that is 10 times higher. However, humans do not perceive a 10-dBA increase as 10 times louder; they perceive it as twice as loud. The following is typical of human response to relative changes in noise level:

- 3 dBA change is the threshold of change detectable by the human ear, in ambient environments;
- 5 dBA change is readily noticeable; and
- 10 dBA increase is perceived as a doubling of noise level.

The SPL heard in the environment typically is composed of many different frequencies, and it can be broken down into numerous individual frequencies. These frequencies are grouped into octave bands. An octave band is a group of frequencies in the interval between a given frequency (such as 350 Hz) and twice that frequency (e.g., 700 Hz). The standard octave bands are each named by their center frequencies. Octave bands can be used to differentiate components of a noise source. For example, a truck traveling downhill will have a different set of sound frequencies than a truck traveling uphill.

Noise from a given source attenuates (diminishes) with distance. A roadway or railway is considered a line source because a motor vehicle or diesel engine moves from one point to another along a fixed linear route, and the receiver experiences noise from all points along the line. Noise from a line source typically attenuates at the rate of 3 dBA per distance doubling based on a reference distance of 50 feet (15 meters). Thus, traffic noise level of 65 dBA at a distance of 50 feet (15 meters) from a roadway would be 62 dBA at a distance of 100 feet (30 meters) from the roadway, and it would be 59 dBA at a distance of 200 feet (60 meters) from the roadway. The 3-dBA attenuation rate is used for noise traveling through the air or over a hard surface. Noise traveling over a soft surface, such as grass or other vegetation, may attenuate at a more rapid rate of about 4.5 dBA.

Noise from a fixed location (e.g.; industrial equipment) is termed a stationary or point source. Point sources of noise attenuate at a rate of 6 dBA per doubling of distance when traveling through air over a hard surface and up to 7 or 8 dBA when traveling over a soft surface. These attenuation rates are general rules for total noise levels from a given source. For the individual octave bands that comprise the total noise, the attenuation rate is greater for high frequencies (4000 – 8000 Hz) than for lower frequencies. Noise in the octave bands of 500 and lower are of particular concern in the analysis of noise from industrial sources due to their slower attenuation rate with distance.

3.15.1.2 Blasting and Vibration Principles

Rock blasting activities include planning, execution, and closure phases. As part of the planning for construction work, specifications are usually developed to ensure blasting is done safely and in conformance to the requirements of the project. Before blasting begins in new areas, it is important to define how blasting might impact neighbors, animals, structures, utilities and the environment in general.

Ground vibration is commonly viewed as the major concern for off-site damage resulting from blasting (ODOT, 2005). The measurement of ground vibration is Peak Particle Velocity (PPV), which is the maximum speed (measured in inches/second or mm/second) at which a particle in the ground is moving relative to its inactive state. The U.S. Bureau of Mines and the Office of Surface Mining have conducted extensive research over the last 40 years to develop acceptable vibration standards, vibration damage criteria, and techniques to predict and control blast vibrations that greatly reduce the risk of off-site impacts from blasting. The principal factors that affect ground vibration levels at a given point are:

- Weight of the explosive fired per delay period
- Distance from blast to point of concern (house, well, etc.)
- Blast configuration (existence of a free face, trench, confined area, etc.)
- Geology (sites with a thick layer of soil have been known to produce vibrations 10 times as great as locations with a thin layer of soil over rock)

The first two factors are the most influential to ground vibration. The distance from the blast to the point of concern cannot necessarily be controlled by the blasting contractor, but the weight of the explosives fired per delay is a controllable variable.

The OSM initially found that if PPV were limited to 1 inch/second (2.5 centimeters/second), then 95% of the damage to surrounding houses and structures would be prevented. After more recent research, the PPV limit was changed to 0.5 inches/second (1.2 centimeters/second) to avoid off-site damage. A PPV of 0.5 is generally equivalent to the vibration caused by a loaded truck or bus passing by 50 to 100 feet (15 to 30 meters) away. As a general rule, a person will begin to feel blast vibrations at levels as low as 0.02 inches/second (0.05 centimeters/second). This is well below the level at which research has shown that damage may occur.

3.15.2 Noise and Blasting Legislation and Guidelines

3.15.2.1 Federal Guidelines

U.S. Department of Interior, Bureau of Mines – The former U.S. Bureau of Mines recommended a safe blasting limit of 5 millimeters/second (2 inches/second) peak particle velocity (PPV). However, based on more recent research, as stated above, the current PPV limit is 0.5 inches/second (approximately 1.2 centimeters/second).

EPA – Studies carried out by the Environmental Protection Agency (EPA) on the effects of noise are the basis of standards and legislation at federal, state, and local levels of government. For the purposes of hearing conservation, EPA determined that a Leq (24) of 70 dBA would be sufficient to protect people. EPA's recommended 70 dBA criterion for public health and welfare is not low enough to prevent people from being annoyed by noise. EPA found that when the background noise level is 55 dBA, conversation between two individuals is 95 percent intelligible at a distance of about 10 feet (3 meters). As background noise increases, they must move closer to maintain 95 percent intelligibility. EPA determined that an indoor L_{dn} of 45 dBA permits normal speech communication in the home. At night, an indoor background noise level of 32 dBA is needed for most people to sleep without interference. Most homes can provide an exterior to interior noise level reduction of 15 dBA, even if the windows are partially open. Thus, an outdoor noise level of 60 dBA would result in an indoor noise level of 45 dBA. However, EPA allowed for a 5 dBA margin of safety resulting in a recommended outdoor noise level of 55 dBA in residential areas. These EPA recommendations are not laws, but they have guided other agencies in establishing legislation.

HUD – Based on the EPA reports, the Department of Housing and Urban Development (HUD) published regulations establishing standards for HUD-assisted projects in 1979. HUD categorized noise levels for proposed residential development as Acceptable, Normally Unacceptable, and Unacceptable, as shown in Table 3.15-2. The assumption is that standard construction provides an average of 20 L_{dn} of attenuation. At 65 L_{dn} or below, this amount of attenuation would be sufficient to meet an interior level of 45 L_{dn}. These standards normally apply to projects where HUD funding is involved.

Table 3.15-2. HUD Acceptability Standards for Noise

Category	Noise Level (L_{dn})
Acceptable	< 65 dBA
Normally Unacceptable	>65 dBA < 75 dBA
Unacceptable	> 75 dBA

Source: U.S. Department of Housing and Urban Development (HUD), March 1985

FHWA – The Federal Highway Administration (FHWA) has standards that govern the analysis and definition of impacts from traffic noise for highway projects using Federal-aid funds. FHWA's Noise Abatement Criteria (NAC) are shown in Table 3.15-3. An impact is defined when projected traffic noise levels: 1) approach or exceed the NAC, or 2) substantially exceed existing noise levels. The FHWA regulations do not specify noise levels that approach or exceed the NAC; state DOTs develop their own definitions. However, state DOTs must use a definition of "approach" that is at least 1 dBA less than the applicable NAC. State DOTs also develop their own criteria for determining a "substantial" increase in noise levels. FHWA standards are typically applicable when federal highway funds are involved in a proposed project.

Table 3.15-3. FHWA Noise Abatement Criteria

Activity Category	Hourly Sound Level (dBA)		Description of Activity Category
	L_{eq}(h)	L10(h)	
A	57 (Exterior)	60 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve it
B	67 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, sports acres, parks, residences, motels, hotels, schools, churches, libraries, and hospitals
C	72 (Exterior)	75 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above
D	--	--	Undeveloped lands
E	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums

**Either L10 (h) or L_{eq} (h) (not both) may be used on a project. Hourly sound levels are expressed in dBA (decibels on the A-weighted scale), which correlate with human perception of loudness.*

Source: 23 CFR 772

FERC – The Federal Energy Regulatory Commission has published a Guidance Manual for Environmental Report Preparation in August 2002. In it, the Commission recommended that compressor facilities not exceed an L_{dn} of 55 dBA at noise sensitive areas.

3.15.2.2 State Guidelines

The West Virginia Department of Environmental Protection (WVDEP) does not currently have guidelines that address noise emitted from large industrial facilities or power plants. However, the Public Service Commission (PSC) of West Virginia is in the process of promulgating new regulations for some types of power plants under Title 150 of the West Virginia Code: Rules Governing Siting Certificates for Exempt Wholesale Generators. These new regulations are expected to include requirements and standards relating to noise generated by these types of facilities.

The West Virginia Department of Transportation (WVDOT), division of Highways, has a design directive (DD-207) dated February 6, 1998 entitled, "Noise Analysis and Abatement Guidelines." Applicable to highway projects, it states that an impact would occur when predicted noise levels approach (are within 1 dBA (L_{eq})) of the FHWA NAC or substantially exceed the existing noise levels by at least 16 dBA.

Blasting activities are required to comply with the Citizens Guide to Blasting published by the WV Department of Environmental Protection (WVDEP) in March 2002. WVDEP's Office of Explosives and Blasting (OEB) is responsible for regulating surface mine blasting operations. Some of the main provisions of the OEB regulations are listed below. However, because the proposed blasting does not relate to mining, the OEB's regulations do not strictly apply to the power plant site.

- Blasting may not be conducted with 300 feet (approximately 90 meters) of a dwelling unless permission is granted by the owner of the structure.
- Blasting may not be conducted within 300 feet (approximately 90 meters) of a school, church, or hospital and not within 100 feet (approximately 30 meters) of a cemetery.
- The blaster will define and control access to all areas (blast area) where flyrock may injure people.
- A pre-blast survey must be offered prior to initiation of blasting. This includes contacting owners and/or occupants of dwellings within 0.5 miles (approximately 1 kilometer) of the permitted area.
- Operators that will detonate 5 pounds (approximately 2.3 kilograms) or more of explosives at any given time must publish a blasting schedule in a newspaper of general circulation in all the counties of the proposed blasting area. Copies of the schedule shall be distributed by certified mail to local governments, public utilities and each resident within 0.5 miles (approximately 1 kilometer) of the permit area.
- Unless otherwise specified by the DEP, detonation blasts may only occur between the hours of sunrise and sunset, Monday through Saturday.

3.15.2.3 Local Ordinances

Neither Greenbrier County nor the Town of Rainelle has a local ordinance that addresses noise from new development or construction activities. Noise from traffic volumes on State and county roadways is outside the jurisdiction of local noise ordinances. In addition, neither Greenbrier County nor Rainelle has ordinances that cover blasting activities. A Zoning Ordinance for the City of Lewisburg has provisions covering blasting operations (Section 55) (Lewisburg, 2005). Although it is not applicable to Rainelle, it is presented here for informational purposes. Blasting is considered in compliance with the Lewisburg ordinance if the following measures are followed:

1. The weight in pounds of explosive charge detonated at any one time shall conform with the following scaled distance formula: $W = (D/50)^2$, where W = weight in pounds of explosive detonated at any one instant time, D = distance in feet from the nearest point of blast to nearest residence, building or

structure, that explosive charges shall be considered to be detonated at one time if their detonation occurs within eight milliseconds of each other.

2. Where blast size would be exceeded under Subdivision (1) of this ordinance, blast shall be detonated by the use of delay detonators to provide detonation times separated by nine milliseconds or more for each of the blasts complying with the scaled distance of the formula.

3. A plan of each blasting operation's methods for compliance with this section (blast delay design) for typical blast, which shall be adhered to in all blasting within the City of Lewisburg, shall be submitted to the City of Lewisburg with the application for a permit. It shall be accepted if it meets the scaled distance formula established in Subdivision (1) of this ordinance.

4. Records of each blast shall be kept in a log to be maintained for at least 3 years, which will show for each blast other than secondary (boulder breaking) blasts the following information:

a. Date and time of blast;

b. Number of holes;

c. Typical explosive weight per delay;

d. Total explosives and blast at any one time;

e. Number of delays used;

f. Weather conditions; and

g. Signature of operator/employee in charge of the blast.

3.15.3 Noise Monitoring

To establish and characterize the baseline noise environment, a noise monitoring program was developed and implemented. The program focused on potential noise sensitive receptor sites in an area along potential transportation corridors and in areas around proposed project activities. Program components related to the proposed project site were developed in consultation with the West Virginia PSC. Noise sensitive receptors are defined as homes, schools, hospitals, etc., which are especially sensitive to high noise levels. The noise monitoring program was carried out over several monitoring events that included the following periods:

- May 11, 2004 through May 13, 2004;
- October 19, 2004 through October 21, 2004;
- January 12, 2005 through January 17, 2005; and
- November 3, 2005.

Additional details on noise monitoring activities are provided in Appendix K (Noise Study).

Monitoring sites along affected arterial roadways were selected to represent worst-case sensitive receptor points in the affected municipalities, while sites in the vicinity of the proposed power plant site were selected to identify baseline conditions in noise sensitive areas that were not dominated by traffic noise (see Figures 3.15-1 and 3.15-2). Monitoring locations along roadways are summarized in Table 3.15-4. Monitoring areas "A" through "F" also represent study intersections for the traffic analysis that was discussed in Section 3.13 (Traffic and Transportation).

Sensitive receptors that could be affected by noise from the proposed Co-Generation Facility include homes that currently experience low levels of noise due to their distances from highways and rail tracks. A radius of 1,000 feet (300 meters) from the proposed plant site was used to define the study area to characterize baseline noise levels in the immediate vicinity of the proposed power plant site. Preliminary review of information on plant equipment indicated that, beyond this distance, site-generated noise would attenuate to a noise level that is below existing background levels. Within the 1,000-foot (300-meter) study radius, the primary focus for obtaining baseline noise data was on noise levels at the site boundaries and at nearby homes.

Both short-term and long-term (LT) monitoring were carried out at locations representing sites that could be affected by noise around the proposed site. The locations of these noise monitoring sites are shown in Figure 3.15-1. Monitoring sites C7 through C10, also shown in Figure 3.15-1, represent short-term monitoring locations in the vicinity of Area C. These sites are in a quiet residential area that is generally not affected by highway noise. Long-term monitoring of ambient noise was carried out at six sites at the boundaries of the power plant site, as well as at nearby residences. These long-term monitoring locations are also shown in Figure 3.15-1.

Table 3.15-4. Noise Monitoring Sites Along Roadways

Area	Description	Monitored Sites
A	North and west of the power plant site. Sites represent noise levels along WV 20 between the intersection with US 60 near the Rainelle Medical Center and the CSXT railroad facility further to the south on WV 20	A1 - WV State Police barracks A3 - Playground A5 - Golf Course A6 - Greenbrier Avenue A7 - Walnut Street A8 - Grace Baptist Church
B	North and west of the power plant site near the Rainelle Medical Center at the intersection of routes WV 20 and US 60	B1 - Rainelle Medical Center B2 - Rainelle School
C	Intersection of WV 20/US 60 (Kanawha Avenue) and Locust/North Sewell Streets	C1 – N. Sewell Street &WV 20/US 60 C4 - Cherry Street C5 - Nicholas Street
D	Represents noise levels in downtown Rainelle	D1 - Seventh Street at Main St.
E	Representative of Rupert	E - CR 1 @ US 60
F	Charmco	F- US 60 at WV 20
G	Green Valley	G - WV 20 at Green Valley
H	Representative of Quinwood	H - WV 20 in Quinwood
I	Representative of WV 20/60 outside of Rainelle	I - WV 20/US 60, Youth Park
J	Representative of Anjean Road	J - CR 1, Anjean mining site

3.15.4 Existing Noise Levels

3.15.4.1 Transportation Corridor Monitoring Results

Table 3.15-5 presents noise levels for existing conditions along affected highways based on the TNM model for all sites except for: 1) Walnut Street, where the monitored value was used due to the influence of local traffic rather than highway traffic; and 2) the peak PM period in Hillsboro, where the monitored value was used because the low traffic volumes resulted in modeled values that would have been below background values. Typical peak hour traffic volumes established for the roadways were used with the TNM model. The locations shown in the table are the sites where noise monitoring was carried out. Except for the golf course, traffic noise is the dominant source of noise at these sites. Noise levels varied with a site's distance from the roadway noise source. For each site, noise levels for the weekday AM, Midday, and PM peaks were similar. Generally, for sites dominated by traffic noise, peak period L_{eqs} are approximately equivalent to an L_{dn}.

Table 3.15-5. Existing Noise Levels at Traffic Sites

Area	ID	Location/Landmark	Peak Periods Leq (dBA)		
			AM	MID	PM
A	1	State Police Barracks	60.3	60.2	60.7
A	3	Playground	58.2	58.2	58.8
A	5	Golf Course	36.3	34.3	34.4
A	6	Greenbrier Avenue	64.0	63.4	62.6
A	7	Walnut Street	-	51.7	-
A	8	Grace Baptist Church	49.6	48.5	49.6
B	1	Rainelle Medical Center	61.9	62.4	60.6
B	2	Rainelle Elementary	62.0	61.8	60.4
C	1	North Sewell Street at WV 20/US 60	63.9	64.0	63.4
C	4	Cherry Street	52.4	51.8	50.6
C	5	Nicholas Street	55.9	51.5	52.4
D	1	Seventh Street at Main St.	67.8	68.6	67.3
E		Route 1 @ US 60, Rupert	69.1	69.1	68.0
F		US 60 at WV 20, Charmco	66.1	65.3	65.3
G		WV 20, Green Valley	64.7	67.3	65.7
H		WV 20, Quinwood	68.1	67.9	66.3
I		WV 20/US 60, Youth Park, Rainelle	59.3	59.8	58.3
J		CR 1, Anjean	60.5	62.1	58.7
K		Donegan, Euke Rd, north of Anjean	60.5	62.1	58.7
L		Hillsboro, Route 219 north of Lewisburg (Mill Point)	52.9	63.5	59.3

Peak Period – Time frames 7-9 a.m., 11-1 p.m., or 4-6 p.m., Monday through Thursday

Noise levels at monitored sites in Area A vary with their distance from the roadway and range from an L_{eq} of 34.3 dBA at the golf course (A5) to 64.0 on Greenbrier Avenue (A6), which is only 7.5 feet (2.3 meters) from WV 20. Homes along WV 20 in Area A are generally close to the roadway, and noise levels at their property lines would be typical of the noise levels shown for the Greenbrier Avenue (A6) and Police Barracks (A1) sites. Homes on side streets and interior streets would have lower noise levels due to distance from the highway and intervening buildings, as represented by the Walnut Street (A7) site. The TNM model addresses traffic noise. It does not model noise from background sources such as trees, birds, insects, etc. The golf course site (A5) is sufficiently distant from the highway that the modeled traffic noise falls below monitored background levels. Thus, the noise level modeled by TNM is unrealistically low. Noise levels at Grace Baptist Church (A8) are about 8 dBA lower than the modeled noise levels at other sites due to topographic differences and distance between the site and roadway (both the church and monitoring site are situated on a hillside above WV 20).

Homes in Area B are also close to the highway, although site conditions generally allowed the noise monitor to be placed 15 to 25 feet (5 to 8 meters) from the roadway. Near the driveway to the Rainelle Medical Center, WV 20 northbound and US 60 eastbound merge. Thus, noise levels in the vicinity of the intersection are slightly higher, due to the higher traffic volume, than noise levels a little further west. The peak period L_{eqs} for both Area B sites are in the low 60s.

The monitoring location for the home at C1 was approximately 12 feet (4 meters) from the roadway. This is a busy intersection due to the Park Center Shopping Complex traffic. The peak period L_{eqs} ranged from 63.4 to 64.0 dBA. Noise levels at the C4 and C5 monitoring locations are lower because homes in this neighborhood are protected from highway noise by both distance and topography.

The monitoring location at D1 is at the corner of Main and South Streets. It is nearly 12 feet (4 meters) from the roadway, and would be typical of homes and apartments in downtown Rainelle. Peak period L_{eqs} ranged from 67.3 to 68.6 dBA.

Noise levels at Areas E through H are similar to those for D1 in downtown Rainelle. These sites are generally 15 feet (5 meters) from the road. Peak period L_{eqs} are in the mid to upper 60s. The highest noise levels would occur at the intersections with Main Street. Homes along the side streets would have lower noise levels.

For the Western Greenbrier Youth Park (Area I), the modeled site is approximately 100 feet (30 meters) from the edge of the roadway due to the sloping terrain close to the road. Peak period L_{eqs} were 58.3 to 59.8 dBA.

The monitoring locations at areas J, K, and L represent special circumstances. Area J is on CR 1 at the Anjean site near the entrance to the mining site, and it represents property lines for an office and several remote residences at this location. At area J, the monitor was approximately 15 feet (5 meters) from the roadway. The comparatively low traffic volumes at Area J resulted in L_{eqs} of 58.7 to 62.1 dBA. The Donegan site is located approximately 14 miles (23 kilometers) north of Anjean with very few residential properties located between Anjean and Donegan. Homes along the route between Anjean and Donegan are approximately 15 feet (5 meters) from the road, and traffic was assumed to be similar to that at the Anjean site. Thus, existing noise levels would be the same, if not less. Area L represents homes about 15 feet (5 meters) from WV 219, which provides access to the Mill Point Quarry. L_{eq} levels here ranged from 52.9 to 63.5 dBA.

3.15.4.2 Monitoring Results at the Proposed Site

Existing noise levels for the four short-term monitoring sites, C7 through C10, are presented in Table 3.15-6. These locations are affected by local traffic and background noise levels rather than by highway noise. Local traffic has a much lower volume than highway traffic and it travels at speeds of about 25 miles per hour (mph) (40 kilometers/hour [kph]). Thus, traffic noise from local roads is lower than from highways. Local traffic may not correspond to commuter traffic patterns. Consequently, the noise levels for typical "peak" traffic periods are similar to the various off-peak periods. The L_{eqs} at these sites are generally in the mid-30 dBAs to upper-40 dBAs. Because the peak and off-peak readings are similar, the estimated L_{dns} for these sites would be higher than the peak L_{eqs}, but well below 60 dBA.

Table 3.15-6. Existing Noise Levels at Short-Term Monitoring Sites in the Vicinity of the Co-Production Facility Site

Area	ID	Location/Landmark	Peak Periods			Off-Peak Periods		
			AM	MID	PM	OP	LN	WE
C	7	Retirement Community	-	35.2	-	42.7	38.0	-
C	8	Nursing Home	-	47.0	-	46.4	45.3	48.2
C	9	Sewell Landing Apts (ADA housing)	-	38.9	-	41.6	43.5	40.2
C	10	Mobile Home Park	-	-	-	45.6	43.7	39.1

Peak Period – Time frames 7-9 a.m., 11-1 p.m., or 4-6 p.m., Monday thru Thursday
OP (Off Peak) – Time frames 7 a.m.-10 p.m., Monday thru Thursday, not within the peak period
LN (Late Night) – Time frames after 10 p.m., Monday through Thursday
WE (Weekend) – Time frames during Off-Peak periods on the weekend
"-" – no monitoring performed

Table 3.15-7 provides the results of the consecutive 24-hour monitoring periods at six sites in the vicinity of the proposed project site that were collected in January of 2005. The noise monitors recorded L_{eqs} and other parameters at 15-minute intervals. This data was reduced by placing the data in a spreadsheet and calculating 24-hour L_{eqs} and L_{dns}. Where possible, the 24-hour period ran from midnight to midnight. Information for both weekday and weekend days is shown in Table 3.15-7.

Table 3.15-7. Existing Noise Conditions (dBA), Long-Term Monitoring Sites

Site ID	Location	Date	Time	Day	Min.	Max.	L_{eq} (24)	L_{dn}
LT-01	Plant - Southeast Side	1/12/05	3:00p - 3:00p	Wed.-Thurs.	27.1	66.3	39.3	42.6
		1/15/05	12:00a - 12:00a	Saturday	29.1	68.2	37.0	41.4
		1/16/05	12:00a - 12:00a	Sunday	27.7	60.5	39.7	44.6
		1/17/05	12:00a - 12:00a	Monday	31.0	64.3	42.2	48.7
LT-02	Plant - East Side**	1/16/05	12:00a - 12:00a	Sunday	26.2	69.9	41.7	46.7
		1/17/05	12:00a - 12:00a	Monday	30.0	70.3	45.8	51.6
LT-03	Plant - North Side	1/14/05	10:15p - 10:15p	Fri.-Sat.	28.0	66.9	38.8	41.9
		1/17/05	12:00a - 12:00a	Monday	31.5	71.6	41.2	46.5
LT-04	Plant - West Side	1/15/05	12:00a - 12:00a	Saturday	30.4	64.9	42.0	46.1
		1/16/05	12:00a - 12:00a	Sunday	30.1	68.3	42.9	48.0
		1/17/05	12:00a - 12:00a	Monday	31.0	70.2	44.8	51.3
LT-05	EcoPark*	1/12/05	4:30p - 4:30p	Wed.-Thurs.	24.9	73.1	44.4	45.9
		1/15/05	12:00a - 12:00a	Saturday	24.0	60.9	36.5	39.6
		1/16/05	12:00a - 12:00a	Sunday	24.3	67.9	42.0	47.3
		1/17/05	12:00a - 12:00a	Monday	28.0	73.4	45.2	52.6
LT-06	Pennsylvania Avenue	1/15/05	12:00a - 12:00a	Saturday	33.0	73.9	40.8	45.2
		1/16/05	12:00a - 12:00a	Sunday	31.2	65.4	43.5	49.2
		1/17/05	12:00a – 12:00a	Monday	36.0	70.5	47.4	54.0

** No rail traffic observed over the weekend monitoring event*
***Residence to be acquired by Western Greenbrier is no longer outside power plant site boundary*

As shown in Table 3.15-7, noise levels at LT-01 through LT-06 are low in comparison to readings observed in the downtown area and at sites influenced by roadway traffic. The 24-hour L_{eqs} are generally in the mid 30s to mid 40s, while the calculated L_{dns} are in the upper 30s to low 50s. Weekend levels appear to be lower than weekdays. The L_{eqs} for these sites are approximately 20 dBA lower than the noise levels for the traffic sites. However, it is important to note that the long-term monitoring was conducted during the winter months, and that baseline noise levels would be expected to be higher from spring through fall when wildlife and insects (e.g., chirping birds, crickets, and cicadas) would be active noise sources. It is also important to note that no rail traffic was observed over the weekend during these monitoring periods, which is atypical for this area.

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4. ENVIRONMENTAL CONSEQUENCES

4.1 Chapter Overview

This chapter provides a discussion of the potential impacts of the Proposed Action and alternatives, including impacts that would be associated with each alternative and mitigation necessary to reduce significant adverse impacts. The chapter has been prepared to address the required elements of an EIS prepared under NEPA (40 CFR 1502.15 and 1502.16) including the analysis of relevant environmental resource areas identified through the scoping process, as well as secondary and cumulative impacts. The chapter is organized into the following key sections:

4.2 Local Features, Aesthetics, and Light

4.3 Atmospheric Conditions

4.4 Surface Water Resources

4.5 Floodplains

4.6 Geology and Groundwater Resources

4.7 Biological Resources

4.8 Cultural Resources

4.9 Socioeconomics

4.10 Environmental Justice

4.11 Land Use

4.12 Utilities and Community Services

4.13 Transportation and Traffic

4.14 Public Health and Safety

4.15 Noise

4.16 Potential Secondary and Cumulative Impacts

4.17 Relationship Between Short-term Uses of the Environment and Long-term Productivity

4.18 Irreversible and Irretrievable Commitments of Resources

4.19 Measures to Mitigate Adverse Impacts

The extent of information provided in each section is commensurate with the detail necessary to present the impacts analysis as related to the “importance of the impact.” In the spirit of NEPA the emphasis of this chapter has been placed on discussing potentially significant impacts that could occur as a result of the Proposed Action and alternatives. To the greatest extent possible, discussions have been formulated in a manner to facilitate a comparison of the alternatives under consideration.

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4.2 Local Features, Aesthetics, and Light

4.2.1 Method of Analysis

Visual impacts relate to changes in the viewshed and the effects of those changes on people. These effects arise from changes in land use, the development or construction of buildings and structures, changes in land management, and, less commonly, changes in production processes and emissions. In addition, over the life of a project, different sources of impacts occur at various stages during construction, operation, and renovation/upgrade. Potential impacts were evaluated subjectively based on a combination of contrasts between natural, rural, and urban/industrial levels of visual quality. The potential for the Proposed Action or an alternative to have a significant impact on local features and aesthetic conditions in the planning area has been evaluated based on a series of predetermined criteria. Based on the criteria, a significant impact may occur if the Proposed Action or an alternative would cause any of the following conditions:

- Block or significantly degrade a scenic vista;
- Significantly damage or degrade a scenic resource; or
- Create excessive glare or light sources that would be obtrusive or incompatible with existing land uses.

4.2.2 No Action

Under this alternative, the DOE would not provide partial funding for the design, construction and operation of the Proposed Action. Because the proposed project would not likely proceed without DOE partial funding, it is anticipated that existing aesthetic and scenic conditions would remain unchanged under the No Action Alternative.

4.2.3 Proposed Action

4.2.3.1 Site Layout and Facility Construction

The elements of the proposed Co-Production Facility that could affect the visual and aesthetic quality of the environment would primarily be the air stack (approximately 300 feet [90 meters] high), the boiler building (approximately 150 feet [45 meters] high), the emission plumes emanating from both the air stack and the cooling towers (ranging from approximately 62 to more than 300 feet [19 to more than 90 meters] high), and security lighting at the facility. The receptors that would be affected most by the proposed project would include the residential areas located immediately east and northwest of the project site (see Figure 4.2-1) and travelers along WV 20, Tom Raine Drive, and John Raine Drive.

The visual elements of site layout Options A, B, and C do not vary dramatically in that they consist of comparable facilities with roughly similar footprints, and all options would cut into the ridgeline in similar fashion. Option C, however, includes a rail spur located north of the project site. The visual characteristics of the rail spur would still retain the same industrial ‘feel’ of the proposed facilities, and this single characteristic would not cause a significant variance when comparing the visual impacts among the three layout options.

During construction, it is anticipated that truck and equipment activities would result in temporary visual and aesthetic impacts such as visual intrusion and daytime noise, dust, storm water runoff, and increased traffic to nearby properties. These impacts are anticipated to be minor in intensity and short-term in duration. In general, visual impacts on the overall landscape setting resulting from construction at the project site are expected to slightly degrade the viewshed only slightly over a temporary amount of time.

Prior to construction, vegetation consisting of a wild growth of grass, shrubs, and small trees would be cleared leaving a partially unobstructed view of the project site for travelers on WV 20, Tom Raine Drive, and John Raine Drive. Construction activities at the project site would not be readily visible from US 60 because a variety of commercial and light industrial activities already obstruct the ground level view of the site. However, construction efforts would be slightly more visible from the residential locations located in the northwest direction of the site, and even more so for the residents located directly east of the project site (see Figure 4.2-1 and Section 4.2.3.2).

4.2.3.2 Facility Operation

A balloon test was performed to a height of 350 feet (110 meters) above grade (i.e., approximately 2,745 feet [837 meters] above mean sea level), equivalent to the maximum proposed power plant stack (see cultural reports in Appendix G). Because of the mountainous terrain and visual barriers (e.g., tree lines), the Area of Potential Effect for impacts on the viewshed was defined as being within a 0.75 mile (1.2 kilometer) radius of the proposed site. The result is that the stack would be readily visible from many locations in Rainelle, including some nearby public, residential, and recreational land use areas. Figures 4.2-2 through 4.2-4 are visual renderings that depict the proposed air stack from various vantage points in Rainelle.

Because Rainelle was developed around the lumber industry, which historically included a number of very visible stacks and smoke plumes, the implementation of the proposed project would not likely result in a community perception of a visual impact that is out of character with the history of Rainelle and the local area. Furthermore, the proposed power plant would be sited on disturbed land in an area previously used for industrial activities, and would constitute a similar use. Also, as a result of prior land development attempts, the exposed ridgeline with its visibly unnatural tree line on top of a scarred hill already degrades the viewshed of the proposed site for the project (see images of the project site in Section 3.2).

It is anticipated that most nearby residences and other land uses would have views limited to the upper portions of the proposed power plant buildings and stack. Views of the project site from US 60 and WV 20 would be confined to a small stretch of the road because the plant site is surrounded by small hills, and visual impacts would be downplayed due to the surrounding land uses, such as the rail yard on WV 20 and various commercial buildings located along US 60. The golf course and neighborhood park located approximately 2,000 feet (600 meters) north and west of the main facility site would have views comparable to those from WV 20, as mentioned above. In general, the view of the project site from the golf course and park would not be substantially degraded due to the surrounding industrial/commercial land uses. The perspective from the park (corner of WV 20 and Fayette Avenue) looking toward the project site provides a viewscape that would include the rail yard on the right, the American Electric Power (AEP) parking lot and U.S. Army Reserve Center to the left, and the scarred ridgeline straight ahead. Overall, the area in the vicinity of the proposed power plant site is largely indistinguishable from a large part of the surrounding area.

Consideration of these factors leads to the conclusion that implementation of the proposed power plant would not result in widespread degradation of the aesthetic quality throughout the community. However, as indicated in Figure 4.2-1, the residential properties to the east within a distance of approximately 1,000 feet (300 meters) from the proposed plant site would experience the most significant aesthetic impacts. As illustrated in the aerial photograph, eight single-family homes and a 52-unit apartment complex would have a direct line-of-sight view of the power plant. Additional residential properties, including four single-family homes, approximately 12 mobile homes, and a nursing and rehabilitation center, would have partial line-of-sight views of the power plant.

Light

In addition to the stack height, the implementation of the Proposed Action also would involve utilizing safety lights on the stack and security lighting in areas of the power plant. The proposed facility would use non-glare, low-impact lighting with shielded or cutoff fixtures. This system would minimize the lighting impact on the immediate vicinity while maintaining low to zero intensity above a horizontal axis. Outdoor lighting would be directed downward and at the project site and equipment, and would not be directed off-site. Lighting would be kept to the minimum required for operator safety requirements and maintenance work. As a result, although the facility would be illuminated and visible to adjacent properties and from certain vantage points within Rainelle, facility lighting is not expected to produce substantial amounts of glare or to change ambient light conditions on neighboring properties. Therefore, the potential for light-related impacts is considered to be minimal with the exception of potentially significant impacts on the properties indicated in Figure 4.2-1.

Visibility

The visual environment was assessed through field studies, and the principal features were identified. Photographs were taken of views that might be affected by the proposed project (see Figures 4.2-2 through 4.2-4). The relative quality of the visual experience afforded by the proposed Co-Production Facility is an important consideration in the EcoPark development and the Co-Production Facility design. Because one of the WGC objectives is to support local and regional development, consistency with those efforts requires visual quality within the proposed project.

There are no protected vistas within the general vicinity of the proposed site. Emissions from the facility would be minimized with best available control technology and are not expected to generate any perceptible change to visibility in the local area. However, because of potential fogging and frost formation that could result from the cooling tower plumes, the plumes were modeled using the Seasonal/Annual Cooling Tower Impact (SACTI) program. Based on the results of the SACTI model, it is expected that the cooling tower would not cause adverse off-site visibility impacts to neighboring properties in terms of excess fogging and plume shadowing. Further details on the SACTI modeling and results are discussed in Section 4.3, Atmospheric Conditions.

In compliance with requirements set forth by the Prevention of Significant Deterioration (PSD) air permit, visibility analyses for Class I and II areas of interest were performed (URS, 2005). Class I and II areas were discussed in Section 3.2. The analysis for regional haze impacts to Class I areas consisted of modeling the emission concentrations of PM_{10} (particulate matter with a diameter of 10 micrometers and smaller), SO_x, and NO_x and incorporating meteorological data such as relative humidity and weather, into predictive modeling techniques. The visibility analysis was conducted using CALPUFF and CALPOST modeling. The modeling results indicated that future air quality levels resulting from the operation of the proposed facility would be in compliance with the NAAQS and that there would not be significant visibility impacts at the Class I areas (for further details see Section 4.3 Atmospheric Conditions).

A visibility analysis for the Class II areas discussed in Section 3.2 was performed using VISCREEN, an EPA-approved visual impact model. The modeling procedures included a Level 1 and Level 2 screening analysis. A Level 1 screening analysis assumes worst-case meteorological conditions represented by an extremely stable atmosphere and light winds to provide a very conservative estimate of plume visual impacts. In the Level 2 analysis, worst-case stability is based on actual meteorological data. Level 1 screening analysis was performed for all four Class II areas. Two areas, Bluestone Lake Project and Bluestone River, passed screening at Level 1. The remaining two areas, New River and Gauley River, were subjected to a Level 2 screening analysis and both passed at this level. To obtain the worst-case stability conditions for the Level 2 analysis, a frequency of occurrence table of wind speed, stability and wind direction was developed for four six-hour time periods using regional data. The VISCREEN results indicate that the maximum visual impacts do no exceed screening criteria either inside or outside the Class II areas, and hence indicate that the visibility impacts as a result of the project would not be significant in Class II areas (for further details see Section 4.3 Atmospheric Conditions).

Figure 4.2-2. Visual Rendering of Proposed Air Stack (350 feet above grade) from Second Street and US 60 Looking West

Figure 4.2-3. Visual Rendering of Proposed Air Stack (350 feet above grade) from Locust Street and Kanawha Parkway Looking South

Figure 4.2-4. Visual Rendering of Proposed Air Stack (350 feet [107 meters] above grade) from the United Methodist Church Looking South

4.2.3.3 Power Transmission

The proposed corridor for new power transmission lines to connect the WGC plant to the existing AEP transmission line right-of-way (ROW) would traverse approximately 17 acres (7 hectares) of land west of WV 20. As described in Chapter 2, this property would be subject to an exchange for comparable acreage along US 60 west of the AEP ROW. The exchange property is essentially undeveloped and is expected to remain so, which would support the National Scenic Highway status of US 60. The clearing of the corridor from WV 20 west to the AEP ROW would result in a minor aesthetic impact for travelers along WV 20, because the corridor would be visible along a short stretch of the roadway.

The option of upgrading the power lines in the existing AEP transmission line right-of-way from Rainelle to Grassy Falls generally would have no significant impact on visual and aesthetic resources. The transmission corridor has already been cleared. During construction to upgrade power lines and poles, however, the visual impact may be moderate due to construction-related activities involving material stockpiles and construction-related traffic. Short-term impacts, however, would be limited to the populated areas along the corridor, such as Rainelle and Quinwood.

The option of widening the existing transmission corridor from Rainelle to Grassy Falls would clear additional lands adjacent to the existing ROW. Minor visual impacts on the surrounding landscape are anticipated, because activities would occur adjacent to an existing power line corridor, which is already cleared. No significant long-term impacts are anticipated to adversely affect other visual or aesthetic resources in the vicinity of the corridor. During construction to clear the additional ROW and install new power lines and poles, however, the visual impact may be moderate due to construction-related activities involving material stockpiles and construction-related traffic. Short-term impacts, however, would be limited to the populated areas along the corridor, such as Rainelle and Quinwood.

The option of developing a new transmission corridor from Rainelle to Grassy Falls would affect a linear stretch of landscape approximately 20 miles (30 kilometers) long and 100 feet (30 meters) wide, potentially including substantial amounts of undisturbed lands causing moderate impacts. An initial survey to identify potentially impacted cultural and ecological resources of the proposed corridor, as described in Chapter 2 (see Figure 2.4-9), was conducted for WGC (see Section 4.8 and Appendix L - Electrical Transmission Line Cultural and Ecological Evaluations). Additionally, preliminary investigation of aesthetic resources that could be impacted by this new route was accomplished by examining aerial photography (from years 1996-1997) and geographical information system (GIS) data. State park, wilderness, trail, byway, and road GIS layers were accessed through the West Virginia State GIS Technical Center and superimposed over the geographical coordinates of the new route as defined in the cultural and ecological survey.

Table 4.2-1 summarizes the possible aesthetic resources that could be impacted by the new corridor route. No crossings of parks, trails, or byways were identified in this preliminary investigation. Table 4.2-1 is not an all-inclusive list and any decisions on the final alignment would need to be determined in consideration of these and newly identified aesthetic resources. Due to the isolated location of the potential alignment, the moderate traffic volumes on WV 20 north of Rainelle, the absence of designated scenic resources along the corridor, and the prominence of mining areas that have been stripped and excavated, long-term significant adverse impacts on visual and aesthetic resources would not be anticipated. However, during construction to clear the ROW and install power lines and poles, the visual impact may be moderate due to construction-related activities involving material stockpiles and construction-related traffic. Short-term impacts, however, would be limited to the populated areas along the corridor, such as Rainelle and Quinwood.

Many of the properties that would be traversed by the new corridor are owned by timber companies that would likely clear-cut the properties prior to WGC construction of the power line. Under this scenario, the relative visual impact of the power line would be minor in comparison to the aesthetic impacts of the clear-cutting activities.

4.2.3.4 Water Supply

The corridor for the proposed water pipeline is shown in Figure 2.2-3 (Chapter 2), and would take advantage of existing pipeline easements held by PSD #2. The vast majority of the landscape in this area has been disturbed by previous activity. Therefore, the principal visual impacts associated with the proposed intake structure and pipeline corridor would occur during construction, including noise, dust and traffic. Lands temporarily disturbed during construction would be returned to pre-construction conditions. The new water line from the Rainelle Sewage Treatment Plant (RSTP) to the power plant site would be buried with the exception of stream crossings at Sewell Creek and Little Sewell Creek. At the Sewell Creek crossing, the line would be hidden underneath the 7^{th} Street bridge; however, the water line would extend above ground when it crosses little Sewell Creek. At this location, the line would be elevated above anticipated flood levels for a 100-year storm so as not to obstruct stream flow. The visibility of this water line would be confined to a localized area and is not expected to significantly detract from the visual setting in this location. Therefore, no long-term impacts are anticipated to affect visual or aesthetic resources in the vicinity of the corridor.

Table 4.2-1. Potential Crossings of New Transmission Corridor

Corridor Location*	Road	Populated Area	Farmland
PR 19	x		
PR 21	x		
PR 29	x		
PR 30	x		
PR 48	x		
PR 54	x		
PR 61	x		
PR 65	x		
PR 66	x		
PR 72	x		
PR 77	x		
PR 80			
PR 84			
PR 85	x		
PR 86	x		
PR 108	x		
PR 112			x
PR 113			x
PR 114			x
PR 115	x		x
PR 116			x
PR 117			x
PR 152	x	x	
PR 153	x	x	
PR 154		x	

**Corridor location as defined in an initial survey of the proposed transmission corridor (as described in Chapter 2, Figure 2.4-9). (See Appendix L -* Electrical Transmission Line Cultural and Ecological Evaluations*)*

4.2.3.5 Fuel Supply

The proposed Anjean/Joe Knob, Donegan, and Green Valley coal refuse sites are located in relatively isolated areas, essentially surrounded by undeveloped land that has been heavily disturbed by previous mining operations. The proposed operations to extract coal refuse as fuel for the WGC plant would be comparable to historic mining activities that have occurred on these properties. The agreement between WGC and WVDEP for the use of waste coal requires reclamation plans for affected coal refuse sites that would include the conversion of barren landscape to vegetated cover and potential recreational uses. As a consequence, the Proposed Action would provide beneficial impacts to the visual or aesthetic resources in these areas.

The candidate sites for the coal refuse prep plant would be located at or near the fuel sources and, like the coal refuse sites, could be described as being sited in remote, disturbed areas with a coal mining past. Of the six candidate sites described in Section 3.2, AN1, AN3, and GV would be located within existing mining permit boundaries. Because the locations of these three candidate sites are generally remote to begin with and are out of sight from any public areas or roads (i.e., CR 1 and WV 20), a new prep plant at AN1, AN3, and GV would not have any adverse visual impacts.

The candidate sites AN2 and DN1 are located on public roads near the entrances to their respective fuel sources. However, both of these candidate sites are on disturbed areas that were related to past mining activities. Although, they are visible from the roads, the adverse visual impact is anticipated to be minor because these sites are in isolated areas. DN1 is located near the entrance to the Donegan site on CR 39/14, which is rarely accessed by any vehicles. Currently, there is an abandoned building on the DN1 site, thought to be a remnant from mining activities. AN2 is located across the road from the Anjean entrance and from several abandoned houses and buildings associated with Anjean's mining history. The prep plant at AN2 would be fairly indistinguishable from its surroundings and would have low aesthetic impacts to observers driving on CR 1. Furthermore, WGC would use a new type of prep plant that would possess a height of approximately 25 feet (8 meters), approximately 25 to 50 feet (8 to 15 meters) shorter than the typical coal prep plant. This novel type of prep plant would also require less structural material and machinery. Thus, the presence of this type of plant would not be as imposing compared to typical coal prep plants, such as those that exist at the Green Valley and Anjean sites. Also, any minor aesthetic impacts that would occur would be temporary, as the prep plant would be disassembled for use at another fuel source when the local sources became depleted.

DN2 is sited within private property on CR 1, approximately 7 miles (11 kilometers) north of Anjean. Prep plant activities at DN2 would essentially be hidden because the topography slopes gently downward from CR 1 and a tree line along CR 1 would partially shield the view. Therefore, adverse visual impacts from a prep plant sited at this location are expected to be minor and temporary.

4.2.3.6 Material Transportation

Although the transport of fuel from the prep plant sites and limestone from the quarries to the WGC plant would increase the number of heavy trucks on local roads in comparison to the No-Action alternative, the impacts on visual and aesthetic resources along the routes would not be significant as most of the haul routes would occur within the Coal Resources Transportation System (CRTS), which is currently already used by many commercial trucks.

4.2.3.7 Limestone Supply

The options being considered by WGC as sources of limestone are all commercial facilities currently operating under existing permits. These facilities would continue to operate regardless of whether the Co-Production Facility is constructed and operated. However, the rate at which limestone would be mined from the selected quarry site is likely to increase as a result of the Proposed Action. Thus, visual impacts related to quarrying would not be expected to be substantially different from baseline conditions as these are active quarries and activities would be taking place within their existing permitted areas.

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4.3 Atmospheric Conditions

4.3.1 Method of Analysis

The potential for a Proposed Action or an alternative to have a significant impact on air resources in the planning area has been evaluated using a series of predetermined criteria. These criteria are largely based on various state and federal air quality standards and emissions limits that have been developed to minimize degradation of air quality as described in Section 3.3. A significant impact to air quality may occur if a Proposed Action or an alternative would cause any of the following conditions:

- Exceed allowable emissions under the federal and West Virginia Prevention of Significant Deterioration (PSD) regulations;
- Cause an exceedance of the National Ambient Air Quality Standards (NAAQS) and West Virginia Ambient Air Quality Standards;
- Exceed allowable emissions of sulfur dioxide (SO_2) and nitrogen oxides (NO_X) under the state and federal acid rain regulations;
- Exceed allowable emissions of mercury under the federal Clean Air Mercury Rule (CAMR);
- Cause significant potential increase in the hazard quotient or cancer risk to the public (evaluated in Section 4.14, Public Health and Safety);
- Discharge objectionable odors into the air, as regulated by 45 CSR 4 of the West Virginia Code of State Rules;
- Exceed allowable emissions of fugitive dust from coal preparation plants, coal handling operations, and coal refuse disposal areas pursuant to 45 CSR 5 of the West Virginia Code of State Rules; or
- Cause excessive solar loss, fogging, icing, or salt deposition that interferes with road traffic, farm production, or quality of life for nearby residents.

To determine whether the Proposed Action would result in any of the above listed conditions, results of predictive air modeling, Class I-related modeling and visibility modeling, which were completed in support of the WGC air permitting process, were carefully reviewed. In summary and as discussed in detail in the following sections, the impact analyses indicate that the Proposed Action would not exceed allowable emission levels, result in objectionable odors, or cause an exceedance of air quality standards as outlined in the above criteria. Nor would the Proposed Action result in excessive solar loss, fogging, icing, or salt deposition that would adversely affect the quality of life of nearby residents or substantially interfere with road traffic. Lastly, as described in 4.14, the Proposed Action would not result in a significant potential increase in health hazards or cancer risks to the public.

4.3.1.1 Sources of Analysis

On April 2006, West Virginia Department of Environmental Protection (WVDEP), Division of Air Quality (DAQ) issued a PSD Permit (R14-0028) to WGC for the proposed construction and operation of the waste coal-fired steam electric Co-Production Facility. The PSD Permit provides detailed information on the emission sources associated with the WGC Project and the conditions under which the facility must be operated. The analyses in this section of the EIS are based on data submitted to the State in November 2005 as part of WGC's PSD permit application and are provided in Appendix O. Detailed air dispersion modeling was conducted as part of the PSD Permit application for the proposed Co-Production Facility to evaluate compliance with NAAQS, to conduct PSD increment analysis, and to review potential impacts to Class I areas (URS, 2005). The results of the modeling are used in this EIS to establish an upper bound limit for assessing potential impacts.

The computer models and related approaches used in the permit application and used to support the impacts analyses are described below. The results of the analyses (i.e., NAAQS compliance analysis, NAAQS/Class II increment compliance analysis, Class I ambient analysis, Class II area visibility analysis, and effects of Proposed Action on soil, vegetation, and economic growth) for the Proposed Action are provided in Section 4.3.3.2. Also discussed in Section 4.3.3.2 are the results of additional analyses (i.e., plume visibility analysis and carbon dioxide [CO_2] impacts) that were conducted to support the EIS and to evaluate impacts related to data that was not addressed under the WGC PSD Permit application.

Impacts related to the coal handling activities and the beneficiation process, using a semi-mobile beneficiation prep plant system, are discussed in Section 4.3.3.5. These facilities were not included in the modeling for the PSD Permit application since these systems would be designed, operated, and constructed by a third party. The third party contractor would be responsible for obtaining required air permits prior to construction of the semi-mobile prep plant system. A WVDEP Class II General Permit G10-C for coal preparation plants and coal handling operations would be required to construct and operate the prep plant. This permit is issued in accordance with state regulations 45 CSR 13.

During construction of the Co-Production Facility and the prep plant system, the potential sources of air emissions would be from material handling and storage, soil excavation, diesel-fueled construction equipment, and construction worker vehicles. During the Co-Production Facility operation and the prep plant system operation, the potential sources of air emissions would be from process equipment, material handling and storage, and vehicles. Table 4.3-1 provides a list of Co-Production Facility sources that were included as part of the PSD permit air dispersion modeling.

Table 4.3-1. Modeled Sources for Co-Production Facility

Name	Vent ID	Type	Name	Vent ID	Type
CFB 1 through 6	EP-01	Point	Raw Mix Conveyor – Alumina	EP-26	Point
Coal Loading Feeder Hopper	EP-02	Volume	Raw Mix Conveyor	EP-27	Point
Coal Day Silo Distribution Conveyor	EP-07	Point	Raw Mill Homogenizing Silo	EP-28	Point
CFB Coal Day Silo A	EP-08	Point	Kiln Coal Mill	EP-29	Point
CFB Coal Day Silo B	EP-09	Point	Coal Feeders	EP-30	Point
Kiln Coal Day Silo	EP-10	Point	Clinker Crusher	EP-31	Point
Limestone to Pile	EP-11	Volume	Clinker Storage	EP-32	Point
Limestone Reclaim Conveyor	EP-12	Volume	Clinker Processing	EP-33	Point
Limestone Preparation	EP-13	Point	Clinker Finish (Ball) Mill	EP-34	Point
CFB Limestone Day Silo	EP-14	Point	Clinker Storage Silos – Three units	EP-35	Point
Kiln Limestone Day Bin	EP-15	Point	Coal Pile	EP-37	Volume
CFB Limestone Day Silo	EP-16	Volume	Cooling Tower 1 to 4	EP-39	Point
CFB Flash Silo	EP-17	Point	Main Fuel Oil Storage Tank	EP-40	Point
CFB Bottom Ash Silo	EP-18	Point	Fire Pump	EP-41	Point
Kiln Bottom Ash Silo	EP-19	Point			
Alumina Silo	EP-20	Point			
Fly Ash Silo	EP-22	Point			
Gypsum Bin	EP-23	Point			
Limestone/Cal Mount - A and B	EP-24	Point			
Raw Mix Conveyor - Bottom/Fly Ash	EP-25	Point			

Source: WGC, November 2005, Addendum to May 2005 Permit Submittal, Table 6-1 and April 2006 PSD Permit R14-0028

The maximum potential air emission from these sources were used in the air dispersion models and were estimated based on facility design, vendor data, mass balance, AP-42 emission characterization methods, and engineering estimates. The maximum potential emissions of criteria pollutants and hazardous air pollutants (HAPs) were estimated and modeled (see Table 4.3-2). Emission calculations for each source are detailed in Appendix O. Control technologies inherent to each source were included in the emissions rate estimates and air dispersion model.

Table 4.3-2. Maximum Potential Emissions from Co-Production Facility Sources

Pollutants[1]	CFB[2]	Kiln[2]	Cooling Tower	Material Handling[3]	Storage Pile[3]	Roads[4]	Oil Storage Tank	Fire Pump	Total PTE[5]	Major Source Threshold
All Values are in tons per year										
PM	134	4.86	3.45	1.09	0.072	12.33		0.13	156	25
PM_{10}	134	4.86	3.45	0.49	0.034	1.90		0.13	145	15
SO_2	624	23						0.003	646	40
NO_X	445	159						1.86	607	40
CO	891	96						0.40	988	100
VOC	26.7	4.56					0.027	0.15	31	40
Pb	0.22	0.003							0.227	0.6
H_2SO_4	26.73	0.97							28	7
Total HAPs	20.38	0.26							20.64	25

[1] PM = particulate matter; PM_{10} = particulate matter with aerodynamic diameter less than 10 micron; CO = carbon monoxide; VOC = volatile organic compounds; Pb = lead; and H_2SO_4 = sulfuric acid
[2] The CFB and Kiln make up the facility combustion unit and include the following emission point IDs: EP-01 and EP-02.
[3] Material handling and storage pile include coal handling, limestone handling, ash handling and clinker production handling and include the following emission point IDs: EP-02, EP-07 through EP-20, and EP-23 to EP-35
[4] Calculations for road emissions accounted for delivery of materials including waste coal and beneficiated coal.
[5] PTE means potential to emit.

Source: WGC, November 2005, Addendum to May 2005 Permit Submittal and April 2006 PSD Permit R14-0028

The majority of the potential emissions from the proposed Co-Production Facility would be generated from the circulating fluidized-bed boiler (CFB) combustor and kiln, which are exhausted from the same stack. The total emissions from the other sources would be minimal in comparison. Based on the potential annual emission rates, a PSD review was performed for the criteria pollutants, except lead. Although the combined HAPs emission did not meet threshold amounts, one HAP, beryllium (Be), at emissions of 0.0114 tons per year, did not meet the individual HAP threshold of 0.0004 tons per year. For the pollutants that exceeded the threshold, a Best Available Control Technology (BACT) analysis was also conducted by WGC as part of the permitting process, resulting in the following technologies being selected for each of the PSD compounds:

- NO_X - Selected Non-Catalytic Reduction (SNCR) from the combined flow of the CFB and Kiln.
- CO and VOCs - Combustion controls for controlling CO and VOC emission rates from the combined flow of the CFB and Kiln. Combustion controls for the CFB would be a combination of temperature profile, residence time, turbulence, and excess air levels
- SO_2 - Limestone injection into the CFB for controlling SO_2 emissions from the CFB, and use of a flash dryer absorber for the CFB/Kiln.

- H_2SO_4 - Limestone injection into the CFB for controlling SO_2 emissions from the CFB, and use of a flash dryer absorber for the CFB/Kiln.
- PM – Use of a baghouse for controlling PM emission rates from the combined flow of the CFB and Kiln.
- Be – Be from the facility will be emitted in the form of fugitive dust from the CFB/Kiln; therefore, the technology for controlling PM emissions will be used to reduce Be emissions.

The BACT analysis is based on the installation of additional control technologies on the sources to limit potential annual emission rates. These additional control technologies were not included in the air dispersion modeling.

4.3.1.2 Predictive Modeling

Air dispersion modeling was conducted to evaluate the potential impact of air emissions associated with the Co-Production Facility activities. Air dispersion modeling is used to predict the manner in which pollutants will disperse as they are released into the atmosphere and the resulting concentrations of these pollutants at various receptors (e.g., residential areas, parks, etc.). The criteria evaluated to determine the correct models that were used for the analysis are the degree of urbanization of the surrounding area; implications associated with the presence of site structures, such as stacks and vents; and topography of the proposed site. The dispersion modeling focused on both point and volume sources of emissions that are within the facility fence line. Point sources are stationary emission points where a stream of emissions is released from a vent or stack. Point source emissions typically have buoyancy, and the emissions rise after release into the atmosphere. Volume sources are emissions that occupy some initial volume and are non-buoyant, such as fugitive dust from materials handling and storage piles. Sources and emission rates included as part of air dispersion modeling are presented in Tables 4.3-1 and 4.3-2 and Appendix O. Two models were used for the ambient impact analysis as part of the PSD Permit application. The Industrial Source Complex Short-Term model (ISCST3-Version 02035) is a steady-state Gaussian plume model used to calculate pollutant concentrations from both point and volume sources. The ISCST3 model was used for all terrain that was lower than the stack-tip height (i.e., simple terrain) of the proposed facility. Concentrations at receptors with elevations greater than the CFB's stack tip were modeled by CTSCREEN, which is a version of the Complex Terrain Dispersion Model Plus Algorithms for Unstable Situations (CTDMPLUS-Version 94111) that uses a predetermined array of conservative meteorological conditions. These complex terrain receptors were placed at two hills, which are located to the north on a spur east of Myles Knob and to the south on Sims Mountain. These elevated receptor locations were also modeled with ISCST3 using terrain elevations truncated to stack-tip height. Overall, the CTSCREEN was used to model the two hills and the ISCST3 was used to model the point and volume sources as well as the two hills at truncated elevation. The concentrations derived from these two models were then compared on a receptor-by-receptor basis, and the results with the higher pollutant concentrations were used in the analysis.

The ISCST3 model was used to calculate the incremental increase in ground level concentrations for nitrogen dioxide (NO_2), CO, PM_{10}, and SO_2. Meteorological data recorded by the National Weather Service (NWS) for 1996 through 2000, including surface weather data from Raleigh County Memorial Airport (KBKW) and mixing height data from Roanoke Regional Airport (KROA) was used in model. An anemometer height at KBKW of 32.8 feet (10 meters) was also input to the model.

A rectangular receptor network was established to determine the location of maximum impact (see Figure 4.3-1). Receptors for the preliminary model runs were placed on the fence line at 164-feet (50-meters) intervals. For more detailed modeling runs, a grid placed receptors every 328.1 feet (100 meters) for a distance of at least 9,842.5 feet (3,000 meters) from the facility. A coarse grid placed receptors every 1,640.4 feet (500 meters) extending out to 12.4 miles (20 kilometer) to capture the SO_2 significant impact area.

Because the CFB/kiln have the potential to emit the majority of pollutants from the Co-Production Facility, a load analysis for the CFB/kiln was performed to determine under what conditions the maximum ambient air pollutant concentrations would be expected. Because of the potential for varying fuel characteristics from the various fuel sources in the project area, specifications for two waste fuel cases (performance and design fuels) were used in the modeling for the project. Key operating parameters used included inputs of 1,070 MMBtu/hr and 37 MMBtu/hr for the CFB and Kiln respectively each operating for 8,760 hours per year. BTU values used for CFB and Kiln coal were 4,000 Btu/lb and 12,000 Btu/lb respectively. Maximum short-term emission rates, using stack characteristics for both the performance and design fuels, were used as input to the model when modeling short-term (i.e., less than or equal to 24 hours NAAQS averaging period) pollutant concentrations. Long-term emission rates, using the design fuel stack parameters, were input into the model for calculating annual averaging period concentrations. Emission factors, short-term and long-term emission rates, and fuel usage rates used in the load analysis are provided in Appendix O.

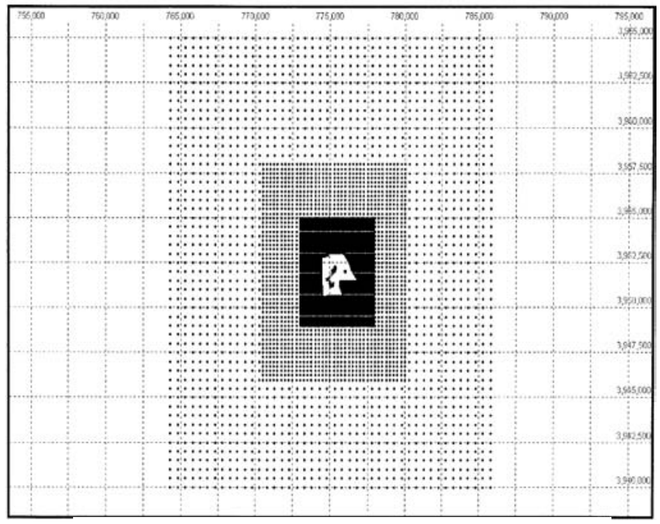

Figure 4.3-1. Receptor Grid

The highest maximum predicted pollutant concentrations were used to define a significant impact area (SIA). The EPA defines a SIA as the circular area whose radius is equal to the greatest distance from the source at which predicted project impacts would equal or exceed the EPA Significant Impact Levels (SILs). The SIA used for the air quality analysis for a particular pollutant is the largest of the areas determined for that pollutant. Based on initial screening, the results indicated that the facility's emissions for CO were *below* the SIL, and no further modeling was necessary for CO.

The maximum predicted incremental increase in ground level concentrations for SO_2, NO_2, and PM_{10} were *above* EPA SILs established for PSD areas. Consequently, a SIA was defined for these three pollutants. Because SO_2 and NO_x would be emitted from the CFB boiler and kiln through the facility stack, maximum impacts for these pollutants were found on the nearby hills. PM_{10} is emitted by numerous materials handling sources in addition to the CFB boiler and kiln; therefore, the maximum impact area for PM_{10} was determined to be close to the proposed facility's fence line. Based on the entire five-year modeling period, the furthest extent of the SIA for each pollutant is listed in Table 4.3-2.

Based on the preliminary results shown in Table 4.3-3, a full impact analysis was conducted for SO_2, NO_2, and PM_{10} to determine if the facility emissions would cause the NAAQS to be violated or PSD increments to be exceeded. The NAAQS for the subject pollutants are presented in Table 3.3-1. As part of the full impact analysis, sources of SO_2, NO_2, and PM_{10} that are within 31.1 miles (50 kilometer) of the facility's SIA were identified because they contribute to the background concentrations.

Potential emission levels for these facilities were then obtained from their air permit limits and included in the full impact modeling effort. The receptor grids for the full impact analysis were limited to the applicable SIA for each pollutant. A receptor grid with a spacing of 328.1 feet (100 meters) was used out to a radius of 1.9 miles (3 kilometer); then it was extended out to the SIA using 1,640.4-feet (500-meters) grid spacing. Fence line receptors with 164-feet (50-meters) spacing were also used, as were hillside receptors within the SIA. Results are provided in Section 4.3.3.2.

Table 4.3-3. Preliminary Modeling Results (100% Load on Boiler and Kiln)

Pollutant(1)	Averaging Time	Maximum Predicted Concentration (μg/m³) (2)		Significant Impact Level (SIL) (μg/m³)	Emissions Greater than SIL (Yes/No)	Significant Impact Area (3)(km)		Significant Monitoring Concentration (μg/m³)
		ISCST3	CTSCREEN			ISCST3	CTSCREEN	
PM_{10}	24-Hour	23.32	13.9	5	Yes	0.5	3.4	10
	Annual	4.7	2.8	1	Yes	2.3	3.4	—
SO_2	3-Hour	111	302	25	Yes	13.6	3.4	—
	24-Hour	41	64.7	5	Yes	14.7	3.4	13
	Annual	2.65	12.9	1	Yes	4.6	3.4	—
NO_2	Annual	3.0	12.3	1	Yes	4.6	3.4	—
CO	1-Hour	527	953	2,000	No	—	—	—
	8-Hour	215	476	500	No	—	—	575

Notes:
(1) The only sources of SO_2, NO_2, and CO are from the CFB/kiln stack; therefore the maximum concentrations from these pollutants are taken from the load analysis results. For PM_{10}, the other potential sources were input into the ISCST3 model to obtain the maximum concentrations and SIA.
(2) All on-site sources were modeled with ISCST3; all receptors were in simple terrain (e.g., hills were cut off at stack tip height). Only the CFB boiler stack was modeled with CTSCREEN; all receptors were in complex terrain.
(3) Radius of a circle centered on the source.
Source: WGC, November 2005, Addendum to May 2005 Permit Submittal, Table 6-3

4.3.1.3 Class II Visibility Modeling

Modeling to analyze visibility impacts for Class II areas was performed as part of the PSD permit application efforts using VISCREEN (version 1.01), an EPA–approved visual impact model. VISCREEN is a conservative screening model that uses the following information:

- Short-term emission rates for the pollutants of interest (usually primary PM and NO_X),
- Distance from the source to the nearest and farthest area of concern boundaries and to the (hypothetical) observer, and
- Background visual range.

The *Workbook for Plume Visual Impact Screening and Analysis (Revised)* (EPA, 1992) and the *Tutorial Package For The VISCREEN Model: Workbook And Diskette* (EPA, 1992) were used for guidance. The guidance document identifies the procedures to conduct a Level 1 and a Level 2 screening analysis. A Level 1 screening analysis assumes worst-case meteorological conditions represented by an extremely stable atmosphere (F stability) and light winds (1 m/s) to provide a very conservative estimate of plume visual impacts. In the Level 2 analysis, worst-case stability is based on actual meteorological data. Both screening analyses used default values for particle size and density. The workbook also identifies a simplistic approach to account for complex terrain in the screening analysis. The workbook states that if terrain greater than 1,640.4 feet (500 meters) is between the source and the area of interst, the worst-case stability class should be shifted "one category less stable."

To obtain the worst-case meteorological conditions for the Level 2 analysis, a frequency of occurrence table of wind speed, stability and wind direction were developed for four six-hour time periods in a given day. The same meteorological data used in the NAAQS analysis (surface data recorded at the Raleigh County Memorial Airport with coinciding mixing height data recorded at the Roanoke Regional Airport) was used to determine worst-case stability for the VISCREEN Level 2 analysis.

For most analyses, plume perceptability is a function of the emission rates of primary PM and NO_X,. For some facilities, the emission rates of primary NO_2, soot (elemental carbon), and primary sulfate are also of intererest: however, the proposed facility is not expected to emit any of the latter three pollutants in appreciable amounts. Only sources that produce a plume of PM and NO_X with the potential to travel long distances (i.e., the CFB combustor and kiln stacks) were considered as input to the model. The CFB/kiln stack is expected to emit 33.2 lb/hr of PM/ PM_{10}, and 143.3 lb/hr of NO_X. The results of the VISCREEN modeling are discussed in Section 4.3.3.2.

4.3.1.4 Class I Area-Related Modeling

Class I analysis utilized the CALPUFF, CALMET and CALPOST models, which are part of the CALPUFF Modeling System. CALMET is a meteorological processor that uses vertical profiles of wind and temperature, CALPUFF is a Lagrangian puff dispersion model, and CALPOST is a postprocessor program that includes a light extinction algorithm for use in regional visibility impact assessments. The analysis was completed by:

- Running CALMET for the domain for each year (1990, 1992, and 1996) using data from the Mesoscale Meteorological Model, Version 5 (MM5), which was supplied by the National Park Service (NPS); and Geophysical data (Geo.dat) and other meteorological data files were obtained from the River Hill study;
- Running CALPUFF for the Western Greenbrier source at each Class I area for each year of data; and
- Running CALPOST to calculate impacts for visibility, concentration, and deposition for sulfur and nitrogen compounds at each Class I area and each year.

The modeling of particulates in CALPUFF separated the total PM_{10} into the size classes shown in Table 4.3-4. A large portion (64 percent) of the particles was assumed to be directly emitted as sulfate.

CALPUFF and CALPOST processing were used for the visibility (regional haze) analysis. Modeled concentrations of visibility impairing pollutants were used to calculate their combined visibility effects. The CALPOST models were used to calculate the predicted facility deposition value for sulfur and nitrogen. The maximum calculated concentrations of SO_2, NO_2, PM_{10}, sulfur, and nitrogen, including averaging period specific concentrations, for each of the Class I areas were compared with EPA-proposed Class I SILs. The results, as well as visibility impacts, are discussed in Section 4.3.3.2.

Table 4.3-4. Particle Size Distribution Used for Particulate Matter (PM) Increment and Regional Haze CALPUFF Modeling

AP-42* Size Cut (microns)	Size Used In Model (Micron)	% Adj.** For PM_{10}	Modeled Rate (lbs/hr)	Model ID
6.0 – 10.0	8.7	23.33	1.55	PM10P0
2.5 – 6.0	4.8	33.33	2.21	PM6P0
1.25 – 2.5	2.1	13.33	0.89	PM2P5
1.0 – 1.25	1.16	5.00	0.33	PM1P25
0.625 – 1.0	0.875	13.33	0.89	PM1P0
0.0 - 0.625	0.48	11.67	27.33	PMP625
TOTAL		100	33.20	INCPM***
Regional Haze	-	-	11.95	PMRH****

Notes:
**AP-42 Table 1.1-9: Cumulative Particle Size Distribution and Size Specific Emission Factors for Spreader Stoker Burning Bituminous Coal. Filterable portion (20% applied to PM size classes in AP-42. Condensable portion (80%) assigned to less than 0.625 micron size classification.*
*** Used 1.6667 percent adjustment factor (100%/60%) to distribute* PM_{10}.
**** The above ID's were grouped to model total* PM_{10}.
***** The remaining fraction of* PM_{10} *that is not modeled as SO4.*

Source: WGC, November 2005, Addendum to May 2005 Permit Submittal, Table 6-8

4.3.1.5 Local Vapor Plume Modeling

Stationary source modeling of the vapor plumes that could potentially be generated by facility cooling towers was conducted using the Seasonal/Annual Cooling Tower Impact (SACTI) model, developed by researchers for the Electric Power Research Institute (EPRI). SACTI is considered by the power industry to be the model of choice for calculating potential environmental impacts from wet evaporative cooling towers. The SACTI model rigorously calculates the effects of the cooling tower's condensed water plume and mineral deposition which can be used to assess the potential for fogging, rime ice deposition, plume shadowing, loss of solar energy, or salt and water deposition.

4.3.2 No Action

Under the No Action alternative, in the absence of DOE funding, it is unlikely that WGC would construct the Co-Production Facility. Because this alternative would not involve introducing new emission sources, the No Action alternative is projected to have no impact on the air quality either regionally or locally. Therefore, air quality would be substantially similar to existing conditions. Similarly, air quality conditions at the sites of the coal refuse piles would be expected to remain the same as existing conditions under the No Action alternative.

4.3.3 Proposed Action

4.3.3.1 Site Layout and Facility Construction

Due to the proposed stack height above surrounding residences, as well as the fact that the majority of Rainelle's schools, residences, and businesses are at least 0.5 mile (800 meters) from the proposed site, the potential effects of pollutant emissions would be substantially the same for site layout options A, B, and C, as described in Chapter 2.

During construction, temporary air quality impacts could occur as a result of fugitive dust from movement of soil and storage of materials, emissions from diesel-fueled construction equipment, and emissions from construction worker vehicles. Potential impacts would be temporary in nature and would be minimized through use of best management practices such as wetting the soil surfaces, covering trucks and stored materials with a tarp to reduce windborne dust, and through use of properly maintained equipment.

4.3.3.2 Facility Operation

The Co-Production Facility's operations have the potential to create point and volume sources of air pollution. Point sources of air pollutant emissions include the equipment, stacks, cooling towers, and silos associated with the power plant facility and the ash byproduct manufacturing facility. Volume sources principally consist of equipment and areas related to materials handling (i.e., conveyors and storage piles). The pollutants of primary interest are CO, NO_X, SO_2, VOCs, mercury, and fugitive dust (PM_{10}). The BACT analysis discussed in Section 4.3.1.1 provides control technologies that would be implemented to ensure that the emissions of these pollutants are reduced and are within compliance of the WGC PSD permit. Airborne water droplets from the cooling towers are also a particular source of interest. No impacts associated with the potential distribution of steam heat to the EcoPark industries are anticipated because the steam pipes would run underground and would not affect atmospheric conditions. Discussions on impacts from the operations of the third party beneficiation prep plant are provided in Section 4.3.3.5.

As discussed under methodology, various modeling efforts were conducted to determine the potential local and regional air quality impacts from the plant's emissions. Potential air quality impacts are discussed in the following order, which correspond to the various modeling and screening analyses that were performed:

- NAAQS Compliance Analysis
- NAAQS/Class II Increment Compliance Analysis
- Class I Ambient Analysis, Class II Area Visibility
- Local Plume Visibility, Shadowing, Fogging, and Mineral Deposition; and
- Acid Rain, Mercury, and Odors

NAAQS Compliance Analysis

Both stationary and mobile sources of pollutant emissions were evaluated for NAAQS compliance. Based on the maximum potential air emissions calculated from each air emissions unit at the proposed site, VOC emissions were below the PSD threshold; therefore, VOC emissions from the Co-Production Facility operations would not be significant either locally or regionally. Based on preliminary screening and modeling, emission rates for CO that would be related to the Co-Production Facility's operations would not be significant either locally or regionally. Because potential concentrations of SO_2, NO_2, and PM_{10} exceeded their respective SILs as part of worst-case screening efforts, a NAAQS compliance analysis that included the impact of "nearby" emission sources, as well as the proposed Co-Production Facility, was conducted. The PSD rules and guidelines require nearby sources of PSD pollutants to be explicitly modeled because these sources contribute to the background pollutant concentrations.

Stationary source compliance with the NAAQS is based on the total estimated air quality that is the sum of the projected ambient impact resulting from the new emission source (i.e., the proposed power plant) plus the existing background concentration. For this compliance analysis (comparison to the NAAQS and PSD increments), the highest, second-highest (HSH) predicted impacts were used to define the short-term (less than or equal to 24 hours) air quality impact of the facility (except PM_{10} which is represented by the highest, sixth-highest concentration over 5 years). Pollutant concentrations with averaging times that are greater than 24-hours are represented by the maximum value occurring in any year (except PM_{10} which is represented by the maximum value averaged over 5 years). The results of the NAAQS modeling and compliance analysis are summarized on Table 4.3-5.

Table 4.3-5. National Ambient Air Quality Standards (NAAQS) Compliance Analysis

Pollutant	Averaging Time	Maximum Modeled Multi-Source Impact (1) Combined (2) (μg/m³)		Background Concentration (μg/m³)	Total (μg/m³)	NAAQS (μg/m³)
		CTSCREEN	ISCST3			
PM_{10}	24-Hour	20.84	20.84	69	89.8	150
PM_{10}	Annual	4.38	4.38	22	26.4	50
SO_2	3-Hour	346.32	268.0	323.9	670.2	1,300
SO_2	24-Hour	72.51	55.93	125.4	197.9	365
SO_2	Annual	13.39	10.11	28.0	41.4	80
NO_2	Annual	12.57	11.94	25.1	37.7	100

Notes:
(1) The highest, second-highest (HS2H) predicted impacts were used to define the short-term (less than or equal to 24 hours) air quality impact (except PM_{10} which is represented by the highest, sixth-highest concentration over 5 years). Pollutant concentrations with averaging times that are greater than 24-hours are represented by the maximum value (except PM_{10} which is represented by the maximum value averaged over 5 years).
(2) Results are the combined receptor results from the ISCST3 and CTSCREEN models each run for the "Worst Case". The maximum of the two was used to calculate the total

Source: WGC, November 2005, Addendum to May 2005 Permit Submittal, Table 6-6

Based on this NAAQS analysis, the projected pollutant concentrations of PM_{10}, SO_2, and NO_2 that would occur as a result of the proposed facility's operations would be in compliance with the NAAQS, and no significant air quality impacts due to stationary sources are projected. As part of the WGC PSD Permit the facility would also be equipped with a Continuous Emission Monitoring System (CEMS) which would help ensure that NAAQS are not exceeded.

With regard to mobile sources (pollutant emissions due to project-generated increases in the numbers of trucks and employee vehicles on local and regional roadways), the pollutants of concern would be: 1) CO from automobiles, and 2) PM_{10} and $PM_{2.5}$ from diesel-powered vehicles. However, WVDEP does not require modeling of pollutants from off-site sources of pollution, and no modeling of mobile sources to demonstrate compliance with the NAAQS was conducted as part of the PSD process. However, for purposes of this EIS, estimates of air emissions that would occur from these sources were calculated using AP-42 emission factors and are presented in Section 4.3.3.7.

Based on guidelines established by EPA, intersections with an overall level of service (LOS) of A, B, or C do not require further analysis for CO air quality impacts because they do not have sufficient delay to produce significant congestion and excessive idle emissions. Intersections with a future LOS of D, E, or F should be considered for air quality modeling to determine compliance with the NAAQS. Traffic modeling of intersections along potentially affected roadways in Rainelle and nearby communities during peak traffic periods indicates that no intersection would experience significant peak hour congestion, with all intersections operating at LOS B or higher (see Section 4.13). The modeling results are based on future traffic conditions (to the year 2008), which includes project-related traffic and projected growth rates as prescribed by the West Virginia Department of Transportation. Based on these conditions, modeling was not warranted for mobile sources to determine the CO that is to be expected with the NAAQS.

For $PM_{2.5}$, a screening threshold of 22 diesel vehicles during a peak period was used to determine whether additional modeling with MOBILE6 and CAL3QHCR was warranted. This threshold was based on the screen developed by the New York City Department of Environmental Protection for use in settings that are generally more congested than the intersections in the study area. The Proposed Action would generate less than 22 truck trips from fuel and other material transport during the peak AM, Midday, and PM hours. Therefore, no further analysis of particulate matter (PM_{10} and $PM_{2.5}$) was carried out.

NAAQS/Class II Increment Compliance Analysis

To limit the rate at which increased emissions can occur in different types of areas (i.e.; Class I, Class II, or Class III), and ultimately the rate at which the NAAQS may otherwise be reached, PSD regulations include limits, or increments (i.e., PSD increments), that proposed facilities must meet. PSD increments are the maximum allowable concentration increases above a baseline concentration and have been established for SO_2, NO_2, and PM_{10}. NAAQS/Class II Increment compliance modeling is performed only if the SIA determination modeling indicates a potentially significant impact on air quality. The purpose of NAAQS/Class II Increment compliance modeling is to determine whether the source(s) of concern would cause or contribute to a violation of a NAAQS (discussed above) or a PSD Increment.

With the exception of Otter Creek and Dolly Sods National Wilderness areas, the entire state of West Virginia is designated as a Class II PSD area designed for moderate growth. Other Class I areas discussed in Section 3.3 and below are located outside of West Virginia. WVDEP provided the state's PSD increment consuming source inventory, which identifies significant emitters (contributors to background concentrations) within 31.1 miles (50 kilometer) of the SIA for each pollutant. Only one facility, Elkem Metals, was within 31.1 miles (50 kilometer) of the SIA. However, because the Elkem source listed negative emission rates for SO_2 and NO_x due to "permanent emission reductions," it was not used in the analysis. Assuming that no other PSD increment consuming sources exist in the area of concern, the maximum predicted increment consumption from the proposed facility for all five years of meteorological data is presented in Table 4.3-6.

Table 4.3-6. Class II Prevention of Significant Deterioration (PSD) Increment Consumption

Pollutant	Averaging Time	Maximum Predicted Increment Consumption(1) Combined(2) (µg/m3)		PSD Class II Increments (µg/m3)	Percent of Class II Increment (%)
PM_{10}	24-Hour	22.42	22.42	30	75%
	Annual	4.34	4.34	17	25%
SO_2	3-Hour	301.76	225.16	512	59%
	24-Hour	64.66	48.25	91	71%
	Annual	12.93	9.65	20	65%
NO_2	Annual	12.33	11.77	25	49%

(1) The highest, second-highest (HSH) predicted impacts were used to define the short-term (i.e., ≤24 hours) increment consumption. Pollutant concentrations with averaging times that are greater than 24-hours are represented by the maximum value.

(2) Results are the combined receptor results from the ISCST3 and CTSCREEN models each run for the "Worst Case" The maximum of the two was used to calculate the percent of Class II increment.

Source: WGC, November 2005, Addendum to May 2005 Permit Submittal, Table 6-7

As shown in Table 4.3-6, the proposed facility is projected to consume 75 percent of the total 24-hour PM_{10} increment. This is due almost entirely to fugitive dust emissions from on-site roadways and material handling sources, and is based on the maximum PM_{10} impact that occurs at a fence line receptor. This maximum impact is very localized, occurring at a receptor adjacent to the point where the main plant road crosses the fence line in the vicinity of Sewell Creek. The facility's PM_{10} impact decreases substantially (by over 50 percent) within a few hundred meters of the fence line.

Based on PSD increment analysis for the Class II areas, the proposed Co-Production Facility would not have a significant impact related to consumption of allowable increments. In addition, because the analysis is based on the maximum PM_{10} emission impact occurring at the facility fence line, and this concentration decreases rapidly with increasing distance from the facility, predicted emissions from the facility would not be expected to inhibit future economic development that may be subject to PSD increment analysis.

Class I Ambient Analysis

Several Class I areas were indicated as areas of concern with respect to air emissions as part of the scoping process. In addition, although Rainelle and the surrounding area are designated as Class II, PSD and West Virginia regulations require an analysis of impacts on Class I areas. Based on discussions with the WVDEP and the Federal Land Managers (FLM), the impacts on the following four Class I areas were analyzed:

- James River Face Wilderness Area (74 miles [120 kilometers] outside of Rainelle),
- Otter Creek Wilderness Area (89 miles [143 kilometers] outside of Rainelle),
- Dolly Sods Wilderness Area (102 miles [164 kilometers] outside of Rainelle) and
- Shenandoah National Park (105 miles [169 kilometers] outside of Rainelle).

Results of the air quality related values of deposition are presented in Table 4.3-7 to 4.3-10 for each Class I area and year of meteorological data. The deposition values for sulfur and nitrogen are less than the significant thresholds (Deposition Analysis Thresholds) and therefore would not impact these areas. Comparisons of the maximum modeled NO_2, PM_{10}, and SO_2 impacts with the EPA-proposed PSD SILs demonstrate that concentration values are less than the respective SILs; therefore concentrations of these pollutants will have an insignificant impact at each of the Class I areas. The regional haze results suggest minimal impact at three of the Class I areas, (James River Face, Shenandoah, and Otter Creek) with no impact at Dolly Sods. A single day at Shenandoah and Otter Creek and five days at James River Face are found to potentially exceed the five percent change in light extinction threshold level over the 3-year period. A review of the meteorological records of the periods associated with potential visibility impacts suggests that naturally obscuring phenomena (such as fog, cloud, and rain) could be occurring during those periods; therefore the visibility impacts predicted using the FLM requested methodology could be discounted. Even without accounting for naturally obscuring periods the likelihood of visibility impact at each of the Class I areas is considered minimal.

Table 4.3-7. Modeled Values at Class I Areas: James River Face Wilderness Area

Modeled Component	Period or Parameter	1996	1992	1990	Threshold	Above Threshold
SO_2	3-hour	0.4054	0.3991	0.2896	1	No
	24-hour	0.0989	0.1424	0.0962	0.2	No
	Annual	0.0123	0.0091	0.0072	0.1	No
PM_{10}	24-hour	0.0527	0.0586	0.0324	0.3	No
	Annual	0.0048	0.0036	0.0030	0.1	No
NO_2	Annual	0.0077	0.0054	0.0041	0.1	No
Visibility Method2 RH=95%	% Change	**7.34**	**7.40**	**6.62**	5	Yes
	Days >5	3	5	2		
	Days > 10	0	0	0		
Deposition	Total N	0.005	0.004	0.004	0.01	No
	Total S	0.010	0.008	0.007	0.01	No

Units: Visibility = % change in extinction; Concentration = µg/m3; and Deposition = kg/ha/yr; RH – relative humidity

Source: WGC, November 2005, Addendum to May 2005 Permit Submittal, Table 6-10

Table 4.3-8. Modeled Values at Class I Areas: Shenandoah National Park

Modeled Component	Period or Parameter	1996[(1)]	1992	1990	Threshold	Above Threshold
SO_2	3-hour	0.2966	0.2364	0.2438	1	No
	24-hour	0.0873	0.0720	0.0957	0.2	No
	Annual	0.0054	0.0049	0.0048	0.1	No
PM_{10}	24-hour	0.0423	0.0414	0.0406	0.3	No
	Annual	0.0024	0.0023	0.0022	0.1	No
NO_2	Annual	0.0023	0.0021	0.0024	0.1	No
Visibility Method2 RH=95%	% Change	**9.51**	2.06	1.47	5	Yes
	Days >5	1	0	0		
	Days > 10	0	0	0		
Deposition	Total N	0.003	0.002	0.002	0.01	No
	Total S	0.006	0.004	0.004	0.01	No

Units: Visibility = % change in extinction; Concentration = µg/m3; and Deposition = kg/ha/yr; RH – relative humidity

(1) The maximum 1996 visibility impact occurred on Julian day 53 at Shenandoah. Reviewing the meteorological data shows many hourly reports of low, overcast skies with high humidity and precipitation. Because of the naturally obscuring phenomena occurring during this day the visibility impact calculated does not represent a realistic viewing situation and therefore can be discounted.

Source: WGC, November 2005, Addendum to May 2005 Permit Submittal, Table 6-11

Table 4.3-9. Modeled Values at Class I Areas: Dolly Sods Wilderness Area

Modeled Component	Period or Parameter	1996	1992	1990	Threshold	Above Threshold
SO_2	3-hour	0.1864	0.2240	0.1831	1	No
	24-hour	0.0507	0.0621	0.0779	0.2	No
	Annual	0.0029	0.0038	0.0053	0.1	No
PM_{10}	24-hour	0.0214	0.0314	0.0280	0.3	No
	Annual	0.0011	0.0016	0.0023	0.1	No
NO_2	Annual	0.0016	0.0021	0.0032	0.1	No
Visibility	% Change	3.85	3.5	3.2	5	No
Method2	Days >5	0	0	0		
RH=95%	Days > 10	0	0	0		
Deposition	Total N	0.002	0.003	0.003	0.01	No
	Total S	0.004	0.006	0.007	0.01	No

Units: Visibility = % change in extinction; Concentration = µg/m3; and Deposition = kg/ha/yr; RH – relative humidity

Source: WGC, November 2005, Addendum to May 2005 Permit Submittal, Table 6-12

Table 4.3-10. Modeled Values at Class I Areas: Otter Creek Wilderness Area

Modeled Component	Period or Parameter	1996	1992	1990	Threshold	Above Threshold
SO_2	3-hour	0.2378	0.2430	0.3538	1	No
	24-hour	0.0538	0.1159	0.1025	0.2	No
	Annual	0.0035	0.0047	0.0070	0.1	No
PM_{10}	24-hour	0.0171	0.0480	0.0412	0.3	No
	Annual	0.0013	0.0019	0.0029	0.1	No
NO_2	Annual	0.0021	0.0028	0.0045	0.1	No
Visibility (1)	% Change	3.97	3.82	**5.53**	5	Yes
Method2	Days >5	0	0	1		
RH=95%	Days > 10	0	0	0		
Deposition	Total N	0.002	0.003	0.004	0.01	No
	Total S	0.005	0.007	0.009	0.01	No

Units: Visibility = % change in extinction; Concentration = µg/m3; and Deposition = kg/ha/yr; RH – relative humidity

(1) The single day with visibility impacts potentially exceeding 5 percent (5.53 percent) occurs on Julian day 280. Reviewing the surface meteorological file suggests cloudiness during the period and the precipitation data shows rain at a few stations in the domain, some near the Otter Creek area. This suggests that the Otter Creek modeled impact occurs because of high humidity associated with naturally obscuring phenomena.

Source: WGC, November 2005, Addendum to May 2005 Permit Submittal, Table 6-13

Class II Area Visibility

Because the Co-Production Facility would be located in southern West Virginia, Class II visibility analysis was conducted for four park areas in southern West Virginia; Bluestone Lake Project, Bluestone River, Gauley River and New River. Level 1 and Level 2 screening analyses were completed as appropriate using VISCREEN (version 1.01) model as previously discussed under Section 4.3.1. Results of the visibility modeling are presented in Table 4.3-11.

A Level 1 screening analysis, using the most conservative worst-case meteorological conditions of light winds (i.e., 1 m/s) and extremely stable atmosphere (Class F), was performed for all four areas of interest. Two areas, Bluestone Lake Project and Bluestone River, passed at this level. The remaining two areas, New River and Gauley River, were then subjected to a Level 2 screening analysis in which, actual meteorological data are used to determine more realistic, worst-case meteorological conditions. The worst-case meteorological conditions predicted for Gauley River were Class E stability (stable conditions) and 3 m/s wind speed. For New River, the worst-case meteorological conditions predicted were Class D stability (neutral conditions) and 1 m/s wind speed; however, those meteorological conditions were adjusted to Class C stability (unstable conditions) and 1 m/s wind speed to account for complex terrain at New River.

Table 4.3-11. Results of VISCREEN Analysis

Location	Screening Level		
	1	2	Comments
Bluestone Lake Project	Pass	---	---
Gauley River	Fail	Pass	---
New River	Fail	Pass	Complex Terrain Adjustment
Bluestone River	Pass	---	---

Source: URS, 2005

The modeling indicates that the maximum visual impacts do not exceed screening criteria either inside or outside of the four areas of interest. Therefore, visual impacts related to Class II areas are not considered to be significant. Potential impacts related to localized vapor plumes are discussed in the following section.

Local Plume Visibility, Shadowing, Fogging, and Water Deposition

The potential for impacts related to vapor plume visibility, shadowing, fogging, and water deposition on nearby residences were modeled using SACTI as described in Section 4.3.1. The principal sources of vapor plumes that would be generated from the site are the cooling towers. The location of the proposed cooling towers and the nearby residences are shown in Figure 4.3-2. The closest neighboring residential properties are more than 328 feet (100 meters) from the cooling tower. Table 4.3-12 lists the specific cooling tower parameters that were input into SACTI. Specifications for the cooling tower and drift deposition drop spectrum were provided by Marley Cooling Technologies, White Plains, NY (Marley, 2004).

Table 4.3-12. Input Parameters for WGC Cooling Tower Plume Modeling

Input Parameter	Value
Number of Cells	4
Effective Cell Diameter (m)1	19.32
Tower Length (m)	51.4
Tower Width (m)	13.0
Tower Height (m)	13.4
Drift Rate	<0.0010
Heat Dissipation Rate (MW)	146.54
Input Airflow Rate (kg/s)	2201.2
Tower Orientation Axis	28° East of North
Representative Wind Directions (degrees from north)	28°, 73° and 118°
Surface Roughness (cm)	1
Hours Modeled	8760

Note: (1) The effective cell diameter is calculated as Deff = (N)1/2D, where D is the cell diameter (31.7 ft = 9.66m) and N is the number of cells; Source: Potomac-Hudson Engineering, Inc, 2005.

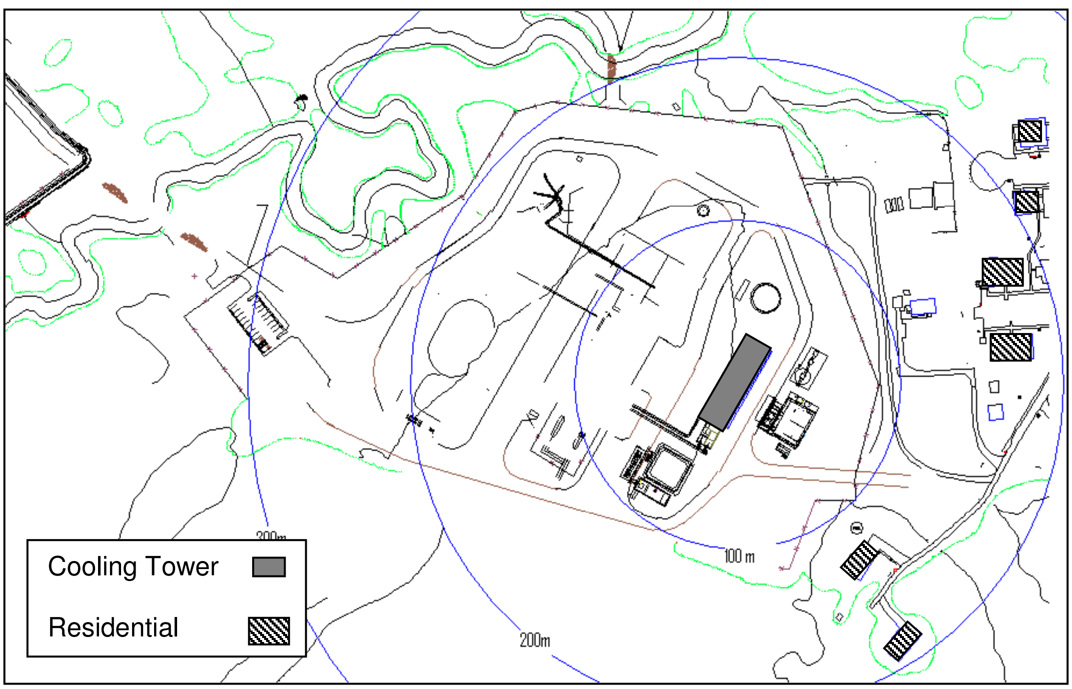

Figure 4.3-2. Cooling Towers and Nearby Residences
Source: Potomac-Hudson Engineering, Inc

One year of hourly meteorological data (2004) recorded at Beckley Raleigh County Memorial Airport (BKW) was used in the model. This station is approximately 23 miles (37 kilometers) to the southwest of Rainelle. The average wind speed in 2004 at BKW was 5.6 miles per hour or 4.8 knots (9.1 kilometers per hour) and the average prevailing wind direction was toward the southeast. Year 2000 mixing height data was also obtained from EPA for BKW (EPA, 2000). Average daily solar insulation and monthly clearness indices were obtained from the SACTI manual, Appendix B, for Parkersburg, WV.

The distance-dependent potential for fog formation for the WGC cooling tower is presented in Table 4.3-13. The values shown in the table are the average hours of occurrence over the single year of meteorological data modeled. As shown in the table, a maximum of 9.2 hours of potential fogging would occur in a year within 328 feet (100 meters) of the tower. Hours of fogging drop rapidly with distance from the tower. Fogging is most likely to occur when the wind is from the SE or NW, which are directions generally perpendicular to the tower array. The fogging events were predicted to occur in winter only (defined as November 30 to February 29 in the model). These hours of fogging correspond directly to the hours of rime icing, which is frost-like and occurs as a result of freezing drizzle. Residential properties to the east and southeast would have the highest potential to be affected by fogging; however, most of these properties and roads servicing them are greater than 200 meters from the cooling tower location and would experience low levels of fogging and icing. There are a few residential properties that are located between 100 meters and 200 meters of the cooling towers including a portion of the Sewell Landing Apartments. These properties, including approximately 500 feet of roadway accessing them, could experience between 2.0 hours and 9.2 hours of fogging and rime ice per year. Traffic traveling on the 500-foot segment of roadway could experience an increase in adverse driving conditions during these fogging and icing periods, but these conditions would be localized, infrequent, and similar to conditions present during winter weather typical of the area. Therefore, impacts from fogging and icing would be minimal.

Table 4.3-13. Results of SACTI Model

Distance (m)	Hours of Potential Fogging and Rime Ice per Year	Hours of Plume Shadowing per Year	Percent Total Solar Energy Loss	Salt Deposition (mg/cm^2/month)	Water Deposition (mg/cm^2/month)
100	9.2			0.04	2.07
200	2.0	153.2	0.7	0.01	1.08
300	3.5			0.01	0.97
400	1.6	52.5	0.2	0.01	0.63
500	0			0.00	0.30
600	0	30.7	0.1	0.00	0.12
700	0			0.00	0.09
800	0	22.5	0.1	0.00	0.07
900	0			0.00	0.06
1000	0	17.7	0.1	0.00	0.06
1100	0			0.00	0.06
1200	0	15.6	0.1	0.00	0.06
1300	0			0.00	0.06
1400	0	14.9	0.1	0.00	0.05
1500	0			0.00	0.05
1600+	0	9 -14.5	0.1	0.00	0.04

Source: Potomac Hudson Engineering, Inc., 2005

Plume shadowing events are only counted during the daylight hours, with changes in sunrise and sunset times adjusted for time of year, and are usually used to evaluate the potential for reduced crop yields in agricultural areas. The most shadowing occurred within 656 feet (200 meters) of the tower (see Table 4.3-10). The maximum, 153 hours/year of shadowing at 656 feet (200 meters) from the tower center, represents approximately 25 minutes of shadowing per day. SACTI also calculated the average annual solar energy loss associated with the cooling tower plumes. For all distances calculated from the tower, less than 1 percent solar energy loss would occur.

Mineral deposition is computed using the assumption that a portion of the drift droplets falling from the cooling tower plume would strike the ground, thereby depositing the dissolved minerals within the droplets. The maximum salt deposition would occur within 100 feet (30.5 meters) of the tower in a southerly direction. The maximum salt deposition in all directions within 100 feet (30.5 meters) of the tower is predicted to be 0.04 mg/cm^2/month. Based on the Institute of Electrical and Electronic Engineers (IEEE) studies, the significant deposition threshold for electric components (above which insulator failure is possible) is assumed to be 0.1 mg/cm^2/month of salt. Based on the modeling results, the project would not deposit salt at rates that would have an adverse effect on plant equipment. Salt deposition rates of 3 to 4 kg/hectare/month (0.03-0.04 mg/cm^2/month) are believed to have an adverse effect on agricultural plants. The salt deposition rate is expected to be well below this threshold 656 feet (200 meters) from the tower. Therefore, there should be no adverse impacts to farms or plant life that may be located immediately outside of the project site boundary. Most of the water deposition per month would occur within 328 feet (100 meters) of the tower (2.07 mg/cm^2/month), primarily in a southerly direction. Water deposition values exceeding 18 mg/cm^2 generally indicate the presence of rain. From the results of the model, water deposition from the cooling tower would generally not be felt in the form of rain-type drops. Overall, water and salt deposition would be higher in the summer and fall months than in the winter and spring, but would still be at less than significant rates of deposition.

Based on predictive modeling using the SACTI program, the cooling tower proposed for the WGC project would cause minimal adverse off-site impacts to neighboring properties in terms of excess fogging, rime ice deposition, plume shadowing, loss of solar energy, or salt and water deposition.

Acid Rain

Acid rain, or acid deposition, can occur from the release of acid precursors such as sulfur dioxide and nitrogen oxides into the atmosphere. These precursors can react with oxygen and water in the atmosphere to form acids that can be deposited during precipitation events (Cooper, 1994). Acid rain can cause soil degradation; increased acidity of surface water bodies; and slower growth, injury, or death of forests and aquatic habitats.

As part of the efforts to reduce the impacts of acid rain, Title IV of the CAA established the Acid Rain Program. The purpose of the program is to reduce the adverse effects of acid deposition through reductions in annual emissions of SO_2 of ten million tons (9.1 million metric tons) from 1980 emission levels; and, in combination with other provisions of the CAA, of NO_X emissions of approximately two million tons (1.8 million metric tons) from 1980 emission levels (EPA, 2005). Under the program, utility generating units greater than 25 MW are required to obtain a Phase II Acid Rain Permit. The objectives of the program are achieved through a system of marketable allowances, which are used by utility units to cover their SO_2 emissions. One allowance means that an affected utility unit may emit up to one ton of SO_2 during a given year. Utilities cannot emit more tons of SO_2 than they hold in allowances. Allowances may be bought, sold, or traded, and any allowances that are not used in a given year may be banked and used in the future. The proposed Co-Production Facility would be required to obtain and comply with a Phase II Acid Rain Permit and would be operated in a manner that is consistent with EPA's overall efforts to reduce SO_2 emissions.

Continuous Emissions Monitoring is a part of the acid rain regulations and includes requirements for monitoring, recordkeeping, and reporting. The compounds and parameters covered under 40 CFR 75 are SO_2, NO_x, and CO_2 emissions, as well as volumetric gas flow and opacity. Because the proposed Co-Production Facility would operate within its prescribed allowance, impacts related to acid rain would be minimal as a result of facility operations.

Mercury

The CAMR establishes "standards of performance" limiting mercury emissions from new coal-fired power plants, under Section 111 of the CAA (i.e. the New Source Performance Standards [NSPS]). The regulation is applicable to "a fossil fuel-fired combustion unit of more than 25 megawatts electric (MWe) that serves a generator that produces electricity for sale. A unit that cogenerates steam and electricity and supplies more than one-third of its potential electric output capacity and more than 25 MWe output to any utility power distribution system for sale is also an electric utility steam generating unit." Therefore the Co-Production Facility is subject to this regulation. The key aspects of the regulations that would be applicable to the WGC Co-generation Facility are:

- Creates Subpart HHHH of 40 CFR Part 60 that establishes the model rule provisions for the mercury budget-trading program for coal-fired utility boilers.
- Incorporates Performance Specification 12A for mercury CEMS in Appendix B of 40 CFR Part 60.
- Revises 40 CFR Part 75 to incorporate mercury monitoring, record keeping and reporting requirements where applicable. This includes missing data substitution procedures, QA/QC requirements, quarterly reporting, etc.
- Creates Subpart I of 40 CFR Part 75 which establishes the mercury mass emission provisions.
- Revises Subpart D of 40 CFR Part 60 by establishing stringent mercury emissions limits in addition to the trading program "cap" for new units (i.e., unit construction on or before January 30, 2004).
- Emission limits are set according to fuel type (e.g., 1.4 x 10-6 lb mercury/megawatt hour for waste coal-fired units) and compliance is determined on a 12-month rolling average basis.
- Market-based cap-and-trade approach in two phases; an initial cap for each source will be set in 2010, and then further reductions on a plant basis will take effect after 2018.

The maximum potential emissions of mercury from the Co-Production Facility would be 0.014 tons per year, which is below the major source threshold of 0.1 tons per year. Based on test results performed during the PSD permitting process, the mercury levels in the waste coal and combustion unit emissions, WGC could achieve a 70 percent removal level with the best available technology (WGC, 2005); however, the project does not include any add-on control for mercury at this time. For permitting purposes, the limit for mercury emissions is a 12-month rolling average using a continuous measurement system. Based on Alstom test burn data, it is expected that the proposed power plant would be well below the major source threshold (WGC, 2005).

Odors

The Proposed Action is not expected to discharge objectionable odors into the air as defined in 45 CSR 4 of the West Virginia Code of State Rules. The potential for odors from coal-fired power plants is primarily related to the use of ammonia (NH_3). To control emissions of NO_X into the air, a selective non-catalytic reduction system (SNCR) that utilizes NH_3 is planned for the Co-Production Facility. Aqueous NH_3 would be delivered and transferred from a horizontal storage tank designed in accordance with the ASME Boiler and Pressure Vessel Code for Unfired Pressure Vessels. In the proposed process, the NH_3 would be injected into the combustion gas stream (i.e., the hot gases exiting the boiler during fuel combustion). Here, it would combine with the NO_X, converting them to nitrogen and water vapor, which would then be released to the atmosphere as part of this process. Small amounts of NH_3 left over from the chemical reactions (termed NH_3 slip) may also be released to the air.

Up to 80 percent of the NH_3 slip can also be adsorbed onto the fly ash, which has been known to cause localized odors on ash ponds if the fly ash has a high pH. A review of available literature indicates that NH_3 emissions are not a source of concern for coal-fired power plants provided that operators of the SNCR system maintain appropriate injection rates. Ideally, operators strive to control the NH_3 slip to 2 ppm in the flue gas. Since the NH_3 slip will be closely controlled by plant operators, and there are no ash ponds associated with the Co-Production Facility, the potential for NH_3-related odors is considered to be low.

Concerns were raised during the scoping process regarding potential odor that could result from use of wastewater plant effluent for power plant process water. This water would be used primarily for supplying water to the cooling towers and plant steam cycle (see Section 2.4.6). Effluent from the wastewater treatment plant is currently discharged to the Meadow River. Because this effluent has been treated to reduce the biochemical oxygen demand (BOD), there is little to no odor associated with the effluent. Most odors associated with wastewater treatment plants are related to the influent, which contains a high amount of organic matter and sulfur compounds, as well as from the biological processes used in the plant to remove these compounds. Water used from the wastewater plant for supply would not be expected to have an objectionable odor because odor-causing compounds have been effectively removed. This conclusion is supported by the fact that municipalities across the country successfully use wastewater effluent for irrigation and other purposes without causing odor or human health problems. The wastewater effluent used for the plant supply would undergo additional treatment; however, this treatment would be related to further clarifying the water for proper operation of the power plant.

Greenhouse Gases

Carbon dioxide (CO_2) would be the primary greenhouse gas that would be emitted from the power plant. It is estimated that the plant would emit approximately 0.87 million tons per year (0.79 million metric tons) of CO_2 (WGC, 2006). Without mitigation, this amount would add to the approximately 2.3 billion metric tons per year of energy-related CO_2 emissions for the electric power sector (as estimated by the Energy Information Administration in 2004 [EIA 2005]).

It is estimated that in a typical coal-fired power plant 60 percent of the heat created during the combustion process is dissipated or wasted to the atmosphere through evaporative cooling. Thus, 60 percent of the heat that is generated is not productively used but still results in CO_2 emissions. However, WGC's plans provide for capturing and using the waste heat from the Co-Production Facility for potential commercial and industrial uses in the planned EcoPark. This approach would reduce the additional energy requirement that might otherwise be needed to support these businesses, and in effect reduce (i.e., off-set) the CO_2 emissions that otherwise would be associated with providing the additional energy (i.e., through the burning of fossil fuels) to these facilities. Productive uses for the waste heat associated with the Co-Production Facility as identified by WGC are provided in Table 4.3-14.

Table 4.3-14. Waste Heat Recover from Productive Uses

Heating Use	Approximate Scale (MMBtu/hr)
10-25 acres of greenhouses	50 (seasonal)
Aquaculture ponds or facilities (e.g., tilapia or catfish)	200 (seasonal)
Eco-Park industrial buildings	10 (seasonal, long- term)
Rainelle residential (1000 homes)	25 (seasonal, long- term)
Total Potential (demonstration project)	285

Source: WGC, 2006

Based on the data provided in Table 4.3-14, WGC could provide up to 285mmBtu/hr of waste heat to EcoPark and other nearby facilities. To generate a comparable amount of heat, and depending upon the fuel sources that would have otherwise been used (e.g., fuel oil, natural gas, coal), it is estimated that these facilities would have generated an additional 0.18 million tons per year (0.16 million metric tons) to 0.32 million tons per year (0.29 million metric tons) (WGC, 2006). Thus, if WGC is able to achieve the desired levels of heat reuse, Co-Production Facility-related CO_2 emissions could be off-set by comparable amounts.

Additional Impact Analysis

Under the PSD requirements, an additional impact analysis is required to evaluate the effects of economic growth, and the effects on soils, vegetation, and visibility (as previously discussed) from regulated compounds emitted in significant quantities from a new or modified major stationary source.

Effects on Economic Growth

Although economic growth is anticipated due to operation of the WGC Project, the impact on air quality from any such growth should be negligible. The WGC Project would employ people generally from the local area, and ample housing and infrastructure would be available to support workers from outside the area. Any air quality impacts due to residential growth would be in the form of automobile and residential (fuel combustion) emissions that would be dispersed over a large area and therefore have negligible impact. Commercial growth would be expected to occur at a gradual rate in the future, and any significant new source of emissions would be required to undergo permitting by the WVDEP. Based on the maximum predicted air pollutant concentrations associated with the proposed power plant, the project is not expected to preclude future development, and it is not expected to restrict other sources in the area that may require air quality permits.

Effects on Vegetation and Soils

The WGC Project area is comprised of a mixture of old pasture/field areas. Vegetation and dominant tree species of the site and surrounding area include old fields with various types of grasses and mixed forests. A good portion of the site has been disturbed by past land use and soil movement. Increased stationary source emissions would have little effect on the soils or vegetation in the vicinity of the project area due to compliance with the NAAQS and PSD regulations. The potential for soil impacts is dependent on moisture, geologic parent material, organic residue, topographic relief, climate, and vegetation. EPA established secondary NAAQS to prevent adverse “welfare” effects such as direct damage to vegetation and harmful contamination of soils. In addition, EPA has developed screening concentrations below which no adverse effects are likely to occur to soils and vegetation. The vegetation sensitivity/effect levels were obtained from the EPA guidance document *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals*, which specifies the screening concentrations for exposure for various vegetation species and soils depending on their sensitivity to compound concentrations.

Table 4.3-15 presents a comparison of the power plant's worst-case air pollutant concentrations with the EPA screening concentrations. As shown in the table, the highest predicted impacts are well below the screening levels, and therefore the facility would not have an adverse impact on soils or vegetation. Particulate matter often comes into contact with vegetation as soil particles, and other airborne particles adhere to vegetative surfaces. Wind and rain tend to remove these particles from the surface of vegetation. Because ambient PM_{10} concentrations resulting from the proposed facility are low and well below the NAAQS, no adverse effects on soils or vegetation are expected.

Table 4.3-15. Screening Analysis for Effects on Vegetation and Soils

Pollutant	Averaging Period	Maximum Facility Impact (μg/m3)	Background Concentration (μg/m3)	Maximum Total Concentration(1) (μg/m3)	Vegetation Screening Concentration(2) (μg/m3)
NO_2	Annual	12.3	25.1	37.4	94
SO_2	3-Hour	302	323.9	625.9	786

(1) Represents maximum future air quality levels, including background pollutant concentrations. Background concentrations from Table 4.3-1 for NO_x from Roanoke, VA and SO_2 from Kanawha, WV
(2) Most stringent of EPA screening level concentrations

Source: WGC, November 2005, Addendum to May 2005 Permit Submittal, Table 7-1

Effects on Animals

Secondary standards for the NAAQS were established to set limits to protect public welfare, including protection against harm to animals. Increased stationary source emissions would have little effect on the fauna in the vicinity of the project area due to compliance with the NAAQS and PSD regulations.

4.3.3.3 Power Transmission

The three different options for power transmission include: A) Widen existing ROW to Grassy Falls Substation to accommodate new poles and lines; B) Upgrade existing AEP poles to carry WGC lines up to Grassy Falls Substation; and C) Construct new transmission corridor to Grassy Falls Substation. No air pollutant issues are associated with the implementation of these options. However, the construction activities for the options may result in emissions of fugitive dust, as well as CO, NO_x, and fine particulates from construction vehicles. Of the three, Option C is expected to have the highest emissions of air pollutants during construction because construction of a new transmission corridor would disturb the greatest amount of soil, contributing to fugitive dust emissions. Option A would be expected to have the second highest level of construction emissions, and Option B would be expected to generate the lowest level of construction emissions.

4.3.3.4 Water Supply

Air impacts related to the proposed intake structure and water pipeline would be associated with construction of these structures. Typical construction E/S control measures and BMPs (e.g., re-vegetation of disturbed soils) would be implemented to minimize fugitive dust emissions.

4.3.3.5 Fuel Supply

Fuel supply for the Co-Production Facility would be from coal refuse, which would be collected from four coal refuse sites: Anjean, Green Valley, Donegan, and Joe Knob. The coal refuse would be processed, at or near a coal refuse site, through crushing, sizing, and then beneficiated using a semi-mobile prep plant system that would be designed, constructed, and operated by a third party. Emissions from the fuel preparation process are expected from the following activities:

- Construction of the prep plant system
- Operations activities related to the beneficiation process
- Transportation of beneficiated fuel to the power plant.

Emissions from transportation of the fuel within the power plant fence line were analyzed as part of the PSD permit process and are discussed in Section 4.3.3.2. Emissions associated with material transport outside the power plant fence line are discussed in Section 4.3.3.7.

Construction of the prep plant system would involve excavation of soil for placement of sumps and the plant foundations. Construction activities may result in emissions of fugitive dust from the excavation process, as well as CO, NOx, and PM_{10} from automobile and construction vehicles. These emissions are expected to increase during the construction phase only, and are expected to be minimal when the prep plant is disassembled in anticipation of relocation to a site that will serve the active coal refuse removal activities. The impacts from emissions from the construction of the prep plant system are expected to be substantially similar regardless of which candidate site is used because similar amounts of soil would need to be excavated from each location. Additionally, the geology of the candidate sites is similar and the same types of construction vehicles would be used.

Activities related to producing fuel for the power plant include extraction of coal refuse from the coal refuse sites, transportation of coal refuse to the prep plant system, beneficiation of coal refuse at the prep plant system, handling and stockpiling of coal refuse and beneficiated fuel, and return of spoil material to the coal refuse site.

The process of extracting the coal refuse from the coal refuse site is similar to mining operations, which are regulated under the WVDEP Division of Mining and Reclamation. The Division of Mining and Reclamation issues and renews permits, inspects facilities for compliance, and issues and assesses violations. Emissions from the extraction of coal refuse from the coal refuse sites, including removal of topsoil and subsoil from the reclaimed sites, would consist primarily of total suspended dust particles (i.e., TSP), which are greater in size than fugitive particulate matter (i.e., PM_{10}), and would be similar regardless of which candidate site is extracted. Excavation and handling of the coal refuse at the coal refuse sites would generate some level of fugitive dust emissions. Quantification of the expected emissions has not been calculated because emissions factors for this type of activity are not available. However, it is expected that fugitive dust emissions would be minimized through the use of dust suppression activities and that would generally be contained within the coal refuse boundary. In addition, because the moisture content of the coal refuse is generally high (12 percent), this material is not considered to have a high potential for generation of fugitive dust.

Fugitive dust from the coal refuse sites would be controlled using dust-suppression techniques (such as surfactant type water spray). Additionally, the Division of Mining and Reclamation, in WV Rules 38 CRS 2, requires facilities with mining operations to implement best available control technologies to minimize, to the extent possible, disturbances and adverse impacts on environmental values and achieve enhancement of those resources where practicable. No impact to sensitive receptors would be expected from emissions related to the extraction of coal refuse from the coal refuse site.

Heavy-duty trucks would be used to transport coal refuse from the coal refuse site to one of the six candidate sites for the prep plant system. The largest distance traveled from a candidate prep plant site to a coal refuse pile is 7 miles (Donegan coal refuse to DN2). Air emission related to these truck are included in emission estimates for transportation activities in Section 4.3.3.7. Emissions related to the transportation of the coal refuse from the coal refuse sites to the candidate sites would be reduced through the use of a surfactant type water spray dust suppression system that would minimize airborne coal dust. Air emissions impacts generated from traffic-related activities (e.g., idling, congestion) would be similar to those presented in Section 4.3.2. At the remaining two sites (AN3 and GV), the coal refuse would be transported directly (less than 0.5 miles) to the prep plant system from the coal refuse site, through conveyor systems or off-road trucks. Impacts to air quality from off-road traffic-related activities would be localized to the vicinity of the haul routes.

Crushing, sizing, mixing, and beneficiation of the coal refuse would be conducted in the prep plant. Based on the description of the prep plant system (Childress, 2003), TSP and PM_{10} emissions would be expected from the coal refuse and magnetite powder. Most of the system would be enclosed and equipped with control devices that would minimize or eliminate the emissions from the plant. It is expected that the emissions from prep plant would be minimal, and well below the major source thresholds of 25 tons per year for TSP and 15 tons per year for PM_{10}. Therefore, the facility would need to be permitted under WVDEP Class II General Permit G10-C for the *Prevention and Control of Air Pollution in Regard to the Construction, Modification, Relocation, Administrative Update and Operation of Coal Preparation Plants and Coal Handling Operations* in accordance with 45 CSR 13.

A third party would design, construct, and operate the prep plant and would also be responsible for ensuring that required air permits are acquired prior to construction and operation. Therefore, actual equipment and control technologies involved with the prep plant system have not been specified. However, emissions can be expected to be similar to those levels predicted from coal handling and hauling activities modeled for the power plant under the PSD permit process. These modeled levels, 13.49 tons per year for TSP and 2.42 tons per year for PM_{10} (See Table 4.3-2 and Table B-1 in Appendix O), are below major source thresholds. These concentrations would be expected to rapidly decrease past the property boundary of the prep plant.

The handling and storage of coal refuse directly outside of the prep plant would emit PM_{10} and TSP. As discussed in Section 2.3.6, it is expected that a feeder hopper would be equipped with a baghouse system to capture and control fugitive dust emissions. Additionally, emissions from a feed hopper and belt magnet and conveyor system could further be reduced by water wetting or installing a covered structure around them. The emissions calculated using wind erosion factors for active coal storage piles provided in the Air Pollution Engineering Manual estimated PM_{10} and TSP emissions to be less than the one percent of the overall emission of those pollutants from the Co-Production Facility (WGC, 2005). It was estimated that water sprays that would be used to reduce emissions would provide for a 50 percent control of dust emissions.

As part of the application process for General Permit G10-C, the third party owner and operator of the prep plant would be required to complete the Coal Prep Calc Sheet demonstrating that the prep plant would not be a major source of air pollution. In addition, the third party would be required to certify the accuracy of the data and meet all the requirements contained in the permit including certain siting and design criteria (e.g., fugitive dust control systems) to ensure emissions are minimized. Based on the fact that emission levels would not exceed major source thresholds, the remote locations of the candidate prep plant sites, and the design and emission minimization standards that the prep plant will be subject to, air quality impacts related to the prep plant are expected to be minimal.

4.3.3.6 Limestone Supply

The options being considered as sources of limestone are all commercial facilities currently operating under existing permits. These facilities would continue to operate regardless of whether the Co-Production Facility is constructed and operated. However, the rate at which limestone would be mined from the selected quarry site(s) is likely to increase as a result of the Proposed Action, which could result in increased air emissions (principally PM_{10} and TSP) at these locations. Activities conducted at these locations that would have the highest potential to result in air emissions include material removal, handling, and placement and the operation of on-site equipment. The extent to which increased PM_{10} and TSP emissions could occur would be dependent upon the future demand of limestone and how this demand affects the quarries baseline operations or tempo, and the site-specific operations at the quarry including the equipment and pollution control measures employed (e.g., dust suppression). However, it is expected that increased levels of PM_{10} and TSP that could occur from these activities would generally be limited to the quarry sites, as the concentrations of these pollutants would rapidly dissipate with distance from the activity generating the emissions. Also, the increase in production would be regulated under and bound by existing operating permits, which incorporate measures to prevent the degradation of atmospheric resources. Therefore, atmospheric impacts would not be expected differ substantially from baseline conditions as these are active quarries and activities would be taking place within their existing permitted areas.

The transport of limestone from the quarry to the power plant is an indirect or off-site source of air pollution. Air emissions associated with these activities are considered and discussed in Section 4.3.3.7. The total regional pollutant emissions from trucks transporting limestone would be lowest for the Boxley New Area route because Boxley is closest to the power plant site in Rainelle, and trucks would travel a shorter distance relative to the alternative limestone source locations. Total truck pollutant emissions would be highest for the Mill Point route, which would increase the round trip truck mileage from Rainelle, and emissions would be highest for the truck transport route from Charleston, WV.

4.3.3.7 Other Materials Handling

Emissions from vehicles traveling to and from the power plant, coal refuse sites, prep plant, quarries, and used to transport other materials and products to and from the power plant site were estimated using AP-42 emission factors. Based on this analysis, up to 0.4 tons/year of particulate matter associated with exhaust, break wear, and tire wear could be emitted as a result of the Proposed Action. Emissions of NO_X, CO, and VOC related to vehicle exhaust would be up to 21 tons/year, 9 tons/year and 2 tons/year respectively.

Particulate emissions could also increase as a result of the re-suspension of loose materials on the roadway surface of the transportation corridors. This type of particulate emission occurs whenever vehicles travel over a paved surface, and is largely influenced by local roadway conditions and practices (e.g., application of granular materials for snow and ice control). Key factors affecting the re-suspension of these loose materials are the Average Daily Traffic and the fraction of heavy vehicles on the road. Since the Proposed Action would increase both of these factors along the transportation corridors, the rate of re-suspension along these roadways would also increase.

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4.4 Surface Water Resources

4.4.1 Method of Analysis

The potential for a Proposed Action or an alternative to have a significant impact on surface water resources in the planning area has been evaluated based on a series of predetermined criteria. A significant impact may occur if a proposed action or an alternative would cause any of the following conditions:

- Substantially change the capacity of available surface water resources.
- Conflict with established water rights.
- Contaminate surface waters to exceed water quality criteria or standards established in accordance with the CWA, state regulations, or permits.
- Conflict with regional water quality management plans or goals.
- Substantially change storm water discharges affecting drainage patterns, flooding, and/or erosion and sedimentation.
- Conflict with applicable storm water management plans or ordinances.

In summary and as discussed in detailed in the following sections, the impact analysis indicate that the Proposed Action would not cause any of the conditions outlined in the above criteria. Positive impacts related to stream water quality down stream of the coal refuse sites could occur from reclamation of these sites. Potential adverse impacts that could result from the Proposed Action would primarily be related to the potential use of the Meadow River and associated reduction in river flow if the river is used as a water source. However, although the flow rates in the Meadow River would be reduced, the analysis indicates that optimum flow conditions (60% of the base flow) could be maintained within the River based on the water supply approach proposed by WGC. Impacts to water quality could also occur from construction and operation of the cooling water intake structure, or a temporary structure, including the potential for causing mortality of organism around the structure.

4.4.2 No Action

Under the No Action alternative, the DOE would not fund construction of the WGC Co-Production Facility. Therefore, implementation of the No Action alternative assumes that the existing conditions at the proposed site would remain unchanged. Because the No Action alternative would not involve new construction, new discharges, or changes in land or water uses in the planning area, this alternative would have no impact on surface water resources.

According to Rainelle and Greenbrier County officials, there are no other immediate plans to develop the project area, including the area known as the EcoPark. Any future development, however, would need to reflect constraints associated with wetlands, floodplains, and other hydrological aspects of Sewell Creek and nearby tributaries.

Water from the coal refuse sites at Anjean, Green Valley, and Donegan is currently being treated through various treatment ponds by the West Virginia Department of Environmental Protection (WVDEP). Without the benefit of this project the coal refuse would remain and water quality treatment would probably continue utilizing current remediation methods. Without the Proposed Action, Anjean, Joe Knob, Green Valley, and Donegan most likely would continue to be characterized by limited habitat and hydrologic functions, and the State of West Virginia would continue to pay the high costs of water quality control for an indefinite period of time.

4.4.3 Proposed Action

4.4.3.1 Site Layout and Facility Construction

Site Layout

Land development typically results in an increase of storm water runoff because of the increase in impermeable surfaces (i.e., roads, buildings, parking lots) from which runoff will discharge at faster rates. The elimination of vegetation, which normally supports transpiration and moderates the rate of runoff, and the leveling of the topography, would lead to increased flow and erosion off-site and on-site. However, the design of storm water facilities, such as detention ponds or grassy swales, typically offsets these adverse impacts by retaining storm water on-site and/or slowly releasing runoff back into the environment (i.e., slow down the rate of runoff discharge).

The three site layout options would involve varying degrees of land clearing, grading, and excavation, and hence, peak discharge rates would vary as well. The pre- and post-development peak storm water discharges were estimated for each layout option (Options A, B, and C as discussed in Section 2.4.1). The Rational Method (Flowrate = Runoff Coefficient x Rainfall Intensity x Total Drainage Area) was used to calculate the peak discharges for a 10-year frequency storm and are summarized in Table 4.4-1. The discharge amounts were calculated assuming that the same type of ground cover, buildings, and grading would have been used for all three options. Hence, the only differentiating variable among the options is the area of the footprint.

Table 4.4-1. Storm water Peak Discharges (Pre- and Post-Development)

Site Layout Option	Footprint Area (acres)*	Pre-Development Runoff (ft^3/s)**	Post-Development Runoff (ft^3/s)**
A	17.0	67.1	55.7
B	20.3	67.1	57.6
C	17.1	67.1	55.7

**To convert acres to hectares, multiply by 0. 4047; ** To convert ft^3/s to m^3/s, multiply by 0.0283*

As shown in Table 4.4-1 the post-development peak discharges for all options are estimated to be less than the pre-development discharges due to proposed storm water controls. All three layout options are expected to exhibit comparable peak discharges. Storm water runoff estimates indicate that development of the site would not adversely impact the existing runoff rates. Additionally, WGC anticipates that further reductions in runoff rates could occur due to the on-site capture, treatment, and reuse of the site's storm water drainage for use in plant processes. Proposed on-site water quality treatment associated with runoff from the coal storage and ash silo areas is discussed in Section 4.4.3.2.

Option A would result in the least number of impacts as it consists of a smaller footprint area that would result in less surface runoff, and the footprint does not significantly disturb the meander of Sewell Creek. Figure 4.4.1 and 4.4.2 show the pre- and post-development drainage areas associated with the power plant site. The post development drainage area shows the potential location of the pond used to collect runoff from the coal storage pile and the clean water pond that could supplement the water supply needs of the plant. The exact location of these ponds is subject to change as the design and planning processes of the storm water management progresses.

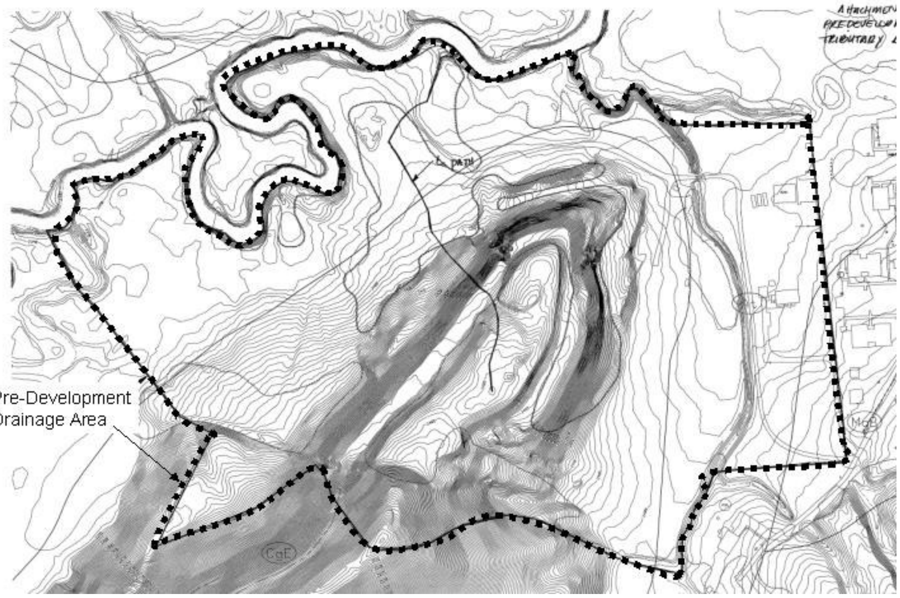

Figure 4.4-1. Pre-Development Drainage Area (PEC, 2005b)

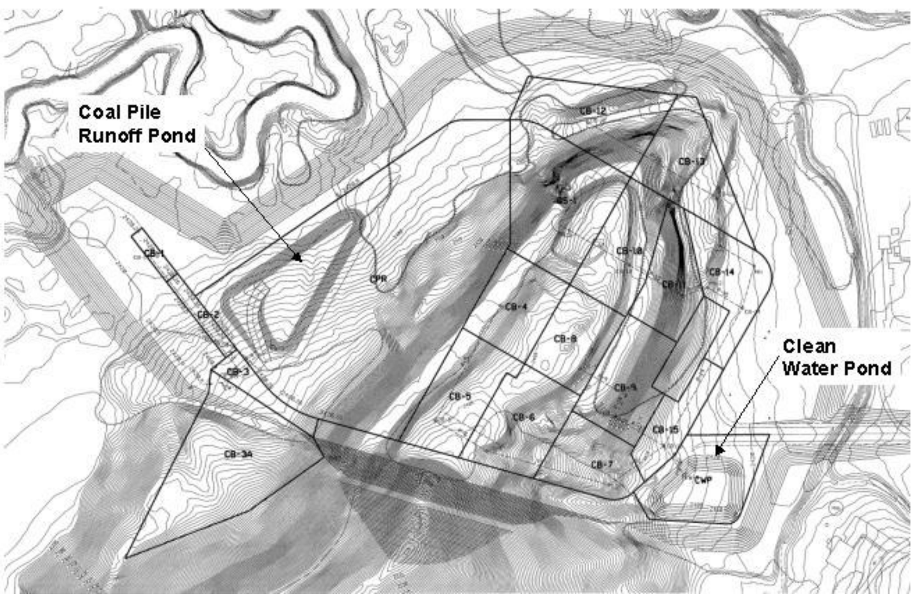

Figure 4.4-2. Post-Development Sub-Drainage Area (PEC, 2005b) (this figure is subject to change based on final storm water design)

Options B and C were designed with the intention of modifying Sewell Creek; however, due to stream encroachment and other technical and cost-related issues, these options were not considered feasible by WGC. A fluvial geomorphic study analyzing the meander pattern of Sewell Creek was performed with the intention of predicting the effects of Option A, WGC's preferred option, on Sewell Creek's path (see Appendix F, Stream Studies). Figure 4.4-3 displays the predicted movement of Sewell Creek over the next 50 years based on the site layout of Option A, which also includes the impacts from the permanent bridge. The analysis of Sewell Creek's movement was investigated through a river meandering model (Edwards, 2005). At the time of the analysis, the exact location of the bridge piers was unknown, which could impact the stream's migration. The following assumptions were provided by the WGC design team and used for the meander study:

- Bridge would consist of three 100-foot (30-meter) spans, with two intermediate concrete piers,
- Both piers would be 4 feet (1.3 meters) wide perpendicular to stream flow and separated by 100 feet (30 meters), and
- Piers would be placed at equal distances from the creek center.

The meander study emphasizes the assessment that pier locations would most likely affect Sewell Creek's path. Hence, any bridge design that would vary from the basic pier location assumptions used in this meander study would require additional modeling to predict implications on Sewell Creek's future movement. The large meander loop located directly northwest of the proposed power plant site is likely to cut off by the year 2060, because the neck is predicted to become smaller and smaller in each successive year. The exact date of the cutoff depends on the frequency and severity of floods, during which most migration would occur. According to the meander study, this meander loop would likely be eventually cutoff over time by the fluvial geomorphic process, whether or not the proposed plant is constructed.

Facility Construction

Storm water discharge during construction could impact surface waters as a result of changes in volume, runoff patterns, and quality. In general, construction activities introduce the potential for increased erosion; however, Best Management Practices (BMPs) through the proposed project's erosion and sediment (E/S) control plan, as required under an NPDES General Construction Permit, would be employed to minimize soil loss and minimize water quality degradation to nearby water resources, including wetlands. Design of the E/S control measures would be based on requirements listed in the West Virginia Department of Transportation (WVDOT) *Erosion and Sediment Control Manual* and the West Virginia Department of Environmental Protection (WVDEP) *West Virginia Erosion and Sediment Control Handbook for Developing Areas*.

Construction of the temporary access road and bridge would be an early construction activity that establishes easy access to the proposed power plant from the laydown areas (see Figure 2.4-11, Plant Construction and Laydown Areas). Other hydrological impacts (e.g., flooding) as a result of the temporary bridge are discussed in Section 4.5.3.2. This temporary access road would intercept some south-flowing runoff in the area. As a result, the runoff would flow along the eastern edge of the access road and drain into Sewell Creek. Based on an examination of the existing topography, the captured runoff would have discharged into Sewell Creek, regardless of whether or not the temporary road existed. However, the impervious surface of the road would most likely result in higher runoff rates and may warrant E/S control at the bridge abutments and embankments. Exact E/S control measures would be specified in the management plans that are prepared as part of the NPDES permitting process.

Initial site preparation would include site clearing and the construction of temporary storm water facilities to detain and treat storm water runoff, and perimeter ditches to intercept and divert any flows from upslope areas around the site. Construction of the storm water facilities and site grading would result in the immediate alteration of surface water flow across the site, including some locations within the wetland areas (see Section 4.7 for discussion on wetlands impacts). Runoff would be directed to two temporary sediment basins (future permanent coal pile runoff pond and ash silo sediment trap) to control runoff from the main plant site. The temporary construction of laydown and parking areas would require minimal grading and the placement of a 12-inch (30.5-centimeter) layer of stone. E/S control measures would also consist of perimeter swales that would direct runoff to sediment traps. When construction is completed, the stone for the parking and lay down area would be plowed into the underlying ground, stabilized with grass planting, and returned to pre-development conditions. Temporary sediment basins would be converted to permanent storm water management facilities.

In general, construction E/S controls and storm water management would consist of BMPs, including techniques such as grading that would induce positive drainage, hay bales, silt fences, and revegetation to minimize or prevent soil exposed during construction from becoming sediment to be carried off-site. The BMPs would detail the E/S control measures and accidental spill prevention and control measures. The BMPs would be implemented, inspected, and maintained to minimize the potential for adversely affecting downstream water quality during the construction phase.

4.4.3.2 Facility Operation

The proposed power plant island would be raised to an elevation of approximately 2,420 ft (738 meters) amsl, approximately 20 feet (6 meters) above the expected 100-year flood elevation. As a result, flooding of the power plant would not be expected (see Section 4.5 for Floodplain impacts).

Because Rainelle does not stipulate specific storm water management design methods, proposed storm water system design would be based on requirements set forth by the WVDOT and WVDEP. A site registration application form requires the preparation of a Storm Water Management and Pollution Prevention Plan (SWMPP) and a Groundwater Protection Plan (GWP). Potential impacts to surface water quality could result from accidental spills of chemicals and from runoff across surfaces containing contaminants, such as the coal storage piles and aqueous ammonia storage tank. Water quality may also be impacted by runoff from surfaces containing oil and grease, such as parking areas or roadways. The SWMPP for operational procedures, in conjunction with the Spill Prevention, Control and Countermeasures (SPCC) plan, would provide structural, operational, and erosion/spill control BMPs for all storm water operational activities at the plant facility. The following BMPs would be used for dust and dirt control at the proposed site:

- Dust emissions would be controlled through the use of filter bag houses as well as strategic placement of coal storage and limestone processing and ash handling areas;
- A truck wash would be used for cleaning fuel delivery trucks prior to exiting the plant property;
- A water truck would be used on plant roads when necessary to dampen accumulated dust; and
- Sprinkler systems would be used on any uncovered coal piles as needed to control dust.

Site discharge to off-site surface waters would be limited by directing any ‘dirty’ runoff into an on-site storm water detention pond (i.e., coal pile runoff pond in Figure 4.4-1). The materials handling area would be entirely asphalt-paved with heavy duty surface course, binder course, and an aggregate base. Surface drainage from the materials handling area would be directed to a collection pond. It is expected that this collection pond would be placed upon a surface such as an artificial liner or compacted clay layer to prevent subsurface soil and potential ground water contamination. Clean storm water would be directed through the storm drainage system to the permanent clear water pond. These ponds would be designed to handle a 10-year storm and would have emergency spillways to pass the peak inflow from a 100-year storm (PEC, 2005a). The storm sewer system would be designed to convey storm water for the peak runoff from the design 10- and 50-year storm frequencies. Velocities would be designed to ensure that the collection pipes would be self-cleaning, yet would not attain destructive velocities (i.e., high energy velocities) that could lead to undue pipe erosion and unsustainable water volumes at the outfall. De-energizing devices consisting of riprap outlet protection at pipe outfalls would provide protection from erosion between the storm drain outfalls and the vegetated downstream channels.

Aqueous ammonia (28 percent solution) would be required for the control of nitrogen oxide emissions by the power plant and would be stored on-site in a single 15,000-gallon (56,800-liter) storage tank. Although the storing and loading of aqueous ammonia are not subject to OSHA’s Process Safety Management (PSM) standard, WGC would institute a number of safety measures to minimize the potential for the accidental release of ammonia, as described in Section 2.3.4. Based on these controls and safe guards, the potential for contamination of surface water, soil, and/or groundwater resources would be negligible. In the event of an accidental spill, it is expected that these safety measures would provide secondary containment and instant alerts that would limit the amount of a spill or leak. An analysis was performed to predict the hazards of off-site emissions from vaporization of aqueous ammonia during an accidental release, which is summarized in Section 4.14, Public Health and Safety.

Runoff from the perimeter of the plant site would drain to either Sewell Creek or the unnamed tributary, and would maintain the pre-development drainage pattern. On-site runoff would be collected in the clear water pond and the coal pile runoff pond, and therefore would not contribute to the total 10-year post-development peak runoff. The clear water pond and the coal pile runoff pond in the main plant area would be designed to hold the 10-year runoff volume with zero discharge.

WGC intends to use the majority of the storm water collected on-site after it is processed through the on-site treatment plant. Because the majority of the runoff volume from the proposed plant site would be collected and contained on-site, the amount and quality of the runoff as a result of the project are not expected to cause any significant adverse impacts to Sewell Creek and the unnamed tributary.

4.4.3.3 Water Supply

The Rainelle Sewage Treatment Plant (RSTP)

As discussed in Section 2.4.6, WGC plans to use all of the treated wastewater effluent from the RSTP, supplemented by withdrawals from the Meadow River and/or groundwater sources. Because 100 percent use of the wastewater from the RSTP is expected this would result in a decrease in the amount of the biochemical oxygen demand (BOD) that would have otherwise been released into the Meadow River. The amount of organic material that can decompose in the sewage is measured by the BOD and is the amount of oxygen required by micro-organisms to biodegrade the organic substances in sewage. Therefore, the more organic material there is in the sewage, the higher the BOD. It is among the most important parameters for the design and operation of sewage treatment plants. On the other hand, dissolved oxygen is an important factor that determines the quality of water in lakes and rivers – the higher the concentration of dissolved oxygen, the better the water quality for aquatic habitat conditions. When sewage enters a stream, micro-organisms begin to decompose the organic materials. Oxygen is consumed as micro-organisms use it in their metabolism, which can quickly deplete the available oxygen in the water. When the dissolved oxygen levels drop too low, many aquatic species begin to perish. Furthermore, if the oxygen level drops to zero, the water become septic, which can result in undesirable odors usually associated with putrid conditions. Therefore, use of the RSTP's effluent for the proposed power plant's processes is expected to decrease the long-term BOD demand in the Meadow River and result in improved habitat conditions for aquatic species downstream.

Minimum day values for Meadow River stream flow were recorded over a three-year period (October 1979-September 1982) at the USGS McRoss gaging station (located approximately 2 miles [3 kilometers] upstream of the Sewell Creek and Meadow River confluence). Based on this data, the median value for daily low-flow was approximately 32,000 gallons per minute (121,000 liters per second). According to RSTP flow data spanning three years (2001 -2003), the annual average of the plant's discharge was approximately 500 gallons per minute (2,000 liters per second), which represents approximately 2 percent of the low-flow value of Meadow River (32,000 gallons per minute [121,000 liters per second]). Assuming the median low-flow value is a typical flow for the Meadow River during dry conditions, it is not expected that eliminating this source of discharge from the river would result in any adverse impacts for downstream users, because the discharge represents a small fraction of the stream flow during low-flow conditions. The RSTP's current NPDES permit would require a modification due to the elimination of this outflow from the Meadow River.

Supplemental Water Sources

The remaining water demand that cannot be supplied by the RSTP is estimated to be up to approximately 800 gallons per minute (1.15 million gallons per day or 4.4 million liters per day), which is expected to be supplied from supplemental sources. Although there is some uncertainty regarding whether sufficient water would be available from either the Meadow River or groundwater sources under extended low recharge conditions, water supply options under consideration by WGC use more than one source water to minimize impacts that would occur from using a sole source. The options outline measures that would be taken to ensure that the power plant maintains an adequate water supply without compromising the local aquifer in Rainelle or reducing flow in the Meadow River that would result in adverse water quality conditions for aquatic habitat. The following two options are similar in that they examine supplemental use from the same sources, but differ in the priority of either using the Meadow River or local aquifer:

- Option A – WGC would withdraw groundwater from PW-1 and PW-3 (and other potential wells) as the secondary source of water supply to supplement the use of up to 100 percent of the RSTP effluent (see Section 4.6, Geology and Groundwater Resources). As a tertiary source of water supply, WGC would take water from the Meadow River using a temporary withdrawal structure to be located near the RSTP.
- Option B –As the secondary source of water supply to supplement the use of up to 100 percent of the RSTP effluent, WGC would take water from the Meadow River using a permanent withdrawal structure to be located approximately 500 feet upstream of the RSTP. During periods when withdrawals would cause the flow in the Meadow River to decline below 60% of base flow (i.e., the river flow rate above which adverse water quality and aquatic habitat impacts would not be expected), or another comparable withdrawal limitation measure determined in consultation with the state, groundwater would be withdrawn from PW-1, PW-3, and other potential wells as a tertiary source of process water supply.

It is expected that either option for a water supply would be adequate. However, under Option A, greater potential would exist for adverse impacts associated with sustained groundwater pumping over longer time periods. Details on groundwater impacts are discussed in Section 4.6 (Geology and Groundwater Resources) and in Appendix J (Groundwater Pump Study). Option B is the preferred option because it provides the greatest flexibility to manage water supply resources and reduce the potential for overall project impacts. Specifically, by withdrawing from the Meadow River when sufficient flow is available, overall demand on the local aquifer is reduced, allowing the aquifer to recharge during these periods, thereby increasing its viability as a sustainable tertiary supply. As described in Section 4.6, groundwater studies on the local aquifer are ongoing to improve the understanding of this resource and any constraints it may have. WGC's final decision on its water supply approach would be dependent upon the outcomes of these ongoing groundwater studies and on the results of consultation with the state agencies on conditions that would need to be met to ensure the local aquifer and Meadow River are not adversely affected (e.g., withdrawal limitations based on base flow rates).

Under Option B, withdrawal from the Meadow River would occur via a permanent intake structure located approximately 500 feet (150 meters) upstream of the RSTP near the confluence of Sewell Creek (see Figure 2.2-3). WGC would monitor the Meadow River and determine its use on a daily basis. On days when the river flow is too low, and therefore unavailable, withdrawals would be suspended and supplemental water would be pumped from the wells.

Option A for the water source would implement a temporary intake structure, most likely by rigging a temporary portable pump and waterline from the river. Depending on the extent of wetlands impacts, this temporary intake structure would require either a Nationwide Permit (NWP) or Individual Permit (both under Section 404 of the Clean Water Act [CWA] issued by the U.S. Army Corps of Engineers [USACE]). Option B, based on conceptual plans, would comprise a permanent concrete intake structure and ancillary components (i.e., water pipeline and maintenance road). Prior to construction of a permanent intake structure WGC would be required to obtain Section 404 and 401 permits under the CWA, both issued by the USACE and WVDEP, respectively. The Water Quality 401 Certification would be required to ensure that the project would not violate the state's water quality standards or stream designated uses. The Section 404 permit would be required as a result of water resources impacts (as described above), including wetlands impacts. For more details on impacts to wetlands see Section 4.7.

Design details of the intake structure are in the conceptual stage and preliminary plans indicate that a typical low-velocity cooling water intake structure (CWIS), such as a shoreline CWIS, would be used. The CWIS would extend from the point at which the river water is withdrawn, up to and including the intake pumps. The water flow would flow naturally into the CWIS when the intake pumps are operating. The CWIS would be able to pump up to 1,300 gallons per minute (approximately 1.9 million gallons per day or 7 million liters per day) through a water line and into a holding tank at the RSTP, where it would be mixed with RSTP effluent and conveyed to the WGC plant in the same water supply pipeline.

Based on the conceptual plans, the intake structure would be a reinforced concrete structure with approximate overall dimensions comprising a 16-foot width, 56-foot depth, and a 20-foot height. The primary components to be installed in the intake structure would be:

- A single chamber consisting of a forebay, intermediate bay and afterbay;
- A concrete stop log to isolate the intake structure from the Meadow River when necessary;
- A steel bar screen with debris collection basket located at the entry to the intermediate bay to prevent larger objects from entering the intermediate bay;
- A plastic fine screen (with 3/4-inch openings) located at the entry to the afterbay to prevent larger fish from entering the afterbay;
- A backup plastic fine screen (also with 3/4-inch openings) to maintain fish protection while the primary screen is being cleaned; and
- Two 50-percent capacity submersible water transfer pumps located in the afterbay, each with a 15-horsepower motor driver.

The intake structure would be recessed from the shoreline, using a riprap apron for stability, and a skimmer wall would be provided to allow floating debris to bypass the structure. The floor of the intake structure at the entry would be slightly below the elevation of the river bottom to allow withdrawals during periods of low river water level subject to limitations placed on withdrawal during low-flow periods. The floor of the intake structure would ramp down several feet lower to satisfy minimum submergence requirements for the transfer pumps. The top of the intake structure would be slightly higher than the elevation of the 100-year flood.

A CWIS can cause adverse environmental impacts by causing impingement mortality and entrainment (IM&E) of organisms in the area around a CWIS. Impingement (or entrapment) is the blocking of larger organisms by some type of physical barrier that is used to protect equipment down the line, such as a pump or condenser. Entrainment is the taking in of organisms with the river water. Since the design intake flow is less than 2 million gallons per day (8 million liters per day), the final rule implementing Section 316(b) of the Clean Water Act (CWA) for new facilities would not apply to the WGC Co-Generation Facility. Nevertheless, the intake structure has been designed to 316(b) standard and technologies for limiting adverse aquatic impacts during the CWIS operation have been incorporated into the conceptual design.

Further discussions on potential impacts to biological resources as a result of the CWIS can be found in Section 4.7, Biological Resources.

Implementation of a CWIS can indirectly impact aquatic habitat by withdrawing significant amounts of stream flow as to degrade aquatic habitat downstream. Protection of aquatic species, therefore, depends upon reserving a portion of the stream flow. Federal and state agencies are often required to generate stream flow recommendations in order to protect stream uses. As a result of preliminary discussions between WGC and the state (WVDNR and WVDEP), the Tennant Method (also commonly referred to as the Montana Method) has been recommended as an approach to investigate the impacts of withdrawing the Meadow River.

The Tennant Method is widely used and considered one of the simplest techniques for recommending or qualitatively evaluating stream flows for fish and wildlife. This method looks at what portion of a stream's average annual flow is the minimum flow needed to sustain survival of stream habitat. The Tennant Method establishes eight flow classifications, as listed in Table 4.4-2, where each classification is assigned a percentage or percentage range of the annual average. Therefore, to recommend a flow that provides habitat described as *minimal*, *good*, or *optimum*, a percentage of the annual average is selected. A general rule of thumb is that serious degradation of habitat occurs beyond 30 percent of the annual average. WGC intends to use the 60 percent threshold as its basis for determining Meadow River availability on a daily basis; however, consultation with the state is needed in determining the best representative base-flow (i.e., annual average) given the limited hydrological data for the Meadow River.

One of the limitations of the Tennant Method is its recommendation of a base-flow for two six-month periods, which may be too general and not representative of a stream's actual flow pattern. A similar approach could be taken to recommend flows on a quarterly basis, though this requires a good amount of hydrological data to truly understand the nature of a stream. Although it is uncertain at this time what the state would finally recommend as a base-flow, lower base-flows may be recommended on a seasonal basis. Uncertainty on the details of the intake structure's monitoring system and state recommendations and limited hydrological data make it difficult to estimate the impacts at this time; however, for purposes of this analysis this section examines the 60 percent threshold based on both the annual average and seasonal average.

Table 4.4-2. Tennant Method for Prescribing Stream Flow Regimens for Fish, Wildlife, Recreation and Related Environmental Resources

Description of Flow	Recommended Base Flow Regimes (Percent of Average Annual Flow)	
	October - March	April - September
Flushing or Maximum	200%	
Optimum range	60%	
Outstanding	40%	60%
Excellent	30%	50%
Good	20%	40%
Fair or Degrading	10%	30%
Poor or Minimum	10%	10%
Severe degradation	0% to 10%	

Source: Tennant, 1975

WGC is proposing to maintain 60 percent of the Meadow River's average annual flow in order to keep an *optimum range* of water quality for aquatic habitat as defined by the Tennant Method. The annual average is typically determined by reviewing existing hydrological data, such as the stream flow data provided by USGS. As discussed in Section 3.4.1.1, stream data near the proposed CWIS location was provided by a USGS gaging station located approximately 2 miles upstream the confluence of Sewell Creek and Meadow River in McRoss, WV. This station has been inactive for more than a decade and provides three years of flow data (from October 1979 through September 1982). However, because of the gage's proximity to the proposed location of the intake structure, it is assumed that this data provides the most representative flow to date for the Meadow River.

The average monthly flow during October 1979 through September 1982, as shown in Figure 4.4-4, provides a general idea on when low flow conditions occur for Meadow River near the CWIS location. The figure indicates that dry conditions can be expected to occur during the summer to fall months (i.e., July through October). Included in the figure are the 60 and 30 percent annual average and the 60 percent seasonal average (estimated based on the three years of data). In this analysis, the summer, fall, winter, and spring seasons were respectively defined as July-September, October-December, January-March, and April-June.

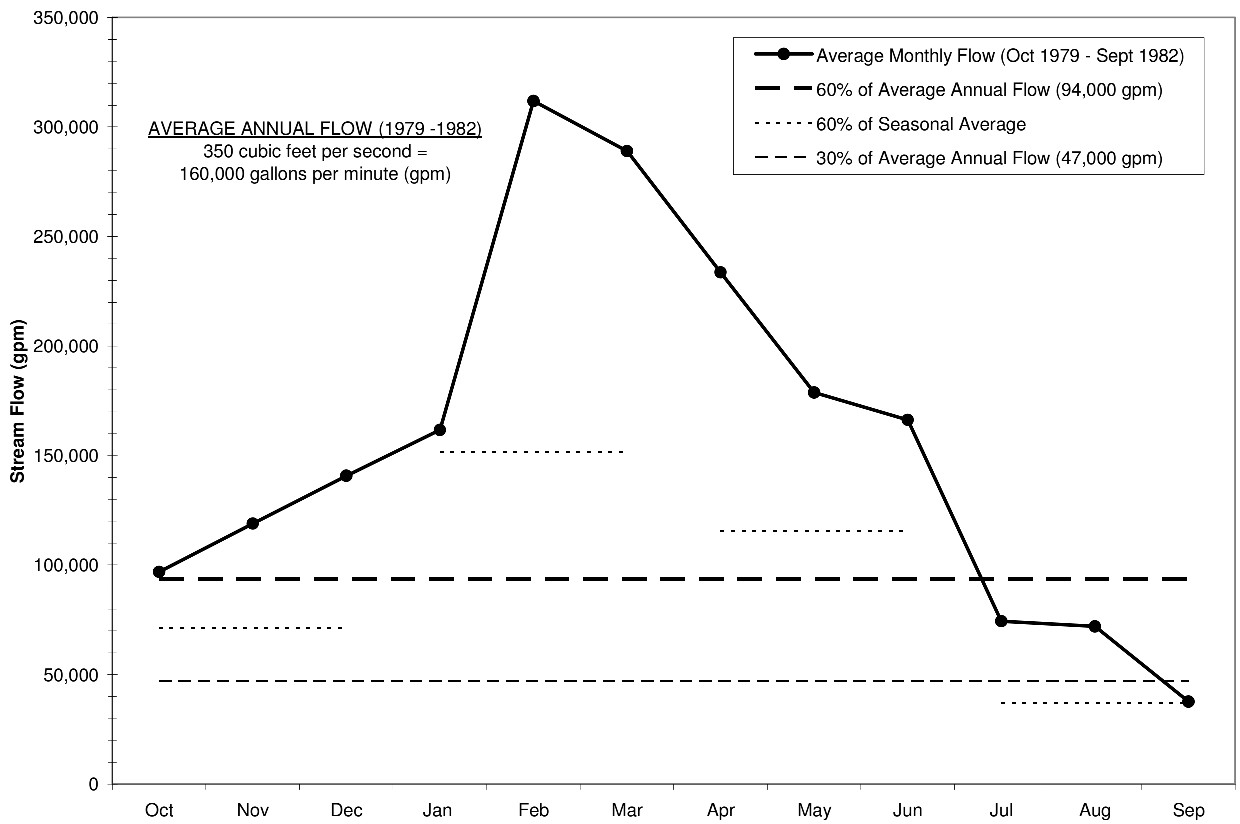

Figure 4.4-4. Meadow River Stream Average Monthly Flow (October 1979 – September 1982)

Based on the USGS data, 60 percent of the average annual flow is estimated to be approximately 210 cubic feet per second (94,000 gallons per minute or 360,000 liters per minute). Figure 4.4-4, implies that the Meadow River would be able to supplement the water demand for most of the year. However, because this is based on averages, a better sense of the Meadow River's availability would be to examine the flow on a daily basis over the sample year. Figure 4.4-5 represents daily flow for a sample year (October 1981 to September 1982) and is used in this analysis to allow for general discussions on potential impacts.

Based on the best data available, the sample year was considered to be the most representative of typical river flow conditions. As discussed in Section 3.4.1.1, because available flow data for the Meadow River is limited to three years, 33 years of precipitation data for the gaging station location were used to assess whether the flow data was representative of a typical year. By comparing the average annual precipitation over the 33-year period with the years that have available flow data (i.e., 1979 through 1982), it was determined that the period of October 1981 through September 1982 was considered to be representative of a typical year from a precipitation perspective. Therefore, because the flow rates within the Meadow River are directly related to precipitation, this year is also considered representative of flow conditions in the Meadow River for a typical or average year.

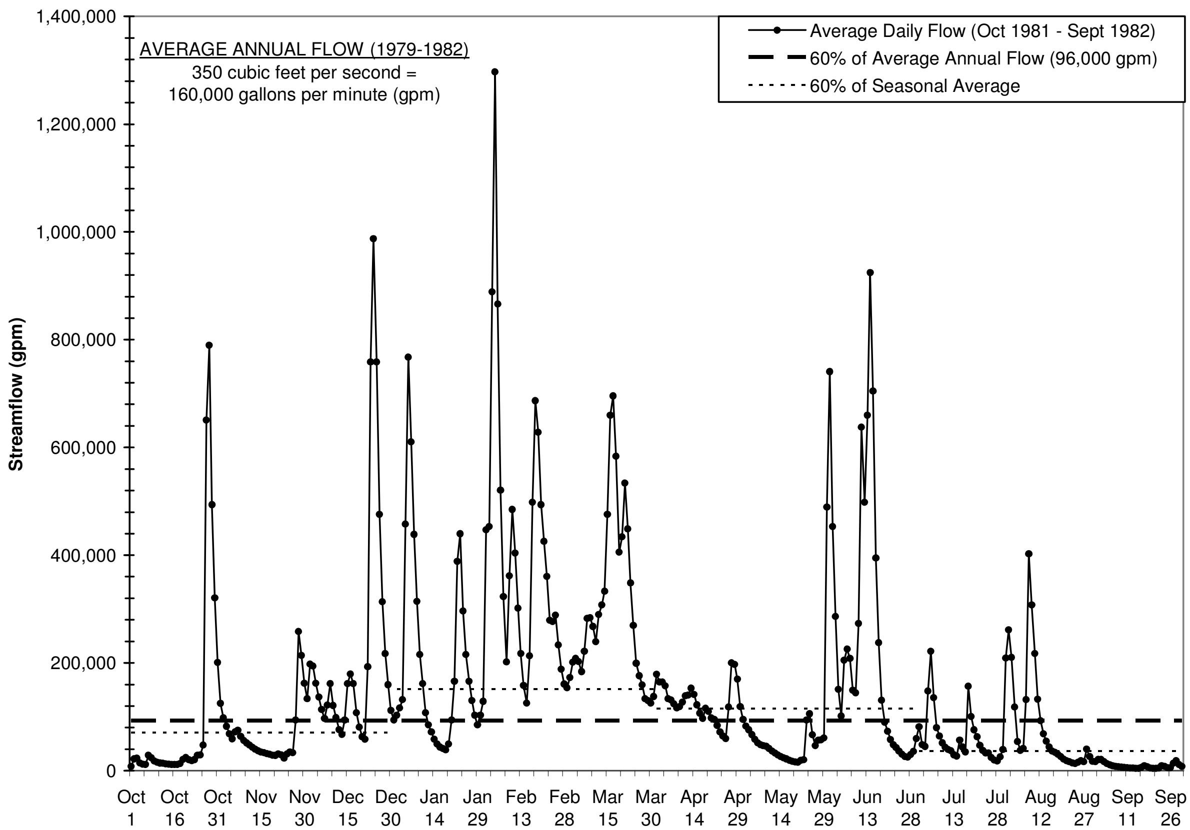

Figure 4.4-5. Meadow River Stream Average Daily Flow (October 1981 – September 1982)

Figure 4.4-5 provides an example of the amounts of water that would have been withdrawn from the Meadow River and aquifer under Option B during the sample year. As the figure indicates, approximately half of the daily flow rates fall near or below either the annual average threshold or the seasonal threshold. Assuming the seasonal threshold would be used, it is estimated that the withdrawal from the Meadow River would have occurred over 186 days during this sample year. This would have resulted in an annual withdrawal of approximately 138 million gallons from the river and 167 million gallons from the wells. Although the river would have been used a greater number of days than the wells, the RSTP would not have been supplying as much water during days when the Meadow River would have been used, and hence, the total withdrawal amounts from the wells would have been greater for this example.

Figure 4.4-6 shows the proposed power plant's total water demand and the projected monthly flow rates that would be required from the Meadow River and the local aquifer if the 60 percent threshold for the seasonal average was used. During the typically dry months (i.e., August through October), while the river water was being used, the local aquifer could replenish itself and therefore, under Option B, the groundwater impacts, such as intense draw down, would not be as significant as in Option A. Under Option A, Meadow River withdrawal would be held to the same restrictions; however, because it would be used on a less frequent basis, this option would implement a temporary intake structure that would follow the guidelines as required under state requirements (e.g., use of 'legal' inlet).

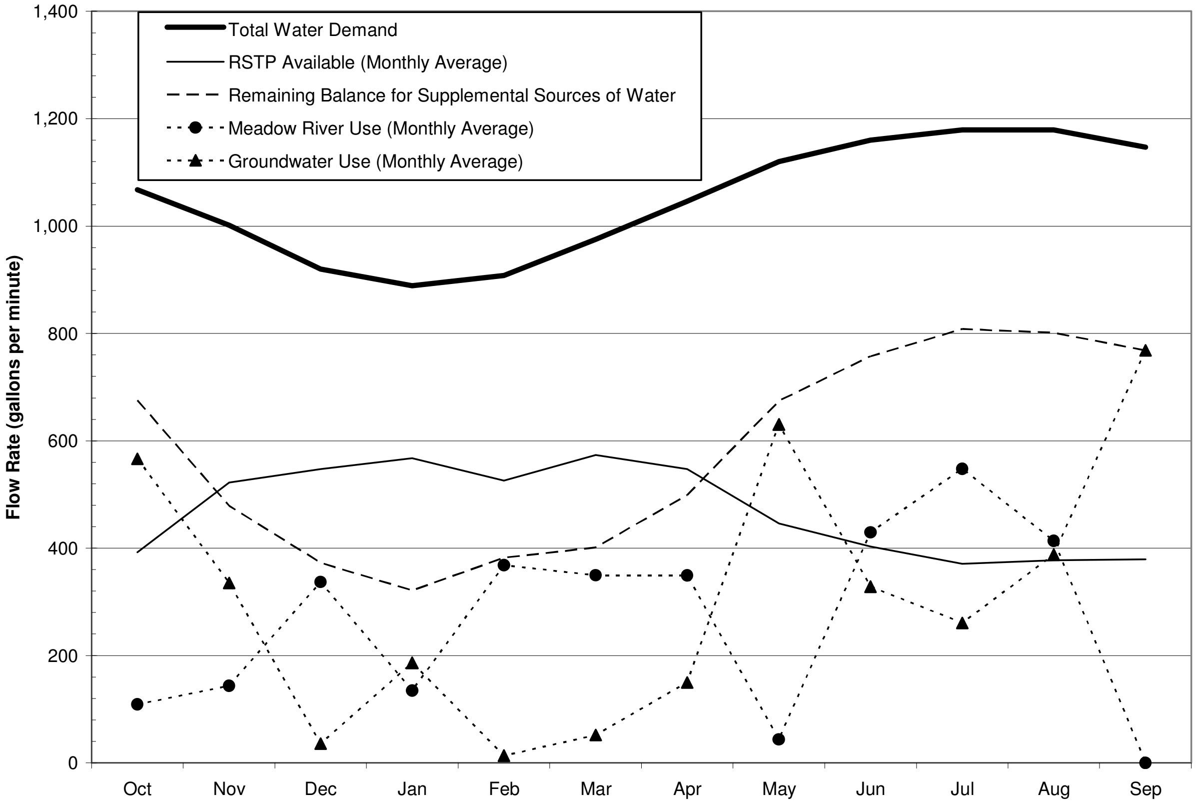

Figure 4.4-6. Water Balance for the WGC Co-Generation Facility under Option B

If the Meadow River indeed follows a similar pattern as that discussed above, then use of the Meadow River under Option B (and complying with the 60 percent seasonal average threshold) would be possible while still upholding the o*ptimum range* to o*utstanding* flow conditions for aquatic habitat as outlined in Table 4.4-2. In general, WGC proposes to maintain the 60 percent threshold (of seasonal or annual average pending forthcoming discussions with the state) under either Options A or B. The river would be metered and the withdrawals would be controlled so as to not permit a withdrawal rate that would fall below o*utstanding* flow conditions. Therefore, although flow rates in the Meadow River would be reduced when compared to baseline conditions, adverse impacts to the aquatic habitat of the Meadow River are not expected to occur because of controlled withdrawal to maintain the 60 percent flow threshold.

Significant withdrawal of the river can also impact recreational water users as low stream levels can impair travel or fishing in the river. WGC would maintain a stream gage that would monitor the Meadow River stream levels. Because use of the river would not go beyond the 60 percent threshold, it is expected that enough flow would be maintained as to not compromise recreational use. Additionally, the State of West Virginia has been concerned with water usage amounts and has been performing a survey of Large Quantity Users (usage greater than 750,000 gallons per month [3 million liters per month]) over the past three years. Under the West Virginia Water Resources Act, if WGC would withdraw more than 750,000 gallons per month, they would be required to report this consumption to the state.

Because of limited hydrologic data on the relationship between the aquifer and the Meadow River, there is an ongoing study on the local aquifer that would provide more insight on the aquifer's characteristics and to better judge its availability and impacts during use. Also, a gage would be located on Meadow River near the intake structure (under either water supply option) as part of a daily check to monitor and record stream levels. Ongoing collection of river data would allow for a better understanding of the Meadow River's characteristics and, along with the ongoing aquifer study, provide WGC more data for better water use decisions. Furthermore, the state would review the issues and provide recommendations to WGC. The forthcoming results from the aquifer tests, continuous monitoring of the river's behavior, and correspondence with state agencies would help WGC decide on the best approach to supplying water for the project and minimize adverse impacts to water sources.

4.4.3.4 Fuel Supply

WVDEP and WGC have agreed to cooperate on the development of specific details with respect to areas of responsibility for reclamation of the Anjean coal refuse site, but for which WVDEP would retain full and final authority. The agreement between WGC and WVDEP for the use of Anjean's coal refuse (and hence, the diminishment of the coal refuse) requires that in return for the coal refuse access; the Co-Production Facility's waste ash would be used in a remediation technique applicable to the coal refuse sites. Additionally, under the agreements with WVDEP, WGC would develop reclamation plans for affected coal refuse sites that would include the conversion of barren landscape to vegetated cover. As a consequence, the Proposed Action would provide water quality benefits to the Anjean area, as well as provide financial benefits to the state. Similar agreements are expected to take place for subsequent coal refuse sites, including Joe Knob, Green Valley and Donegan; hence, comparable water quality improvements at these sites would be anticipated.

Extraction of coal refuse from the coal refuse sites could result in a temporary loss in water quality through a short term increase in sedimentation that could result in a slight decrease in water quality. However, the temporary increase of sediments would be controlled through implementation of E/S control BMPs, such as silt fencing, placement of hay bales and construction of diversion ditches that convey surface runoff into sediment basins.

Removal of the refuse and restoration of the Anjean site is expected to provide long-term benefits. Potentially realized benefits to water quality would be associated with removal of the refuse pile and replacement of this material with alkaline ash from the power plant. As a result, the source of the AMD (i.e., the coal refuse) would be removed, while the alkaline ash would act as a buffer to remaining pyretic materials. In addition, as part of the reclamation effort topsoil would be placed in the disturbed areas and revegetated with trees, shrubs and grasses. The resulting restoration of the site would provide habitat for a variety of species as well and provide a substrate for microbial life.

Potential impacts to water quality resulting from the construction of a coal prep plant at any of the candidate sites would be typical of impacts associated with construction activities. These impacts would be minor and minimized through the use standard E/S control measures (e.g., placement of silt fencing). Operational-related impacts would primarily be related to the use of chemicals for the prep plant processes. At this time, details regarding chemical inputs and the methods of storm water management at the beneficiation prep plant are uncertain. As stated in Section 2.4.4, it is assumed that industry standard coagulants, flocculants, and pH control inputs would be used as is typical in coal prep processing. It is anticipated that the prep plant would employ general storm water management practices that are typically used at cleaning plants and required under the NPDES permit. This would include the use of containment ditches to manage on-site runoff and accidental "black water" discharges to a special collection pond(s). Inside the prep plant and/or in storage areas, as appropriate, secondary containment basins would be used to catch any leaks or spills. With respect to chemical delivery and storage, bulk chemicals would typically be delivered in reusable chemical “totes” and stored inside a secondary containment barrier. The chemicals would likely be fed from these totes using chemical feed pumps delivering the chemical in a controlled manner.

The potential impacts for the three candidate prep plant sites AN1, AN2, and AN3 would be substantially similar; however, AN3 offers the advantage of being within the watershed of the existing Anjean treatment ponds. The potential impacts for the two candidate sites DN1 and DN2 would be substantially similar; however, DN1 offers the advantage of being within the same watershed as the Donegan refuse and leachate treatment ponds. Storm water runoff from the candidate site GV could be diverted to the existing treatment ponds for the Green Valley site.

4.4.3.5 Limestone Supply

The options being considered as sources of limestone are all commercial facilities currently operating under existing permits. These facilities would continue to operate regardless of whether the Co-Production Facility is constructed and operated. However, the rate at which limestone would be mined from the selected quarry site is likely to increase as a result of the Proposed Action. This increase in production would be regulated under and bound by existing operating permits, which incorporate measures to prevent the degradation of surface water resources. Thus, impacts related to quarrying would not be expected to be substantially different when compared to projected baseline conditions as these are active quarries and activities would be taking place within their existing permitted areas.

4.4.3.6 Material Transportation

As part of the BMPs, a truck/wheel wash would be located at the coal refuse sites and the Co-Generation Facility to remove dust from the trucks before entering public roads to minimize the potential contamination to runoff from the roads.

4.4.3.7 Power Transmission

Any construction or upgrading of transmission lines would require land disturbance and clearing as well as the placement of utility poles. As described above for the proposed facility, the potential for contamination of storm water with sediment or accidental spills is likely during utility line construction. These impacts would be temporary and would be minimized through the use of BMPs during clearing and construction activities. BMPs to be used would be included as part of the required SWMPP for land disturbing activities, and would include strategic placement of silt fencing and temporary drainage controls. Upon completion of construction, it is expected that disturbed areas would be re-vegetated, which would reduce or eliminate any long-term effects.

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4.5 Floodplain

4.5.1 Method of Analysis

As discussed in Section 3.5, portions of the proposed location of the Co-Production Facility fall under flood insurance Zone A on the FIRM, which indicates that detailed hydraulic analyses were not performed by FEMA for this area. As a result, flood hazard boundaries have been mapped but FEMA has not defined floodway boundaries or a Base Flood Elevation (BFE) around the immediate project area. Generally, to comply with National Flood Insurance Program (NFIP) requirements, communities prohibit development in the floodway, which is defined by FEMA as "…*the channel of a river or other water course and the adjacent areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation by more than the designated height*" (Haestad Methods, 2003). The designated height set by FEMA is a surcharge value of 1.0 foot (0.30 meters) for the 1 percent annual chance flood (i.e., the 100-year recurrence interval flood). In areas where floodway boundaries have not been established by FEMA, it is incumbent upon the community to ensure that development within the floodplain complies with the NFIP requirements.

Part 65 of the NFIP program (44 CFR 65, Identification and Mapping of Special Flood Hazard Areas) outlines the steps a participating NFIP community must take to provide FEMA with up-to-date flood hazard identification. This regulation includes requirements stating that, until a floodway is developed for a mapped stream, substantial development or new construction is not allowed in the floodplain unless it is demonstrated that the cumulative effect of the development will not result in increases in the water surface elevation above the designated height along any segment of the water course. Local communities generally require that project owners submit engineering analyses before permits are approved for development in the floodplain.

If the designated height would be exceeded by a proposed project, the community would need to apply for a Conditional Letter of Map Revision (CLOMR). The community, or project sponsor working with the community, may also request FEMA's comments on a proposed project to determine whether a map revision is justified and to confirm that the project does not violate any of the NFIP requirements. FEMA's comments are then issued in the form of a letter, termed a CLOMR in accordance with 44 CFR 72 Procedures and Fees for Processing Map Changes. Some communities establish development controls that are more stringent than the FEMA requirements. In addition, some state agencies have more stringent requirements for allowable impacts on projects that they support. As related to the Proposed Action, because the construction of the permanent bridge across Sewell Creek is expected to be a West Virginia Department of Transportation's Division of Highways (DOH) project, the bridge would be subject to DOH requirements. DOH has a zero backwater effect policy, which means that no changes in water surface elevations can occur as a result of the bridge.

The potential for significant impact to floodplains or impacts that could result from flooding in the study area has been evaluated based on a series of predetermined criteria. Based on the criteria, a significant impact may occur if the Proposed Action or an alternative would cause either of the following conditions to occur:

- Filling of the floodplain in a manner that would expose people or structures to substantial adverse effects, including risk of loss, injury, or death resulting from flooding.
- Construction in the floodplain in a manner that would violate NFIP requirements or result in changes of surcharge value of 1.0 foot (0.3-meters) or more for the 1 percent annual chance flood.

To assess the potential for impacts based on the established criteria, a prediction of changes in water surface elevations during flood events was developed. These predictions were based on detailed hydraulic computer modeling for the project area based on both existing conditions and for proposed development activities. The developed model used flow data generated from estimates of peak discharges for 100-year and 500-year storm events as described in Section 3.5. The estimated storm discharges, along with detailed topographic data, were then used to develop the detailed hydraulic model using the River Analysis computer program, HEC-RAS (version 3.1.1). Detailed topographic mapping, consisting of 1-foot contour interval of the project area, as well as field surveyed cross-sections at select locations along Sewell Creek and Wolfpen Creek were used to develop the necessary geometric data for the model.

Geometric data (including approximately 28 cross-sections, applicable roughness coefficients, and bridge and culvert geometries) were entered into the model and used with the discharge values to calculate water-surface elevations of 100-year and 500-year storm events. Based on the model runs, flood profiles were outlined on topographical maps showing the computed water-surface elevations. The following specific information was used in development of the model:

- Cross sections were generated from 1-foot interval topographic maps. Elevations were referenced to North American Vertical Datum 1988 (NAVD88). The longitude and latitude data were referenced to North American Datum 1983 (NAD83).
- Channel and overbank roughness factors (Manning's "n") were chosen from field observations, aerial mapping and previous studies. The channel's "n" value used for Sewell Creek and Wolfpen creek was 0.04 and the overbank's "n" value was 0.075.
- The coefficients for expansion and contraction losses at the bridges have generally been adopted from "rules of thumb." Generalized expansion and contraction coefficients have been used, 0.3 and 0.1 respectively.

The 100-year and 500-year floodways and BFE can be numerically computed with HEC-RAS. The built-in HEC-RAS encroachment analysis methods were used to estimate floodway location based on a maximum surcharge value of 1 foot (0.3 meters) between the 100-year base flood. The model was first used to estimate the base flood elevation, then multiple profile runs were performed for varying floodways using target water surface elevation increases and modification of floodways by specifying left and right encroachment stations. Cross-section data for site layouts under consideration for the proposed Co-Production Facility were then modeled to determine the changes in water surface elevations compared to the predicted baseline conditions. Steady flow was assumed for the computation where a peak discharge is applied at each cross-section to determine maximum water surface elevation.

4.5.2 No Action

Under the No Action alternative, DOE would not provide financial assistance for the Co-Production Facility and the project would most likely not be completed. As a result, no development would occur in the floodplain and there would be no impact or change in baseline conditions relating to the potential for future flooding.

4.5.3 Proposed Action

4.5.3.1 Site Layout

Several site layout options that were considered by WGC were evaluated for comparative purposes. As described in Chapter 2, Option A is the preferred site layout by WGC. Each of these options includes development within the floodplain that would be subject to the NFIP requirements as described above. The power plant site would be graded so that the base elevation is above the 100-year floodplain elevation (would be raised from an existing base elevation of approximately 2,400 feet amsl [730 meters] to 2,420 feet amsl [740 meters]). Therefore, permanent losses of floodplain areas would occur as a result of the

Proposed Action with associated losses of flood storage volume. The resulting acreages of floodplains lost for each of the development options is listed in Table 4.5-1.

Table 4.5–1. Acreage of Floodplain Loss

Siting Option	Acres Filled*
Option A	16
Option B	20
Option C	18

**To convert acres to hectares, multiply by 0.4047*

Although floodplain areas would be filled, based on the predictive modeling that was conducted using HEC-RAS, none of the siting options would result in changes in surface water elevations that would exceed the FEMA designated height of 1 foot (0.3 meters) for the 100-year event. Changes in water surface elevations that are expected to occur for each of the options are presented in Table 4.5-2; these changes correspond to water surfaces presented in Figure 4.5-1 through 4.5-3. These figures present the corresponding water surface elevation expected for a 100-year storm for each of the development options. Based on the changes in the water surface elevations as computed, only minor changes are expected for the predicted 100-year flood boundary, with little potential impact to upstream or downstream structures over baseline conditions for either the Option A, Option B, or Option C scenarios. However, Option B includes the relocation of the unnamed tributary, which would result in a more substantial change in local hydrology. In addition, Option B includes the removal of a stream meander neck on Sewell Creek. Although removal of this feature is not expected to substantially impact surface water levels during flood events, removal of this feature would be expected to increase stream flow velocities in this segment of Sewell Creek and trigger downstream changes in the stream channel location.

Table 4.5–2. Changes in Water Surface Elevation for 100-year flood at Representative Locations

Cross Section	Option A (increase in ft)*	Option B (increase in ft)*	Option C (increase in ft)*
Point A – Sewell Creek	.27	.37	.51
Point B– Sewell Creek	.48	.52	.52
Point C– Sewell Creek	.37	.67	.35
Point D– Sewell Creek	.37	.37	-.06
Point E– Unnamed Tributary	.00	.48	.06

****To convert feet to meters, multiply by 0.3048***

4.5.3.2 Power Plant Construction

Construction-related impacts are expected to be less severe than those presented for the development scenarios. Although there are certain areas that would be used for construction staging and laydown areas (see Figure 2.4-11), the base elevations of these areas would not be elevated above the base flood elevations. Materials and equipment stored in these areas could be at risk for damage during a flood event; however, permanent impacts to the floodplain and/or local resources are not expected to occur. Option C shows an increase in surface water elevation because the rail spur feature that was included in layout further constrict the surface area of the floodplain.

A prefabricated, temporary bridge would be constructed for access to the E&R Property during construction, and would be in place until the permanent DOH bridge is operational. The temporary road would extend from John Raine Drive and extend to the prefabricated bridge. This temporary bridge would provide construction access (up to five years), after which a more robust and permanent bridge across Sewell Creek would be built to provide access on the western side of the power plant site. The temporary bridge would be located just upstream of the confluence of Sewell Creek and the unnamed tributary and be built to pass a 2- or 5-year storm. During more severe storm events, Sewell Creek may overflow its banks and overtop the height of the temporary bridge, causing water to flow over the bridge and restricting access to the site during construction. In general, temporary changes in local hydrology around the temporary bridge site could occur while the bridge is in place. However, these changes would be limited to backwater effects caused by the bridge during storm events that cause Sewell Creek to experience flow over its banks. Areas that could potentially be affected by this backwater are limited to lower, undeveloped areas in the EcoPark and on the E&R Property that are immediately upstream of the temporary bridge. Because the temporary bridge would not be substantially above existing site grades, and the bridge would be overtopped during flood events, these potential impacts are considered short-term and minor.

4.5.4 Fuel Supply

4.5.4.1 Anjean

No floodplain impacts would be expected as a result of the fuel recovery efforts that would occur at Anjean. Both candidate prep plant sites, AN1 and AN2, are in close proximity but appear to be outside the 100-year floodplain as mapped by FEMA. However, AN1 lies in a slight topographic depression that could make the site prone to occasional flooding. Consequently, prior to selecting AN1 as the prep plant site, the boundary of the 100-year floodplain should be closely reviewed to ensure that the site is outside of the floodplain boundary and that no floodplain impacts would occur. No impacts related to floodplains are expected to occur from the construction and operation of the prep plant at either site AN2 or AN3.

4.5.4.2 Donegan

No floodplain impacts would be expected as a result of the fuel recovery efforts that would occur at Donegan or from the construction and operation of a prep plant at candidate sites DN1 or DN2 because of the sites' relatively high ground.

4.5.4.3 Green Valley

No floodplain impacts would be expected as a result of the fuel recovery efforts that would occur at Green Valley. Coal prep plant candidate site GV does not lie within a mapped 100-year FEMA floodplain; however, because this site is on the lower portion of the Green Valley coal refuse pile near Hominy Creek, the potential for flooding on this site should be closely reviewed to ensure that no flooding related impacts would occur as a result of the construction or operation of the prep plant.

4.5.4.4 Joe Knob

No floodplain impacts are expected to occur as a result of the fuel recovery efforts that would occur at Joe Knob because this site is not located within the 100-year floodplain and is on relatively high ground.

4.5.5 Limestone Supply

The options being considered as sources of limestone are all commercial facilities currently operating under existing permits. These facilities would continue to operate regardless of whether the Co-Production

Facility is constructed and operated. However, the rate at which limestone would be mined from the selected quarry site is likely to increase as a result of the Proposed Action. This increase in production would be regulated under and bound by existing operating permits, which incorporate measures to prevent impacts to floodplains. Thus, flooding impacts related to quarrying would not be expected to be substantially different when compared to projected baseline conditions as these are active quarries and activities would be taking place within their existing permitted areas.

4.5.6 Water Supply

The construction of the water supply pipeline would not alter existing floodplains as it would be installed subsurface and the alignment would take advantage of the easement for the PSD #2 corridor.

Option A for the water source would implement a temporary intake structure, most likely by rigging a temporary portable pump and waterline from the river, which would not alter existing floodplains because of the relatively small size of the operation and also because of its temporary usage. Option B, based on conceptual plans, would comprise a permanent concrete intake structure that would not increase the surcharge height upstream by one foot or more. Other ancillary components associated with the intake structure (i.e., pipeline and maintenance road) have not yet been designed; however, WGC is currently looking at the best locations for these facilities as to minimize disturbance of wetlands and floodplains. If the final design and location of the ancillary components involve construction in the floodplain, it is not expected to result in increased potential for flooding as it would not result in substantial filling of the floodplain or obstruction of the floodway.

4.5.7 Power Transmission Corridor

Under all options for the transmission corridor, construction activities would be temporary and localized and would not be expected to result in permanent impacts to existing 100-year floodplains. Where the transmission corridor would cross a stream, new power poles would be situated at maximum distances possible as to not obstruct flood flows.

4.6 Geology and Groundwater Resources

4.6.1 Method of Analysis

The potential for the Proposed Action or an alternative to have a significant impact on geologic or hydrogeologic resources in the study area has been evaluated based on a series of predetermined criteria. Based on the criteria, a significant impact may occur if a Proposed Action or an alternative would cause any of the following conditions:

- Exposes people or structures to substantial adverse effects, including risk of loss, injury, or death resulting from blasting or seismic activity.
- Results in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.
- Is located on a geologic unit or soil that is unstable as a result of the project, and may potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.
- Results in substantial soil erosion or loss of topsoil.
- Violates any water quality standards or waste discharge limitations.
- Otherwise substantially degrades groundwater quality.
- Substantially depletes groundwater supplies or interferes substantially with groundwater recharge, such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level that has adverse impacts on local wells (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing uses or planned uses).

4.6.2 No Action

Under the No Action alternative, DOE would not provide financial support for the project and the Co-Production Facility would not be constructed and operated. In addition, without the project as a stimulus and anchor, it is doubtful that the planned EcoPark could attract potential tenants. Hence, the No Action alternative would maintain the status quo with respect to geologic and hydrogeologic resources in western Greenbrier County and would have no impact on any geologic or hydrogeologic resources.

Treatment of leachate from the coal refuse sites would continue to be required under the No Action alternative. Contamination of groundwater and surface water from the coal refuse has the potential to remain an issue for many years into the future under the No Action alternative.

4.6.3 Proposed Action

This section addresses each of the components of the Proposed Action. Based on an evaluation of each component of the Proposed Action against the previously identified significance criteria, those components that represent a significant impact are discussed in detail below. Impacts on soils, hydrogeologic resources, and geologic resources as a result of the transport of materials (e.g., coal, limestone, and waste ash) are considered negligible and are not discussed further in this section.

4.6.3.1 Site Layout and Facility Construction

Impacts to geological and hydrogeological resources would not change based on the layout of the power plant site. Site layout Options A and B are both within the same general vicinity, which share geology and groundwater resources; however, because the footprint is greater under Option B than it is for

Option A (footprint acreage of Option A and B approximately 17 and 20 acres [7 and 8 hectares], respectively), Option B would result in greater land disturbance and soil impacts.

Earthmoving and grading activities, like those required for the completion of the Proposed Action, may create conditions where accelerated erosion could cause large quantities of soil to be deposited into nearby streams. In order to prevent off-site migration of soils and stream pollution, WGC would be required to obtain an NPDES General Construction Permit for storm water discharges associated with construction activities. Compliance with the requirements of the General Permit would minimize sedimentation and erosion that could occur on the site during construction activities. Upon completion of construction it is expected that vegetation would be re-established to minimize impacts related to soil erosion and loss of topsoil.

The Preliminary Report of Geotechnical Subsurface Investigation and Analyses indicated that some areas of more competent rock might be encountered during excavation at the site, which would require blasting (Mactech, 2004). Any blasting would require the issuance of a permit by the West Virginia Fire Marshall's Office. Blasting would be expected to occur over a short period of time and in such a manner as to minimize impacts to surrounding properties and neighbors. WGC would prepare a blasting plan as required by the permit to address any potential impacts to local buildings.

4.6.3.2 Facility Operation

Coal and Limestone Storage Areas

The coal, coal refuse, and limestone storage and handling areas would be underlain with asphalt pavement, which would divert the storm runoff from these areas into a collection pond. It is expected that this collection pond would be placed upon a surface such as an artificial liner or compacted clay layer to prevent subsurface soil and potential ground water contamination. Although details of the pond design are uncertain at this time, it is expected that the final design would be based on state requirements governing the prevention of such contamination. Additional water needed for plant operations would be pumped from the collection pond to an on-site water treatment plant prior to use. All on-site storage and handling of hazardous material and/or waste would be conducted in a manner consistent with applicable regulations and best management practices to minimize potential subsurface and soil contamination (see subsequent section for discussion on aqueous ammonia storage).

The 10-day emergency coal storage pile has been designed to enable normal power generation to continue in the event of a major disruption in fuel trucking operations or other fuel supply interruptions. In normal plant operation, the pile would not be used or accessed. The pile would contain processed ready-to-fire fuel in a covered pile located on the side of a slope at the south end of the power plant site. The coal pile would be covered with topsoil and seeded to prevent coal from being washed away during precipitation events. A liner underneath the pile would intercept leachate and channel it to underdrain pipes that flow into the adjacent runoff pond. The underdrain pipes would be designed to prevent the contamination of groundwater by drainage from the pile. Therefore, adverse impacts to localized groundwater resources are not expected during the construction and operation of the emergency coal pile.

Aqueous Ammonia Storage

Aqueous ammonia (28 percent solution) would be required for the control of nitrogen oxide emissions by the power plant and would be stored on-site in a single 15,000-gallon (56,800-liter) storage tank. Although the storing and loading of aqueous ammonia are not subject to OSHA's Process Safety Management (PSM) standard, WGC would institute a number of safety measures to minimize the potential for the accidental release of ammonia, as described in Section 2.3.4. Based on these controls and safe guards, the potential for contamination of soil, groundwater, and/or surface water resources would be negligible. In the event of an accidental spill, it is expected that these safety measures would provide secondary containment and instant alerts that would limit the amount of a spill or leak. An analysis was performed to predict the hazards of off-site emissions from vaporization of aqueous ammonia during an accidental release, which is summarized in Section 4.14, Public Health and Safety.

4.6.3.3 Power Transmission Corridors

All of the corridor alternatives as discussed in Section 2.2.7 would be expected to impact soil resources. The construction of the power transmission infrastructure and removal of existing vegetation may temporarily cause or accelerate erosion. To prevent off-site migration of soils from these activities, WGC would be required to obtain a NPDES General Permit for storm water discharges associated with construction activities. Compliance with the requirements of the General Permit would effectively minimize sedimentation and erosion that could occur on the site during construction activities. However, the potential for erosion and loss of topsoil is expected to be higher for constructing a new corridor (Option C) when compared to widening an existing corridor or upgrading existing poles (Options A and B, respectively).

4.6.3.4 Water Supply

As discussed in Section 2.4.6, WGC plans to use all of the treated wastewater effluent from the RSTP, supplemented by withdrawals from the Meadow River and/or groundwater sources. Although there is some uncertainty regarding whether sufficient water would be available from either the Meadow River or groundwater sources under extended low recharge conditions, two water supply options under consideration by WGC includes measures that would be taken to ensure that the power plant maintains an adequate water supply without compromising the local aquifer in Rainelle or drastically reducing flow in the Meadow River. The following two options are similar in that they examine supplemental use from the same sources, but differ in the priority of either using the Meadow River or local aquifer:

- Option A – WGC would withdraw groundwater from PW-1 and PW-3 (and other potential wells) as the secondary source of water supply to supplement the use of up to 100 percent of the RSTP effluent. As a tertiary source of water supply, WGC would take water from the Meadow River using a temporary withdrawal structure to be located near the RSTP.
- Option B – As the secondary source of water supply to supplement the use of up to 100 percent of the RSTP effluent, WGC would take water from the Meadow River using a permanent withdrawal structure to be located approximately 500 feet upstream of the RSTP (see Section 4.4, Surface Water Resources). During periods when withdrawals would cause the flow in the Meadow River to decline below 60% of base flow (i.e., the river flow rate above which adverse water quality and aquatic habitat impacts would not be expected), or another comparable withdrawal limitation measure determined in consultation with the state, groundwater would be withdrawn from PW-1, PW-3, and other potential wells as a tertiary source of process water supply.

Option B is the preferred option for WGC because it provides them with the greatest flexibility to manage the water supply options and reduce the potential for overall project impacts. Although Options A and B are similar in that they would both use and impact the local groundwater, from a technical perspective these options are different. Initial groundwater modeling indicated that concerns regarding the use of the local aquifer are related to sustained pumping of the aquifer over an extended period of time (discussed later in this section) and the potential to deplete the aquifer over time when used as the secondary source. Therefore, under Option A the potential for adverse impacts associated with sustained pumping is a potential concern, and withdrawals from PW-1 and PW-3 would have the potential to draw down the local aquifer to a greater extent. Under Option B overall withdrawals from the aquifer would be reduced and it is expected that during periods when the Meadow River would be used, the aquifer would have the opportunity to recharge. Therefore, the long-term potential for impacts associated with sustained pumping over time would not occur.

Several hydrogeologic studies have been undertaken to evaluate the viability of the local aquifer as a water source and the condition under which it would be impacted. These studies have provided useful information for assessing the potential impacts that would occur on the aquifer under normal conditions and operations; however, there are still some uncertainties related to how the aquifer would behave over long periods of time (particularly as a secondary source) and under certain stresses (e.g., droughts). The ongoing groundwater studies will provide more information to resolve these uncertainties and confirm initial assessments made on the available data. These studies will be included in the FEIS. As previously stated, Option B is WGC's preferred option, but any decisions on water sources and limitations or conditions of their use would be contingent upon results from the ongoing study of the local water sources (discussed later in this section) and further consultation with various state agencies (WVDEP and WVDNR) on the use of the Meadow River. Impacts to the Meadow River and usage estimates are discussed in Section 4.4.3.3.

Although the groundwater resources in the planning area are relatively plentiful, the aquifer that underlies Rainelle is the sole source of drinking water for the residents of Rainelle, and any impacts to this resource must be considered very carefully. The estimated maximum water demand by the power plant would be 1,200 gallons per minute (4,500 liters per minute). This value, when considered with the water supply expected from the RSTP, results in the need for up to an additional 800 gallons per minute (3,000 liters per minute) of water (see Section 2.4.6). Under Options A and B, the maximum monthly average water demand from groundwater could be approximately 800 gallons per minute (3,000 liters per minute) and 760 gallons per minute (2,900 liters per minute), respectively, which is projected to occur during the summer to early fall months (June – October) (see Figure 2.4.5 and Figure 4.4-4).

The hydrogeologic investigation and modeling of the proposed plant site, which is included in Appendix D, concluded that the withdrawal of 760 gallons per minute (2,900 liters per minute) of water from the two production wells owned by WGC (PW-1 and PW-3) may be supported, but would produce significant drawdown within the local aquifer. The modeling effort was based on the results of relatively short-term pump tests and limited field data. For these reasons, it is possible that the actual drawdown would be larger than simulated in the groundwater model if actual conditions in the field vary from the simulated conditions.

The hydrogeologic investigation found that the aquifer, which has been proposed as a supplemental source of water, is highly fractured, very well connected hydraulically, and has limited storage capacity. Three pump tests were conducted as part of the hydrogeologic investigation. PW-1 was tested in August 2004, PW-3 was pump-tested in April 2005, and PW-4 was pump-tested in November 2005. During the tests at PW-1 and PW-3, each production well was pumped at a rate of 500 gallons per minute (1,900 liters per minute) for a period of 72 hours while water levels were monitored in other wells in the area. PW-4 was pumped at approximately 110 gallons per minute (420 liters per minute) for a 72-hour period. Drawdown was observed in all of the wells that were monitored during the pump tests for PW-1 and PW-3, indicating that these wells are very well connected hydraulically. PW-4 was not as well connected hydraulically as the other production wells, in fact no drawdown was observed at the other production wells while PW-4 was pump tested. Drawdown observations are shown graphically for the pump tests at PW-1 and PW-3 in Figures 4.6-1 and 4.6-2.

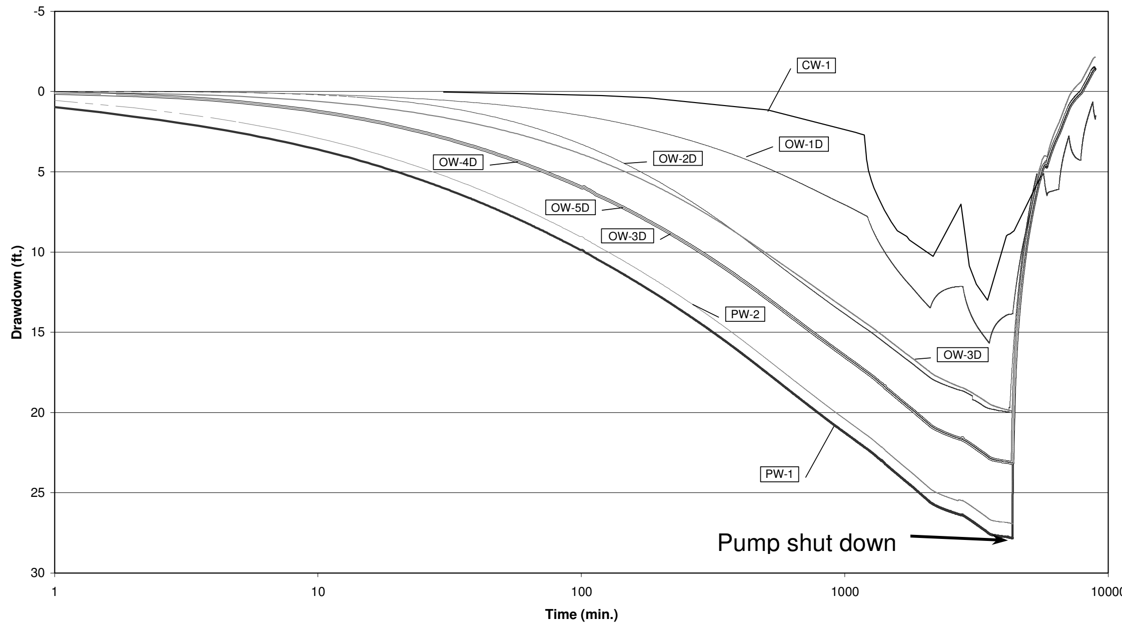

Figure 4.6-1. Drawdown Observations for 72-Hour Pump Test at PW-1

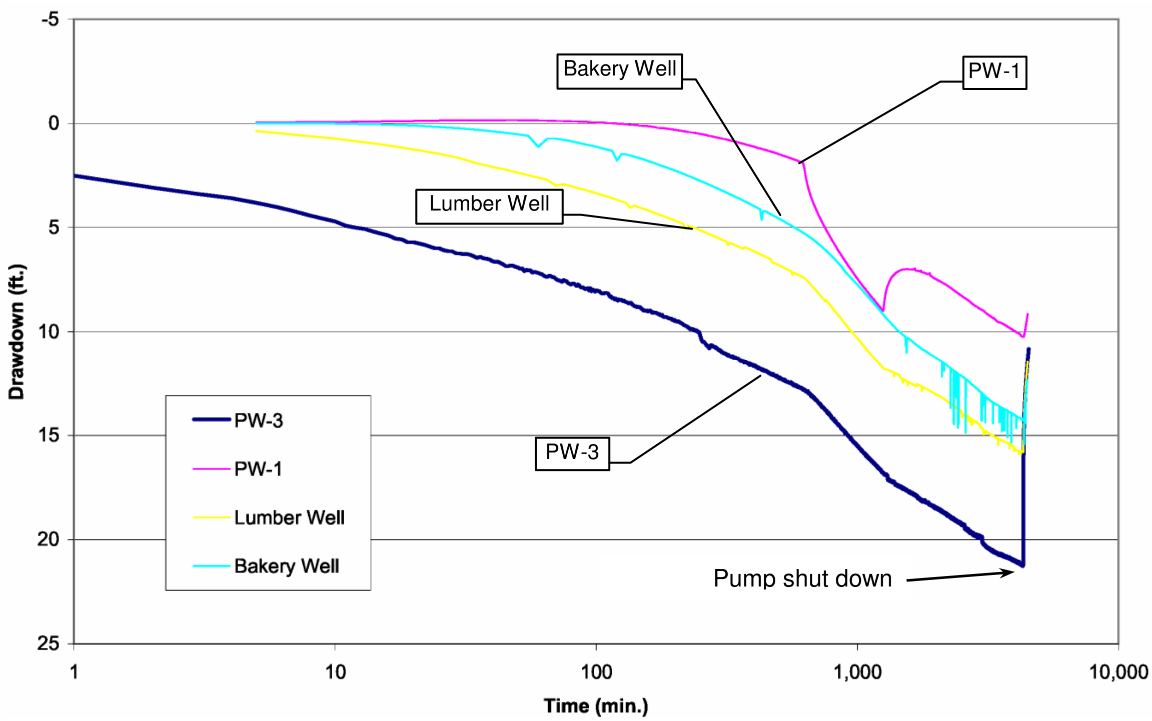

Figure 4.6-2. Drawdown Observations for 72-Hour Pump Test at PW-3

The data collected from each pump test was reviewed and analyzed using the commercially available software AQTESOLV (Duffield, 2002). For the purposes of analyzing the pump test data, the groundwater system was conceptualized as a leaky aquifer system. The analytical solution developed by Hantush (1960) for a leaky confined aquifer with storage in the aquitard was used to analyze the pump test data. For the pump test at PW-1, the effective transmissivity and storativity values were 700 ft^2/day (65 m^2/day) and 4×10^{-6}, respectively. The effective transmissivity and storativity in the vicinity of PW-3 were found to range from 700 ft^2/day to 1,070 ft^2/day (65 to 99 m^2/day) and $1 x 10^{-5}$ to $1 x 10^{-7}$, respectively. Analysis of the pump test data for PW-4 indicated that the effective transmissivity and storativity are approximately 400 ft^2/day (37 m^2/day) and $2 x 10^{-6}$ respectively. The aquifer transmissivity is much lower for PW-4 than for PW-1 and PW-3. These values indicate that there is little storage within the aquifer and that groundwater moves relatively quickly through this very fractured system.

The aquifer characteristics measured and observed in the field along with the values of transmissivity and storativity calculated for the aquifer were used as inputs to a groundwater flow model using MODFLOW-2000 (Harbaugh et al., 2000). MODFLOW is the most widely used program for simulating groundwater flow. The groundwater model encompassed an area of approximately 50 square miles (130 square kilometers) and was composed of three layers. The layers were used to represent the surficial alluvial aquifer, the intervening aquitard, and the fractured sandstone aquifer (the water source). Hydraulic properties of the model, including horizontal and vertical hydraulic conductivity and specific storage, were determined through an iterative calibration procedure. Model calibration was facilitated through the use of PEST (Doherty, 2005), a nonlinear parameter estimation and model calibration software.

The calibrated model was run for 25 years with a specified production rate for PW-1 of 760 gallons per minute (2,900 liters per minute) to simulate long-term drawdown in the groundwater system. The model was run using parameters obtained from calibration to pump test results at PW-1 and PW-3 separately, to compare aquifer response for high and low vertical conductivity conditions in the valley. In addition, combined pumping from wells PW-1 and PW-3, each at a rate of 380 gallons per minute (1,400 liters per minute), was simulated under both high and low conductivity conditions.

In order to address concerns regarding short-term periods of drought, available data from groundwater observation wells in Greenbrier, Fayette, and Nicholas Counties, which encompass the drainage basin of Rainelle, were downloaded from the USGS NWIS Database. Water level data were considered for wells with available data spanning more than one year and with sufficient number of measurements. The maximum water level fluctuation for all wells did not exceed 12 feet (4 meters), which could be considered as additional drawdown to reflect short-term drought conditions. This drawdown value was combined with the output from the MODFLOW model and is summarized in Table 4.6-1 to show calculated drawdown over 25 years.

Table 4.6-1. Results of Groundwater Modeling (Calculated Drawdown)

Well	Pump Rate (gpm)	25-Year Drawdown (ft)
Scenario 1: PW-1 Pumped at 760 gallons per minute (gpm)		
PW-1	760	47 - 68
CW-1	250	35 - 55
CW-2	0	32 - 52
Scenario 2: PW-1 and PW-3 Each Pumped at 380 gallons per minute gpm		
PW-1	380	33 - 57
PW-3	380	33 - 56
CW-1	250	36 - 54
CW-2	0	36 - 53

Notes: To convert gpm to L/min, multiply by 3.79. To convert ft to m, multiply by 0.305.

The results of the groundwater modeling indicate that, based on the current understanding of the aquifer system, it is feasible to produce 760 gallons per minute (2,900 liters per minute) during a 25-year period; however, this rate of pumping would be expected to produce significant drawdown within the fractured sandstone aquifer. For the 25-year pumping period, a maximum drawdown of 68 feet (21 meters) was predicted for PW-1, 56 feet (17 meters) for PW-3, 55 feet (17 meters) for CW-1, and 53 feet (16 meters) for CW-2. The pump in each WGC production well would be set deeper than the projected drawdown value, so the wells could sustain these withdrawal rates based on this analysis. The depths of the pumps in each of the city wells could not be confirmed, but are believed to be greater than 100 feet (30 meters) below ground surface, based on discussions with Rainelle Water Department personnel. If the pumps are set at this depth, they should be able to sustain these withdrawal rates, based on the results of the groundwater model.

The groundwater model is based on the results of relatively short-term pump tests and a conceptual geologic model that is based on limited field data. For these reasons, it is possible that the actual drawdown would be larger than simulated in the groundwater model if actual field conditions differ from the simulated conditions. A major uncertainty of the groundwater model is the characteristics of the fractured sandstone aquifer beneath the valley walls (upland areas). Recharge to the sandstone aquifer primarily occurs via the vertical fractures along the valley walls. If the sandstone aquifer is much less permeable in the valley walls than was assumed for the groundwater model, then the actual drawdowns from long-term pumping would be greater than those shown in Table 4.6-1. This information will be used to determine the quantity of groundwater that can be withdrawn without causing adverse impacts. Ongoing groundwater pump tests are currently being conducted to verify this assumption and adequacy of the current groundwater model. The results will be available and presented in the FEIS. Regardless, WGC would implement a groundwater monitoring program to ensure that groundwater withdrawals for supplemental plant water supply would not draw down aquifer levels and threaten public water supplies and private wells. This would also include verifying pump depths for the city wells to establish the limits to which drawdown could safely occur.

Because of limited data, there is also considerable uncertainty about the relationship between the sandstone aquifer and the Meadow River. If the Meadow River recharges this aquifer, then it is possible that the aquifer would receive less recharge during the periods when water is pumped from the river. If the aquifer recharges the Meadow River, then it is possible that the river would have a lesser base flow when water is pumped from the production wells. As part of the ongoing study on the local aquifer and controlled use and monitoring of the Meadow River, it is expected that more hydrological insight would be provided to aid WGC in the decision-making process, while minimizing adverse impacts to water resources.

In summary, based on the analysis and testing done to date, it is expected that the groundwater levels and flow in the Meadow River would be maintained at acceptable levels during both construction and operation of the WGC Project. Additional ongoing tests will confirm or refine the analysis. The results of these ongoing tests and subsequent analysis will be available and presented in the Final EIS.

4.6.3.5 Fuel Supply

Operations at the coal refuse sites would include the extraction of the coal refuse, the processing of coal refuse at a prep plant at or near the coal refuse site, and the spreading of waste ash from the Co-Generation Facility and, potentially, the prep plant spoils at the remediation sites. Under a Memorandum of Understanding (MOU) and Prospective Purchaser Agreement between WGC, WGBDC, and the WVDEP, WGC is responsible for the development of a remediation plan for the Anjean site. It is anticipated that similar agreements would be developed for each of the coal refuse sites.

The remediation plan for each site would address the methods in which coal refuse would be excavated from each pile along with the procedures that would be used to return alkaline ash and any other amendments to these areas for the purpose of reclamation. WVDEP must approve each remediation plan before any recovery or reclamation activities begin. Under the MOU, WGC would serve as a no-cost reclamation contractor for WVDEP and would operate under the supervision and direction of the WVDEP. WGC would mix alkaline ash with unusable coal refuse to neutralize the site and prevent further AMD generation.

Bed drain ash and bag house ash from a trial burn performed by Alstom using coal refuse samples from Anjean was analyzed for metals using the toxic characteristic leaching procedure (TCLP), as well as a total metals analysis. The purpose of the TCLP is to determine if metals can be leached from the ash into the groundwater. The TCLP is designed to simulate the leaching a waste material would undergo if disposed in a sanitary landfill. The TCLP extraction was performed by subjecting the ash samples to a simulated landfill leachate. An acetic acid buffer solution with a pH of 4.9 was mixed with the sample and subjected to an 18-hour rotary extraction, designed to accelerate years of material/landfill exposure in the shortest possible time. After extraction, the resulting liquid was subjected to analyses for a list of eight metals contained in the EPA's TCLP Final Rule. The results of these tests are summarized in Table 4.6-2.

The ash samples were also analyzed for total metals. In the total metals analysis, relatively high levels of barium and arsenic, along with lower levels of cadmium, chromium, and lead were detected in both the fly ash and bottom ash. Relatively low levels of selenium, silver, and mercury were detected in the fly ash. The results of the total metals analysis are summarized in Table 4.6-2.

Table 4.6-2. Results of Ash Analysis

Analyte	Bed Drain (Bottom Ash)		Bag House (Fly Ash)	
	TCLP (mg/L)	Total Metals (mg/kg)	TCLP (mg/L)	Total Metals (mg/kg)
Arsenic	*< 0.069*	35.20	*< 0.069*	83.60
Barium	*< 0.011*	129.00	*< 0.011*	549.00
Cadmium	*< 0.0055*	1.29	*< 0.0055*	3.01
Chromium	*< 0.0066*	11.60	*< 0.0066*	40.70
Lead	*< 0.011*	5.14	*< 0.011*	19.60
Selenium	*< 0.058*	*< 5.00*	*< 0.058*	11.00
Silver	*< 0.020*	*< 2.50*	*< 0.020*	3.32
Mercury	*< 0.0078*	*< 0.10*	*< 0.0078*	1.03

Notes: TCLP – toxic characteristics leaching procedure

Although both the fly ash and bottom ash contain metals, it is not likely that they would be leached from the ash given the results of the TCLP analysis and existing research in this area. Lime used during combustion gives the fluidized bed combustion (FBC) ash much greater neutralizing capacity than non-FBC ashes (Ziemkiewicz, 2000). However, FBC ash has been shown to be pozzolanic in nature, meaning it reacts with water to form a cementitious material. This characteristic limits its ability to neutralize AMD because the flow of AMD through the FBC ash can be restricted once it has been cemented. However, the pozzolanic nature of the FBC ash has the advantage of being capable of encapsulating pyrite (source of AMD) and preventing it from further AMD generation (Schueck, 2001).

Recovery and reclamation processes at each of the coal refuse sites also have the potential to release iron and sulfates to the groundwater. The disturbance and exposure of the coal refuse to oxygen and creation of new flowpaths through the fill could potentially release iron at higher than current rates, and in effect deteriorate groundwater quality. The period of disturbance and exposure, prior to removal or remediation, should be relatively short, with short-term increases in AMD generation being outweighed by long-term reductions after the remediation is complete.

Under the direction and supervision of the WVDEP, WGC would carry out a carefully managed and executed recovery and reclamation project that would ensure AMD generation is reduced to the extent practicable and groundwater quality improves as a result of this reduction. Groundwater quality is expected to improve as a result of the Proposed Action at each of the coal refuse sites. The remediation plan that WGC would develop and that WVDEP would review and approve is expected to include measures to minimize AMD over time and to minimize impacts to the local environment.

Construction activities associated with site preparation at each of the coal refuse sites (Anjean and Green Valley) may cause temporary erosion. Due to the land disturbance required for site preparation at each of the coal refuse sites and to prevent off-site migration of soils and stream pollution, an NPDES General Permit for storm water discharges associated with construction activities may be required. The measures conducted to comply with the NPDES regulation would minimize impacts related to soil erosion or loss of topsoil.

Excavation operations at the coal refuse supply locations (gob piles) would also likely result in accelerated erosion unless proactive measures are taken. Compliance with the requirements of the NPDES permit and the remediation plan would effectively minimize sedimentation and erosion that could occur on the site during construction activities. Sediment loading is already the main problem affecting stream quality for neighboring trout streams. While sediment loading may increase in the short term due to recovery and reclamation activities, sediment loading should decrease in the long term due to effective reclamation efforts.

It is also anticipated that the disposal of prep plant spoils would be addressed in the remediation plan for each coal refuse site, if after the spoils have been characterized and it is determined that the prep plant spoils would be properly disposed of at the coal refuse sites. WGC and WVDEP would coordinate to ensure that any prep plant waste stream is properly characterized, handled appropriately, and that it does not contribute to any further surface water or groundwater quality degradation.

Although the types of chemicals and quantities for coal beneficiation are uncertain at this time, the prep plant would likely process coal refuse using chemicals as discussed in Section 2.4.4 that may have the potential to contaminate groundwater resources if not properly managed. Although details on the prep plant contamination prevention devices are also uncertain at this time, it is anticipated that the prep plant would employ general storm water management practices that are typical at cleaning plants. This would include the use of containment ditches to manage on-site runoff and accidental "black water" discharges to a special collection pond(s). Inside the prep plant and/or in storage areas, as appropriate, secondary containment basins would be used to catch any leaks or spills. With respect to chemical delivery and storage, bulk chemicals would typically be delivered in reusable chemical "totes" and stored inside a secondary containment barrier. The chemicals would likely be fed from these totes using chemical feed pumps delivering the chemical in a controlled manner.

The prep plants would use a closed loop system that requires 100 gallons per minute (380 liters per minute) of make-up water. It is expected that this water would be supplied through the construction of on-site wells at or near the prep plant sites. Groundwater availability would be investigated as part of the screening process for siting a prep plant and would review issues associated with aquifer use (e.g., proximity to active wells).

4.6.3.6 Limestone Supply

The options being considered as sources of limestone are all commercial facilities currently operating under existing permits. These facilities would continue to operate regardless of whether the Co-Production Facility is constructed and operated. However, the rate at which limestone would be mined from the selected quarry site is likely to increase as a result of the Proposed Action. This increase in production would be regulated under and bound by existing operating permits, which incorporate measures to prevent the degradation of groundwater resources. Thus, impacts related to quarrying would not be expected to be substantially different when compared to projected baseline conditions as these are active quarries and activities would be taking place within their existing permitted areas.

4.6.3.7 Power Transmission Corridor

Subsurface and soil impacts as a result of the power transmission corridor options would be limited to short-term impacts during construction. These impacts, however, would be minimized through the implementation of a SWMPP plan and a GWP plan in accordance with WVDOT and WVDEP requirements.

4.7 Biological Resources

4.7.1 Method of Analysis

A project action or alternative may have the potential for significant adverse impacts on biological resources in the subject area if it would cause, either directly or indirectly, the loss, displacement, isolation, or significant (irreparable or irreversible) alteration of:

- Vegetation and/or wildlife;
- Aquatic habitat, including wetlands and other *waters of the United States*; streams and vegetated wetlands;
- Aquatic ecosystems;
- Protected species and habitat; or
- Wildlife and habitat management plans.

Wetlands, rivers and streams are regulated under the CWA as administered by the USEPA, USACE, and WVDEP. Federally listed protected species of both flora and fauna in West Virginia are governed by the Endangered Species Act and regulated by the USFWS. The basis for impact analysis includes both direct and indirect effects of the Proposed Action on the resources listed above.

4.7.2 No Action

The No Action alternative would result in no changes to the baseline biological resources of the project area. However, the anticipated benefits of the Proposed Action would likewise not be realized, of which there are many. Particular benefits that would be missed as a result of selecting the No Action alternative would include the removal of numerous coal refuse (gob) sites throughout the area in conjunction with the Proposed Action, which would enable the reclamation of these underutilized lands.

4.7.3 Proposed Action

This section discusses both the adverse and beneficial impacts to biological resources within the vicinity of the proposed Co-Production Facility (primarily adverse) and the Anjean, Joe Knob, Green Valley, and Donegan coal refuse sites (primarily beneficial).

4.7.3.1 Site Layout and Facility Construction

The proposed Co-Production Facility and clinker kiln would be located on the E&R Property, which is an approximate 23-acre (9-hectare) site south of Sewell Creek. Development of the 20-acre (8-hectare) EcoPark site is not associated with the WGC Proposed Action, but it would be developed as a third-party action independent of WGC actions. Consequently, references to EcoPark are presented in this discussion for analysis and conceptual terms and illustrations only. WGC considered three site layout options for the facility as described in Section 2.4.1. For comparative purposes, the wetland boundaries relative to the three layout options are illustrated in Figures 4.7-1 through 4.7-3. Of the three siting and layout options considered, Option A is preferred by WGC and is the basis for planning and conceptual design. WGC does not consider Options B or C feasible, in part because of the degree to which these siting options would impact streams and wetlands as indicated in Figures 4.7-2 and 4.7-3.

Vegetation and Wildlife

The implementation of the Proposed Action would result in the clearing of approximately 15 acres (6 hectares) of vegetation within the E&R Property. The acreages of vegetation that would be impacted for each component of the Co-Production Facility are identified in Table 4.7-1. Table 4.7-2 lists the areas that would be impacted by vegetative community type. The areas affected by the Proposed Action do not include the laydown areas; however, it is anticipated that impacts on vegetation in the laydown areas would be temporary and that after construction these areas would be revegetated.

The loss of vegetation would result in a net loss of habitat for various wildlife species and a temporary loss in sediment stabilization/retention and nutrient transformation functions. However, the temporary loss of sediments would be mitigated through the implementation of erosion and sediment (E/S) control best management practices (BMPs) required during construction. Additionally, since the subject site is located within areas that have been disturbed historically, and in some cases are presently undergoing disturbance, it is anticipated that the vegetation impacts for the Proposed Action would not be significant. Large tracts of the Co-Production Facility site have been cleared of vegetation and topsoil during previous grading activities, and large portions of the site possess unvegetated areas that contribute an undetermined amount of sediments to adjacent waters. Furthermore, most areas affected by the Proposed Action currently contain numerous piles of refuse, some quite large, containing various debris and waste that may provide refuge for pest species that may carry diseases such as rabies. Elimination of the refuse would benefit the environment and the local community.

Another factor to consider is that the surrounding areas beyond the site of the Proposed Action contain hundreds of acres of contiguous undeveloped woodlands. By their proximity to the project area, many of these adjacent woodlands include similar vegetative communities. Because of the abundance of similar habitat surrounding the project area, it is estimated that the loss of habitat area for existing wildlife species as a result of the Proposed Action would not be significant.

Table 4.7-1. Cleared Vegetation Areas based on Facility Component Footprints (Option A)

Facility Component or Feature	Approximate Area in acres	Approximate Area in Hectares
Power Plant	9.9	4.0
Ash Byproduct Facility	3.3	1.3
Emergency Fuel Storage	1.4	0.6
Temporary Construction Road	0.3	0.1
Total	14.9	6.0

Table 4.7-2. Cleared Vegetation Areas by Type of Community* (Option A)

Vegetative Community	Approximate Area in Acres	Approximate Area in Hectares
Wooded upland	12.9	5.22
Wooded wetland	0.1	0.04
Shrub/herbaceous upland	1.8	0.73
Shrub/herbaceous wetland	0.1	0.04
Total	14.9	6.03

** includes only facility components listed in Table 4.7-1*

Wetlands

The principal watercourse within the project area is Sewell Creek, which flows northeast to join the Meadow River. There are also several smaller tributaries in the project area that discharge into Sewell Creek. These tributaries include Wolfpen Creek, Little Sewell Creek, and an unnamed tributary (see Sections 3.4 and 3.5). These watercourses are *waters of the U.S.* and under the jurisdiction of the USACE. Implementation of the Proposed Action would require permitting from the USACE, and mitigation would be required in accordance with USACE requirements.

Based on the preliminary site layout for the preferred layout (Option A) as illustrated in Figure 4.7-1, the Proposed Action would impact approximately 0.23 acres (929 square meters) of jurisdictional wetlands and other *waters of the United States* as defined by USACE regulations (CWA Section 404). Potential impacts to wetlands and other waters related to Option A are listed below and summarized by Co-Production Facility component in Table 4.7-3. Option A has the lowest acreage of wetlands among the layout options considered by WGC.

Table 4.7-3. Wetland Areas/*Waters of the U.S.* Affected by Facility Component Footprint (Option A)

Facility Component or Feature	Approximate Area in Acres	Approximate Area in Hectares
Ditch crossing	0.03	0.01
Power Plant	0.10	0.04
Stream Crossing	0.03	0.01
West of permanent bridge	0.01	0.004
Tributary Impact	0.02	0.01
Temporary Road	0.01	0.004
Water Supply Line	0.03	0.01
Total Area	**0.23**	**0.09**

Preliminary evaluation of the project site plans revealed potential impacts to wetland areas, as follows:

- A 0.03 acres (121 square meters) wetland ditch would be impacted by the construction of a road crossing accessing the site facility north of Sewell Creek.
- Approximately 0.1 acre (405 square meters) of wetland bordering the south side of Sewell Creek would be filled for construction of the power plant facility. This wetland has the highest resource value of the wetlands on the project site. However, the impact would represent a very small percentage of the overall size of the contiguous wetland area along Sewell Creek. Therefore, the Proposed Action would not significantly affect the hydrology of the remainder of the contiguous wetland area. Nonetheless, the Proposed Action would result in a minor loss of habitat and function in this area, which would require a CWA Section 404 USACE permit.
- One permanent road crossing over Sewell Creek would impact approximately 0.03 acre (121 square meters) of wetland for the placement of a bridge accessing the site during construction. A proposed second temporary bridge to the east would not result in permanent impacts to wetlands or *waters of the United States*. Water flow beneath the bridges would be maintained.

- A small wetland area totaling approximately 0.01 acres (40 square meters) west of the permanent bridge crossing and on the south side of Sewell would be impacted during construction of the bridge.
- A 0.02-acre (81 square meters) of the unnamed vegetated tributary west of the proposed site would be filled by a proposed emergency access road east of the facility and have a culvert placed beneath the fill to allow water to continue to flow to Sewell Creek. As a result, this feature would not be completely eliminated, and the activity should not impact the flow of water. A small loss of habitat along the banks in this area would occur.
- A 0.01-acre (40 square meters) of an emergent wetland area would be filled for placement of a temporary construction access road (the road would be temporary, but the impact would be permanent) north of Sewell Creek.
- A 0.03-acre (121 square meters) of emergent wetland would be temporarily impacted along the proposed waterline right-of-way. This wetland impact would be located east of the proposed facility.

Final design of the Proposed Action would incorporate measures to minimize impacts to jurisdictional waters, as outlined in Section 4.7.4. At a minimum these measures would include actions required under a CWA Section 404 Nationwide Permit, or Individual Permit if applicable. Because wetland impacts would be greater than 0.1 acre, submission of an acceptable wetland mitigation plan to the USACE and WVDEP would be required.

Aquatic Ecosystems

Storm water discharge during construction may impact surface waters and aquatic ecosystems as a result of changes in volume, runoff patterns, and water quality. In general, construction activities introduce the potential for increased soil erosion; however, the implementation of BMPs through the proposed project's erosion and sediment (E/S) control plan, regulated under a NPDES General Construction Permit, would be employed to minimize soil loss and degradation to nearby waterways. Construction E/S control and storm water management BMPs would include techniques and features such as grading to induce positive drainage, silt fences, and re-vegetation to minimize or prevent soil exposed during construction from becoming sediment to be carried offsite. Construction plans would detail appropriate BMPs, E/S control measures, and spill prevention and control measures. The BMPs would be implemented, inspected, and maintained to minimize the potential for adversely affecting downstream water quality and aquatic communities.

Storm water collection and discharge would occur within the same drainage basin area where the storm water originates. As long as storm water management plans prevent drastic increases in runoff and hydraulic residence time, and the E/S control measures effectively prevent substantial soil erosion, there should be no significant impacts to the aquatic ecosystems in the Sewell Creek and tributary drainage areas during construction.

Protected Species and Habitat

The project area is not designated as a critical habitat for any threatened or endangered species. Preliminary agency coordination with WVDNR and the USFWS has identified potential suitable habitat for the Indiana Bat (*Myotis sodalist*) and Virginia Big-eared Bat (*Plecotus townsendii virginianus*) to be absent from a 30-mile (50-kilometer) radius of the study area (ESI, 2005). The closest population of the Virginia northern flying squirrel occurs 15 miles northwest of the project area in the Cranberry Wildlife Management Area. According to the *Habitat Assessments and Surveys for Endangered Mammals at Proposed Development Areas for Western Greenbrier Co-Gen, Greenbrier County, West Virginia*

(Appendix E), suitable roosting habitat for the Indiana Bat was observed within portions of the Plum Creek Property on the south side of Sewell Creek. This habitat, deemed to be of moderate value, was located in the undisturbed portion of Sims Mountain, immediately south of the E&R property boundary. The Proposed Action, specifically with respect to the emergency fuel storage area, may potentially impact such suitable habitat as described in the report (Appendix E). However, the presence of suitable habitat does not necessarily indicate the presence of this species, and no Indiana Bats were observed at the site during the field assessment and mist net survey. The report indicated that a "May Impact - Not Likely to Adversely Impact" determination for Indiana Bat is anticipated from the USFWS. Documented consultation and clearance regarding Section 7 of the ESA would be required from the USFWS and the WVDNR for the project to proceed. A response from the USFWS is expected as a result of the USFWS's review of this document.

4.7.3.2 Facility Operation

Vegetation and Wildlife

The majority of impacts to vegetation or wildlife at the site would occur during project construction and development. Once the facilities begin operation, minimal additional impacts would occur, with the exception being the introduction of new noise and light sources and increased traffic in the area. The generation of noise and/or the facility's lighting may result in the out-migration of some wildlife species. However, wildlife species would have ample suitable habitat for relocation within the surrounding areas. The increased truck traffic may result in a minor increase in animal fatalities due to vehicular collisions.

Wetlands

The majority of wetland impacts at the site would occur during construction and development. Once the facilities begin operation, few additional impacts would occur. The bridge over Sewell Creek and all culverts would be inspected routinely and maintained to avoid future impacts on wetland streams and ditches.

All storm water at the plant site would be collected and transported to an onsite retention basin for reuse by the facility as process water. Storm water would be discharged to Sewell Creek only when the capacity of the detention basin would be exceeded (see Section 4.4, Surface Water Resources). The loss of natural runoff from the project area to the wetlands along Sewell Creek is not anticipated to have a significant impact.

Aquatic Ecosystems

WGC intends to reuse virtually all of the storm water runoff collected onsite. Storm water would be discharged to Sewell Creek only when the capacity of the retention basin would be exceeded. Because the majority of the runoff volume from the proposed plant site would be collected, treated, and reused, the amount and quality of the runoff as a result of the project would not significantly impact the aquatic ecosystem of Wolfpen and Sewell Creek (see Section 4.4.3).

Protected Species and Habitat

Impacts related to protected species and habitat within the vicinity of the Proposed Action are not expected to occur as a result of facility operation.

4.7.3.3 Water Supply

Cooling Water Intake Structure (CWIS)

For the power plant processes, WGC is proposing to use up to 100 percent of the RSTP effluent and to supplement remaining water requirements with the Meadow River and/or local wells, as explained in Section 4.4 (Surface Water Resources). Both water supply Options A and B would use the Meadow River as a water source. Under Option A, a temporary intake structure would be used during days the well could not be pumped. Under Option B a permanent structure, including a cooling water intake structure (CWIS), pump house, and pipeline, would be used to withdraw water from the river. The CWIS would be located in areas bordering the Meadow River and a well head bordering Sewell Creek. The water pipeline would generally traverse in a southwestern direction cross Sewell Creek beneath an existing railroad track and parallel Sewell Creek until arriving at a well near the RSTP.

Although both water supply Options A and B would use the Meadow River, the extent of impacts to the river and other biological resources would be greater under Option B as this option uses Meadow River as a priority over use of the wells. Furthermore, Option B would require a permanent and larger structure, which would have more land disturbance impacts. The following discussion on potential impacts assumes that water supply Option B would be implemented as this is WGC's preferred option and would result in greater impacts to biological resources than in Option A.

Vegetation and Wildlife

The majority of wetland impacts would occur during construction, development and maintenance of the cooling water intake structure. Routine maintenance after the construction of the intake structure would have minimal impacts to wetlands or other *waters of the United State*s. The water pipeline crossing Sewell Creek would be inspected routinely and maintained to ensure proper function and efficiency. Impacts to wildlife would be minimal, because they would continue to utilize adjacent wetlands not affected by the Proposed Action.

BMPs required during construction would minimize adverse affects to Meadow River. Silt fencing, and positive drainage would minimize the introduction of unconsolidated sediments into the stream. Impacts to wetlands bordering Sewell Creek would also be minimal, because the adjacent vegetation would provide sediment retention and stabilization functions. Disturbance to wildlife utilizing areas bordering the west side of Sewell Creek would be minimal and temporary, because the areas are characterized by mowed and maintained fields that lack sufficient structural complexity to support wildlife. Areas capable of providing bird habitat are immediately adjacent to Sewell Creek, and birds would most likely return to the riparian herbaceous fringe upon completion of disturbance. WGC may also include an access road along the eastern edge of Sewell Creek. Depending upon the final siting of this roadway, additional wetlands could be impacted; however, to the greatest extent practical, the road would be located in a manner to avoid wetland areas. Areas affected by the Proposed Action would be restored to the original grade and planted with native vegetation, where feasible, when construction has been completed.

Wetlands

A mid-sucessional hardwood floodplain forest adjacent to the Meadow River would be temporarily affected by the Proposed Action. The floodplain forest is vegetated by silver maple, managrass, clear weed, false nettle, winged stem, and iron wood. Potential impacts to the forested wetland consist of the possible loss of flood flow attenuation functions, wildlife habitat, and a potential increase in run off resulting from the placement of impervious structure at the mouth of the cooling water intake structure.

Impacts to wetlands adjacent to Sewell Creek would be minimal and temporary. These wetlands are currently characterized as herbaceous wetlands containing persistent and non-persistent vegetation, mowed on a regular schedule, and they lack a complex wildlife habitat structure. The magnitude of potential impact may be mitigated by the vegetation on the channel banks of Sewell Creek and the bordering floodplain. Areas affected by the Proposed Action would be restored to the original grade and planted with native vegetation common to the region of influence when construction has been completed.

Option A for the supplemental water source would implement a temporary intake structure, most likely by rigging a temporary portable pump and waterline from the river. This temporary intake structure would require either a Nationwide Permit (NWP) or Individual Permit (both under Section 404 of the CWA issued by the USACE). Typically an NWP permit is issued when proposed activities are minor in scope with minimal projected wetlands impacts and the final design of a structure does not significantly change pre-construction conditions. An Individual Permit is required for more complicated activities involving significant wetlands impacts.

Option B, based on conceptual plans, would comprise a permanent concrete intake structure and ancillary components (i.e., water pipeline and maintenance road). Other ancillary components associated with the intake structure (i.e., pipeline and maintenance road) have not yet been designed; however, WGC is currently looking at the best locations for these facilities as to minimize disturbance of wetlands and floodplains. Prior to construction of a permanent intake structure WGC would be required to obtain Section 404 and 401 permits under the CWA, both issued by the USACE and WVDEP, respectively. The Water Quality 401 Certification would be required to ensure that the project would not violate the state's water quality standards or stream designated uses. The Section 404 Authorization permit would be required as a result of water resources impacts (as described above), including wetlands impacts. Depending upon the final design, additional wetlands and *waters of the U.S.* could be impacted (approximately up to 1 acre [0.4 hectare] and 120 linear feet [40 meters], respectively) and an individual wetland permit could be required for the project because the ancillary components could increase the total acreage wetlands impact to over (including the power plant site).

Aquatic Ecosystems

WGC is evaluating the feasibility of using water from the Meadow River using a cooling water intake system (CWIS) to supplement process water shortages during droughts, as described in Section 4.4 (Surface Water Resources). Consequently, to evaluate potential adverse impacts on aquatic habitat in the Meadow River, the West Virginia Department of Natural Resources (WVDNR) recommended using the Tennant Methodology, also known as the Montana Method (Tennant, 1976). In general, the Tennant method is a desktop biologic assessment that uses a percentage of a stream's average annual flow to calculate the amount of water that can potentially be withdrawn from a perennial stream without severely affecting aquatic life. There are three flow regimes used to determine potential adverse impacts to waterways. The flow regimes are identified as 10 percent, 30 percent and 60 percent of the average annual flow. The WVDNR typically uses a modified version of the Tennant Method for assessing streams potentially affected by water withdrawal for commercial or private purposes. Instead of using the annual average, the WVDNR uses seasonal average flows to evaluate potential impacts. Although it is uncertain which base-flow WVDNR would advise WGC to use, WGC is pursuing ongoing discussions with the state agencies (WVDNR and WVDEP) in determining the best approach. Determination of Meadow River's average annual flow and seasonal flow are discussed in Section 4.4.

Maintaining 10 percent of the annual average or seasonal average is the minimal instantaneous flow necessary to sustain short term survival for most aquatic life forms and would result in the least favorable condition for water-dependant fauna if water was withdrawn from the Meadow River (Tennant 1976). Approximately one half of the stream substrate would be dewatered and fish fry could be severely affected by low flow conditions. Large fish would be confined to deeper pools, resulting in increased competition for food and over crowding. A large concentration of fish in deep pools would also exhaust the food resources and contribute to stressful conditions. Low flow conditions would also make it difficult for the larger fish species to migrate over riffles in search of better surroundings. In addition to a decrease in suitable fish habitat, low base flow can also result in increased water temperatures, causing an increased biological demand for the available oxygen and creating conditions unfavorable to the cold water fisheries.

The general rule of thumb indicated by the Tennant Method is that severe degradation of aquatic habitat begins below the 30 percent threshold. Maintaining 30 percent or above of the annual average or seasonal average is typically recommended to sustain a good survival rate for most aquatic life forms (Tennant 1976). Above the threshold, the majority of the substrate would be covered with water and most gravel bars would be partially covered with water. Turbulence created by water flowing over an irregular surface would serve to increase the oxygen content of the stream. Maintaining base flow under these conditions would noticeably increase wildlife habitat for water-dependant fauna when compared to the level of 10 percent of the annual or seasonal average. In addition to maintaining moderate fish and wildlife habitat, retaining 30 percent of the annual or seasonal average in the Meadow River would provide recreational opportunities such as canoeing or rafting that would not be possible at 10 percent of annual or seasonal average.

WGC is planning to maintain 60 percent of either the annual or seasonal average flow (dependent on state recommendations). Maintaining 60 percent of annual or seasonal average would provide *excellent* to *outstanding* habitat for most aquatic life forms during their primary periods of growth and most forms of recreation (Tennant 1976). Channel width depth and velocities would be slightly affected by water withdrawal during periods of drought and the bordering riparian vegetation would not be significantly affected by a decrease in available water. Pools, runs and riffles would be covered with water and provide excellent feeding and nursery habitat for fish, and there would be no impediments to fish migration. Undercut channel banks, where present, would provide slightly better fish and wildlife habitat than conditions presented at 30 percent of the annual or seasonal average, and much better habitat than conditions that use 10 percent of the annual or seasonal average.

In addition to withdrawing too much of the Meadow River beyond a recommended threshold, as described above, the CWIS can also have an adverse effect on aquatic life in two ways: (1) entrainment and (2) entrapment-impingement (USEPA 1977). Entrainment occurs when phytoplankton, zooplankton, fish eggs and other forms of aquatic life are imported into the plant through the CWIS. Typical physical trauma experienced by the aquatic biota consists of coming into contact with the internal surface pumps, increased water temperatures and pressure and toxic or corrosive chemicals (USEPA 1977).

The entrapment-impingement process occurs when a larger entrained organism, (e.g. fish), enters the cooling water intake and is prevented from escaping by a physical barrier such as a screen. If the aquatic organism is not removed or can not escape, it would become impinged on the screen and suffocate because the water current prevents the gill covers from opening (USEPA 1977).

Since the design intake flow is less than 2 million gallons per day (8 million liters per day), the final rule implementing Section 316(b) of the Clean Water Act (CWA) for new facilities would not apply to the WGC Co-Generation Facility. Nevertheless, the intake structure has been designed to 316(b) standard and technologies for limiting adverse aquatic impacts during the CWIS operation have been incorporated into the conceptual design. Furthermore, adverse impacts would also be minimized through routine maintenance and inspection of the CWIS.

Protected Species and Habitat

In West Virginia all types of mussels are considered protected. A freshwater mussel survey near the potential CWIS location along the Meadow River was performed in July 2006, and no mussels were encountered at the site (Taylor, 2006a). The study area for the freshwater mussel search covered 60 meters downstream from the Sewell Creek and Meadow River confluence, and upstream of Sewell Creek to the RSTP outfall. Approximately 1000 square meters of the Meadow River and Sewell Creek stream bed were searched for the presence of mussels. Results of the study indicate no mollusks occur within the Sewell Creek study area and downstream of the confluence.

The field investigation encountered two snails (*Helisoma aceps*), and one finger-nail clam (*Sphaerium striatinum*) in the study area. In addition to the species mentioned, the field studies also identified a large Asian clam (*Corbicula fluminea*) community downstream of the confluence (Taylor 2006b).

Therefore, based on the information available regarding protected species and habitat in the area, it is anticipated that no protected species and habitat would be impacted as a result of actions related to the CWIS or water withdrawal. Water withdrawn from the Meadow River would be metered and controlled as to maintain 60 percent of the annual or seasonal average flow (as recommended by the state). Consequently, although flow rates in the Meadow River would be reduced when compared to baseline conditions, adverse impacts on aquatic habitat and populations are not expected.

Water Pipeline (to the Co-Generation Facility)

Vegetation and Wildlife

The Proposed Action would require the installation of a water supply pipeline, extending from the RSTP to the power plant facility, within a corridor located near and parallel to much of Sewell Creek. Once the pipeline would cross US 60, it would extend towards the power plant in a southerly direction between the alleys of modular homes until it runs into 15th Street. Upon meeting 15th Street, the water line would proceed west until it encountered an open field west of the modular residential community, at which point the water line would progress south to the power plant.

The pipeline ROW would be approximately 20 feet (6 meters) wide by approximately 8,500 feet (2,600 meters) long encompassing 4 acres (2 hectares). Most of the length of the proposed pipeline includes developed and/or previously disturbed areas and undeveloped alluvial land that provides minimal wildlife habitat. The open field is mowed and maintained on a regular schedule. A small emergent wetland would be crossed en route to the power plant, and wildlife utilization would be concentrated along the forest edge east of the emergent wetland or an adjacent intermittent stream. Impacts to wildlife and wetlands during construction would be temporary and minor. Appropriate E/S controls and BMPs would be required during construction. The elevation contours within the wetland would be restored to their original grades and seeded once construction activities are completed.

Wetlands

Wetlands are adjacent to Sewell Creek in several areas that would be traversed by this proposed pipeline route. Approximately 0.027 acre (100 square meters) of wetlands would be impacted by the water pipeline.

Aquatic Ecosystems

Because the proposed pipeline would traverse the streams from above and along the bridge crossings, impacts would be limited to construction activities. These impacts would be localized and temporary, and are not expected to cause any significant impacts to the surrounding aquatic ecosystems.

Protected Species and Habitat

Based on the information available regarding protected species and habitat in the area, it is anticipated that no protected species and habitat would be impacted as a result of actions related to water supply

4.7.3.4 Power Line Transmission Corridor

The options for power transmission from the proposed WGC power plant to the Grassy Falls substation, as described in Chapter 2, share common corridors identified as Segments A and B (see Figure 2.4-9). As planning decisions by WGC evolved relating to the power line transmission corridor, several surveys and studies were conducted. These studies included a screening-level survey of the segments, as well as a more extensive survey and assessment of Segment A (between WV 20 and the existing AEP transmission corridor). The screening level surveys included site walkovers to assess the potential for suitable habitat for protected species, identification of wetland features, and the presence of riparian streams. The most recent study completed a survey of the proposed new transmission corridor (Segment C) to the Grassy Falls substation (see Appendix L).

Vegetation and Wildlife

The option of constructing a new power transmission line would require a 100-foot (30-meter) wide linear corridor to be created from near the project area in Rainelle to an existing substation at Grassy Falls. This action would require the clearing of a 100-foot-wide swath, as needed, along the entire approximately 17-mile (27-kilometer) route discussed in Chapter 2, which would result in a net loss of vegetation and wildlife habitat. However, not all of the entire length of the proposed easement is presently wooded and/or undisturbed. Several former strip mines and areas of former commercial logging are located along the proposed route. In portions of these areas, little or no vegetation is present. In addition, developed areas, including residential dwellings and public roads, were also observed along the proposed route.

The loss of woodland habitat may permanently displace some species; however, the creation of an edge habitat may favor other species. As noted earlier, abundant comparable vegetative communities and habitat exist adjacent to and contiguous with the proposed corridor route. These areas should be more than ample to receive any migration of wildlife displaced due to the creation of the new easement. The generation of noise during clear-cutting and pole installation activities would result in a temporary, minor impact to wildlife in the immediate area.

The option of upgrading existing poles and lines on the AEP corridor would not result in the permanent loss of any wooded areas other than those related to Segment A. However, existing vegetation along the ROW would be disturbed during construction activities. These impacts would be temporary and minor in severity.

The option of widening the existing AEP corridor to accommodate new power lines and poles would have impacts similar to those for the proposed new corridor, because a 100-foot (30-meter)-wide swath would be cleared along the entire AEP corridor from Rainelle to Grassy Falls.

Wetlands

Several wetland areas were identified within Segments B and C of the proposed corridor. Along segment B, there are eight potential wetland areas comprising approximately 2.3 acres (0.9 hectares). In segment C, there are 14 wetland areas comprising approximately 2.8 acres (1.1 hectares). The corridor also includes numerous stream crossings.

Construction of the new corridor would result in the clearing of vegetation within and adjacent to wetland areas and stream channels. In addition, certain wetland areas would be traversed by heavy machinery during clear-cutting and pole installation. These activities could result in compaction of soil, and diversion of water flow. However, any impact to wetlands during pole installation would be temporary. Additional impacts could be avoided by locating utility poles outside of the wetland areas along the proposed route to the greatest extent practicable. This may be possible due to some flexibility in pole spacing, and the small size and widely scattered nature of the wetland features observed.

The construction activities would be regulated under a CWA Section 404 permit, preferably a Nationwide Permit as opposed to an Individual Permit, and the BMPs specified in the permits would be implemented at a minimum.

The option of upgrading existing poles and lines on the AEP corridor would not result in permanent impacts on wetlands. Wetland areas within the existing corridor would be avoided during construction as practicable and regulated under a Section 404 permit.

The option of widening the existing AEP corridor to accommodate new power lines and poles would have impacts similar to those for the proposed new corridor, because a 100-foot (30-meter)-wide swath would be cleared along the entire AEP corridor from Rainelle to Grassy Falls. Wetland areas along the existing corridor would be avoided during construction as practicable and regulated under a CWA Section 404 permit.

Aquatic Ecosystems

A total of 38 streams or drainage channels were identified along the proposed corridor. None of the streams or rivers within the route (e.g., Meadow River) would be affected by pole placement, because poles would not be placed within waterways. Therefore, the proposed new corridor would have negligible impact on aquatic ecosystems. Minor clearing of vegetation within the vicinity of the waterways, as may become necessary to establish the power line, is not anticipated to have a significant impact on the aquatic ecosystems, particularly if measures are implemented to control erosion of the soil that may occur during this activity.

The option of upgrading existing poles and lines on the AEP corridor would not result in permanent impacts to aquatic ecosystems. Stream crossings within the existing corridor would be avoided during construction as practicable, erosion and sedimentation controls would be implemented, and poles would not be placed within waterways.

The option of widening the existing AEP corridor to accommodate new power lines and poles would have impacts similar to those for the proposed new corridor, because a 100-foot (30-meter)-wide swath would be cleared along the entire AEP corridor from Rainelle to Grassy Falls. However, impacts on aquatic ecosystems would be negligible, because stream crossings within the expanded corridor would be avoided during construction as practicable, erosion and sedimentation controls would be implemented, and poles would not be placed within waterways.

Protected Species and Habitat

Protected species and habitat surveys were conducted on Segment A of the proposed corridor that extends east-to-west from WV 20 near the EcoPark location to the existing AEP right-of-way near the golf course (Appendix E). This section of the transmission line corridor is common to all three options and would be utilized regardless of the corridor ultimately selected. In the portion of the proposed power line corridor evaluated, the survey concluded that roosting and/or foraging potential for the Indiana Bat and the Virginia Big-eared Bat are low to moderate. Mist net surveys in this area did not collect any specimens of Indiana Bat or the Virginia Big-eared Bat.

Portions of this area contain high potential foraging and nesting habitat for the Virginia Northern Flying Squirrel, specifically on the ridge top and eastern slope of Sewell Mountain. However, after mist netting in this area did not collect any Virginia Northern Flying Squirrel and after discussing the potential for this species being present with the WVDNR, it was determined that, although the habitat may be suitable, the topographic elevation of the area was likely to be the reason why none of this species was observed. This flying squirrel prefers topographic elevations of 3,280 feet (1,000 meters) or higher but is sometimes found in slightly lower elevation areas. It is also often associated with coniferous forest habitats comprised of spruce and fir trees. The survey report concluded that a "May Affect – Not Likely to Adversely Affect" determination is anticipated from the USFWS with regard to the Virginia Northern Flying Squirrel.

Approximately 85 percent of Segment B and 50 percent of Segment C consists of forested land and may serve as potential habitat for the Indiana Bat. However, no karst regions or spruce/fir forests were encountered during the survey, which suggests that the existence of the Virginia Big-Eared Bat and the Virginia Northern Flying Squirrel within the route is limited as these regions are not typical habitats for the respective species. The existence of Running Buffalo Clover and the Small Whorled Pogonia were also assumed to be limited because the various historical coal mining and logging operations encountered during the survey meant limited habitat suitable for these species. Medium to large rivers with gravel and sand substrate, which are the preferred habitats for the Northern Riffle Shell, Fanshell, and Pink Mucket, were not encountered during the survey, and therefore, are assumed not to be present within the new corridor route.

Construction of the proposed power transmission corridor would result in the clearing of forested lands that may provide habitat for the Indiana Bat. However, some of these lands could be cleared by timber operations prior to WGC's acquisition of a ROW for the corridor. Additional surveys of forested areas would be required to determine the presence or absence of this species prior to the removal of vegetation. Otherwise, clearing of vegetation must occur during winter months when the Indiana Bat would be hibernating and not present in the forest. Continued Section 7 consultation with the USFWS would be required to coordinate construction plans and the results of any surveys.

The option of upgrading existing power lines and poles in the existing AEP corridor would not be expected to have an adverse effect on protected species or habitat, because the corridor has already been cleared of wooded vegetation.

The option of widening the existing AEP corridor to accommodate new power lines and poles would have impacts on potential habitat for the Indiana Bat similar to those for the proposed new corridor, because a 100-foot (30-meter)-wide swath would be cleared along the entire AEP corridor from Rainelle to Grassy Falls. Therefore continued Section 7 consultation with USFWS and additional surveys would be required under this option to ensure that the species would not be adversely impacted..

4.7.3.5 Fuel Supply

WGC has entered into a Memorandum of Understanding (MOU) with WVDEP which states that in return for using coal refuse at Anjean, WGC would use the proposed facility's waste ash in reclamation processes and be responsible for remediation and reclamation plans as approved by WVDEP. The use and reclamation of the Joe Knob, Green Valley and Donegan coal refuse would be subject to the same conditions as stated in the Anjean MOU with WVDEP.

Anjean

Vegetation and Wildlife

The coal refuse piles at Anjean Mountain are sparsely vegetated. The limited amount of vegetation can be attributed to the lack of topsoil and high acidity of the soil caused by the coal refuse. The Proposed Action would result in a temporary disturbance of this vegetation and any associated wildlife as the existing pile is removed to fuel the Co-Production Facility. However, the impact would be short-term, as coal ash would be returned to the site and covered by a layer of fresh topsoil. During reclamation, as dictated by WVDEP-approved plans required under the MOU, the lands that formerly contained coal refuse piles would be reclaimed to an extent that would surpass existing conditions.

Wetlands

The field reconnaissance on March 15, 2006 identified one disturbed, isolated emergent wetland situated at the base of a hillside slope and an area characterized as an end dump. Vegetation in the wetland consists of soft rush, woolgrass and sedge, and the substrate consists of coal fines. This isolated wetland is not considered to be a jurisdictional wetland and does not provide water quality functions, such as the export of detritus, which could be consumed by the benthic macroinvertebrates of streams. If water quality functions are provided by the isolated wetland, they would probably be characterized as poor and would not benefit the environment through the mitigation of acid mine leachate.

The use of alkaline ash from the proposed facility, as stated in the Anjean MOU, would result in the reduction of soil acidity, which would improve the quality of runoff in the area and may potentially benefit wetlands and drainage ways downstream of Anjean Mountain.

Several sites were identified as candidates for location of the coal prep plant to service Anjean (AN1, AN2, and AN3). Of these sites, AN1 has the greatest possibility of having wetlands. AN2 and AN3 do not appear to contain any jurisdictional features. Wetlands potentially associated with AN1 may occur adjacent to Big Clear Creek and adjacent to excavated sediment ponds. Potential impacts resulting from the construction and operation of a prep plant on AN1 would be dependent upon the site layout and design of the plant and whether or not these features were disturbed. If these potential wetlands were disturbed, impacts could result from the loss of wildlife habitat, loss of sediment stabilization and retention functions, and flood flow alteration functions. However, it is expected that these areas could be avoided as part of the coal prep plant design and planning process.

Aquatic Ecosystems

Briery Creek and Big Clear Creek are located at the base of the Anjean site, and likely receive surface water runoff from the mountain. The Proposed Action would result in a beneficial impact to these features, as acid water runoff currently generated by the coal refuse piles would be reduced or eliminated when the piles are removed and through the use of the proposed facility's waste ash as a neutralizing agent as agreed under the MOU. The reduction of runoff and leachate would result in increased aquatic species diversity within these watercourses.

Protected Species and Habitat

Due primarily to the disturbed nature of the Anjean site, the potential for protected species of flora and fauna or their habitat is low and no significant impact is anticipated. No impacts to protected species or habitat would be expected with the construction and operation of a coal prep plant at AN1, AN2, or AN3.

Donegan

Vegetation and Wildlife

The coal refuse pile at the Donegan site has undergone reclamation and has been capped, graded, and re-vegetated. The composition of the cap could not be determined from available records. The soil conditions within the cap are capable of supporting numerous grasses, weeds, shrubs, and some saplings and young trees. The capped area and surrounding property is comprised of a large population of black locust, tulip popular, and maple saplings in addition to many varieties of opportunistic weeds and grasses. According to the 7.5-minute USGS Quadrangle (Richwood Quadrangle), the elevation of the capped area is approximately 2,600 feet (792 meters) above MSL.

The Proposed Action would result in the removal of the existing vegetation and any associated wildlife as the existing coal refuse is removed to fuel the Co-Production Facility. However, the impact would be limited to a short period of time, as coal ash would be returned to the site and covered by a layer of topsoil. It is anticipated that WGC would enter into a similar MOU contract for Donegan as was agreed to for Anjean; therefore, during site remediation and reclamation, the lands that formerly contained coal refuse would be replanted with vegetation to an extent that would equal or surpass existing conditions.

Most of the DN1 site is characterized as a grassy area dominated with a variety of annual and perennial plants. Some shrubs are scattered throughout the site. Impacts from the construction and operation of a coal prep plant at this site would consist of the disturbance to woody and herbaceous plants that could increase erosion and sedimentation. However, E/S BMPs would minimize these impacts. The site appears to be mowed on a regular schedule and provides little wildlife habitat structure and complexity.

DN2 is characterized as an early sucessional hardwood forest. A majority of the trees have an average DBH of less than 2 inches (5 cm), and portions of the forested areas are dominated by red maple saplings. Because the trees are approximately the same age, they provide a limited habitat for wildlife and avifauna. The older mature vegetated areas provide a slightly more complex wildlife structure. Consequently, if a prep plant is sited here, utilization of these areas by wildlife would be lost. However, nearby areas provide a similar habitat and the impacts to natural resources would be minor.

Wetlands

Surface water runoff from the Donegan coal refuse pile flows into a series of settling ponds located along the southern edge of the reclaimed area. Leachate and some surface runoff flows into a channel on the southeast side of the reclaimed area where lime is continually added using AMD neutralization. Several seeps from the refuse area are located downstream of the current treatment area. Drainage from the site ultimately flows into Laurel Creek, a tributary of the Cherry River that feeds the Gauley River.

Because the Donegan coal refuse pile is adjacent to Laurel Creek, wetland impacts could occur as a result of the Proposed Action. Consequently, an investigation for potential jurisdictional waters would be required as part of the reclamation planning process for this site. However, the Proposed Action would ultimately be expected to benefit wetland features, as acid mine runoff generated by the buried coal refuse would be eliminated when the coal refuse is removed. The reduction of soil acidity would also result in increased species diversity in these areas, and may eliminate the need for the water treatment system.

Because avoidance of flooding and wetlands impacts would be part of the siting criteria for the prep plants, it is expected that potential wetlands impacts from the construction and operation of a coal prep plant at either the DN1 or DN2 candidate sites would be minimized.

Aquatic Ecosystems

The Proposed Action would result in beneficial impacts to aquatic ecosystems receiving surface water runoff from the Donegan coal refuse pile, because the concentration of contaminants generated by the coal refuse pile would be reduced through the elimination of pollution. The reduction of runoff acidity would also result in improved water quality and over time increase the biodiversity within these watercourses.

Impacts to the water resources from the construction and operation of the coal prep plant at either of the candidate sites could result in water resources impacts related to increased erosion and sedimentation. However, impacts to these water resources would be minimized by implementing E/S BMPs.

Protected Species and Habitat

Due primarily to the disturbed nature of the Donegan site, the potential for protected species of flora and fauna or their habitat is low and no significant impact is anticipated. No impacts to protected species or habitat would be expected with the construction and operation of a coal prep plant at DN1 or DN2.

Green Valley

Vegetation and Wildlife

The coal refuse pile at the Green Valley Coal Company site is approximately 1,000 feet (305 meters) in length and reaches a height of 300 feet (91 meters) near its center. Although the pile was to be uniformly covered with 3 to 4 feet (approximately 1 meter) of topsoil, at present most areas contain less than 2 feet (0.61 meters), while topsoil thickness is as low as several inches in some areas. Due to the extreme acidity of the soil, the coal refuse pile was planted with various pine tree species, which are more suitable for these conditions. In addition, young saplings, invasive weeds and shrubs, and other land cover species have migrated to the coal refuse pile. The Proposed Action would result in removal of this vegetation and any associated wildlife as the existing coal refuse is removed to fuel the Co-Production Facility. However, the impact would be short-term, as coal ash would be returned to the site and covered by a layer of topsoil. It is anticipated that WGC would enter into a similar MOU contract for Green Valley as was agreed to for Anjean; therefore, during site remediation and reclamation, the lands that formerly contained coal refuse piles would be replanted with vegetation to an extent that would equal or surpass existing conditions.

Wetlands

Surface water runoff from the Green Valley coal refuse pile is collected into three ponds located at the base of the pile. At present, a solution of 20 percent sodium hydroxide is added to these ponds to act as a neutralizing agent for the acid water runoff. The Proposed Action would result in a positive impact to these features, as acid water runoff generated by the coal refuse pile would be eliminated when the piles are removed. The reduction of soil acidity would result in increased species diversity in these areas and may eliminate the need for the sodium hydroxide application.

A portion of the Green Valley coal-processing site is characterized as a scrub-shrub/emergent wetland area. Soils of the site have a dark color, which could be indicative of anaerobic or reducing conditions. A wetland investigation and a jurisdictional confirmation from the USACE would be required to evaluate the regulatory status of wetlands.

The site reconnaissance indicates the presence of reed canary grass, an extremely invasive plant. Reed canary grass tends to form monocultures, and out-competes native plants that provide beneficial values to wildlife. A potential benefit that could occur from the development of the site would be the potential elimination of reed canary grass. Some shrubs are scattered throughout the site. Impacts would consist of the disturbance to woody and herbaceous plants resulting in increased erosion and sedimentation. However, E/S BMPs would minimize the impacts to the environment. Because avoidance of flooding and wetlands impacts would be part of the siting criteria for the prep plants, it is expected that the siting of a prep plant would avoid any potential emergent wetlands and, therefore, potential wetlands impacts at GV would be minimized.

Aquatic Ecosystems

The Proposed Action would benefit aquatic ecosystems receiving surface water runoff from the Green Valley coal refuse pile, as acid water runoff generated by the coal refuse pile would be reduced when the piles are removed. The reduction of acidic waters would result in increased aquatic species diversity within these watercourses.

Protected Species and Habitat

Due primarily to the disturbed nature of the Green Valley site, the potential for protected species of flora and fauna or their habitat is low and no significant impact is anticipated. No impacts to protected species or habitat would be expected with the construction and operation of a coal prep plant at GV.

Joe Knob

Vegetation and Wildlife

The coal refuse pile at the Joe Knob site has been reclaimed and re-vegetated. Soils are capable of supporting numerous grasses, weeds, shrubs, and some saplings. The reclamation site was originally seeded with a grass mixture containing Kentucky fescue and orchard grass, supplemented with black cherry plantings (Green, 2006). Volunteer species have also become established in some areas and have contributed to plant diversity. Vegetation surrounding the Joe Knob coal refuse pile site is typical of the biotic community common to the region. Representative members of the plant community are represented by sugar maple, black cherry, oak and hickory. Slope and aspect probably influence of the species composition in portions of the forested area. Hence, there would be some variations in the plant community composition.

The Proposed Action would result in removal of the cap, vegetation and the displacement of wildlife as the coal refuse is extracted to fuel the Co-Production Facility. However, the impact would be temporary and of a short duration. Coal ash would be returned to the site and covered by a layer of topsoil. It is anticipated that WGC would enter into a similar MOU contract for Joe Knob as was agreed to for Anjean; therefore, during site remediation and reclamation, the lands that formerly contained coal refuse would be replanted with vegetation to an extent that would equal or surpass existing conditions.

Wetlands

Seasonal runoff at the Joe Knob coal refuse pile is directed into existing ponds and constructed wetlands. These water resources function in treating AMD. A solution of sodium hydroxide is added to the pond which functions as a neutralizing agent for acidified runoff. The Proposed Action would provide improved water quality benefits when the coal refuse is extracted and removed from the site. The reduction of AMD and related contaminants could result in increased species diversity in these areas, and potentially reduce sodium hydroxide applications. A wetland investigation and a jurisdictional confirmation from the USACE would be required to evaluate the regulatory status of existing wetlands and other water resources not previously identified.

Aquatic Ecosystems

The Proposed Action would benefit aquatic ecosystems receiving seasonal runoff from the Joe Knob coal refuse pile through improved water conditions. The reduction of acidic waters would result in increased aquatic species diversity downstream of Joe Knob coal refuse pile. Joe Knob Branch and Little Clear Creek, the receiving waters of Joe Knob, could benefit from improved water quality.

Protected Species and Habitat

Due primarily to the disturbed nature of the Joe Knob site, the potential for protected species of flora and fauna or their habitat is low and no significant impact is anticipated.

4.7.3.6 Limestone Supply

The options being considered as sources of limestone are all commercial facilities currently operating under existing permits. These facilities would continue to operate regardless of whether the Co-Production Facility is constructed and operated. However, the rate at which limestone would be mined from the selected quarry site is likely to increase as a result of the Proposed Action. This increase in production would be regulated under and bound by existing operating permits, which incorporate measures to prevent impacts to biological resources. Thus, biological impacts related to quarrying would not be expected to be substantially different when compared to projected baseline conditions as these are active quarries and activities would be taking place within their existing permitted areas.

4.7.3.7 Material Transport

As part of the BMPs, a truck/wheel wash would be located at the coal refuse sites and the Co-Generation Facility to remove dust from the trucks before entering public roads to minimize the potential contamination to runoff from the roads, and therefore, would minimize adverse impacts to aquatic habitats.

4.8 Cultural Resources

4.8.1 Method of Analysis

This section first summarizes the overall method of cultural resource analysis. It is followed by a summary of how the project-specific archaeological and historic resource analyses were performed.

4.8.1.1 Overall Methodology of Impacts Analysis

The types of cultural resources that could be affected by Proposed Action depends on the specific location of ground disturbance and its environmental context. Based on predetermined criteria, a significant impact may occur if a Proposed Action or an alternative would cause any of the following conditions:

- Cause the potential for loss, isolation or substantial alteration of an archaeological resource eligible for listing on the National Register of Historic Places (NRHP).
- Cause the potential for loss, isolation or substantial alteration of a historic site or structure eligible for listing on the NRHP.
- Introduce visual, audible or atmospheric elements that would adversely affect a historic resource eligible for listing on the NRHP.
- Cause the potential for loss, isolation or substantial alteration of a Native American resource, including graves, remains and funerary objects.

As part of the EIS and Section 106 process, DOE consulted the West Virginia State Historic Preservation Officer (SHPO). Consultation efforts included meetings as well as written correspondence. In addition, DOE contacted 10 tribal organizations that have cultural affiliation with the region to solicit input and concerns related to the Proposed Action. Few tribal organizations responded, and none indicated any concerns about the Proposed Action. Correspondence, consultation letters, and responses are presented in Appendix B, Consultation Letters.

4.8.1.2 Project-Specific Archaeological and Historic Resources Surveys

Three separate cultural resource studies were completed in support of this EIS to survey the project area and identify cultural resources that potentially might be impacted by the Proposed Action and alternatives. The studies include the *Phase I Archaeological and Geomorphological Investigation of the Proposed Western Greenbrier Co-Production Plant* and the *Historic Resources Determination of Eligibility and Assessment of Effects, West Greenbrier Co-Production Demonstration Project* contained in Appendix G, and *Electrical Transmission Line Cultural and Ecological Evaluations* contained in Appendix L. Summarized below are the survey methodologies and findings of these efforts.

Phase 1 Archaeological Survey Methodology

In consultation with the SHPO, a staged approach to archaeological field investigations in identified Areas of Potential Effect (APE) was conducted to comply with Section 106 and NEPA requirements. Stage 1 was performed in April 2004, and Stage 2 took place in November 2004. The purpose of the Stage 1 was to identify obvious cultural resources and assess the potential for subsurface archeological sites. Areas investigated during the walkover survey included: (1) the proposed 26-acre (11-hectare) plant site south of Rainelle, (2) the proposed location of the transmission corridor between the plant site and the existing power line to the west, (3) the proposed steam and water line corridor that would parallel the existing railroad bed north of the plant site, (4) the proposed location of the loading facilities in Anjean, and (5) selected refuse piles on Little Clear Creek Mountain east of Anjean.

Stage 2 of the Phase I investigations involved the excavation of 32 shovel test pits (STPs), soil probes, and eight backhoe trenches. Stage 2 efforts included: (1) an intensive Phase I survey and deep testing of alluvial terraces between Sewell Creek and the toeslope of the truncated ridge that have a high probability for containing archeological deposits; (2) Phase I archeological survey and excavation of judgmental STPs on the terraces in the Plum Creek tract south of the property fenceline; (3) walkover survey and judgmental soil probes of the steam/water pipeline corridor and preparation of archeological sensitivity map; and (4) walkover survey of the 17-acre (7-hectare) exchange property and preparation of archeological sensitivity map.

Phase I investigations were not performed at the Joe Knob, Green Valley and Donegan coal refuse sites, because both sites have been disturbed extensively during prior mining operations, and the potential for archeological resources at either site is considered negligible.

Historic Resources Survey Methodology

Based upon sight distances and potential audible effects that could result from the Proposed Action, two separate APEs were delineated for a historic resources survey, which included portions of Rainelle and Anjean. Factors influencing these APEs included viewsheds, topographic features, proposed use of the property, and existing road network, as well as potential audible effects. As part of this effort, field reconnaissance and archival research were conducted to determine whether any historic properties exist within the APE of the proposed undertaking and to assess effects to any such properties by the proposed undertaking. The project area for the WGC co-production facility is located on and adjacent to the former location of the Meadow River Lumber Company (MRLC) in Rainelle. Due to the height of the stack, the APE in Rainelle for the plant site extends a radius of approximately 0.75 mile (1.2 kilometers) from the exhaust stack location. Because of the steep terrain, the APE for the Anjean site is limited to about 0.25 mile (0.4 kilometers) from the center of Anjean, near the entrance to the mountain.

The field survey consisted of a reconnaissance of the entire APEs, during which all properties appearing to be 50 years old or older were described, photographed, and mapped. In addition, a balloon test was conducted to visually evaluate the effects of the stack for the proposed location of the power plant from various vantage points in Rainelle. Photos were then taken of the balloons from various locations around Rainelle and, in turn, used to produce renderings of the stack from various locations, including possible historic districts, to determine potential effects.

Transmission Line Evaluation Methodology

The alternative of constructing a new transmission corridor was not identified in the planning process until after the prior Phase I investigations had been completed. Therefore, cultural resources investigations were subsequently performed to assess the potential for effect on resources along the corridor. The investigations included background research for information about previously recorded cultural resources within a 2-mile (3.2-kilometer) radius of the proposed transmission corridor, determinations of archaeological sensitivity for prehistoric and historic sites and artifacts based on the background research, and a field survey of the transmission corridor. The pedestrian survey examined ground conditions and included limited soil auguring.

Background research indicated that there are no previously recorded archaeological sites in the transmission corridor alignment and no historic structures that would be impacted by the proposed project. Based on the background research, the evaluation concluded that potential unrecorded prehistoric sites are most likely to occur on ridgetops, benches, and saddles in upland settings, as well as in bottomlands that have not been disturbed by prior timbering, mining, or construction activities. A moderate potential for containing unrecorded prehistoric sites was determined for these settings. The potential for historic archaeological sites in the corridor was estimated to be low, because past land use was generally limited to timbering and mining.

The pedestrian reconnaissance of the corridor indicated that approximately 95 percent of the alignment has been disturbed extensively during prior timbering and mining activities. Hence, the majority of the corridor is concluded to have limited to no potential for archaeological artifacts. The study concluded that seven areas, representing 5 percent of the alignment, retain some potential for unrecorded archaeological sites. Based on these findings, the study recommended that a Phase I subsurface archaeological survey be conducted in the seven areas identified as PR 1-2, PR 12-13, PR 83-84, PR 92-95, PR 98-99, PR 112-114, and PR 132-134 (see Appendix L, Transmission Line Corridor Study).

4.8.2 No Action

Under this alternative, the DOE would not provide partial funding for the design, construction and operation of the Co-Generation Facility. In the absence of DOE support, it is unlikely that the project would proceed. Therefore, there would be no impacts to cultural resources resulting from the No Action alternative.

4.8.3 Proposed Action

4.8.3.1 Potential Impacts on Archaeological Resources

Site Layout, Facility Construction and Operation

Despite the excavation of 32 STPs and eight backhoe trenches, no archeological materials were recovered in the proposed plant site during the Phase I survey. Also, 11 STPs were excavated on the three small benches or terraces south of the fenceline in the Plum Creek tract. The STPs resulted in the recovery of a single flake fragment of gray chert on the third or smallest bench. Two additional STPs were excavated on the bench, but no other artifacts were recovered.

Collectively, the trench profiles indicated that (1) the proposed plant site location has very little potential to contain buried cultural artifacts, and (2) Sewell Creek as a whole has little, if any, potential for buried artifacts, given the very active nature of this stream course. Based on the soil profiles, there are no deeply buried (greater than 4 feet [1.2 meters]) alluvial soils that could have supported human occupation or that have potential to contain buried archeological deposits in the proposed plant site area. Both prehistoric and historic archeological sites, if present, would necessarily be confined to the upper 12 to 14 inches (30-35 centimeters). Given this fact and the horizontal and vertical extent of historic and recent disturbances in the project area, there is very little potential for finding undisturbed sites. These areas should be considered cleared for purposes of Section 106 compliance and no additional archeological consideration is warranted in these areas. After reviewing the Phase I archaeological survey report, the WV SHPO concurred with the determination that the proposed project would have no effect on potential archaeological resources at the plant site (see letter in Appendix B).

Power Transmission

The proposed corridor for new power transmission lines to connect from the WGC plant to the existing AEP transmission line right-of-way would traverse approximately 17 acres (7 hectares) of land west of SR 20. As described in Chapter 2, this property would be subject to an exchange for comparable acreage along US 60 west of the AEP right-of-way (ROW). A walkover survey of the 17-acre (7-hectare) land exchange property was performed as part of the Phase I survey. This property is steep, extremely rocky in parts, and heavily disturbed by former logging roads. Erosion of exposed soils on these steep slopes has reduced the surface horizon to only a few centimeters. No archeological sites and no high probability areas were identified in the land exchange property as a result of the pedestrian survey.

Option A, the option of widening the existing transmission corridor from Rainelle to Grassy Falls, would affect undisturbed lands adjacent to the existing ROW. If this option were selected for power transmission, the area to be widened should be evaluated for the potential to affect unrecorded cultural resources and be subjected to a Phase I survey where indicated by the evaluation. The results of the survey should be coordinated with the WV SHPO to determine whether and where Phase II surveys should be conducted. Final adjustments in the alignment would be determined in consultation with the WV SHPO to avoid potential impacts on unrecorded archaeological resources.

Option B, the option of upgrading the power lines in the existing AEP transmission line ROW from Rainelle to Grassy Falls, would generally affect areas that have already been disturbed. Therefore, it is not anticipated that this option would adversely impact archaeological resources.

Option C, the option of developing a new transmission corridor from Rainelle to Grassy Falls, would affect undisturbed lands. If this option were selected for power transmission, the results of the Phase I survey recommended for the seven areas of the proposed corridor would be coordinated with the WV SHPO to determine whether and where Phase II surveys should be conducted. Final adjustments in the alignment would be determined in consultation with the WV SHPO to avoid potential impacts on unrecorded archaeological resources.

Water Supply

The corridor for the proposed water pipeline is shown in Figure 2.2-3 (Chapter 2), and takes advantage of existing pipeline easements held by PSD #2. The vast majority of the surface horizon in this area has been stripped and removed. Pedestrian surveys, which evaluated an initially proposed corridor along Sewell Creek, identified four areas of major disturbance, three of which were not investigated by soil probes because the extent of disturbance precluded any potential for intact archeological deposits. There is little if any potential for these alluvial soils to contain any buried cultural deposits. The initially proposed corridor included portions of the current corridor from US 60 to the RSTP. Portions of the current corridor from US 60 to the power plant site were not included as part of these surveys. However, this segment of the new corridor (i.e., south of US 60) primarily traverses improved and heavily disturbed lands.

Portions of the corridor along Sewell Creek contain relatively undisturbed soils. The archaeological report recommended that a Phase I survey be completed for these areas if the corridor were to be sited through these locations. After reviewing the archaeological report, the WV SHPO concurred with the recommendation for a Phase I survey in the proposed pipeline corridor between shovel probes 4 and 6 (see letter in Appendix B). Final adjustments in the pipeline alignment would be determined in consultation with the WV SHPO to avoid potential impacts on unrecorded archaeological resources.

Fuel Supply

Proposed coal refuse/fuel sites have been heavily disturbed by previous mining operations. Hence, there is a negligible potential for these areas to contain archaeological resources that may be impacted.

WGC has identified six areas as possible candidates for siting of a coal prep plant by a third party. Three alternate candidate sites were identified that could potentially process coal refuse from Anjean (AN1, AN2, and AN3). All of these sites have been heavily disturbed as a result of past mining operations and WVDEP reclamation efforts. Therefore, there is a negligible potential for these areas to contain archaeological resources that may be impacted from the construction and operation of the coal prep plant.

Two alternative candidate sites were identified that could potentially process coal refuse from Donegan (DN1 and DN2). DN 1 is located on a previously developed site and the potential for this area to contain archaeological resources that may be impacted from the construction and operation of the coal prep plant is considered negligible. DN2 is located on private property that appears to have been used for agricultural purposes. The potential for archaeological resources to be present on this site is unknown. Prior to construction of the coal prep plant on the DN2 site if selected, the site should be evaluated for the potential to affect unrecorded cultural resources and subjected to a Phase I survey where indicated by the evaluation. The results of the survey should be coordinated with the WV SHPO to determine whether and where Phase II surveys should be conducted. Final site layout would need to be determined in consultation with the WV SHPO to avoid potential impacts on unrecorded archaeological resources.

WGC has identified one area (GV) to potentially serve as the prep plant site for the Green Valley coal refuse. This site is situated along the southern margin of the coal refuse source near the southern boundary of the refuse pile. The site is partially located on top of the Green Valley source, and there is a negligible potential for this area to contain archaeological resources that may be impacted from the construction and operation of the coal prep plant.

Limestone Supply

The proposed sources of limestone and the routes for their transport are established, ongoing commercial activities that are occurring independently of the Proposed Action. These areas have already been disturbed by previous extraction and transportation activities. Hence, there is a negligible potential for these areas to contain archaeological resources that may be impacted.

4.8.3.2 Potential Impacts on Historic Resources

Site Layout, Facility Construction and Operation

The historic resources survey concluded that there is one non-contiguous historic property within the APE that is eligible for the NRHP. This property is the City of Rainelle Historic District (Figure 4.8-1). The study found that the proposed West Greenbrier Co-Production Demonstration Project would have no effect on the NRHP-eligible resources and that the undertaking would not alter the existing setting or characteristics of the City of Rainelle Historic District.

Within some areas of the historic district, viewshed changes would occur relating to the height of the facility and its approximate 300-foot (90-meter) tall exhaust stack (see Figures 4.2-1 through 4.2-3 previous). These changes would be limited largely to those historic buildings and structures located in the western half of the city. Given the existing setting, however, it cannot be said that the Proposed Action would alter, directly or indirectly, any of the characteristics of these historic properties that individually or collectively qualify them for inclusion in the NRHP. Nor can it be fairly said that the Proposed Action would alter the existing setting, feeling or association of these historic properties.

In its response to the historic resources survey report (see Appendix B), the WV SHPO indicated that it would complete its review of the potential for visual impacts on architectural resources after reviewing comments on the proposed project during a public meeting and as provided by the Greenbrier County Historical Society. These comments will be elicited in conjunction with the Draft EIS publication and the associated public meeting.

Power Transmission

The proposed corridor for new power transmission lines to connect from the WGC plant to the existing AEP transmission line ROW would traverse approximately 17 acres (7 hectares) of land west of WV 20. No structures potentially eligible for the NRHP were identified during the walkover survey of this property.

Option A, the option of widening the existing transmission corridor from Rainelle to Grassy Falls, would affect undisturbed lands adjacent to the existing ROW. If this option were selected, potential historic resources in this corridor and their context should be identified and coordinated with the WV SHPO to determine whether they may be eligible for the NRHP.

Option B, the option of upgrading the power lines in the existing AEP transmission line corridor from Rainelle to Grassy Falls, would generally occur in an existing cleared ROW. Therefore, it is not anticipated that this option would affect properties eligible for the NRHP.

Option C, the option of developing a new transmission corridor from Rainelle to Grassy Falls, would affect undisturbed lands. Background research and pedestrian reconnaissance performed for the transmission line evaluation report indicated that there are no historic structures eligible for the NRHP that would be impacted by this option.

Water Supply

The corridor for the proposed water pipeline is shown in Figure 2.2-3, and takes advantage of existing pipeline easements held by PSD #2. It is anticipated that the construction and implementation of the proposed pipeline would not alter, directly or indirectly, any of the characteristics of historic properties that individually or collectively qualify them for inclusion in the NRHP. Nor is it anticipated that the existing setting, feeling or association of these historic properties would be adversely impacted.

Fuel Supply

Because there are no buildings or structures eligible for the NRHP at the Anjean, Joe Knob, Green Valley, or Donegan sites, there would be no effect on any historic structures as a result of activities at these sites.

WGC has identified six locations as possible candidate sites for a coal prep plant. With the exception of DN1, none of the sites contain any permanent structures and there would be no affect on any historic structures as a result of activities at these sites. Site DN1 contains one structure that was used during the Donegan mining operations. This structure is a one-storey, one by four-bay, concrete block building with steel overhead door on its gable end. The gables are clad with vertical steel siding. The concrete block and steel are a type that dates from the late twentieth century indicating the building is less than 50 years old. This building is not considered to be eligible for the NRHP. and no adverse impacts to historic properties are expected to occur from the construction and operation of the coal prep plant at DN1.

Limestone Supply

The proposed sources of limestone and the routes for their transport are established, ongoing commercial activities. The continuation of these commercial activities would not impact historic resources.

4.8.3.3 Potential Impacts on Native American Cultural Resources

None of the project components associated with the Proposed Action would occur on, or otherwise affect, recognized Native American tribal lands. However, to evaluate the potential for impacts by the Proposed Action on Native American cultural resources, DOE contacted 10 organizations representing Native American tribes that are known to have cultural affiliation with the region. Few tribal organizations responded, and none indicated any specific concerns about the Proposed Action (see Appendix B). As described in Section 3.8, this area of West Virginia was used extensively as a hunting ground by tribes of the Iroquois Confederacy, but the tribes generally did not create settlements on these local lands. Therefore, the potential for encountering Native American cultural artifacts, graves, remains, or funerary objects is considered negligible. Nonetheless, project activities would be performed in full compliance with the Native American Graves Protection and Repatriation Act (NAGPRA), which outlines specific procedures to be implemented in the event that Native American artifacts may be encountered during project activities.

4.9 Socioeconomics

4.9.1 Method of Analysis

Based on predetermined criteria, a significant socioeconomic impact may occur if a Proposed Action or an alternative would cause any of the following conditions:

- Displace substantial housing stock and numbers of people residing in the planning area and necessitate the construction of replacement housing elsewhere to support the relocation of residents.
- Induce substantial population and housing growth in the planning area either by the direct construction of new housing with an influx of residents or by providing new roads or infrastructure that would influence new housing construction and population growth not otherwise expected to occur in the planning area.
- Substantially reduce employment opportunities by displacing businesses in the planning area or by otherwise eliminating existing jobs.
- Induce substantial population influx into the county by providing new employment opportunities not otherwise anticipated, which may create pressure for the housing market and public services.

4.9.2 No Action

Under the No Action alternative, without funding support from DOE, it is likely that WGC would not construct the Co-Generation Facility. Without the project as a stimulus and anchor, it is doubtful that the planned EcoPark could attract potential tenants. Hence, this alternative would maintain the status quo with respect to demographic and socioeconomic conditions in western Greenbrier County. Given the current reduced state of the local economy, employment, and income, the area would lose the potential for a needed stimulus to prevent further decline in population, especially among younger working-aged residents.

4.9.3 Proposed Action

4.9.3.1 Site Layout and Facility Construction

The Proposed Action would not require significant demolition of housing or significant displacement of existing population in the Rainelle area. Although the sites proposed for the WGC power plant and kiln consist of vacant lands, WGC may acquire two or more residential properties closest to the plant site to provide additional buffer area for the plant (see Figure 4.2-1). Furthermore, the design and construction contractors would plan, schedule, and monitor potential blasting activities on the partially leveled ridgeline during excavation and site preparation for the power plant to minimize noise impacts on surrounding property owners and avoid damage to adjacent residential and commercial structures. However, the residential properties to the east within 1,500 feet (460 meters) of the proposed plant site (see Figure 4.2-1), including approximately 12 single-family residences, 12 mobile homes, 52 apartment units, and a nursing and rehabilitation center, would experience the most significant impacts from dust, noise, and vibration during construction of the plant. Site layout Options A and B would impact the same residential properties; however, the property impacts under Option B would be greater because the site footprint is larger and would extend further to the east.

Construction of the proposed facilities would employ an average of 185 construction workers during the 29 months of principal construction, with a peak of 274 employees in a single month based on a study commissioned by WGC (Childs, 2005). A study for the Greenbrier Housing Authority by the Virginia

Tech Center for Housing Research (Koebel, et al., 2004) determined that nearly 1,600 construction workers live in Greenbrier County with over 100 residing in Rainelle, Quinwood, and Rupert. The study concluded that most construction workers would commute from within the wider region, rather than relocate to the communities. Therefore, the construction phase of the project is not expected to create a demand for new permanent housing. However, long commutes and temporary overnight stays were considered likely for many workers, which may increase the need for overnight lodging. Currently, the local communities have a very limited supply of overnight lodging; Rainelle has one existing motor lodge with 18 rooms. The demand would likely be absorbed by the current supply of lodging facilities in Lewisburg, approximately 30 miles (50 kilometers) away (Koebel, et al., 2004). The increased demand for overnight lodging might also stimulate owners of local homes to rent rooms. These temporary impacts during the construction phase would not have a significant adverse effect on local housing or population in the planning area.

The proposed project would not displace any existing businesses or eliminate jobs. Instead, based on the study for WGC (Childs, 2005), the economic impact of facilities construction would result in approximately $356 million in business volume and nearly $3 million in state taxes. This increased economic activity would result in more than 1,000 job-years. Additional expenditures in preparation for the operation of facilities would contribute nearly $8 million to the state economy.

The construction phase would not create substantial permanent employment opportunities in the Rainelle area that would cause an influx of new residents and affect the capacity of public services. As described in preceding paragraphs, the project is expected to employ an average of 185 individuals per month over a 29-month period. At the completion of construction, these positions would terminate locally.

4.9.3.2 Facility Operation

During the demonstration phase and subsequent commercial operation, the proposed project would employ approximately 126 full-time personnel. At least half of the positions would require experience and training that area residents are not likely to possess. Therefore, the proposed project may cause an influx of 50 to 100 new employees to the region, many with families. As concluded by the Greenbrier Housing Authority study (Koebel, et al., 2004), the new employees are expected to receive salaries that would enable them to afford housing well above the median values of local housing stock. The study estimated that the local communities would need to provide upgraded housing opportunities to attract these workers as local residents. However, given the small size of the housing market in western Greenbrier County, the development of a new subdivision for plant personnel would be speculative and risky, because there is no other source of demand. More likely, employees for the proposed project would find housing initially in Lewisburg or Beckley. It is anticipated that, over time, individual homes would be built under contract locally. Therefore, the proposed project would not have a sudden and substantial adverse impact on the local housing market or public services.

Continuous commercial operation of the proposed project would generate approximately $28 million in business volume per year. An economic study conducted by Childs (2005), which was based on an assumption of 109 positions directly required for the project, determined that the resulting economic activity would support approximately 114 additional jobs. Businesses would spend over $8 million in employee compensation annually, and the state would realize an additional $500,000 in tax revenue annually (Childs, 2005).

The existence of a co-generation facility providing electricity and steam, along with the cement manufacturing facility as the premier tenant, may attract other commercial tenants to the proposed EcoPark. New businesses in the region would provide needed jobs and stimulate the local economy, which could help retain working-aged residents who are currently leaving the communities for lack of employment opportunities (Koebel, et al., 2004 and GCPC, 1994).

However, due to their close proximity to the proposed power plant, residential properties to the east within 1,500 feet (460 meters) of the plant site may experience significant long-term adverse impacts on property values in relation to comparable properties in Rainelle. As illustrated in Figure 4.2-1 previously, the properties most affected would include approximately 12 single-family residential lots. Additional properties that would be affected include a block containing approximately 12 mobile homes, a 52-unit apartment complex (USDA Rural Development property), and a commercial nursing and rehabilitation center.

4.9.3.3 Power Transmission Corridors, Water, Fuel, Limestone, and Other Resources

None of the options for upgrading the existing power transmission corridor or establishing a new transmission corridor would significantly affect socioeconomic conditions in the region. The actions would not displace housing or businesses, and would not otherwise affect local demographics. Although property owners granting easements for transmission corridors would be constrained in their future beneficial uses of the ROWs, they would be appropriately compensated for the easements.

The transport of fuel and limestone by trucks would occur on designated heavy haul routes, principally US 60. Because increased traffic would increase noise, traffic hazards, and emission levels, residential property values along the fuel routes may be affected adversely. All of the candidate prep plant sites, except for DN2, are located in remote areas and would not affect nearby residential property values. DN2 is located on private property that includes a residence. Although the value of the residence would be affected if DN2 were selected for the prep plant, the residence is part of the property that would be acquired from the site owner.

Potential actions and options for meeting the water supply, fuel, limestone, and other resource requirements of the proposed project would not displace existing housing or businesses, and would not otherwise affect the demographics of the region. The reduction of coal refuse piles at Anjean, Joe Knob, Green Valley, and Donegan to supply fuel for the proposed facility; the use of waste ash for the remediation of the coal refuse sites; and the potential increased business given to regional limestone quarries would all provide beneficial economic impacts locally.

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4.10 Environmental Justice

4.10.1 Method of Analysis

The potential for a proposed action or an alternative to have a significant environmental justice impact may occur if a Proposed Action or an alternative would cause:

- A significant and disproportionately high and adverse effect on minority populations in the area of influence.
- A significant and disproportionately high and adverse effect on low-income populations in the area of influence.

In its guidance for the consideration of environmental justice under NEPA, the Council on Environmental Quality (CEQ) defines a "minority" as an individual who is American Indian or Alaskan Native, Black or African American, Asian, Native Hawaiian or Pacific Islander, Hispanic or Latino. CEQ characterizes a "minority population" as existing in an affected area where the percentage of defined minorities exceeds 50 percent of the population, or where the percentage of defined minorities in the affected area is meaningfully greater than the percentage of defined minorities in the general population or other appropriate unit of geographic analysis. The CEQ guidance further recommends that low-income populations in an affected area should be identified using data about income and poverty from the U.S. Census Bureau (CEQ, 1997). Due to small sample sizes in census block groups, some statistics may not be reflective of actual populations within Greenbrier County and surrounding areas.

4.10.2 No Action

Under the No Action alternative, WGC would not construct the Co-Generation Facility. This alternative would maintain the status quo with respect to demographic and socioeconomic conditions in western Greenbrier County and the three local communities. Although the alternative would not create the potential for direct environmental justice impacts, the area would lose the potential for the new jobs and economic stimulus described in Section 4.9 to help reduce the high percentage of low-income residents in the region characterized in Section 3.10. The No Action alternative may also perpetuate the widespread belief that the region is in economic and social decline, which has contributed to the loss of its working-aged population to areas offering better employment opportunities.

4.10.3 Proposed Action

4.10.3.1 Site Layout, Facility Construction, and Operation

The economic impacts of the proposed project on local residents generally would be favorable as described in Section 4.9. However, residents living closest to the proposed plant would represent the populations affected most by the unfavorable aspects of such a facility as described elsewhere in this chapter. Environmental justice issues occur when these unfavorable aspects would affect minority or low-income populations disproportionately in comparison to the general population.

As described in Section 3.10, the compositions of minority populations in the proposed project area (Census Tract 9503, Block Group 3, of Greenbrier County) do not exceed 50 percent, and they are not meaningfully greater than the compositions of the local jurisdictions in the vicinity. Also, as described in Section 3.10, the general population of western Greenbrier County represents a "low-income population" compared to the county and state, because the region is economically disadvantaged. Therefore, regardless of where the proposed plant would be located in the vicinities of Rainelle, Rupert, or Quinwood, low-income populations likely would be affected by the unfavorable characteristics of such a facility. However, the composition of the low-income population in the unit of geographic analysis closest to the proposed project does not exceed 50 percent, and it is not meaningfully greater than the general population of western Greenbrier County. Therefore, the Proposed Action would not have a disproportionately high and adverse impact on minority or low-income populations.

4.10.3.2 Fuel Supply

The reduction of coal refuse piles at Anjean, Green Valley, Joe Knob, and Donegan to supply fuel for the proposed plant and the use of waste ash to remediate the sites would provide favorable economic and environmental impacts as described elsewhere in this chapter. Although the extraction operations that would be performed at these sites would have unfavorable aspects relating to particulate emissions (see Section 4.3), and the movement of trucks to and from the sites to haul coal refuse and ash would create local noise and traffic impacts (see Sections 4.13 and 4.15), these operations would be comparable to mining activities that have occurred historically at these sites.

The Anjean and Joe Knob coal refuse sites are located in Census Tract 9502, Block Group 5, of Greenbrier County. The proportion of minorities in this block group (4.4 percent) is comparable to the proportions in local communities as presented in Section 3.10. The poverty rates in the block group (28.6 percent of individuals, 18.8 percent of families, and 22.4 percent of households) also are comparable to those in the general population of western Greenbrier as presented in Section 3.10. Therefore, potential adverse impacts of the proposed project would not affect minority and low-income populations disproportionately in the vicinity of the Anjean and Joe Knob sites.

The Green Valley coal refuse site is located in Census Tract 9806, Block Group 4, of Nicholas County. The proportion of minorities in this block group (1.1 percent) is lower than the proportions in local communities as presented in Section 3.10. The poverty rates in the block group (19.0 percent of individuals, 16.5 percent of families, and 20.5 percent of households) also are lower than those in the larger local communities as presented in Section 3.10. Therefore, potential adverse impacts of the proposed project would not affect minority and low-income populations disproportionately in the vicinity of the Green Valley site.

The Donegan coal refuse site is located in Census Tract 9806, Block Group 3, of Nicholas County. The proportion of minorities in this block group (1.6 percent) is lower than the proportions in local communities as presented in Section 3.10. The poverty rates in the block group (19.1 percent of individuals, 14.1 percent of families, and 18.5 percent of households) also are lower than those in the larger local communities as presented in Section 3.10. Therefore, potential adverse impacts of the proposed project would not affect minority and low-income populations disproportionately in the vicinity of the Donegan site.

4.10.3.3 Power Transmission Corridors, Water, Fuel, Limestone, and Other Resources

Other project activities related to power transmission corridors, water supply, fuel processing, and the transportation of coal refuse, processed fuel, and limestone supplies would affect local roads and wider areas of Greenbrier County. Based on the composition of minorities and low-income populations in the local jurisdictions and the county, potential adverse impacts of these activities would not affect minority and low-income populations disproportionately.

4.11 Land Use

4.11.1 Method of Analysis

Based on predetermined criteria, a significant impact may occur if the Proposed Action or an alternative would cause any of the following conditions:

- Conflict with existing land uses on surrounding properties in project areas.
- Conflict with jurisdictional zoning ordinances applicable to project areas.
- Conflict with local and regional land use plans applicable to project areas.

The laws, regulations, policies, standards, directives and guidance that should be utilized to avoid any potential adverse land use impacts include the following:

- Greenbrier County Floodplain Ordinance;
- Greenbrier County Strategic Comprehensive Development Plan;
- Greenbrier County Master Land Use Plan;

As indicated in Section 3.11, Greenbrier County currently has land use plans and zoning regulations in effect only in the tax districts of Lewisburg and Fort Springs. Rainelle does not have a municipal planning commission or a municipal zoning ordinance, and Anjean, Joe Knob, Green Valley, and Donegan are not addressed in comprehensive land use plans.

4.11.2 No Action

Under this alternative, the DOE would not provide partial funding for the design, construction and operation of the Co-Generation Facility. In the absence of DOE support, it is unlikely that the project would proceed. Therefore, there would be no direct impacts on land use resulting from the No Action alternative. However, without the potential economic stimulus afforded by the Proposed Action, it is doubtful that the EcoPark planned by the local communities would attract commercial tenants.

4.11.3 Proposed Action

4.11.3.1 Site Layout, Facility Construction and Operation

The proposed Co-Generation Facility would be sited on disturbed land in the vicinity of areas used historically for industrial activities. A third party cement manufacturing facility would potentially be located in a proposed EcoPark to be sited on the property of the former Meadow River Lumber Company (MRLC). Thus, the Proposed Action would commit land that had been used historically for industrial activities to a similar use and would be consistent with existing and historical land uses at the proposed site.

Because the power plant site would be located in an area where industrial activities have historically occurred, it is not anticipated that the Proposed Action would result in significant widespread, long-term adverse impacts on housing, educational, medical or recreational land uses throughout the community. However, as described in Section 3.11 and illustrated in Figure 4.2-1 previously, land uses located within 1,500 feet (460 meters) of the proposed power plant site's eastern perimeter include approximately 12 single-family residential properties, approximately 12 mobile homes, a 52-unit apartment complex (USDA Rural Development property), and a nursing and rehabilitation center. In addition, the Rainelle Elementary School and Rainelle Medical Center are located 2,000 feet (610 meters) north of the proposed power plant site. These existing land uses would experience the most significant adverse impacts during construction and operation of the power plant and associated facilities. Site layout Options A and B would impact the same properties; however, the property impacts under Option B would be greater for the properties near the eastern site boundary because the site footprint is larger under Option B and it extends further to the east. Impacts from construction activity, including noise, dust emissions, and traffic congestion, are described in Sections 4.15, 4.3, and 4.13, respectively. Because of the business opportunities arising from the proposed project, land uses surrounding the power plant could change over time.

Potential impacts on floodplains are described in Section 4.5. To avoid any inundation and flood-related damage to the power plant, the site would be filled and graded to an elevation above the current floodplain. However, there would be some loss of flood storage volume resulting in less attenuation of flood waves downstream of the site. The loss of attenuation is expected to be negligible, because the volume of flood storage loss would be negligible (less than 1 percent) in comparison to the total available storage volume at and upstream of this site. Other project proponents would be required to comply with the county floodplain ordinance to secure a permit for development.

4.11.3.2 Power Transmission

The proposed corridor for new power transmission lines to connect from the WGC plant to the existing AEP transmission line ROW would traverse approximately 17 acres (7 hectares) of land west of WV 20. The proposed corridor is undeveloped except for a small roadside picnic area at the eastern end of the property adjacent to WV 20. As described in Chapter 2, this property would be subject to an exchange for comparable acreage along US 60 west of the AEP ROW (see Figure 2.2-3). However, there are no current plans to provide picnic facilities on the exchange property comparable to those that would be lost on the existing 17-acre (7-hectare) site. Short-term effects would include noise, dust, and traffic impacts during clearing and construction as described elsewhere in this chapter.

Option A, the option of widening the existing transmission corridor from Rainelle to Grassy Falls, may affect undisturbed lands adjacent to the existing ROW. However, because the ROW is already cleared as a corridor for power transmission lines, it is not anticipated that additional widening of the corridor would affect adjacent land uses significantly. Furthermore, existing landowners would be compensated for the restrictions on land use that would be applicable to the new easements.

Option B, the option of upgrading the power lines in the existing AEP transmission line ROW from Rainelle to Grassy Falls, would not alter the land use on or adjacent to the existing corridor.

Option C, the option of developing a new transmission corridor from Rainelle to Grassy Falls, would potentially affect substantial amounts of undisturbed lands along a linear alignment approximately 18 miles (29 kilometers) long and 100 feet (30 meters) wide. WGC contracted for an initial survey to identify cultural and ecological resources that could potentially be impacted in the proposed corridor (see Section 4.8 and Appendix L). A preliminary investigation of land uses that could be affected by the new route was accomplished by examining aerial photography (from years 1996-1997). Furthermore, data layers in geographical information systems (GIS) showing state parks, wilderness, trails, byways, and roads were accessed through the West Virginia State GIS Technical Center, which were superimposed over the geographical coordinates of the new route as described in the cultural and ecological survey. No crossings of parks, trails, and/or byways were identified in this preliminary investigation, and the route does not traverse populated land areas. Although the ROW would be cleared and subject to restrictions on land uses, existing landowners would be compensated for these restrictions in the granting of easements.

4.11.3.3 Water Supply

The corridor for the proposed water pipeline is shown in Figure 2.2-3 (Chapter 2), and would take advantage of existing pipeline easements held by PSD #2. The majority of the alignment has been disturbed during prior activities. Lands temporarily disturbed during construction would be returned to pre-construction conditions. No long-term adverse impacts on adjacent land uses are anticipated.

4.11.3.4 Fuel Supply

The proposed Anjean, Joe Knob, Donegan, and Green Valley coal refuse sites are located in relatively isolated areas, essentially surrounded by undeveloped land that has been heavily disturbed by previous mining operations. The proposed operations to extract coal refuse as fuel for the WGC plant would be comparable to historic mining activities that have occurred on these properties. Hence, the Proposed Action would not have a significant adverse impact on land use.

WGC is currently investigating the feasibility of the six candidate sites for coal refuse prep plant locations. Three sites would ultimately be chosen for the essentially three fuel supply sources: Anjean/Joe Knob, Donegan, and Green Valley. Only one prep plant would be operating at any given time, and the location would depend on which coal refuse source was being used at the time. At this time, WGC has identified sites at or near the coal refuse sources; therefore, the surrounding land characteristics are similar to those described above for the coal refuse sites (i.e., remote and surrounded by undeveloped land with historical ties to mining activities). One of the siting criteria includes examining property availability and conflicts with existing land uses. Because some of the sites (AN1, AN3, and GV) are located within the mining permit boundaries, coordination with either WVDEP or companies with mining rights at the Anjean and Green Valley sites would be required before WGC or a third party could use the property. Although AN2, DN1, and DN2 are situated outside coal refuse boundaries, the same property availability investigation and coordination with property owners would be required. Because property rights acquisition requirements would be negotiated and because of the fact that the candidate sites are located in fairly remote areas within or near properties that have experienced mining activities in the past, it is less likely that the prep plant would have significant adverse impacts on land use.

4.11.3.5 Limestone Supply

The options being considered as sources of limestone are all commercial facilities currently operating under existing permits. These facilities would continue to operate regardless of whether the Co-Production Facility is constructed and operated. However, the rate at which limestone would be mined from the selected quarry site is likely to increase as a result of the Proposed Action. This increase in production would be regulated under and bound by existing operating permits, which incorporate measures to prevent conflict with existing land uses. Thus, land use impacts related to quarrying would not be expected to be substantially different when compared to projected baseline conditions as these are active quarries and activities would be taking place within their existing permitted areas.

4.11.3.6 Material Transport

The transport of the fuel, limestone, and other miscellaneous supplies to the Co-Generation Facility would not conflict with any land uses as these routes would mainly occur on US 60, which is already an established east-west route through the county for many commercial vehicles and also part of the Coal Resources Transportation Route for Greenbrier County.

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4.12 Utilities and Community Services

4.12.1 Method of Analysis

Based on predetermined criteria, a significant impact on utility systems or community services may occur if a Proposed Action or an alternative would cause any of the following conditions:

- **Water Supply**
  - Substantially affect, directly or indirectly, the capacity of public water utilities.
  - Require substantial upgrades to water mains or improvements to community treatment systems.
- **Wastewater**
  - Substantially affect the capacity of public wastewater utilities or the ability of the treatment facility to meet permit requirements.
  - Require substantial upgrades to sewer mains or treatment facilities.
- **Energy**
  - Substantially affect capacity of energy suppliers (coal, other commodities)
- **Telecommunications**
  - Require substantial extension of telecommunications utilities involving offsite construction for connection with network
- **Solid & Hazardous Waste Management**
  - Substantially affect capacity of solid or hazardous waste collection services and/or landfills.
- **Public School System**
  - Increase enrollment in local school system beyond available capacity of facilities.
- **Law Enforcement**
  - Exceed service capacities of local and regional law enforcement agencies.
- **Fire Protection**
  - Exceed service capacities of local and regional fire protection agencies.
  - Exceed water supply capacity for fire suppression demands.
- **Heath and Emergency Services**
  - Exceed capacities of local and regional health care, public safety, and emergency services.

4.12.2 No Action

Under the No Action alternative, DOE would not co-fund the construction of the WGC Co-Production Facility and cement manufacturing facilities, which would not likely proceed without federal support. The proposed project site is located near established lines of typical urban infrastructure, and all required utilities are available and currently exhibit adequate capacity. Public services that accommodate Rainelle and its neighboring communities are also meeting current demands without capacity issues.

According to Rainelle and Greenbrier County officials, the EcoPark is the only proposed new commercial-industrial development within the project vicinity, and the EcoPark is not expected to succeed without the Co-Production Facility as an anchor. Therefore, for the No Action alternative, current trends in utility consumption rates, infrastructure capacities, and demand for public services would remain essentially unchanged. However, the general lack of economic and employment opportunities within western Greenbrier County has resulted in the loss of working aged individuals and contributed to the aging of the general population. As described in Section 3.9, the Greenbrier County Planning Commission has expressed concerns about this trend toward an aging population and the potential for adverse long-term effects on health care services and the demand for suitable housing in the area (GCPC, 1994).

4.12.3 Proposed Action

4.12.3.1 Site Layout and Facility Construction

Based on community response to the proposed project, WGC expects that many of the construction workers would be hired from the local area. Therefore, little net increase in the population would be anticipated, and as a result, the proposed project would not place additional demand on public services (schools, police, fire, and recreation) during the construction phase.

Due to the higher risks and rates of injuries associated with construction activities, additional demands on local emergency and health services may be created in the short term. Currently, the Rainelle Medical Center and Greenbrier Valley Medical Center have adequate capacity to support emergency medical needs during facility construction without significant impacts on their operations. Rainelle Medical Center is staffed from 8:30 a.m. to 5 p.m. and can provide services for minor injuries to construction workers. Serious injuries would require emergency transport to Greenbrier Valley Medical Center approximately 30 miles (50 kilometers) away, which operates a 24-hour, 7-day Emergency Room.

The proposed project would require the connection of the following utility lines:

- Water supply – potable water uses.
- Wastewater – for discharge of proposed plant process water and for the conveyance of sanitary sewage.
- Energy – power transmission.
- Telecommunications.

New lines for the above-mentioned utilities would need to be constructed and connected to Rainelle's existing infrastructure. The utility service capacities would be adequate to accommodate the increased demand for the construction phase. Anticipated impacts of installing and connecting proposed utilities to existing lines would mostly be construction-related impacts, such as construction noise, the disruption of existing utility services as necessary to access and connect to an existing utility line, potential short-duration traffic detours and congestion due to excavations that might occur along or across roads, and excavating/trenching difficulties resulting from proposed underground utility crossings at Sewell Creek.

Non-hazardous solid waste typically generated during construction activities, primarily consisting of wood, metal, plastic, concrete ingredients and components, etc., would be transported to the Greenbrier County Landfill located in Lewisburg, approximately 30 miles (50 kilometers) from Rainelle. In general, the proposed Co-Production Facility would be designed and constructed to minimize the types and quantities of hazardous materials required for plant construction and operation. During construction, small amounts of hazardous wastes that may be generated would be contained appropriately (i.e., standard drums), temporarily stored on site in a location protected from weather, and transported to an off-site licensed hazardous waste disposal facility. It is anticipated that only small quantities of hazardous wastes would be generated during construction, which would preclude any substantive management requirements to comply with existing hazardous waste regulations.

It is anticipated that construction for the third-party prep plants would result in similar types of impacts as described above for the Co-Production Facility but at a much smaller scale. Because the modular design of the prep plant would facilitate construction activities, it is expected that a prep plant would not result in adverse impacts to utility resources because of its significantly smaller size, which would require fewer construction employees over a much smaller timeframe.

4.12.3.2 Facility Operation

The major solid waste materials generated by power plant operations (i.e., ash waste) would be re-used for cement manufacture or returned to the coal refuse sites for remediation of environmental problems. The relatively small amounts of other non-hazardous solid wastes generated during plant operations would be transported to the Greenbrier County Landfill in Lewisburg and would not adversely affect landfill utilization rates.

Hazardous bulk material storage and handling facilities would be designed with secondary containment and provide emergency handling procedures to minimize the impacts of spills as described for aqueous ammonia in Section 2.3.4. The quantities of hazardous waste that would be generated during the operation of the proposed Co-Production Facility are expected to be sufficiently low to qualify the plant as a “Small Quantity Generator” under federal waste regulations. Typical hazardous wastes that would be generated include used oil, waste lubricants, and other small amounts of common maintenance-related wastes. Hazardous waste management would include either waste recycling or temporary storage in suitable waste storage containers, with collection and transport by an approved hazardous waste disposal contractor to a licensed disposal site.

According to local and county officials, the public services that accommodate Rainelle and surrounding communities have no capacity limitation issues, because the local population has been declining in recent decades. As described in Section 4.9, due to the specialized skill requirements of plant positions, the operation of the proposed facilities may attract between 50 and 100 employees from outside the local communities. Initially, many of these workers would find housing in the larger communities of Lewisburg and Beckley and commute to Rainelle. Therefore, community services (schools, police, fire, health services, waste management) and utilities (water, wastewater, energy, telecommunications) would not be impacted adversely by the demands of facility workers and their families. Impacts on utilities related to plant processes are addressed in the following subsections.

4.12.3.3 Water Supply

As discussed in Section 2.4.6, the maximum water demand from the Co-Production Facility would be up to approximately 1,200 gallons per minute (4,500 liters per minute), which WGC proposes to supply with a combination of treated effluent from the Rainelle Sewage Treatment Plant (RSTP) and supplemental sources (Figures 4.12-1 and 4.12-2) (WGC, 2006). The single largest water-consuming aspect of the WGC plant operation would be the evaporative cooling tower (estimated at approximately 850 gallons per minute [3,200 liters per minute] during average flow conditions). WGC intends to divert up to 100 percent of the RSTP effluent to the Co-Production Facility for process use. The RSTP has a hydraulic design capacity of 1.3 million gallons per day (5 million liters per day) and routinely receives between 0.6 million gallons per day (2 million liters per day) during dry summer season and 1.0 million gallons per day (4 million liters per day) during fall/winter season. Thus, the effluent available for use by the Co-Production Facility would range between approximately 400 and 600 gallons per minute (1,500 and 2,300 liters per minute) on a monthly average basis.

WGC proposes to make up the deficit between process water demand and RSTP effluent by using the Meadow River (see Section 4.4, Surface Water Resources) and/or groundwater sources (see Section 4.6, Geology and Groundwater Resources). As described in Section 2.4.6, water supply Option A would rely on groundwater as the secondary source and surface water as the tertiary source; Option B would rely on surface water as the secondary source and groundwater as the tertiary source. Although there are currently no water supply shortages in Rainelle, the source aquifer is the sole supply of potable water for the community. Project-related groundwater withdrawals could have significant adverse impacts on the Rainelle water supply by drawdown of the aquifer as indicated in groundwater pumping tests (see Section 4.6 for further discussions of geologic and groundwater impacts). Furthermore, should the EcoPark succeed in attracting commercial and industrial tenants, the water demands of these tenants in addition to the Co-Production Facility would likely require the evaluation of alternative water sources or plant processes that minimize the demand on Rainelle's water supply aquifer. Therefore, WGC prefers Option B for supplemental process water supply and would manage withdrawals from the Meadow River and groundwater sources to avoid adverse impacts as described respectively in Sections 4.4 and 4.6.

Design details of the intake structure on the Meadow River for Option B are in the conceptual stage, and preliminary plans indicate that a typical low-velocity cooling water intake structure (CWIS), such as a shoreline CWIS, would be used. The river water would flow naturally into the CWIS when the intake pumps are operating. The CWIS would pump the river water through a water pipeline and into a holding tank at the RSTP, where it would be mixed with RSTP effluent and conveyed to the WGC plant in the same water supply pipeline.

The WGC project would retain and use as much water collected on-site as possible, and therefore, the treatment and reuse of process-generated wastewater and storm water collected on-site would be achieved through the project's on-site water treatment system. Generally, only sanitary wastewater from the Co-Production Facility lavatories and sinks would be discharged to the RSTP. However, as currently envisioned in the preliminary design, process-generated wastewater could potentially be discharged in small quantities to the RSTP. This effluent, however, would be treated on site at the proposed facility's water treatment system before being discharged to the RSTP. West Virginia regulations require that any non-domestic discharge into NPDES-permitted publicly owned treatment works (POTW) must obtain a pretreatment permit from WVDEP. Hence, the Co-Production Facility would be subject to a pretreatment permit in the event that process-generated wastewater would be discharged to the RSTP.

4.12.3.4 Fuel Supply, Limestone, and Other Resources

No impacts on community services or utilities are expected to occur as a result of activities related to limestone supplies, because there would be no substantial change in baseline conditions at the commercial quarries.

The beneficiation prep plant would use water in a closed-loop circuit that would require a make-up demand of approximately 100 gallons per minute (380 liters per minute). As part of the final siting criteria for the prep plants, water source supplies would be investigated for availability and impacts. Due to the remote locations of the candidate prep plant site, adverse impacts on local groundwater users are not anticipated.

The prep plants would also generate spoils from the processing of the coal refuse. It is assumed that during the beneficiation process the spoils would be separated into two streams: rejected aggregates and pyritic solids. The pyritic solids would be collected and marketed for commercial purposes, while the aggregates would be disposed of at the coal refuse site in accordance with a reclamation plan to be prepared for, and approved by, WVDEP. The chemical makeup of this reject material is not currently known. Therefore, prior to any decisions about how this material should be managed, WGC would characterize this material to evaluate the appropriate uses or disposition. It is expected that the reclamation plan for each coal refuse site would address the proper disposal of reject material from the prep plant.

As stated in Section 2.4.4, it is expected that commercial coagulants, flocculants, and pH control inputs would be used during the coal prep process, and waste streams may also contain residuals of these chemicals. However, the composition and quantities of these materials are unknown at this time. Some of the products that would be added during the coal cleaning process may become a waste that could meet the criteria of a hazardous waste as defined by the Resource Conservation and Reclamation Act (RCRA). Before disposal, any waste stream would be characterized to determine whether or not it qualifies as a hazardous waste. Hazardous wastes would be transported and disposed of or treated at a licensed hazardous waste treatment, storage, disposal or recycling facility as required under state and federal regulations.

4.12.3.5 Transmission Line Corridor

Initially, WGC had planned to connect the Co-Production Facility directly to the existing American Electric Power Company (AEP) 69 kV transmission line located approximately 4,000 feet (1,200 meters) northwest of the plant site. However, WGC subsequently determined that the AEP lines lacked adequate capacity to accommodate the plant output. Thus, WGC is currently considering the following options for exporting the generated electricity to the national grid as described in Section 2.4.8:

- Option A –Widen existing right-of-way (ROW) to Grassy Falls Substation to accommodate new poles and lines;
- Option B – Upgrade existing AEP poles to carry WGC lines north to Grassy Falls Substation and south to Layland Substation;
- Option C – Construct new transmission corridor to Grassy Falls Substation.

Based on infrastructure upgrade requirements and feasibility of using the AEP corridor, WGC's preferred approach for transmitting electricity from the proposed facility is Option C. Under Option C, the plant would be connected directly to the Allegheny Power System (APS) at the Grassy Falls 138kV substation via a new 138kV line and transformer. WGC would be responsible for the new 138kV line from the proposed plant to Grassy Falls, and associated equipment at the power plant. The conceptual routes for transmission corridors to Grassy Falls were discussed in Section 2.4.8. Determining the final alignment of the corridor would depend on securing options for a ROW and other factors that may affect siting (e.g., environmental constraints). WGC intends to contract for the design and construction of the transmission line, and anticipates that the contractor would also be responsible for providing the pole structure type or tower structure configuration. A feasibility report was conducted by PJM to determine the impacts of the proposed Co-Production Facility on the APS system and concluded that direct connection of the facility into the APS system would be possible with network reinforcements (PJM, 2005).

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4.13 Transportation and Traffic

4.13.1 Method of Analysis

The potential for the Proposed Action or an alternative to have a significant impact on transportation resources in the planning area has been evaluated based on a series of predetermined criteria. A significant impact may occur if the Proposed Action or an alternative would cause any of the following conditions:

- Significantly increase traffic volumes and road hazards compared to existing conditions on roadways in the region of influence;
- Significantly degrade Level of Service (LOS) conditions to unacceptable levels (e.g., increase traffic delays and cause significant congestion);
- Significantly alter traffic patterns or circulation movements; and/or
- Conflicts with local or regional transportation plans.

Impacts to vehicular traffic on the local roadway network are analyzed based on three elements:

- Existing traffic volumes;
- No-Build volumes – estimated future traffic volumes without the project; and
- Build volumes (i.e., Proposed Action volumes) – estimated future traffic volumes with the project (No-Build volumes in addition to the project-generated traffic volumes).

Existing traffic data for the Co-Generation Facility study areas was provided by field observations and discussed in Section 3.13. An annual traffic growth rate of 3 percent was provided by WVDOT and was used to forecast future traffic volumes. Future No-Build traffic may include traffic volumes generated by other land development projects that are planned, but not yet operational, changes in traffic patterns from roadway improvements or operations, and/or the effects of population and business growth. Based on the projected traffic volumes, levels of service (LOS) were then estimated using the Highway Capacity Manual (HCM) guidelines.

4.13.2 No Action

Under the No Action alternative, DOE would not provide financial assistance for the Co-Production Facility, and the project would not be completed. According to Rainelle and Greenbrier County officials, the only new development proposed in the project vicinity would be the planned EcoPark. Without the WGC project as a stimulus, it is doubtful that the planned EcoPark could attract potential businesses that would add significant traffic volumes in the next few years. As a result, the No Action alternative would maintain the status quo with respect to future traffic conditions in Rainelle and the rest of western Greenbrier County.

Traffic demand on the roadway system is composed of existing traffic and estimated future No-Build traffic (i.e., non-project traffic). Estimated future traffic growth is generally composed of the following:

- Traffic volumes generated by other land development projects that are planned but not yet operational;
- Changes in traffic patterns from roadway improvements or operations; and
- Effects of population and business growth.

The existing (i.e., year 2004) traffic volumes and conditions for the study intersections were discussed in Section 3.13. Based on population and business trends, WVDOT estimates that a 3 percent annual traffic growth rate applies for all of Greenbrier County. Under the No Action alternative (i.e., No-Build), traffic volumes in Rainelle, Charmco, and Rupert would be expected to increase at approximately 3 percent per year based on WVDOT's traffic growth rate. The projected No-Build (2008) traffic volumes for the AM, MID, and PM peak hours at the six study intersections (A through F) were projected using the 3 percent growth factor and the traffic volumes that were estimated for the year 2004. Based on the projected volumes, LOSs were estimated using the 2000 Highway Capacity Software (HCS2000). Peak AM, MID, and PM traffic hours during a typical weekday were observed to be from 7:30 a.m. to 8:30 a.m., 11:45 a.m. to 12:45 p.m., and 4:45 p.m. to 5:45 p.m., respectively. The peak hourly volumes and LOSs of the existing and the projected No-Build conditions for the study intersections are summarized in Table 4.13-1. As shown in Table 4.13-1, all of the traffic movements would continue to operate at LOS A or B. The No Action alternative would not alter baseline conditions and would therefore have no impact on transportation resources.

Table 4.13-1. Peak Hour Traffic Volumes and Level of Service for Existing and No-Build Conditions

Intersection	AM Volume	AM LOS	MID Volume	MID LOS	PM Volume	PM LOS
A: WV 20 & Tom Raine Drive	216 (244)	A (A)	313 (352)	A (A)	284 (320)	A (A)
B: US 60 & WV 20 (in Rainelle)	549 (618)	A (A)	479 (540)	A (A)	513 (577)	B (B)
C: US 60 & Locust Street & Park Center Shopping Complex	662 (745)	B (B)	988 (1,112)	B (B)	849 (955)	B (B)
D: US 60 & 7th St	525 (591)	B (B)	729 (820)	B (B)	723 (813)	B (B)
E: US 60 & CR1 (Anjean Rd)	744 (837)	A (B)	627 (706)	A (A)	797 (898)	B (B)
F: US 60 & WV 20 in Charmco	564 (635)	A (A)	520 (585)	A (A)	602 (678)	B (B)

Note: Values in parentheses represent the No-Build condition (i.e., No Action alternative); Existing and No-Build conditions shown represent the years 2004 and 2008, respectively.

4.13.3 Proposed Action

4.13.3.1 Power Plant Site Layout and Facilities Construction

Site Layout

In general, all of the site layout options would potentially impact travel patterns along Tom Raine Drive, John Raine Drive, WV 20, and US 60. Primary access to the project area during construction is essentially similar among the three layout options, all utilizing an access road extending south from John Raine Drive and a temporary bridge across Sewell Creek. There would also be a secondary rear entrance road for emergency use on the southeast corner of the project site that would connect to Pennsylvania Avenue. For Site Options A and B, the primary site access road and bridge used during construction would be temporary. Permanent plant access for Options A and B would be through Tom Raine Drive as it is extended to a new permanent bridge west of the plant site (see Figure 2.4-4). I-64, US 60 and WV 20 would provide the same regional access routes for vehicular travel to Rainelle regardless of the layout options (see Figure 2.4-4). Options A and B would produce comparable traffic movement with the majority of the plant's in- and outbound car and truck travel via WV 20 and Tom Raine Drive, with some travel by employees en route to the Park Center Shopping Complex or US 60. Overall, the siting of the project would potentially increase volumes and change traffic patterns along John Raine Drive. John Raine Drive would most likely see an increase in vehicular travel due to its accessibility to Park Center

Shopping Complex and US 60. The project-related impacts on traffic volumes are discussed in greater detail below.

Facilities Construction

Power Plant Facility

During construction, traffic intersections in Rainelle could potentially experience increased congestion, and some local roads could possibly experience a reduction in the LOS. Other potential transportation impacts during construction could also include damage to state highways or county roads, increased traffic hazards, or impairment of access due to construction activities. During construction, access to the project site would be provided through Tom Raine Drive and John Raine Drive via WV 20. Although John Raine Drive extends east and directly connects to US 60, construction vehicles would be directed to gain access to and from the project site from the west (i.e., Tom Raine Drive and WV 20) to prevent traffic conflicts between construction vehicles and local shoppers at the Park Center Shopping Complex, and to avoid the visibility problems currently associated with Intersection C.

Project-generated traffic volumes during construction would be produced by employees commuting to and from work at the project site, as well as by material suppliers and heavy construction service vehicles. Construction of the proposed facilities would employ an average of 185 construction workers during the 29 months of construction, with a peak of approximately 270 employees in a single month (see Figure 2.4-12). Construction work at the project site is expected to occur on weekdays from 7 a.m. to 6 p.m. WGC anticipates that a large proportion of the permanent and temporary workforce would be located in Rainelle, Quinwood, Rupert and other surrounding communities. Primary impacts would be to regional roads surrounding the project site, such as WV 20 and US 60, and smaller local roads connecting to the site, such as Tom Raine Drive and John Raine Drive, which are likely to be the most traveled. Construction materials and equipment would arrive at the project site by vehicular transport via I-64, US 60 and/or WV 20. Trips generated by construction vehicles and by facility employees would add to existing traffic levels on local roadways; however, substantial construction-related impacts on the local roads are not expected because the existing roadway capacity is adequate to accommodate the additional traffic volumes as indicated in Table 4.13-1 (major roads currently operating at LOS A or B), and construction start and end hours are not expected to coincide with local peak hours.

Beneficiation/Prep Plant Facility

Traffic-related impacts from the construction of the coal refuse prep plant by a third party would be concentrated at or near the coal refuse sites. Although US 60 provides the main east-west thoroughfare for commercial vehicles in Greenbrier County, smaller county roads (e.g., CR 1) would experience greater impacts from commercial vehicles supporting construction. The intersections of US 60 with CR 1 and WV 20 in Rupert and Charmco, respectively (identified as Intersections E and F, respectively, in LOS analysis), would see some increase in traffic from construction activities, as these intersections are the main intersections encountered en route to the coal refuse sites.

An important feature of the type of prep plant that WGC intends to use is its modular design, which would facilitate transport of equipment and structures by standard flat bed trailers. In comparison to typical prep plants, the footprint and number of structures are significantly reduced, thereby reducing the number of construction equipment and vehicle trips required for its construction. Therefore, traffic impacts are expected to be minor because the construction traffic volume is anticipated to be fairly low and temporary, and would not degrade intersection LOS levels to below unacceptable levels (i.e., not lower than LOS "C"). Also, traffic impacts would be focused near the coal refuse sites, which are in relatively remote areas with little existing traffic, and therefore would not cause significant traffic delays.

4.13.3.2 Facility Operation

Operation of the proposed facility would generate additional traffic, and therefore could potentially decrease the LOS at certain intersections, increase the rates of damage to roadways, and increase traffic hazards in Rainelle and its surrounding area. The transportation routes from the quarry and coal refuse sites to Rainelle are shown in Figure 2.4-6. The transportation impacts analysis for the operational phase has been adjusted to reflect the concerns related to the variation of the coal refuse and limestone sources, and provides the level of analysis that was deemed appropriate for reviewing and measuring the impacts for each variation.

Coal Refuse Transport

For the coal refuse (gob) supply, WGC is considering the Anjean and Joe Knob sites as the initial principal fuel sources for the first four years. It is anticipated that Donegan would serve as the next coal refuse supply for the subsequent 11 years, and then Green Valley would serve the following five years.

In order to limit the number of trucks required to travel to the power plant facility in Rainelle, WGC has decided to have the coal refuse processed off-site by a third party. During operation of the power plant facility, a single beneficiation prep plant would be operating simultaneously at or near the fuel source. Therefore, a total of three sites for a beneficiation plant would ultimately be required: one for the Anjean and Joe Knob sources; one for the Donegan source; and one for the Green Valley source. Off-road trucks would be used to haul the raw coal refuse from the coal refuse piles to the prep plant for processing and haul alkaline ash generated by the power plant back to refuse areas undergoing remediation.

On-road trucks would be used to haul the processed fuel to the power plant facility and return alkaline ash back to the prep plant site. To limit the travel for the off-road trucks and, thus minimize road hazards, the most logical location to site a prep plant would be near the coal refuse sites. WGC intends to site the prep plants as close as practicably possible to the coal refuse supply being used at the time. At this time WGC has identified six candidate sites for prep plant locations, as discussed in Section 2.4.4.2 and shown in Figure 2.2-15. Table 4.13-2 lists the travel distances from the candidate sites to the coal refuse and power plant site.

Table 4.13-2. Travel Distances for Candidate Prep Plant Sites

Candidate Site	Fuel Source	Distance to Coal Refuse*	Distance to Power Plant Site*
AN1	Anjean/Joe Knob	4 mi to Buck Lilly, 4.5 mi to Joe Knob	14 mi
AN2	Anjean/Joe Knob	4 mi to Buck Lilly, 4.5 mi to Joe Knob	14 mi
AN3	Anjean/Joe Knob	<0.1 mi to Anjean, 2 mi to Joe Knob	18 mi
DN1	Donegan	<0.1 mi	28 mi
DN2	Donegan	7 mi	21 mi
GV	Green Valley	< 0.1 mi	13 mi

**To convert miles to kilometers, multiply by 1.6093*

The traffic analysis conducted in this section assumes that the final locations for the prep plants would be sited at the coal refuse sites. Most of the sites that WGC has identified as possible candidates for prep plants follow this assumption (see Figure 2.2-15). Only DN2 would require some travel outside the coal refuse sites for the off-road trucks. For this scenario, the off-road trucks would travel approximately seven miles (11 kilometers) south before reaching DN2 (prep plant) from Donegan; however, it is anticipated that most of this travel would be on an abandoned haul road that was used in the past to transport coal. Therefore, traffic impacts related to off-road vehicles would mostly be limited to this back road, away from any residential properties or frequently traveled roads.

If WGC identifies alternative coal refuse sources, further transportation analysis would be required, including consideration of Coal Resources Transportation System (CRTS) permitting procedures, as quality and location of the fuel source may greatly change the amount of required truckloads and location of transportation routes.

Limestone Transport

As noted in Chapter 2, WGC is considering the following options for sources of limestone or other calcium carbonate material:

- Option A – Truck limestone from Boxley's Alta New Area (for the boiler) and Mill Point (for the kiln), with trucking the responsibility of the quarry or other third party.
- Option B – Truck limestone from Greystone quarry or other permitted quarry in the Lewisburg area (for the boiler) and Mill Point (for the kiln), with trucking the responsibility of the quarry or other third party.

Routes for Options A and B are located within or near the Lewisburg region, and haul trucks would most likely use I-64 and US 60 (westbound) to access Rainelle. Therefore, truck routes for Options A and B would be similar. In general, limestone truck volumes would differ among different quarries depending on the limestone characteristics because the higher the quality of limestone (i.e., higher calcium carbonate, $CaCO_3$, content), the less the limestone supply needed to feed the boiler/kiln, and subsequently, a lower number of trips needed for transport. The Lewisburg (Alta) source, which is adjacent the Boxley New Area, exhibited $CaCO_3$ levels ranging from 82 percent to 88 percent (based on chemical analysis records from years 2000-2002). Therefore, it is assumed that the Boxley New Area would exhibit similar limestone quality because of its close proximity. Greystone exhibited 85.8 percent $CaCO_3$ (based on 1994 data). Thus, Options A and B would result in a comparable number of trucks because of the similar quality of both limestone sources. However, the distance from Rainelle to the Boxley's New Area and Greystone, is approximately 20 miles (32 kilometers) and 40 miles (64 kilometers), respectively. The distance from Rainelle to the Mill Point quarry (limestone for kiln) is approximately 60 miles (97 kilometers). Currently, WGC's preference for limestone sources is Option A.

Employee-Generated Traffic

The traffic analysis performed in this section focuses on the key intersections along US 60 that were discussed in Section 3.13. Most of the additional traffic volume during operation of the proposed facility would result from employees commuting to and from work and from material transport.

When the plant is operational, it is anticipated that approximately 62 employees would be working at the proposed plant and nearby facilities during the day shift (i.e., 8 a.m. – 5 p.m., Monday through Friday). Although the ash byproduct facility (by a third party) is not a proposed component of the WGC project, employee estimates from potential ash byproduct manufacturing facilities were used to capture worst-case analysis.. Also, in anticipation of other EcoPark tenants, a general estimate was made regarding the number of employees at a Tilapia/Greenhouse business (refer to Section 4.16.2) based on typical observations for light industrial uses and size of area available for EcoPark development. Therefore, the projected employee traffic used for the traffic analysis represents upper bound estimates. Table 4.13-3 summarizes the expected number of workers at each proposed facility. The traffic generated by the late night shift was not analyzed in this section because it is not expected that there would be a significant number of late night shift workers at the proposed plant and EcoPark.

The number of trips that would be generated by the proposed facility's operation has been estimated based on the application of factors for different uses obtained in the Trip Generation Manual developed by the Institute of Transportation Engineers (ITE). Trip generation estimates are based on the number of employees and the ITE published average vehicle trip generation rates available for utilities and other comparable land uses. Because specific ITE rates are not available for a proposed facility of this nature, trip generation numbers for this traffic study were assumed based on comparable facilities, such as typical trip rates used for light industrial land uses. A "0.5 trips per employee" average rate for AM and PM peak hours was assumed, which means that approximately 31 trips would be generated for each of those peak hours. For the MID peak hour, a rate of "0.3 trips per employee" would result in approximately 18 trips.

Table 4.13-3. Anticipated Number of Employees During the Dayshift

Facility	Day Shift Totals
Power Plant	18
Overhead – Power	7
General – Admin	3
Ash Byproducts (by a third party)*	10
Cementitious Structural Products*	14
Tilapia/Greenhouse*	10
TOTAL	**62**

**Not part of the Proposed Action; however, included to capture worst-case scenario for traffic analysis*
Source: WGC, 2004

Drawing from general past observations of small industrial facilities, it was assumed that 70 percent of the AM trips generated would be entering the plant and 30 percent would be exiting the plant. The reverse was assumed to be true for the PM peak hour scenario. For the MID peak hour, a 50/50 ratio was assumed. Figure 4.13-1 displays the number of employee trips IN (traveling to power plant) and OUT (leaving power plant) during the peak hours and the anticipated travel routes by the employees. The distribution of the trips generated by the employees was developed based on location of residential areas and nearby towns. Based on this information, it was generally assumed that a large proportion of the employee travel to the proposed facility would originate north and east of Rainelle. The higher distribution percentages toward the north indicate that the majority of the trips would utilize US 60 to gain access to the proposed facility.

Truck Trips

Based on anticipated weekly material requirements and delivery schedules, the number of trucks per shift was estimated and is summarized in Table 4.13-4. Truck estimates for the transport of processed fuel and limestone for the boiler were based on worst-case coal refuse and limestone requirements, and therefore, represent conservative truck trip estimates (WGC, 2006). The truck trip analysis was based on the following assumptions:

- Full operation of the proposed plant facility would begin in 2009;
- The proposed facility would be operating 24 hours a day, 7 days a week;
- Processed fuel (i.e., beneficiated coal) truck deliveries would occur: 8 a.m.-5 p.m., Monday through Friday;
- All other supply/waste haul truck deliveries, including those for the ash by-product facilities, would occur 8 a.m.-5 p.m., Monday through Friday; and
- For processed fuel/ash return transport, 22 forty-ton trucks would be available and each would make approximately 3 roundtrips during its shift.

Solid waste transport was not included in the truck trips analysis, as it was assumed that the volume of solid waste (other than ash) generated would be insignificant, hence, hauling would only take place one to three times per week and during off-peak hours. Aqueous ammonia trucks were also not considered in the analysis because it is estimated that delivery of the ammonia would only occur once per week. Figure 4.13-2 was developed for the truck distribution and routes that would be expected to occur during the peak hours for all fuel supply scenarios (i.e., Anjean, Green Valley, etc.). The truck trips would most likely vary among the AM, MID, and PM peak hours; however, conservative estimates were applied at each intersection for an upper bound estimate.

Table 4.13-4. Worst-Case Trucking Requirements to Power Plant Facility During Operation

Material	Truck Size (ton)	Weekly Requirement	Shift[1] Requirement	# Trucks	# Trips[2]	
		(tons/wk)	(tons/shift)	per shift[1]	IN/hr	OUT/hr
Co-Production Facility						
Processed Fuel/Ash Return	40	12,600	2,520	*66*	*8*	*8*
Limestone (Boiler)	20	689	138	*7*	*1*	*1*
Cement Production Facility/Kiln Facilities [3, 4]						
Raw Material Delivery	20	163	33	1.6	---	
Alumina source	20	95	19	1	---	
Gypsum source	20	354	70	3.5	---	
Kiln Fuel	20	117	23	1.2	---	
Limestone[5] (Kiln)	20	980	196	10	---	
Cement	20	700	140	7	---	
Cement Total				*24*	*3*	*3*

Note: Number of trucks shown reflects number of round trips per shift. To convert tons to metric tonnes, multiply value by 0.907.
[1]Shift means Eight-hr shift (Mon-Fri); [2] Trip means a single or one-direction vehicle movement (i.e., either entering or exiting the plant)
[3]Associated kiln/cement production trucks were analyzed to capture worst-case scenarios in anticipation of planned cement-related deliveries. [4] Source: Daily Requirements of Materials taken from Hazen's Flowstream Summary (CDR Book2 "04_02_02HazenFlowStreamSummary 12-22-04 CWK"); [5] Source: Hazen (If WGC identifies pure CAO source, volume requirement is substantially reduced.)

As shown in Table 4.13-4, the Co-Production Facility would require 73 trucks per shift (66 plus 7) for the transport of fuel/ash and limestone and the kiln facilities would require 24 trucks per shift. This would total 97 trucks daily (assumed that a shift means an 8-hour day). The table also breaks down the number of trucks per shift into number of trips per hour (e.g., the processed fuel/ash return trucks would require 8 trucks entering and 8 trucks exiting for a total of 16 truck trips per hour). Because each truck would result in two vehicle trips (or one roundtrip), one upon entering the project site and one upon exiting, this would result in approximately 194 total trips per day (8 a.m.-5 p.m., Monday through Friday).

The roads that would be most impacted would depend on the fuel source (see Figure 2.4-6 for truck routes). As described earlier, WGC is considering the Anjean and Joe Knob sites as the initial principal fuel sources for the first four years. It is anticipated that Donegan would serve as the next coal refuse supply for the subsequent 11 years and Green Valley would serve the following five years. In general, US 60 in Rainelle would be accessed in all scenarios and would be most impacted with respect to traffic, road hazards, and maintenance (see Table 4.13-2 for distances between plant site and fuel source). During the Anjean/JoeKnob and Donegan scenarios, US 60 from Rainelle to Rupert and CR 1 would be used. During the Green Valley scenario, US 60 between Rainelle and Charmco and WV 20 from Charmco to Green Valley would be used.

Level of Service (LOS) Build Conditions

The estimated number of trips through the study intersections shown in Figures 4.13-1 and 4.13-2 were in addition to the projected No-Build volumes that were discussed in the No Action alternative. The new traffic volume totals for each intersection were entered into the HCS2000 traffic model and used to determine Build conditions (i.e., Proposed Action conditions) LOSs (see Appendix J for model outputs). A comparison of the existing and projected LOSs, with and without the Proposed Action, is provided in Table 4.13-5 for the AM, MID, and PM peak hours.

As shown in Table 4.13-5, all study area intersections would continue to operate at LOS A or B. In general, over the analyzed time period (2004-2008), all of the intersections would exhibit minor LOS degradation regardless of whether or not the Proposed Action would take place. Upon examining the Average Control Delay values between the No-Build and Build conditions (i.e., No Action and Proposed Action conditions), the Proposed Action would not contribute to significant increases in traffic delays at the study intersections. Based on the results shown in Table 4.13-5, delays would be few, and no substantial traffic queuing or congestion is expected to occur on any of the major streets during plant operations.

One area of concern that should be noted is the conflicting turn movements at Intersection A. For haul trucks to gain site access from WV 20 (southbound), a left turn movement is required. As a result, trucks may begin to 'pile up' as they wait to turn left onto Tom Raine Drive. This may present a traffic hazard for automobiles trying to bypass the queue. However, based on the assumptions used for the LOS analysis, the impact at this intersection is considered to be non-significant, because the operating LOS for the year 2008 was estimated to be at level A, which signals free-flowing traffic. Also, the current line of sight for vehicles making turning movements at Intersection A is considered fairly good and should provide unobstructed views of on-coming traffic. Any significant changes in traffic patterns due to future EcoPark development that could not be reasonably captured in this LOS analysis would warrant further traffic assessments.

TABLE 4.13-5. Peak Hour Traffic Volume, Average Control Delay, and LOS for Existing, No-Build, and Build Conditions

INTERSECTION	AM Peak Hr			MID Peak Hr			PM Peak Hr		
	Existing LOS	No-Build LOS	Build LOS	Existing LOS	No-Build LOS	Build LOS	Existing LOS	No-Build LOS	Build LOS
A: WV20 and Tom Raine Dr.									
Traffic Volume	216	244	301	313	352	396	284	320	377
Average Control Delay (veh/s)	8.1	8.1	8.4	8.2	8.3	8.6	8.2	8.3	8.5
Intersection LOS	A	A	A	A	A	A	A	A	A
B: US60 & WV20 (S. Sewell St.)									
Traffic Volume	550	619	668	479	540	577	512	577	625
Average Control Delay (veh/s)	8.4	8.6	8.7	8.3	8.5	8.7	8.4	8.4	8.6
Intersection LOS	A	A	A	A	A	A	A	A	A
C: US60 & Locust St. & Park Center									
Traffic Volume	663	746	787	988	1112	1144	849	954	996
Average Control Delay (veh/s)	10.5	11.0	11.2	13.0	14.8	15.7	10.7	11.5	11.8
Intersection LOS	B	B	B	B	B	B	B	B	B
D: US60 & 7th St									
Traffic Volume	525	541	632	729	820	852	722	813	854
Average Control Delay (veh/s)	11.0	11.4	11.8	12.4	13.1	14.0	12.2	12.8	13.5
Intersection LOS	B	B	B	B	B	B	B	B	B
E: US60 & CR1 (Anjean Rd)(+)									
Traffic Volume	744	837	865/851	527	706	726/712	798	898	927/913
Average Control Delay (veh/s)	10.0	10.6	10.9/10.7	9.5	9.9	10.2/10.0	10.9	11.7	12/11.9
Intersection LOS	A	B	B/B	A	A	B/A	B	B	B/B
F: US60 & WV20 (in Charmco)									
Traffic Volume	564	635	671	520	585	611	602	677	710
Average Control Delay (veh/s)	9.5	9.7	10.1	9.4	9.8	10.0	10.2	10.8	11.0
Intersection LOS	A	A	A	A	A	A	B	B	B

Note: The projected No-Build and Build volumes were based on a 3% growth factor per year as given by WVDOT.

(+) There are two BUILD scenarios for Intersections E: one scenario occurs when the fuel source is from Anjean, Joe Knob, or Donegan (first value shown); and the other scenario (second value shown) occurs when the fuel source is from Green Valley.

Additional Traffic Items

North of Anjean, CR 1, CR 32, and CR 39 are infrequently traveled roads and are currently not designated as CRTS roads (current gross weight limit is 65,000 pounds [29 metric tons]) from Anjean to Donegan. For the prep plant candidate site DN2, it is anticipated that the abandoned haul road between Donegan and Beech Knob would be used for the off-road trucks. If WGC were to continue using similar trucking operations as proposed for Anjean and Green Valley (i.e., 40-ton loaded coal trucks), an application would be required by the West Virginia Public Services Commission (PSC) for CRTS inclusion of the route between Anjean and Donegan. The CRTS-permitting process entails a fee and inspection of the conditions of the road and bridges by the district. There are three bridges en route to Donegan from Anjean. The concrete bridge just before the Donegan site is currently in poor condition and would need to be upgraded before new trucking operations began at Donegan. It is anticipated that the quality of the coal refuse from Donegan would not fall outside the worst-case fuel requirement that was used for this traffic analysis. Hence it is assumed that if and when Donegan is used as a coal refuse source, the LOS analysis at Intersection E would be comparable to the analysis that was conducted for the Anjean scenario.

4.13.3.3 Power Transmission

None of the options for upgrading the existing power transmission corridor or establishing a new transmission corridor would significantly affect traffic conditions in the region. Potential traffic impacts would be limited to construction-related activities; however, these traffic impacts would be few and temporary.

4.13.3.4 Water Supply

Potential actions and options for meeting the water supply requirements of the proposed project would not affect the traffic conditions in the region. Potential traffic impacts would be limited to construction-related activities; however, these traffic impacts would be few and temporary.

4.14 Public Health and Safety

4.14.1 Method of Analysis

4.14.1.1 Methodology for Analyzing Impacts to Public and Worker Safety

Public and worker safety-related impacts were considered from the perspective of both increased road hazards and on-the-job incidents. Methods used to assess road safety were based on crash rates obtained from the National Highway Transportation Safety Administration (NHTSA). Methods to assess worker safety-related impacts were based on application of accident and incident rate data as described in Section 3.14 for activities that are expected to be associated with the Proposed Action.

4.14.2.1 Methodology for Analyzing Impacts to Public and Worker Health

Ammonia Handling and Storage

Although, the storing and loading of aqueous ammonia are not subject to OSHA's Process Safety Management (PSM) standard (29 CFR 1910.119 – for anhydrous ammonia), WGC would implement a number of safety controls and procedures, as discussed in Section 2.3.4, to minimize the potential for the accidental releases of aqueous ammonia. Furthermore, a hazard assessment analysis of the worst-case and alternative release scenarios was prepared. This risk analysis was based on several guidance documents as provided by the U.S. EPA's Risk Management Program, including: *Risk Management Program Guidance for Offsite Consequence Analysis (OCA)*; *General Risk Management Program Guidance*; and *RMP*Comp* (computer software).

Contaminants of Potential Concern (COPCs)

Methods used to assess human health-related impacts associated with contaminants of potential concern (COPCs) are described below. The following criteria were used to determine whether a significant impact exists:

- Proposed Action would result in an unacceptable cancer risk as defined by the U.S. EPA, or a cancer risk over 10^{-4} (1 in 10,000).
- Proposed Action would result in an unacceptable non-cancer hazard (i.e., morbidity) as defined by U.S. EPA, or a hazard index greater than 1.
- Proposed Action would create unsafe conditions or expose employees and the public to situations that exceed health standards, or present an undue risk of health-related problems.

The multi-pathway health risk assessment model developed by the U.S. EPA to assess exposures and risks to the various identified receptors was used to evaluate the potential impacts that could occur as a result of the proposed Co-Production Facility. The fate and transport models used in the risk assessment were based on those in the U.S. EPA *Methodology for Assessing Health Risks Associated With Multiple Pathways of Exposure to Combustor Emissions* (USEPA, 1998a), the U.S. EPA *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities* (USEPA, 1998b), and subsequent correction to the Protocol (USEPA, 1999b). The model is used to estimate direct inhalation health risks as well as health risks resulting from incidental ingestion of airborne constituents deposited to soil, consumption of produce and livestock exposed to facility-related chemicals, recreational contact with water bodies and sediments in the area of influence of the facility, and consumption of fish caught in affected water bodies.

COPCs were identified through emissions testing on trial burns that were conducted on coal refuse samples collected from Anjean's Buck Lilly pile, as well as from maximum potential emission rate data presented in the WGC PSD permit application (see Section 3.3, Atmospheric Conditions). The trial burn was conducted on a pilot scale boiler owned by Alstom Power on September 17, 2004. Analytical testing of emissions was conducted by TRC Environmental Corporation for the following constituents based on the noted U.S. EPA Methods:

- Particulates and Metals – U.S. EPA Test Methods 5 and 29
- PAH and Dioxins - U.S. EPA Test Methods SW-846 0010 and 23
- VOCs – U.S. EPA SW-846 0030

Average emission rate concentration data generated by the trial burn was the primary data source for inputs into the risk model. Detection limits were used for those contaminants that were not detected in the analysis. Maximum potential emission rate data provided in the PSD application were used for only those contaminants that were not included or analyzed in the trial burn data but were presented in the PSD application. The PSD data are based on EPA AP-42 Series emission factors for other chemicals that are also associated with anthracite coal combustors. Specific and groups of chemicals included in the risk model are listed in Table 4.14-1.

Table 4.14-1. Chemicals of Potential Concern

PCDD/PCDF	Semi-Volatiles
2,3,7,8-Tetrachlorodibenzodioxin	Benzo(a)pyrene (equivalents)
	Bis(2-ethylhexyl)phthalate
	Bromoform
	2,4-Dinitrotoluene
	Formaldehyde
	Isophorone
	Phenol
PCBs	**Acid Gases**
Polychlorinated biphenyls	HCl

Volatiles			Inorganics
Acetaldehyde	Ethylene dichloride (I,2-dichloroethane)	Methylene chloride	Antimony
Acetone	Ethylene dibromide (I,2-dibromoethane)	Methyl ethyl ketone (2-butanone)	Arsenic
Acetophenone	Freon 11 (trichlorofluoromethane)	Methyl methacrylate	Beryllium
Acrolein	Freon 12 (dichlorodifluoromethane)	Methyl tert butyl ether	Cadmium
Benzene	Hexane	Styrene	Chromium VI
Benzyl chloride	Methyl bromide (bromomethane)	Tetrachloroethene	Cobalt
Carbon disulfide	Methyl chloride (chloromethane)	Toluene	Manganese
Chlorobenzene		1,1,1-Trichloroethane	Mercury (elemental)
Chloroform		Vinyl acetate	Nickel
Cumene		Xylenes	Selenium
Ethylbenzene			
Ethyl Chloride (chloroethane)			

An important part of the exposure assessment is the identification of subgroups within the potentially exposed population of the study area. It is assumed that the exposure of each receptor can be represented using exposure factors that reflect patterns of behavior and activity representative of the receptor subgroup. For the purpose of the EIS, a conservative approach to assessing risk was adopted which included the use of subsistence farmer, resident/home gardener, nursing infant, subsistence fisher, and sensitive subpopulation (i.e., student/day care child and hospital patient/extended care resident) scenarios. The assumptions used in each scenario to calculate the estimated exposures to these receptors are expected to be the highest exposures found. These receptors were chosen to be the most conservative for individuals living in the region of influence; so that if found to be within acceptable U.S. EPA guideline values, then the potential for exposure to the remaining population would be much lower. The exposure assumptions for each of the receptor types are described in Table .

Table 4.14-2. Sensitive Sub-Populations Considered

Population Subgroup	Methods of Exposure
Resident/Home Gardener (adult and child)	• Consumption of homegrown produce; • Consumption of locally raised beef, milk, pork, chicken and eggs; • Incidental soil ingestion; • Direct inhalation of vapors and particulates.
Subsistence Farmer (adult and child)	• Consumption of farm-produced beef and milk; • Consumption of homegrown produce; • Consumption of farm-produced pork, chicken and eggs; • Incidental soil ingestion; • Direct inhalation of vapors and particulates.;
Nursing Infant	• Exposure to dioxin in mother's milk for all exposure scenarios
Subsistence Fisher (adult and child)	• Consumption of homegrown produce; • Consumption of locally raised beef, milk, pork, chicken and eggs; • Incidental soil ingestion; • Direct inhalation of vapors and particulates; • Consumption of fish from specific waterbodies.
School/Day Care Child	• Incidental soil ingestion; • Direct inhalation of vapors and particulates.
Hospital Patient/Extended Care Resident	• Direct inhalation of vapors and particulates

To calculate the risk associated with each of the identified subgroups, representative receptor points were selected for the prediction of associated exposure rates. Based on the local setting and atmospheric conditions, a total of 18 discrete receptor locations were identified for consideration in the model. These receptor locations and their relative distance from the stack of the proposed Co-Production Facility are shown in Figure 4.14-1 and listed in Table 4.14-3.

Based on the identified locations, normalized deposition concentrations for the vapor phase, the particulate phase, and the particulate-bound phase were determined through air dispersion modeling (see Section 4.3, Atmospheric Conditions). The respective normalized concentrations for each deposition phase at the respective receptor locations from the model results are presented in Table 4.14-4. It is important to note that pollutants discharged from tall stacks are released into the atmosphere at elevations well above ground level, which results in lower pollutant levels closer to the stack where dispersion has yet to bring the plume in contact with the ground. The emitted plume disperses as it travels downwind and eventually intercepts the ground surface where pollutant levels are maximized. Thus, pollutant concentrations at receptors very close to the plant (e.g., Sewell Landing Apartments) result in very low values when compared to other more distant receptor locations.

Table 4.14-3. Discrete Receptor Points Used for Risk Assessment Modeling

ID	SITE	Distance from Stack (km)
Local Coordinates (Rainelle)		
L1	Rainelle School	0.75
L2	Heartland Nursing and Rehabilitation Center	0.39
L3	Sewell Landing Apartments (ADA Compliant)	0.24
L4	Downtown Rainelle (Main St/6th St)	1.21
Farm Coordinates		
F1	Williamsburg	24.7
F2	Falling Spring	38.5
F3	Canvas	32.6
Trout Stream Coordinates		
S1	Flynn Creek	23.9
S2	Job Knob Branch	26.0
S3	Middle Branch	30.9
S4	Hanging Rock Branch	45.3
S5	Big Run	40.4
S6	Dogway Fork	46.6
S7	Brown Creek	14.8
S8	Beech Run	22.9
S9	Bushy Meadow Creek	20.7
S10	Barrenshe Run	44.3
S11	Cranes Nest Run	30.5

Normalized concentrations that were generated for each receptor location, along with the emission rate data expected for the Co-Production Facility, were then used to determine the resulting deposition rates for each applicable COPC. The deposition values were in turn used in the risk assessment model and as part of risk characterization efforts to determine the respective, as well as total, risks and hazards for each population type considered in the model.

The objective of the risk characterization portion of the risk assessment was to evaluate the potential health impacts of exposure to the constituents of emissions released into the environment by the Co-Production Facility. Risk characterization is the final step of the risk assessment process. In this step, cancer and non-cancer toxicity values for the COPCs found in stack and fugitive emissions were examined in conjunction with estimated exposure doses corresponding to the sensitive receptors defined in Table 4.14-2. Total lifetime cancer risks and non-cancer health hazards associated with direct and indirect exposures to constituents of the facility emissions were then compared with values considered acceptable by the U.S. EPA.

Table 4.14-4. Deposition Modeling Results

VAPOR PHASE						PARTICULATE PHASE				PARTICULATE-BOUND	
ID	RECEPTORS	CONC	WET	CONC	TOTAL	DRY	WET	CONC	TOTAL	DRY	WET
		(µg/m^3)	(g/m^2/yr)	(µg/m^3)	(g/m^2/yr)	(g/m^2/yr)	(g/m^2/yr)	(µg/m^3)	(g/m^2/yr)	(g/m^2/yr)	(g/m^2/yr)
Local Receptors (Rainelle)											
L1	Rainelle School	0.00193	0.0334	0.0015	0.06851	0.00194	0.06656	0.0019	0.02624	0.00036	0.02589
L2	Nursing Home	0.00003	0.04978	0.00003	0.10571	0.00003	0.10568	0.00003	0.03954	0.00001	0.03953
L3	Sewell Landing Apts	0	0.06587	0	0.1471	0	0.1471	0	0.05349	0	0.05349
L4	Downtown Rainelle	0.0096	0.02196	0.0071	0.04893	0.00903	0.0399	0.0091	0.01811	0.00168	0.01643
Farm Receptors											
F1	Williamsburg	0.00168	0.00011	0.0011	0.00054	0.00046	0.00008	0.0016	0.00018	0.0001	0.00008
F2	Falling Spring	0.00106	0.00005	0.0007	0.00024	0.00021	0.00003	0.001	0.00008	0.00005	0.00004
F3	Canvas	0.00108	0.00005	0.0008	0.00025	0.00022	0.00003	0.001	0.00009	0.00005	0.00005
Trout Stream Receptors											
S1	Flynn Creek	0.00317	0.00014	0.0021	0.00074	0.00064	0.0001	0.003	0.00025	0.00014	0.00011
S2	Job Knob Branch	0.00367	0.00013	0.0024	0.0008	0.00071	0.00009	0.0035	0.00026	0.00016	0.0001
S3	Middle Branch	0.00358	0.00012	0.0023	0.00064	0.00056	0.00008	0.0034	0.00022	0.00013	0.0001
S4	Hanging Rock Branch	0.00296	0.00007	0.0019	0.00036	0.00032	0.00004	0.0028	0.00013	0.00008	0.00006
S5	Big Run	0.00192	0.00006	0.0012	0.00032	0.00028	0.00003	0.0018	0.00011	0.00007	0.00005
S6	Dogway Fork	0.00249	0.00005	0.0016	0.00031	0.00028	0.00003	0.0023	0.00011	0.00007	0.00005
S7	Brown Creek	0.01506	0.00068	0.0112	0.00377	0.00321	0.00055	0.0145	0.00114	0.00066	0.00048
S8	Beech Run	0.0061	0.00025	0.0042	0.00126	0.00109	0.00017	0.0058	0.00042	0.00024	0.00019
S9	Bushy Meadow Creek	0.00755	0.00028	0.0059	0.00163	0.00144	0.00019	0.0073	0.00051	0.0003	0.00022
S10	Barrenshe Run	0.00429	0.00008	0.0029	0.00049	0.00044	0.00005	0.004	0.00018	0.0001	0.00007
S11	Cranes Nest Run	0.00938	0.0002	0.0069	0.00123	0.00111	0.00012	0.009	0.00041	0.00025	0.00016

Of special note is the method by which infant exposure to dioxin in mothers' breast milk has been assessed. The presence of compounds in mothers' milk provides an exposure pathway to infants, who constitute a sensitive subpopulation. The concentration of a constituent in breast milk is based on the maternal dietary intake of soil, vegetation, beef, dairy, pork, poultry, and eggs, as well as inhalation of air. However, because of the contracted exposure duration (i.e., one year) of the infant, "risk" to the infant was not calculated in the same fashion as for older children and adults.

The nursing infant scenario evaluated exposure to dioxins in its mother's breast milk during a nursing period of one year. The exposure to an infant was compared to 50 pg/kg/day (5.0×10^{-8} mg/kg/day) established by the U.S. EPA *Estimating Exposure to Dioxin-Like Compounds. Volume II: Properties, Sources, Occurrences, and Background Exposures, EPA/600/6-88/005Cb* (USEPA, 1994).

Particulate Matter (PM)

People within the area of influence of the WGC power plant site would be exposed to PM associated with the activities and processes on the site as well as with ambient PM not associated with the project. The U.S. EPA *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities* describes ambient PM as:

"…a complex mix of constituents derived from many sources, both natural and anthropogenic. Hence, the physicochemical composition of PM generally reflects the major contributing local and regional sources arising locally as well as regionally. It stands to reason that the contribution of any given component within the mix may not be equivalent in value or potency, but may well be highly dependent on other physicochemical attributes (e.g., co-constituents, specific bioavailability, or chelates), as well as the health status of the exposed individual. Evidence collected to date indicates that the discovery of a uniquely responsible physicochemical attribute of PM is not likely to occur." (USEPA, 2004a)

It has long been understood that exposure to particulates can lead to a variety of serious health effects. People living for long periods in areas with high particle levels can exhibit such problems as decreased lung function, development of chronic bronchitis, and premature death. Short-term exposures to particle pollution (hours or days) are associated with a range of effects, including decreased lung function, increased respiratory symptoms, cardiac arrhythmias (heartbeat irregularities), heart attacks, hospital admissions or emergency room visits for heart or lung disease, and premature death. (U.S. EPA 1982c; 2004; and 2005).

Subsequent to the release of the proposed rule on the NAAQS for PM, the U.S. EPA conducted a review and assessment of the numerous studies relevant to assessing the health effects of PM that were published too recently to be included in the 2004 PM Air Quality Criteria Document (AQCD). Although the new information and findings did not materially change any of the broad scientific conclusions regarding the health effects of PM exposure made in the 2004 PM AQCD, the survey and assessment found that the new studies expanded the scientific information and provided important insights on the relationships between PM exposure and health effects of PM. The conclusions of the survey and assessment are paraphrased below:

- Recent epidemiologic studies continued to report associations between acute exposure to fine particles and mortality and morbidity health endpoints. These include three multi-city analyses, the largest of which (in 204 counties) shows a significant association between acute fine PM exposures and hospitalization for cardiovascular and respiratory diseases, and suggestions of differential cardiovascular effects in eastern U.S. as opposed to western U.S. locations. The new studies support previous conclusions that short-term exposure to fine PM is associated with both mortality and morbidity.

- New toxicology and epidemiologic studies have continued to link health outcomes with a range of fine particle sources and components. Several new epidemiologic analyses and toxicology studies have included source apportionment techniques, and the results indicated that fine PM from numerous sources, including traffic-related pollution, regional sulfate pollution, combustion sources, re-suspended soil or road dust, are associated with various health outcomes. Toxicology studies continue to indicate that various components, including metals, sulfates, and elemental and organic carbon, are linked with health outcomes, albeit at generally high concentrations. Recent epidemiologic studies have also linked different fine PM components with a range of health outcomes; new studies indicate effects of the organic and elemental carbon fractions of fine PM that were generally not evaluated in earlier analyses.
- The recent epidemiologic studies greatly expand the more limited literature on health effects of acute exposure to thoracic coarse particles ($PM_{10-2.5}$). The 2004 PM AQCD conclusion that $PM_{10-2.5}$ exposure was associated with respiratory morbidity is substantially strengthened with these new studies; several epidemiologic studies, in fact, report stronger evidence of associations with $PM_{10-2.5}$ than for $PM_{2.5}$. In two new case-crossover studies, associations with thoracic coarse particles are robust to the inclusion of gaseous co-pollutants. For mortality, many studies do not report statistically significant associations, though one new analysis reports a significant association with cardiovascular mortality in Vancouver, Canada.
- Evidence of associations between long-term exposure to thoracic coarse particles and either mortality or morbidity remains limited.
- New toxicology studies have demonstrated that exposure to thoracic coarse particles, or PM sources generally representative of this size fraction (e.g., road dust), can result in inflammation and other health responses. Clinical exposure of healthy and asthmatic humans to concentrated ambient air particles comprised mostly of $PM_{10-2.5}$ showed changes in heart rate and heart rate variability measures. The results are still too limited to draw conclusions about specific thoracic coarse particle components and health outcomes, but it appears that endotoxin and metals may play a role in the observed responses. Two studies comparing toxicity of dust from soils and road surfaces found variable toxic responses from both urban and rural locations.
- Significant associations between improvements in health and reductions in PM and other air pollutants have been reported in intervention studies or “found experiments.” One new study reported reduced mortality risk with reduced $PM_{2.5}$ concentrations. In addition, several studies, largely outside the U.S., reported reduced respiratory morbidity with lowered air pollutant concentrations, providing further support for the epidemiological evidence that links PM exposure to adverse health effects (USEPA, 2006).

PM is not typically included as a separate COPC in risk assessments because of the complexity of the chemical make-up of particulates and also because of the temporal and spatial variability of PM, locally and regionally (USEPA, 2005). However, a less robust analysis can be conducted to determine the potential cumulative impact of site-related and ambient PM_{10} and $PM_{2.5}$ via comparison with their respective National Ambient Air Quality Standards (NAAQS). The ambient PM_{10} and $PM_{2.5}$ concentrations were obtained from data collected in 2004 by the WVDEP’s Division of Air Quality for Kanawha and Summers, respectively.

For the PM_{10} analysis the 24-hour and annual concentrations derived from the air dispersion models were compared on a receptor-by-receptor basis and results with the highest pollutant concentrations were used in the analysis. $PM_{2.5}$ was not modeled because the NAAQS have not been implemented in the state. However, the U.S. EPA’s Air Quality Criteria for Particulate Matter (USEPA, 2004c) presented data from the *Aerometric Information Retrieval System on the Ratios of $PM_{2.5}$ to PM_{10}* for various regions in the

U.S., and provides 24-hour and annual concentrations of $PM_{2.5}$ as a function of PM_{10}. The results are discussed in Section 4.14.2.3.

4.14.2 No Action Alternative

The No Action alternative in this case would result in no changes to baseline conditions and would, therefore, have no impacts in the area of human health and safety.

4.14.3 Proposed Action

4.14.1.3 Public and Worker Safety

Predicted Work-Related Incidents and Accidents

Worker safety-related impacts associated with the Proposed Action would be associated with facility construction, operation of industrial equipment, and transportation of materials and wastes to and from the sites. For these project-related areas, notable differences are not expected between the various plant siting options under consideration by WGC. Based on the incident rates developed by the Bureau of Labor and Statistics (see Section 3.14), the potential for work-related incidents and accidents as presented in Table 4.14-5 would not be significant when compared to baseline conditions.

Table 4.14-5. Predicted Incidents for the Proposed Action

Industry	Estimated Number of Workers	Potential for recordable incidents per Year	Potential Lost Workday Cases per Year	Potential Number of Fatalities (based on rate per 100,000 FTEs)
Construction (peak)	274	23.02	11.51	<1 (0.04)
Mining*	28	1.9	1.54	<1 (0.00)
Trucking	42	2.94	1.3	<1 (0.02)
Utilities	109	1.96	0.03	

**includes prep plant and coal refuse site locations*

Road Safety

To control overweight trucks, Senate Bill (SB) 583 was passed and signed into law in 2003, which revised weight enforcement laws, was designed especially with coal trucks in mind, and established the Coal Transportation Resource System (CRTS) that includes most of southern West Virginia, including Greenbrier and Nicholas Counties. It is anticipated that implementation of SB 583 would provide stricter electronic truck weight reporting and higher penalties for violators and, therefore, safer road conditions. Also, a hotline has been established which allows citizens to call and report poor driving or law violations by truck drivers throughout West Virginia. It is expected that weight enforcement and motor carrier officers will access this information on a daily basis to deploy the necessary enforcement resources. In addition, the CRTS permit fees provide funds that benefit CRTS road maintenance, which would cover the majority, if not all, of the routes involved in the WGC project. If the new law works as claimed, a substantial increase in road hazards and rapid deterioration is not expected as a result of the Proposed Action, due to the new enforcement rules on haul trucks.

Data from the National Highway Transportation Safety Administration (NHTSA) and National Institute for Occupational Safety and Health (NIOSH) was reviewed to assess the potential for accident-related impacts. Available statistical and industry data was also researched and reviewed. Based on 2003 statistics from NHTSA's National Center for Statistics and Analysis, the U.S. involvement rate for large trucks (gross vehicle weight rating greater than 10,000 pounds) in fatal crashes was 2.19 per 100 million vehicle miles traveled (NHTSA, 2004a). In comparison, the fatality rate per 100 million vehicle miles of travel for all registered motored vehicles in 2003 was 1.46 (NHTSA, 2004b). NHTSA noted that "most of the fatal crashes involving large trucks occurred in rural areas (66 percent), during the day (67 percent), and on weekdays (80 percent). During the week, 74 percent of the crashes occurred during the daytime (6 a.m. to 5:59 p.m.). On weekends, 62 percent occurred at night (6 p.m. to 5:59 a.m.)" (NHTSA, 2004a). The U.S. involvement rate for large trucks in injury crashes was 41 per 100 million vehicles miles traveled in 2003 (NHTSA, 2004a). In comparison, this rate was 100 per 100 million vehicle miles of travel for all registered motor vehicles during that same year (NHTSA, 2004b). Based on these data, and the estimated vehicle miles that would be traveled, potential increases of fatal and injury crashes for the large trucks hauling are presented in Table 4.13-6.

Table 4.14-6. Estimated increase in fatal and injury crashes resulting from the project

Site	Distance to Plant Site (Rainelle) (mi)	Total Distance Traveled per year (mi)	Fatal crash involvement rate per year[1]	Injury crash involvement rate per year[1]	Number of Fatalities during period of fuel source's use[2]	Number of Injuries during period of fuel source's use[2]
Anjean/Joe Knob	14	466,000	0.010	0.191	0.04	0.76
Green Valley	13	433,000	0.009	0.178	0.05	0.89
Donegan	28	932,000	0.020	0.382	0.23	4.20
				Total	*0.32*	*5.85*

[1] These estimates are based on U.S. data and do not factor in local conditions (e.g., road conditions, terrain, traffic flow and congestion).

[2] Assumes that Anjean and Joe Knob sites would be initial principal fuel sources for the first four year, Donegan for the subsequent 11 years, and then Green Valley the following five years.

Table 4.14-6 indicates that the highest number of fatalities and injuries would occur when Donegan was the fuel source – total number of fatalities and injuries that could occur during Donegan's 11-year period would be 0.23 and 4.2, respectively (assumes that Anjean and Joe Knob sites would be initial principal fuel sources for the first four year, Donegan for the subsequent 11 years, and then Green Valley the following five years). "0.23 fatalities" means that over the 11-year period that Donegan was the fuel source, there would be less than one fatality that could occur or a 23 percent probability that one fatality could occur over that period. The estimates are highest for Donegan, principally because the number of miles traveled and period of use as fuel source is greater. The total number of fatalities and injuries related to truck accidents that could occur over the 20-year period of the Co-Generation Facility's operations would be 0.32 and 5.85, respectively.

Based on statistics from NHTSA (NHTSA, 2004a), West Virginia does appear to have a slightly higher fatality rate (7.1 percent) than the U.S. as a whole (3.4 percent) for crashes involving large trucks, buses, and other unknown vehicle types. Considering this fact, local accident rates could be higher than those predicted in this analysis; however, no local data were available to quantify this potential. If the rates predicted in Table 4.15-6 were scaled proportionally to the difference in U.S. and West Virginia fatality rates, the highest annual fatality rate associated with the Proposed Action would be less than 0.08 annually, or approximately 1.5 persons over a 20-year period.

4.14.2.3 Human Health Risks

Aqueous Ammonia Risk Assessment

During plant operations, aqueous ammonia would be used for the reduction of nitrogen oxides (NO_x) in the SNRC system. Although liquid ammonia is less volatile than other common forms of ammonia, such as anhydrous ammonia, once exposed to open air, it will vaporize and pose a public health risk because of its emissions. Ammonia gas is a severe respiratory tract irritant. OSHA considers ammonia gas to be a high health hazard because it is corrosive to the skin, eyes, and lungs. Depending on the concentration inhaled (e.g., at 0.6 to 50 ppm), it may cause burning sensations, coughing, wheezing, shortness of breath and other syndromes. Exposure to concentrations of approximately 200 to 300 ppm is immediately dangerous to life and health. Ammonia has a low odor threshold (20 ppm), hence, most people will seek relief at lower concentrations. However, brief exposure to concentrations above 1,500 ppm may result in pulmonary edema, a potentially fatal accumulation of liquid.

Accordingly, DOE conducted a risk assessment (URS, 2006) to investigate the potential health consequences resulting from a potential aqueous ammonia spill under "worst-case" (see U.S. EPA definition below) and more likely scenarios. The results provide information about the maximum reasonably foreseeable potential consequences that might occur from a spill as a result of accidental causes (natural or human induced), or as a result of a deliberate act of sabotage or terrorism.

A 28 percent solution of aqueous ammonia would be stored in a single 15,000 gallon storage tank having a working volume of 13,500 gallons (90 percent capacity). The capacity of the tank would provide approximately one to two weeks of storage, depending on the characteristics of the beneficiated fuel. Although the exact frequency of transport is uncertain at this time, it is estimated that, based on a 6,000-gallon tank truck, the proposed power plant would require approximately one delivery per week.

The aqueous ammonia system would include the tank, pumps and piping, and instrumentation and controls. For secondary spill containment, the tank would be set within a concrete containment area of approximately 600 square feet (60 square meters). The concrete containment area would be diked and would be sized to contain the entire contents (13,500 gallons [51,000 liters]) of a spill should the entire tank fail. The tanker truck unloading area would also be provided with secondary containment to capture any potential spills and prevent migration to soil or groundwater. Therefore, the accidental release analysis in this section is limited to air emissions from vaporization of the ammonia.

U.S. EPA defines a worst-case release of toxic substances that are normally liquids at ambient temperatures to be the release of the greatest quantity held in a single vessel or a pipe, taking into consideration administrative controls that limit the maximum quantity. Furthermore, it is assumed that the quantity of liquid in the vessel or pipe is spilled instantaneously to form a liquid pool. In evaluating worst-case release scenarios, U.S. EPA allows the consideration of passive mitigation, which includes mitigation that does not involve human, mechanical, or energy input. Thus, passive mitigation can include dikes, containment vessels, enclosures, and facility administrative controls that limit inventory (minimizing storage amounts).

For this analysis, the worst-case release would be a rupture of the storage tank releasing 13,500 gallons (51,000 liters) of 28 percent aqueous ammonia solution. Methods as provided in U.S. EPA's "Risk Management Program Guidance for Wastewater Treatment Plants" issued under the *General Risk Management Program Guidance Document* were used to calculate both the volatilization rate and distance to the toxic endpoint. For a worst-case release, the temperature of the liquid pool is assumed to be 95°F (35°C), resulting in a higher volatilization rate, and thus, more emissions. Assuming terrain similar to that of an urban area and worst-case meteorological conditions, the results of the worst-case release analysis indicate that the toxic endpoint (200 parts per million of ammonia) would be approximately 0.11 mile or 600 feet (180 meters) from the storage tank containment area.

An alternative release scenario, which is defined as a more likely event than the worst-case release, is generally associated with lesser off-site consequences. For this project, it is estimated that the alternative release would not likely allow a great enough quantity to reach a toxic endpoint off site. However, for the sake of examining what could occur under more typical ambient conditions (i.e., temperature of the liquid pool is assumed to be 77°F [25°C]), it was assumed that the entire volume of the tank would be released and contained in the diked area. Under this scenario it was estimated that the toxic endpoint (200 parts per million of ammonia) would be approximately 0.052 miles or 280 feet (80 meters) from the storage tank containment area.

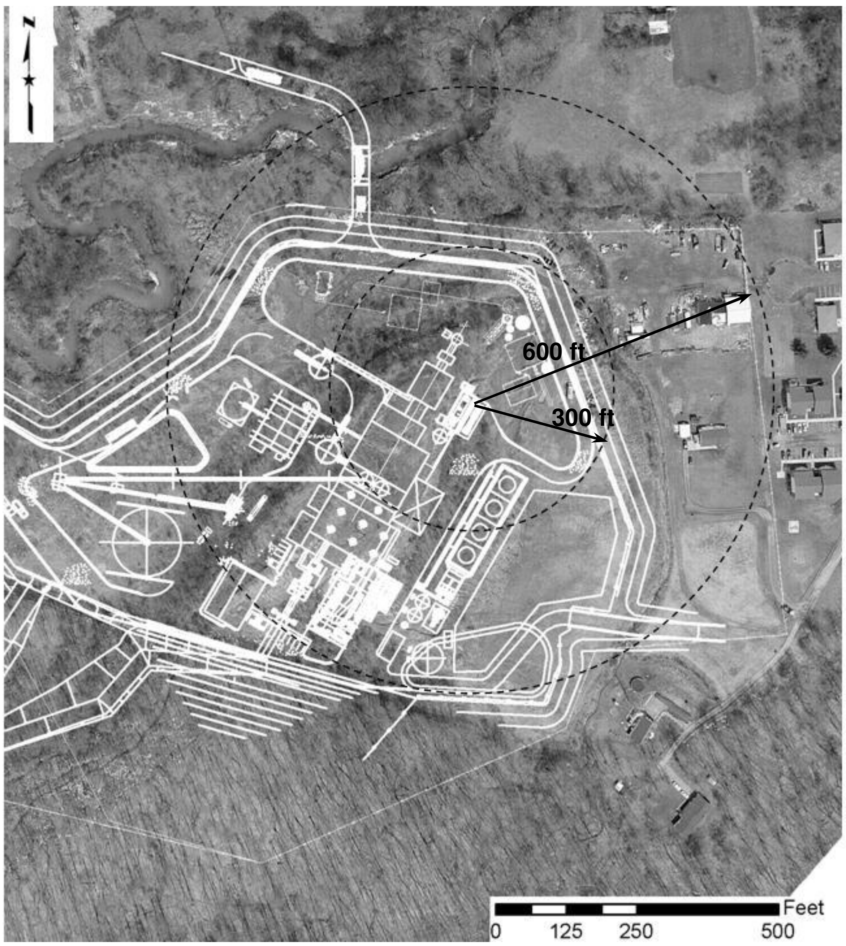

Figure 4.14-2. Worst-Case and Alternative Release Impact Areas for an Accidental Ammonia Spill

Figure 4.14-2 shows 600- and 300-foot radial distances from the ammonia storage tank and the relation to exposed population receptors that fall within/near the impact area. The population receptors that fall within the 600-foot worst-case release impact area include a couple of residential properties to the east. WGC plans to purchase these properties and, therefore, these receptors would not be present when the facility is constructed. There are no other residential receptors located inside the worst-case boundary. The Sewell Landing Apartments are located just outside the eastern perimeter of the worst-case limit. There are no residential receptors within the more likely (i.e., alternative release) scenario; however, on-site workers would be susceptible to potential hazards in either scenario.

As discussed in Section 2.3.4, WGC would implement a number of safety programs and procedures to minimize the safety risks and health hazards associated with aqueous ammonia, including the implementation of an emergency response/spill control plan. In the unlikely event of an accidental release, it is expected that proposed safety measures would help minimize the vaporization of ammonia and, therefore, minimize the health impacts to the receptor populations, which would mainly include on-site workers.

Chemicals of Potential Concern (COPCs)

Human health-related risks and impacts have been considered from a Co-Production Facility operational perspective and the associated release of potentially harmful contaminants related to these activities. As with worker safety, substantial differences are not expected in the various siting options under consideration by WGC. Human health related impacts have been quantified using standard risk characterization techniques as described in Section 4.14.1.

The U.S. EPA guidelines were followed in characterizing the health risks for carcinogenic constituents of stack and fugitive emissions from the proposed Co-Production Facility. Cancer risks were calculated by multiplying lifetime average daily doses (LADD) by the respective chemical- and pathway-specific cancer slope factors (CSF). To account for exposures to multiple COPCs it was assumed that cancer risks are additive (USEPA, *The Risk Assessment Guidelines of 1999*). Pathway-specific risks were calculated by summing the cancer risk estimates of the individual COPCs relevant to each pathway. Individuals might also be exposed to a given COPC or a combination of COPCs through several pathways. To account for risks resulting from multi-pathway exposures, the total cancer risks for different receptor scenarios were calculated by summing the risks for all carcinogenic COPCs across appropriate routes of exposure.

Other (non-cancer) impacts on human health were evaluated by comparing projected or estimated daily constituent intakes with reference levels for each COPC. Reference doses (RfD) and reference concentrations (RfC) represent, respectively, estimated daily oral or inhalation exposure levels not expected to result in any adverse health effects in persons exposed over their entire lifetimes. Margins of safety are incorporated into the derivation of RfD and RfC values. Even sensitive subpopulations (such as children and the aged) should be protected when exposed to a given COPC at levels as high as the RfD or RfC. RfD values are expressed in units of milligrams (mg) compound per kilogram (kg) body weight per day. RfC values are expressed in units of mg compound per cubic meter (m^3) of air. RfC values may be compared directly to exposure concentrations in air because human exposure characteristics (i.e., inhalation rate of 20 m^3/day and average adult male body weight of 70 kg) have been incorporated into their derivation.

The ratio of an exposure dose (or concentration) to the RfD (or RfC) is called the hazard quotient (HQ). A HQ of one or below is considered by the U.S. EPA to be protective of human health. For example, if the HQ is 0.01 (1×10^{-2}), then the calculated dose is 100 times less than the RfD or RfC and expected to safeguard the health of even the most sensitive members of the population. It should be noted that the RfD and RfC are not actual thresholds for adverse effects; therefore, ratios greater than one do not necessarily indicate a health hazard. In fact, in some cases, depending on the substance being evaluated, a dose that is more than an order of magnitude greater than the RfD or RfC may not lead to adverse health effects.

A hazard index (HI) is used to assess the overall potential for non-cancer effects posed by combined constituent exposures (USEPA, 1989). The HI is often calculated for those constituents that affect the same target organ (e.g., liver, nervous system, etc.) and is equal to the sum of the respective HQ for those constituents. The total carcinogenic risks and non-carcinogenic hazards anticipated for the various receptors in the region of influence as a result of the Proposed Action are provided in Table 4.14-7. The Total Risk and the Hazard Index values are well below the U.S. EPA criteria of 10^{-4} and 1.0, respectively, for each of the considered receptor types. Chemical-specific risks and hazards for each receptor are presented in Appendix I.

As described in Section 3.14, Greenbrier County has a higher rate of lung disease and cancers when compared to the remainder of the US, and West Virginia has the highest median age of any state. These populations may be at higher risk to the effects of chemical exposure than the normal population. However, the reference doses (RfD) that are used to quantify the potential for non-cancer health hazards (i.e., morbidity) to a population are adjusted by a "safety factor" of 10 to account for the uncertainty attributable to variability within populations (including portions which exhibit greater sensitivities to contaminants of concern). The receptor scenarios considered for the risk assessment as outlined in Table 4.14-7 are considered conservative, and are therefore expected to portray an accurate characterization for the region of influence. Therefore, the incremental carcinogenic risks and non-cancer health hazards that could occur as a result of the Proposed Action are not expected to be significant.

Table 4.14-7. Total Cancer Risks and Non-Cancer Hazards

Receptor	Total Risk (cancer)	Hazard Index (non-cancer)
Resident/Home Gardener		
Adult	0.00059×10^{-4}	0.01530
Child	0.00018×10^{-4}	0.01789
Subsistence Farmer		
Adult	0.00016×10^{-4}	0.00036
Child	0.000037×10^{-4}	0.00050
Subsistence Fisher		
Adult	0.00085×10^{-4}	0.00194
Child	0.00026×10^{-4}	0.00282
School/Day Care Child	0.000013×10^{-4}	0.00016
Hospital Patient/Extended Care Resident	$0.00000057 \times 10^{-4}$	0.00000006
U.S. EPA Criteria (Acceptable Risk Defined as Less Than)	1×10^{-4}	1.0

Particulate Matter (PM)

For the PM_{10} analysis the 24-hour and annual concentrations derived from the air dispersion models were compared on a receptor-by-receptor basis and results with the highest pollutant concentrations were used in the analysis. For the 24-hour averaging period, the total PM_{10} concentration was predicted to be 73.3 $\mu g/m^3$ (= 23.32 [modeled] + 50 [background]). For the annual averaging period, the total PM_{10} concentration was predicted to be 26.8 $\mu g/m^3$ (= 4.7 [modeled] + 22.1 [background]). The results of the analysis, as shown in Table 4.14-8, indicate that the combined concentrations of modeled and background PM_{10} would not exceed the NAAQS.

$PM_{2.5}$ was not modeled because, to date, the NAAQS have not been implemented. However, the U.S. EPA Air Quality Criteria for Particulate Matter (USEPA. 2004c) presented data from the Aerometric Information Retrieval System on the Ratios of $PM_{2.5}$ to PM_{10} for various regions in the United States. Therefore, as a conservative measure, the mean ratio of 0.70 for the Southeast U.S. was used as a surrogate to derive the 24-hour and annual concentrations of $PM_{2.5}$ as a function of PM_{10}. For the 24-hour averaging period, the total $PM_{2.5}$ concentration was predicted to be 45.7 $\mu g/m^3$ (= 16.32 [derived] + 29.4 [background]). For the annual averaging period, the total $PM_{2.5}$ concentration was predicted to be 13.1

µg/m^3 (= 3.29 [derived] + 9.8 [background]). The results of the analysis, as shown in Table 4.14-8, indicate that the combined concentrations of derived and background $PM_{2.5}$ would not exceed the NAAQS.

Table 4.14-8. PM Concentrations in Comparison to National Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS Standard (µg/m^3)	Modeled Concentration (µg/m^3)	Ambient Background Concentration (µg/m^3)	Total Impact (µg/m^3)	Total Impact as a Percent of the NAAQS
PM_{10}	24-hour	150	23.32[a]	50[c]	79.3	48.9%
	Annual	50	4.7[a]	22.1[c]	26.8	53.6%
$PM_{2.5}$	24-hour	65	16.32[b]	29.4[d]	45.7	70.3%
	Annual	15	3.29[b]	9.8[d]	13.1	87.3%

a Source of PM10 modeled concentration data - WGC, November 2005, Addendum to May 2005 Permit Submittal, Table 6-3.

b Based on mean ratio of PM2.5 to PM10 (0.70) in southeast U.S. from measurements at 76 sites. Table 3-1 of the Air Quality Criteria for Particulate Matter - Volume 1 (USEPA, 2004).

c Source of PM10 data from Kanawha, WV collected in 2004. West Virginia Department of Environmental Protection, Division of Air Quality.

d Source of PM2.5 data from Summers, WV collected in 2004. West Virginia Department of Environmental Protection, Division of Air Quality.

The incremental changes in concentrations for both PM_{10} and $PM_{2.5}$ that would occur as a result of the Co-Production Facility would not exceed the NAAQS, and thus are below the EPA defined thresholds for significant environmental and health impacts. Since the NAAQS were established to be protective of human life, as long as the NAAQS are not exceeded, hazardous impact to human life should be minimized. Although impacts are not expected to be significant as measured against current standards, recent studies and research indicate the possibility that receptors could still be subject to some level of risk from exposure to increased concentrations of PM. Because these risks were not considered significant as previously described, and they cannot be accurately quantified (due to a high degree of uncertainty regarding the chemical composition of particulates and the temporal and spatial variability of PM concentration), modeling to quantify these risks was not conducted as part of this EIS.

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4.15 Noise

4.15.1 Method of Analysis

The Proposed Action or an alternative may have a significant impact from noise and/or blasting vibration if it would result in any one of the following conditions:

- Conflicts with a jurisdictional noise ordinance.
- Permanently increases ambient noise levels significantly at nearest residential neighborhoods in the region of influence.
- Increases ambient noise levels significantly at nearest sensitive receptors in the region of influence during construction and/or operation phases.
- Exposes personnel on site to noise levels that exceed OSHA standards.
- Causes a blasting Peak Particle Velocity (PPV) greater than 0.5 inches/second at off-site structures.
- Causes an airblast in excess of 133 dB

To determine whether the Proposed Action would result in any of the above listed conditions for noise, predictive modeling was performed for noise generated from project activities, including plant operations and materials transportation. Predictive models used to conduct these analyses, and key considerations with respect to these models, are described below.

4.15.1.1 Transportation-Related Noise Model and Criteria

The Federal Highway Administration (FHWA) Traffic Noise Model (TNM), Version 2.5, was used to evaluate baseline noise and increased noise levels caused by traffic associated with the project. The TNM calculates noise levels at specific receptor points based on traffic volume, vehicular mix, traffic speed, roadway and receptor elevations, rows of buildings, and terrain features. To ensure that the modeled results accurately reflect the site conditions, TNM is typically calibrated by using the traffic counted concurrently during the noise monitoring as input. The resulting modeled noise levels for the calibration runs were within 1 decibel (dBA) of the monitored noise levels except at sites somewhat distant from the roadway, where traffic noise attenuated to levels below background levels. In these cases, the modeled noise levels were much lower than monitored noise levels. After calibration of the model, TNM was run using the volumes, vehicular mix, and speeds provided by the traffic analysis for existing, No Action, and Proposed Action conditions. This traffic information is based on worst-case conditions, which may not have been present during the monitoring periods.

Many locations along the WV 20/US 60 corridor currently experience a peak hour L_{eq} of 65.0 dBA or higher, and some exceed the FHWA guideline of 67 dBA. Using the peak-hour L_{eq} as an approximation of the L_{dn} indicates that these locations have L_{dns} that also exceed the HUD guideline of 65 dBA. Therefore, the HUD and FHWA guidelines that specify an absolute noise level for determining potential impacts would not be useful in establishing criteria for evaluating project-generated impacts along the transportation corridors. A more appropriate impact criterion would be a relative increase in noise between No Action and Build (i.e., Proposed Action) conditions.

To communicate the degree of noise-related impacts along the transportation corridors, the following scale has been used for permanent changes in baseline noise levels:

- 0 to < 5 dBA increase – minor increase in noise level
- < 5 to 10 dBA increase – moderate increase in noise level
- > 10 dBA increase – significant increase in noise level

This scale was developed based on available criteria used by federal and state agencies with consideration of local conditions. Although the WVDOT standard for significant increase is an increase of > 16 dBA, a perceived doubling of the noise level (or 10 dBA) was selected because it is a more typical and more conservative criteria for use with transportation-related projects.

4.15.1.2 CADNA Model and Criteria

The Computer Aided Noise Abatement (CADNA 3.4) model quantifies industrial noise sources using the International Environmental Noise Directive and International Standards Organization (ISO) guidelines to accurately describe ambient noise in community environments. It is a state-of-the-art noise model used throughout the U.S for industrial and power plant noise modeling. Differences in terrain, construction materials, and source heights are also included in the calculations. CADNA can integrate aircraft, rail, motor vehicle traffic, and industrial noise sources to predict A-weighted continuous equivalent sound level (L_{eq}), day-night equivalent sound level (L_{dn},), and sound pressure level (SPL) values. However, for this project it was utilized for industrial noise modeling only. Noise remediation measures can be assessed using several program capabilities: barriers, natural embankments, and on-site attenuation measures like sound reducing materials.

The CADNA model was set up using available site layout, design, and equipment data. Additional factors that were addressed for the structures and noise-emitting machinery were elevations, points of noise escape (windows, openings, louvers, doorways), and known attenuation measures that were associated with specific pieces of equipment. On-site noise sources for the WGC Co-Production Facility were modeled as point sources (an unenclosed stationary source) or area sources (a group of noise sources within a building or enclosure). Due to the conceptual nature of the proposed Co-Production Facility design, and the fact that specific pieces of equipment have not been specified, predictive modeling was limited to "Base Plant" modeling (i.e., power plant equipment/facilities with limited or no noise mitigation equipment), and is therefore considered a worst-case scenario.

Monitored sites in the vicinity of the plant have L_{dn} noise levels ranging from 41.4 dBA to 54.0 dBA. These levels are based on baseline measurements that occurred during the winter months, and baseline conditions are expected to be higher during seasons when birds and insects are present and actively making noise (see Section 3.15). In the absence of applicable local requirements for the project, an L_{dn} of 60 dBA was selected as the threshold for significant impacts at noise sensitive sites in the vicinity of the plant. An L_{dn} of 60 dBA would be equivalent to a continuous noise level of 53.6 dBA. This is lower than HUD's criterion of a 65 L_{dn}, which would be equivalent to a constant noise level of 58.6 dBA.

4.15.2 No Action

Under the No Action alternative, DOE would not provide financial assistance for the Co-Production Facility and the project likely would not be completed. Without the proposed Co-Production Facility, it is doubtful that the planned EcoPark could attract potential businesses and limited increases in area traffic would be expected.

Baseline noise levels for the monitoring locations shown in Figures 3.15-1 and 3.15-2 were listed in Table 3.15-5. The future No-Build conditions (i.e., No Action) for the same locations are listed in Table 4.15-1. Based on projected worst-case increases in traffic, the incremental increases in noise levels at the monitoring locations range from 0.0 to 3.3 dBA when compared to existing.

At the Mill Point Quarry near Hillsboro, the No-Build noise levels would fall below background levels during the peak PM period. No monitoring data is available to adjust the No-Build level during the peak PM period, but it would be higher than 34.2 dBA. The reason for the substantially lower traffic noise during this period is due to the lower volume of heavy trucks compared to the peak AM and Midday periods.

For the areas near the proposed site, the No Action noise levels would be the same as the existing noise because no changes in background noise levels (e.g., local traffic, birds, crickets, occasional freight rail passbys, etc.) are anticipated. Therefore, the noise levels that were discussed in Section 3.15 (see Tables 3.15-5, 3.15-6 and 3.15-7), which were obtained for the winter months, would be applicable to No Action conditions for the same season. During spring and summer, existing and No Action noise levels would be higher due to higher background noise levels. However, for the purposes of preparing a worst-case scenario, the relatively quiet wintertime noise levels were used for the noise analysis.

Table 4.15-1. No-Build (No Action) Conditions, Traffic Noise Levels (dBA)

Area*	ID	Location / Landmark	Peak Periods+		
			AM	MID	PM
A	1	WV State Police Barracks	60.8	60.8	61.3
A	3	Playground	58.8	58.7	59.3
A	5	Golf Course	36.6	34.6	35.2
A	6	Greenbrier Avenue	64.0	64.0	62.6
A	7	Walnut Street	-	51.9	-
A	8	Grace Baptist Church	50.2	49.0	50.0
B	1	Rainelle Medical Center	62.4	62.9	61.2
B	2	Rainelle School	62.2	62.0	60.6
C	1	North Sewell Street	64.2	64.4	63.9
C	4	Cherry Street	52.3	52.2	51.2
C	5	Nicholas Street	49.4	51.8	51.4
D	1	Seventh Street	68.5	69.1	67.7
E		CR 1, Rupert	69.6	69.7	68.5
F		US 60, Charmco	67.1	66.2	65.8
G		WV 20, Green Valley	65.4	67.9	66.2
H		WV 20, Quinwood	69.2	68.4	66.4
I		WV 20, Youth Park	59.8	60.4	58.8
J		CR 1, Anjean	61.3	62.7	59.3
K		CR 39, Donegan	63.6	63.4	60.3
L		CR 219 / CR 39, Hillsboro**	53.6	64.2	59.5

**See Figures 3.15-1 and 3.15-2 for monitoring locations*

*** Estimated value for peak PM period due to low PM volumes resulting in modeled values that are below background concentrations.*

+Peak Period – Time frames 7-9 a.m., 11-1 p.m., or 4-6 p.m., Monday thru Thursday; monitored off-peak, late night, and weekend values for traffic sites have been adjusted to reflect the relative increase in noise due to increases in background traffic for the peak periods.

4.15.3 Proposed Action

4.15.3.1 Construction Noise and Blasting

Noise levels in the vicinity of the power plant site would temporarily increase due to construction-related traffic and on-site use of construction equipment. Table 4.15-2 presents typical noise levels due to various types of construction equipment. The duration and magnitude of noise related impacts would vary depending upon the type of equipment in use at any given time during the 29-month construction period; however, construction activities would generally be limited to day-time hours (between 7 a.m. and 6 p.m.) Noise generated from construction activities would mostly affect adjacent properties to the south and east which are closest to the site.

Table 4.15-2. Typical Noise Levels for Various Types of Construction Equipment

Type of Equipment	Noise Level (dBA) at 50 Feet	Type of Equipment	Noise Level (dBA) at 50 Feet
Clearing		**Grading and Compacting**	
Bulldozer	80	Grader	80-93
Front end Loader	77-84	Roller	73-75
Dump Truck	83-94	**Paving**	
Jackhammer	81-98	Paver	86-88
Crane with ball	75-87	Truck	83-94
Excavation and Earth Moving		Tamper	74-77
Bulldozer	80	**Landscaping and Clean-Up**	
Backhoe	72-93	Bulldozer	80
Front end loader	73-84	Backhoe	72-93
Dump truck	83-94	Truck	83-94
Jackhammer	81-98	Front end loader	72-84
Scraper	80-93	Dump truck	83-94
		Paver	86-88
Structure Construction			
Crane	75-87	Pneumatic Tools	81-98
Welding generator	71-82	Bulldozer	80
Concrete mixer	74-88	Pile Driver	91-105
Concrete pump	81-84	Front end loader	72-84
Concrete vibrator	76	Dump truck	83-94
Cement and dump trucks	83-94	Paver	86-88
Air compressor	74-84		

Note: Noise levels from equipment can vary according to the engine size. Thus, the table may show a different range of typical noise levels for some types of equipment during different construction phases. Source: U.S. Environmental Protection Agency, "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances," NJID 300.1, December 31, 1971.

Some blasting may be required to loosen rock as part of the site preparation activities. Blasting and rock drilling can produce noise levels greater than 90 dBA at the source depending upon the size of the blast. Table 4.15-3 shows typical noise levels from blasting as a function of distance from the source. Similar to the use of construction equipment, noise related to blasting would mostly affect adjacent properties to the south and east, which are closest to the site. Based on the example provided in Table

4.15-3, noise levels in the range of 75 dBA could occur at the closest property to the south of the site, approximately 1,500 feet (460 meters) east of the plant site. However, blasting would occur on an intermittent basis over a relatively short time period.

Table 4.15-3. Estimated Blasting Noise, Distance Attenuation Blasting Noise

Distance to Receptor (feet)	Sound Level at Receptor (dBA)
50	94
100	88
200	82
400	75
600	71
800	69
1,000	66
1,500	62
2,000	59
2,500	56
3,000	53

Source: Farad Diversion Dam Replacement Project, EIR (March 2003)

Potential noise impacts related to construction activities would be minimized by using properly maintained and muffled equipment. In addition, WGC would coordinate with local officials to minimize or alert residents in advance to especially noisy activities (e.g., blasting). Construction materials would also be handled and transported in a manner that avoids unnecessary noise.

A blasting plan would need to be developed (if blasting is required) to ensure that PPVs do not exceed 0.5 inches/second at off-site structures and that air blasts do not exceed 133 dB. Additional measures to minimize impacts related to blasting operations could include:

- Prohibiting blasting on Sundays, holidays and between the hours of 8 p.m. and 8 a.m.;
- Notifying nearby residences whenever blasting work will be occurring; and
- Installing temporary or portable acoustic barriers around blasting areas.

4.15.3.2 Traffic Noise Sources

As was listed in Table 4.13-3 of Section 4.13 (Traffic and Transportation), there would be approximately 62 employees during the daytime shift for routine operations. Truck trips would be associated with the power plant and the kiln/cement manufacturing facilities, which were listed in Table 4.13-4. Kiln/Cement production facility-associated vehicles were used in this noise analysis in anticipation of EcoPark tenants and to provide for an upper bound in the noise analysis.

All of the truck traffic for transporting materials to or from the site would occur during the daytime shift, Monday through Friday from 8 a.m. to 5 p.m. The processed fuel/ash return trucks at the power plant would be 40-ton, 3-axle dump trailers that would operate during the daytime shift. It is assumed that trucks delivering limestone or hauling other materials to or from the kiln/cement manufacturing buildings would be 20-ton, 2-axle dump trailers operating during the daytime shift. Traffic noise was modeled using the FHWA's TNM model. Two scenarios were modeled. The first scenario examines delivery of fuel from the prep plant processing the coal refuse from Anjean/Joe Knob or Donegan (assuming prep plant location is at candidate site AN1, AN2, AN3, DN1, or DN2 – see Figure 2.2-15). Under this scenario, traffic on WV 20 between Green Valley and US 60 would be the same as for No Action conditions, with the exception of additional employee vehicles used for commuting. Truck traffic on CR 1 between Anjean and Rupert would increase because of the process fuel/ash return haul trucks (40-ton trucks). Traffic on US 60 between Charmco and the power plant site also would increase as a result of these trucks, in addition to the presence of kiln/cement and limestone trucks (20-ton trucks).

The second scenario assumes the delivery of fuel from the prep plant processing coal refuse from the Green Valley source (assuming prep plant location is at candidate site GV– see Figure 2.2-15). Under this scenario, traffic on CR 1 and US 60 between Rupert and WV 20 in Charmco would be the same as for No Action conditions, with the exception of additional employee vehicles used for commuting. However, traffic on WV 20 between Green Valley and Charmco, and on US 60 between Charmco and Rainelle would increase as a result of the haul trucks.

Table 4.15-4 shows the noise levels at the monitoring sites for the first scenario, when Anjean/Joe Knob or Donegan is the fuel source (refer to Figures 3.15-1 and 3.15-2 for monitoring locations). Noise levels at sites along the proposed truck routes would fall below the impact criterion of an incremental increase of 10 dBA. Peak period noise levels would increase by up to 6.3 dBA near the entrance to Anjean (Area J) and up to 5.7 dBA along the route to Donegan (Area K). These are the highest relative increases, and they occur because traffic volumes are low under No Action conditions. For the purposes of the noise analysis, conservative project-generated traffic volumes were assumed to be similar during all three peak hours (i.e., AM, MID, and PM peak hours) to provide an upper bound estimate. It is assumed that the noise levels at Donegan (Area K) would be similar to, if not less than, those at Anjean because of its remoteness and similarity of the projected traffic volumes.

Noise levels along WV 20 in Green Valley (Area G) and Quinwood (Area H) would exhibit almost no increase when the Anjean/Joe Knob and Donegan sites would be used because project-generated traffic would include only employee vehicles used for commuting. Peak period L_{eqs} would continue to be in the 60s and 70s dBA. At Area B and Areas E through J, relative increases in noise during the peak traffic periods would fall below 3 dBA. Peak period L_{eqs} would continue to be in the 60s and 70s dBA.

The receptor points along WV 20 from the Rainelle Medical Center south past the power plant site entrance (Sites A1-A8 in Figure 3.15-1) would experience noise level increases of up to 2.9 dBA depending on their distance from the highway. The location outside of the police barracks (A1 in Figure 3.15-1) would have the highest increase in noise (2.9 dBA) because all of the project-generated traffic would converge at this intersection to turn into the roadway leading to the plant. Most of this traffic would also pass the intersection of Greenbrier Avenue and WV 20, where noise levels would increase by up to 2.4 dBA. South of the power plant entrance, at the playground (Site A-3 in Figure 3.15-1), noise levels would increase by up to 0.8 dBA. Although the golf course would experience a relative increase of up to 1.3 dBA, the modeled noise levels in the mid-30s dBA would still fall below ambient noise levels; thus the increase would not be detectable.

Table 4.15-4. Noise Levels (L_{eq}), Build (Proposed Action) Conditions – Fuel Source: Anjean/Joe Knob or Donegan

Site Area	ID*	Location / Landmark	Peak Periods (dBA)			Relative Increase from No Action to Build Conditions (dBA)		
			AM	MID	PM	AM	MID	PM
A	1	WV State Police Barracks	63.7	63.7	63.9	2.9	2.9	2.6
A	3	Playground	59.5	59.5	60	0.7	0.8	0.7
A	5	Golf Course**	37.4	35.9	36.3	1.1	1.3	1.1
A	6	Greenbrier Avenue	65.9	65.8	65	1.9	1.8	2.4
A	7	Walnut Street	Interior location surrounded by homes					
A	8	Grace Baptist Church	50.4	49.5	50.2	0.2	0.5	0.2
B	1	Rainelle Medical Center	63.1	63.4	62.1	0.7	0.5	0.9
B	2	Rainelle School	62.5	62.3	61.1	0.3	0.3	0.5
C	1	North Sewell Street	65.5	65.6	65.2	1.3	1.2	1.3
C	4	Cherry Street	53.7	53.5	52.9	1.3	1.4	1.7
C	5	Nicholas Street	49.8	52	51.6	0.4	0.2	0.2
D	1	Seventh Street	69.5	70	68.8	1	0.9	1.1
E		CR 1, Rupert	70.4	70.5	69.5	0.8	0.8	1
F		US 60, Charmco	67.8	67.1	66.7	0.7	0.9	0.9
G		WV 20, Green Valley	65.4	67.9	66.2	0	0	0
H		WV 20, Quinwood	69.2	68.4	66.4	0	0.0	0
I		WV 20, Youth Park	61	61.4	60.3	1.2	1	1.5
J		CR 1, Anjean	66.1	66.6	65.6	4.8	3.9	6.3
K		CR 39, Donegan	66.5	67.1	66.0	2.9	3.7	5.7
L		CR 219 at CR 39 in Hillsboro	53.6	64.2	59.5	0	0	0.0

**See Figures 3.15-1 and 3.15-2 for monitoring locations; **Modeled noise levels are below background noise levels;*
**** Estimated value for peak PM period due to low PM volumes resulting in modeled values that are below background concentrations.*

Table 4.15-5 shows the relative noise level increases when Green Valley is the source of coal refuse. Under these conditions, the noise levels at Anjean and Donegan (Areas J and K) would show almost no increase, while the noise levels in Green Valley (Area G) and Quinwood (Site H) would increase by up to 1.7 dBA. Although the additional number of trucks passing these sites on WV 20 is the same as for CR 1 at Anjean, the relative noise level increase is lower because baseline volume of trucks on WV 20 is lower.

Relative increases in noise levels at other sites are the same because the traffic under Build conditions is the same as the baseline conditions. The noise levels for the Mill Point Quarry in Hillsboro would increase only if that source is used for limestone. Otherwise noise levels would be the same as the No Action alternative. Short-term peak noise levels from coal trucks accelerating or decelerating would be similar to noise levels from the coal and lumber trucks currently operating on the roadways. Therefore, such peak truck noises would occur with more frequency.Based on EPA standards for maximum noise levels associated with heavy trucks, maximum short-term noise levels that could occur at 50 feet (15 meters) off the roadway centerline as trucks pass would range from 83 dBA (<35 mph) to 87 dBA (>35 mph). These noise levels are comparable to the sound level of a leaf blower or a lawn mower, and could occur as frequently as 24 times per hour during the daytime above existing conditions.

Table 4.15-5. Noise Levels (L_{eq}), Build (Proposed Action) Conditions – Fuel Source: Green Valley

Short-Term Noise Monitoring Locations (L_{eq})									
Area	**ID***	**Location / Landmark**	**Type**	**Peak Periods**			**Relative Increase from No Action to Build Conditions (dBA)**		
			T/P	AM	MID	PM	AM	MID	PM
A	1	WV State Police Barracks	T	63.7	63.7	63.9	2.9	2.9	2.6
A	3	Playground	T	59.5	59.5	60	0.7	0.8	0.7
A	5	Golf Course**	T	37.4	35.9	36.3	0.8	1.3	1.1
A	6	Greenbrier Avenue	T	65.9	65.8	65	1.9	1.8	2.4
A	7	Walnut Street	T	Interior location surrounded by buildings					
A	8	Grace Baptist Church	T	50.4	49.5	50.2	0.2	0.5	0.2
B	1	Rainelle Medical Center	T	63.1	63.4	62.1	0.7	0.5	0.9
B	2	Rainelle School	T	62.5	62.3	61.1	0.3	0.3	0.5
C	1	North Sewell Street	T	65.6	65.6	65.2	1.4	1.2	1.3
C	4	Cherry Street	T	53.7	53.5	52.9	1.4	1.3	1.7
C	5	Nicholas Street	T	49.8	52	51.6	0.4	0.2	0.2
D	1	Seventh Street	T	69.5	70	68.8	1	0.9	1.1
E		CR 1, Rupert	T	69.7	69.8	68.7	0.1	0.1	0.2
F		US 60, Charmco	T	67.3	66.5	66.1	0.2	0.3	0.3
G		WV 20, Green Valley	T	66.8	68.8	67.5	1.4	0.9	1.3
H		WV 20, Quinwood	T	70.2	69.6	68.1	1	1.2	1.7
I		WV 20, Youth Park	T	61	61.4	60.3	1.2	1	1.5
J		CR 1, Anjean	T	61.3	62.7	59.3	0	0	0
K		CR 1, Donegan	T	63.6	63.4	60.3	0	0	0
L		CR 219 at CR 39 in Hillsboro***	T	53.6	64.2	59.5	0	0	0

**See Figures 3.15-1 and 3.15-2 for monitoring locations; **Modeled noise levels are below background noise level;*
**** Estimated value for peak PM period due to low PM volumes resulting in modeled values that are below background concentrations.*

4.15.3.3 WGC Co-Production Facility Plant Noise Sources

Figure 4.15-1 depicts the proposed layout of buildings and equipment, and Tables 4.15-6 and 4.15-7 list the buildings and equipment for the power plant, respectively. The power plant site and would be sited on a plateau approximately 20 feet (6 meters) higher than the surrounding terrain. The proposed site includes the planned acquisition of a residential property east of the existing E&R property (see Figure 4.2-1). Therefore, the most impacted would be the residential area located approximately 1,500 feet (460 meters) to the east.

Table 4.15-6. Legend for Figure 4.15-1 – Site Buildings & Structures Layout

Building or Area ID Number	Building or Area Use	Building or Area ID Number	Building or Area Use
1	Steam Turbine Generator Building	39	Fuel Oil Tank (100,000 Gal)
2	Boiler Building	40	Fire Water/Stormwater Pump House
3	Cooling Tower	44	Kiln Limestone Pile (2 Days)
9	Warehouse/Maintenance Building	45	Limestone Preparation System
10	Limestone Day Silo	47	Prepared Kiln Limestone Storage Silo (Not Shown)
11	Utility Bridge	50	Chemical Storage Tanks
14	Water Treatment Building	51	Fly Ash Piping (Later)
17	Emergency Coal Storage	52	Bottom Ash Piping (Later)
18	Stack	55	Coal Pile Storage Building
19	Emergency Limestone Storage	56	Steam Pipe To Woodbrik Facility (Future)
20	Ammonia Storage Tank	66	Air Compressor Building
21	Fly Ash Silo	69	Coal Day Silo A
22	Bottom Ash Silo	70	Coal Day Silo B
23	Cems Enclosure	81	Limestone Preparation Building
25	Main Electrical Room	82	Limestone Pile Storage Building
26	Baghouse/Foam	84	Raw Water Tank (100,000 Gal)
27	Control Room	87	Dead End Structure
33	Material Handling Electrical Room	88	Truck Dump Canopy
36	Guard & Scale House	89	Boiler Baghouse Electrical
37	Demin/Condensate Tank (100,000 Gal)	90	Water Treatment Electrical Room
38	Service Water Tank (Est. @ 700,000 Gal)	93	Diesel Fuel Tank
X	Gypsum Slurry Tank	N	Raw Coal Bin
G	Limestone Bin	D	Homogenizing Silo
E	Bottom Ash Bin	T	Rotary Kiln
F	Limestone Bin	Z	Finish Mill
H	Synthetic Gypsum Slurry Tank	S	Clinker Cooler Building
I	Fly Ash Bin	M	Coal Mill
J	Homogenizing Silo	L	Coal Slurry Tank
K	Raw Mill	aa	Coal Mill Electric Room
ab	Burner/Cooler Building E Room	ac	Limestone Dump Hopper
ad	Kiln Baghouse	ah	Raw Mill/Blending Area E Room
ai	Alumina Bin		

Source: CH2MHill/Lockwood Greene, May 2006

Table 4.15-7. Legend for Figure 4.15-1 – Site Equipment Layout

Equipment ID Number	Description	Equipment ID Number	Description
4	Circulating Water Piping	58	Coal Stacking Conveyor
5	Circulating Water Pumps	59	Coal Loading And Transfer Feeder W/ Truck Dumps
6	Unit Auxiliary Transformer	60	Cycle Makeup Pumps
7	Generator Step-Up Transformer	61	Service Water Pumps
8	Wastewater Clarifier	62	Mmf Backwash Pumps
12	Site Drainage Fire Water Storage Pond	63	Truck Wash Station
13	Parking	64	Fuel Oil Unloading/Forwarding Pumps
15	Primary Air Fan	65	Coal Day Silo Feed Conv Dust Collector
16	Id Fan	67	Coal Day Silo Distribution Conveyor
60	Cycle Makeup Pumps	68	Coal Loading And Transfer Feeder Dust Suppression System
24	Oil Water Separator		
28	Coal Truck	71	Coal Day Silo A Dust Collector
29	Wastewater Sump	72	Coal Day Silo B Dust Collector
30	Diesel Refueling Area	73	Coal Day Silo Feed Conveyor
31	Switchyard	74	Limestone Reclaim Feeder
32	138kv Line	75	Limestone Reclaim Conveyor
34	Coal/Limestone Pile Runoff Sedimentation Pond	76	Not Used
35	Truck Scale	77	Limestone Prep System Dust Collection System
41	Coal Pile (2 Days)	78	Not Used
42	Boiler Limestone Pile (2 Days)	79	Not Used
43	Front End Loader	80	Limestone Reclaim Feeder Dust Collection System
46	Bucket Elevator	83	Not Used
48	Crane Setting Area	85	Raw Water Forwarding Pumps
49	Not Used	91	Portable Demin Water Trailer Parking Area
53	Coal Collecting Conveyor W/ Fixed Tripper	92	Emergency Generator
54	Limestone Truck	T	Rotary Kiln
57	Ammonia/Fuel Oil Truck Unloading Pad	ae	Clinker Conveyor
af	Raw Material Conveyor	ag	Bucket Elevator

Source: CH2MHill/Lockwood Greene, May 2006

The power plant would be accessed by Tom Raine Drive from WV 20 to the west. Vehicles would enter the site from the west by accessing a new bridge across Sewell Creek. Figure 4.15-1 depicts the locations of the on-site equipment and activities for the site plan and general arrangement (dated May 2006). Because of the developing design process, this general arrangement is slightly different than the general arrangement used to develop the Base Plant model (i.e., with limited or no noise mitigation measures) in CADNA that is presented in Appendix K. However, based on a review of the general arrangement changes (primarily in the materials handling area located at western boundary of the plant site) and preliminary CADNA model runs, it was determined that the Base Plant model provides a representative upper bound from a noise analysis perspective.

As previously noted, traffic-related noise was not included in the Base Plant model. As determined in the public scoping meeting and comments, the volume of employee vehicles at the site is not considered to be a source of concern for surrounding residents at this time. This traffic was included in the modeling of highway noise as previously discussed in Section 4.15.1. The hourly volume of trucks on site would be the same as described in Table 4.13-4 (Worst-Case Trucking Requirements to Power Plant Facility During Operation). Coal refuse trucks would be on site for approximately 10 minutes each and limestone trucks for approximately 5 minutes each. These trucks were not included in the Base Plant model due to their small size (relative to the operations buildings), intermittent nature, and distance from sensitive receptors.

Material handling equipment and heavy trucks that would be operating during plant operations are expected to be equipped with backup beepers for safety reasons. Noise generated from these beepers would be emitted at intermittent high-frequency tones generated when vehicles are backing up. As a result of the intermittent nature of this source, these noises would not contribute notably to modeled increases in 24-hour baseline noise levels. The majority of heavy material handling equipment is expected to be contained within the material handling area. This area, on the western portion of the site, is effectively shielded by the power island from the adjacent residential properties to the east. Because of this fact, and the distance of this area from these receptors, noise generated from onsite backup beepers is not expected to be a nuisance.

Conveyor belts are not considered to be a significant source of noise because they typically do not cause noise problems unless the rollers or belts are squeaking. This would be prevented through proper maintenance. Nonetheless, the motors for the conveyors were modeled as separate area sources on the sides of the buildings where openings would feed the conveyor belts.

Transformers have lower noise levels than conveyor belts. Typically, two transformers (auxiliary and step-up transformers) provide energy to a power plant. On the site plan, both are surrounded by a firewall on the north side, the administration building on the west side, and the water treatment facility on the east side where residences are located. Therefore, the noise contribution is considered to be negligible because the surrounding structures would act as noise barriers, partially shielding the transformer-generated noise.

A review of the processes and equipment associated with the proposed power plant and kiln process indicated that the following buildings and equipment could be significant sources of increased noise levels at the site boundary due to the configuration of fans, conveyor motors, crushers, pumps, and compressors within the buildings (see Figure 4.15-1):

Limestone preparation building (45). Limestone would be dried and sized to meet the limestone sizing specifications in the limestone preparation building. The prepared limestone would then be transported pneumatically to the CFB limestone day bin and the kiln limestone day bin. Both of the limestone crushers were modeled even though they are not expected to be in use simultaneously. The pressure blower associated with limestone preparation was also included in the Base Plant model.

Boiler building (2). Coal and limestone from the day silos and storage pile would be burned in a fluidized bed combustor (CFB) in the boiler building to create heat for steam for the steam turbine generator. Residual ash would be removed, and some of it would be used in the rotary kiln for the cement process. The Base Plant modeling for this building includes conveyor motors, compressors, fluidized air blowers, and building roof fans. An induced draft fan would be connected to the boiler's stack vent to help exhaust gases from combustion. This fan would be located outdoors adjacent to the boiler building, and it also was included in the Base Plant model. A forced draft fan would operate to ensure sufficient air supply for coal combustion in the boiler building. Forced draft fans are frequently placed outdoors. Due to the fan's high noise levels and the power plant's proximity to residential areas, a building to reduce the level of noise reaching the site boundary would enclose the forced draft fan. The forced draft fan was modeled with silencers and acoustic lagging because these noise attenuation measures would be needed to achieve OSHA standards for employees. The induced draft fan was modeled with a silencer, but was placed at the top of an adjoining stack in order to serve as a worst-case scenario for the location of the noise source.

Steam turbine generator (STG) building (1). In this building, high-pressure steam would turn the blades of the turbine to create electric energy. At the end of the turbine, the steam enters a condenser to recapture the water. Key equipment used to model the noise from the STG includes pumps, air compressors, the steam turbine generator itself, and building roof fans. The step-up transformer located in the yard adjacent to the STG also was modeled.

Cooling towers (3). The purpose of the cooling tower is to reduce the temperature of the steam in the condenser at the end of the STG. Liquid droplets that are entrained in the steam would be carried out of the tower, where they would evaporate. A cooling tower with four cooling tower cells would be constructed. The Base Plant model included the circulating water pumps, cooling tower fans, and cooling tower inlet. A splash attenuator and inlet barrier wall to reduce noise levels for the cooling towers was included in the Base Plant model.

Coal mill (M). Coal from the coal preparation building would be further pulverized for use as fuel for the kiln. The pulverizer is the primary source of noise from the mill.

Clinker cooler building (S). Raw meal is fed to a long, dry kiln where limestone and the various other mineral components chemically combine to form the desired new compounds, called clinker. The hot clinker formed in the kiln burning zone passes into a grate-type air-swept cooler. The air cools the clinker from about 2,300^{o} F to 250^{o} F (1,260^{o} C to 121^{o} C). Noise from the fan and other equipment was included in the CADNA modeling.

Finish mill (Z). The cooled clinker is conveyed to a storage bin, then conveyed to an air-swept ball mill for grinding. The grinding mill product is collected and pneumatically conveyed to the cement product manufacturing plant, where it is stored in a bin. Noise from the kiln equipment was included in the Base Plant model.

For each of the noise sources, information on the equipment noise, by octave band, was obtained from industry specifications provided by vendors and is typical of the equipment that would be installed for the operations. For sources where vendor data was not provided, available algorithms were used to estimate the spectral data. Buildings were assumed to have metal walls with insulation.

Table 4.15-8 presents the results of the Base Plant model (i.e., without additional mitigation measures). The model predicts daytime noise levels ranging from 55.1 to 64.9 dBA, which results in L_{dns} that range from 61.5 to 71.3 dBA. Thus, without further mitigation, all sites are projected to exceed the impact criterion of a 60 dBA L_{dn}. The highest noise levels are at the property line north of the site (LT3 in Figure 3.15-1).

Table 4.15-8. Anticipated Noise Levels Near Plant Site During Operations (with limited or no noise mitigation measures)

Receptor Points		Modeled Results (dBA)			Required acoustic reduction**
Site ID*	Location	Daytime	Nighttime	L_{dn}	
LT1	Plant - Southeast Side	57.2	67.2	63.6	3.6
LT2	Plant - East Side	Not applicable, property to be acquired			
LT3	Plant - North Side	64.9	74.9	71.3	11.3
LT4	Plant - West Side	56.9	66.9	63.3	3.3
LT5	Eco-Park	55.1	65.1	61.5	1.5
LT6	Pennsylvania Avenue	55.5	65.5	61.9	1.9
C7	Retirement Community	61.9	71.9	68.3	8.3
C8	Nursing Home	55.5	65.5	61.9	1.9
C9	ADA housing	56.0	66.0	62.4	2.4
C10	Mobile Home Park	55.2	65.2	61.6	1.6

**See Figure 3.15-1 for site locations in Section 3.15.*

CADNA provides information on the contributions of each source to the noise levels at a given receptor point. To identify the sources of noise that require mitigation, the contributing sources for each receptor point were ranked from highest to lowest noise level. The top three sources for each receptor point are presented in Table 4.15-9. The Base Plant modeling does not include the full range of potential noise attenuation and mitigation measures that may be incorporated into the plant design because the detailed specifications and equipment vendors on which these measures are dependent have not yet been finalized. Primary noise contributors identified in the model are shown in Table 4.15-9. Although other types of equipment contributed lesser amounts of noise at each site, they could still contribute to an exceedance of the 60 dBA L_{dn} due to the number of such sources. Approximately 65 sources of noise were modeled at the power plant site. To achieve an L_{dn} of 60 dBA, the daytime noise levels from each individual source must be well below 60.0 dBA at the property line. For example, if one source creates a noise level of 50 dBA at a given receptor point, then a maximum of 10 sources may have a noise level of 40 dBA, an additional 30 may have a noise level of 30 dBA, and the remaining 24 must have a noise level of 20 dBA or lower to maintain an L_{dn} of 60 dBA at the receptor point.

Daily sources of noise are not the only consideration. During facility start-up, the steam must be conditioned. This means that it must be free of minerals or other impurities that could plug the lines or cause deposition on the turbine blades. Typically, the operators start up the boiler, but have the steam bypass the turbine and enter the condenser. This is done repeatedly until the quality of the steam is suitable for the turbine. If a line or valve becomes plugged during this process, the pressure relief (blow-off) can generate notable amounts of noise. To avoid noise impacts, temporary silencers can be installed on all drain lines and vents. These pieces of equipment are typically removed after the steam has been conditioned. Another means of minimizing impacts during this process is to perform venting, flushing, and cleaning during daytime hours. However, some steam must be generated during the overnight period.

Table 4.15-9. Major Sources of Noise During Power Plant Operations

Receptor Points			Highest Contributing Sources of Noise (dBA)		
Site ID*	Location	Daytime L_{dn}	1	2	3
LT1	Plant - Southeast Side	63.6	49.5 DE aerator vent	48.4 STG – east	48.0 STG – east
LT2	Plant - East Side	Not applicable. Property to be acquired.			
LT3	Plant - North Side	71.3	58.2 ID fan	56.8 coal mill – west	56.8 coal mill – east
LT4	Plant - West Side	63.3	50.4 coal conveyor	50.4 clinker cooler – north	47.6 limestone prep – south
LT5	Eco-Park	61.5	48.0 limestone prep – east	44.5 limestone prep – south	44.4 coal/limestone conveyor
LT6	Pennsylvania Avenue	61.9	49.3 ID fan	44.8 FD – east	43.9 raw material conveyor
C7	Retirement Community	68.3	59.6 raw material conveyor	56.7 ID fan	46.2 FD – east
C8	Nursing Home	61.9	51.6 raw material conveyor	50.5 ID fan	42.5 FD – east
C9	ADA housing	62.4	50.2 ID fan	48.7 raw material conveyer	47.3 FD – east
C10	Mobile Home Park	61.6	51.1 ID fan	47.4 coal/limestone conveyor	42.2 coal prep - north

**See Figure 3.15-1 for site locations in Section 3.15. Notes: FD = forced draft building east, west, or north wall*
FM = finish mill east, west, or north wall; STG = steam turbine generator building east, west, or south wall

Mitigation of WGC Co-Production Facility Noise

Based on the CADNA modeling for the proposed Co-Production Facility, additional reasonably available mitigation measures may be necessary to reduce the noise levels at the site boundary and sensitive sites to 60 L_{dn} or less. To achieve the 60 L_{dn} noise target at the site's property line, noise attenuation features would need to reduce the combined daytime noise levels of key noise contributors to below 53.6 dBA. Because multiple noise sources are being considered, contribution from individual noise sources should target a range of achieving between 20.0 to 40.0 dBA at the property line. Potential means of achieving this objective include methods such as:

- acoustic enclosures,
- absorptive material on interior walls,
- acoustic ducts and louvers,
- noise curtains for conveyor motors, and
- more robust structural materials.

Placing acoustic walls or curtains around specific pieces of equipment, such as the conveyor motors, to increase the transmission loss, can also reduce noise. For example, Table 4.15-10 lists the resulting noise levels and the remaining noise suppression required after implementing acoustic curtains around conveyor motors – the L_{dn} values are lower at all sites and the nursing home location is now below the 60 L_{dn} criteria. A similar approach is to place cladding around the steam turbine, which can be designed to allow visual inspection and maintenance of equipment. In addition, louvers and ducts in the walls of buildings permit more noise to pass through than solid steel walls. Acoustic louvers, packless silencers, and duct silencers can be installed to reduce the noise that is transmitted through these openings. Similarly doors and windows can be designed to meet specific noise reduction criteria.

Table 4.15-10. Anticipated Noise Levels at Power Plant Receptor Sites with Minimal Mitigation (e.g., acoustic curtains for conveyor motors)

Receptor Points		Modeled Results (dBA)			Remaining Required Noise Suppresion (L_{dn})
Site ID*	Location	Daytime	Nighttime	L_{dn}	
LT1	Plant - Southeast Side	56.8	66.8	63.2	3.2
LT2	Plant - East Side	Not applicable, property to be acquired			
LT3	Plant - North Side	64.7	74.7	71.1	11.1
LT4	Plant - West Side	53.9	63.9	60.3	0.3
LT5	EcoPark	54.3	64.3	60.7	0.7
LT6	Pennsylvania Avenue	55.1	65.1	61.6	1.6
C7	Retirement Community	57.9	67.9	64.3	4.3
C8	Nursing Home	52.9	62.9	59.3	-0.7
C9	ADA housing	55.1	65.1	61.5	1.5
C10	Mobile Home Park	54.2	64.2	60.6	0.6

**See Figure 3.15-1 for site locations. Assumes use of acoustic curtains for conveyor motors only.*

The available mitigation methods needed to reduce the noise levels from specific equipment to the desirable design criteria will depend on final design and selection of specific equipment. The specific suite of mitigation measures for the buildings and equipment, as supplied by the vendors, should be incorporated into the Base Plant model during the final design phase to ensure that collective targeted noise levels will be achieved. After the Base Plant model and mitigation measures have been fine-tuned for the final design, the WGC contract documents should specify that vendors and suppliers provide equipment that will meet the noise specifications. Operational procedures should include proper maintenance of equipment to prevent noise and vibration from equipment, such as conveyor belts, that may become noisy due to poor maintenance.

In accordance with noise requirements as regulated by the West Virginia Public Service Commission (PSC), WGC would incorporate noise attenuation and mitigation measures into the final plant design that ensure operational noise levels at sensitive noise receptors identified in the noise analysis would not exceed 60 dBA L_{dn}. Because this threshold would not be reached, no noise monitoring would be required by the PSC. However, to ensure compliance, WGC would be voluntarily monitoring noise levels during plant operations. With reference to Table 4.15-10, acoustic suppression from 1.5 to 11.3 dBA L_{dn} (depending on the receptor) is required to meet the 60 dBA L_{dn} requirement at all sensitive locations.

4.15.3.4 Fuel Supply

Limited information regarding noise levels that would be generated by the prep plant is available. However, it is assumed that noise emissions from the prep plant would not significantly impact sensitive receptors because of several factors. First, the candidate sites would be located at or near the coal refuse sources, which are in fairly isolated areas. The only exception would be the candidate site known as DN2 (see Figure 2.2-15), which is located on private, residential property. However, it is uncertain whether or not the entire property, including the adjacent home, would be acquired if the property became available. Another factor is that the novel design of the prep plant implements the use of sumps, which effectively reduce the amount of machinery and structures. Compared to typical coal prep plants, the type of plant WGC intends to use features a total reduction in the number of steel chutes in the building, lowering a substantial source of noise within the plant as material slides down the chutes from one piece of machinery to another. In addition, a substantial amount of noise is reduced in comparison to typical prep plants because the pumps are located below grade and are submerged in the sumps.

4.16 Potential Secondary and Cumulative Impacts

4.16.1 Secondary Impacts

Secondary or indirect impacts on the natural or human environments may be caused by changes in land use, population, housing, community services, and other conditions that would be induced through the implementation of a proposed action. For example, the construction of a new highway may influence development of residential housing and commercial establishments on lands designated as prime farmland. Therefore, it is important to consider the aspects of a project and the context of the planning area when evaluating the potential for secondary impacts.

DOE's proposed participation in the WCG project is intended to meet the department's need to demonstrate innovative coal power technologies under the CCPI program; in this case, the first commercial application in the United States of the compact, inverted cyclone (I^2CMS) design. The proposed WGC Co-Production Facility project would also serve the needs of the municipalities of Rainelle, Quinwood, and Rupert, and surrounding communities in western Greenbrier, eastern Fayette, and southern Nicholas Counties which include:

- Creating economic and social revitalization by serving as an anchor for an ecologically balanced and sustainable industrial park;
- Providing a clean, reliable supply of electrical energy, steam, and hot water for use by the industrial park and for export to the regional electric grid; and
- Demonstrating an economical coal refuse cleanup strategy, both by using coal refuse as a fuel source, and by using the coal ash for remediation of acid drainage from coal refuse piles and as a byproduct for the manufacture of cement for construction and other uses.

As described in Section 3.9, population, housing, and economic activity in the project area have been declining in recent decades because of the local decline in the coal and timber industries. Area businesses have been closing and job opportunities have been shrinking. Although the project is intended to stimulate the local economy, the objective is more to stabilize the local population by providing sufficient commercial activity and employment to stem the ongoing loss of working-aged adults in the region rather than encouraging significant population growth. The current trend toward an aging population in western Greenbrier County continues to have an adverse socioeconomic impact on the region by disproportionately increasing the demands on social services locally.

The scale of the WGC project and objectives for the associated sustainable industrial park are consistent with the regional planning and economic development goals of Greenbrier County as described in Sections 3.9 and 3.11. Therefore, beneficial local and regional development is anticipated as a result of the Proposed Action.

4.16.2 Cumulative Impacts

Cumulative impacts on the natural or human environments are caused by a proposed action when combined with the impacts of other planned and reasonably foreseeable actions. In such cases, cumulative impacts may exacerbate the environmental effects of any specific action implemented independently. Other than commercial activities by private sponsors, there are no known major projects planned by federal, state, county, or municipal authorities in the WGC area. The principal commercial activities in the planning area include:

- Ongoing timber harvesting activities (clear cutting) in the vicinity of the WGC project;
- Ongoing and planned coal mining (surface mining) and preparation operations at and near the Green Valley and Anjean sites; and
- Proposed wind power generating facility to be located north of the WGC project area.
- The planned EcoPark industrial development to be located adjacent to the WGC plant site.

Timber harvesting activities have occurred historically in Greenbrier County and adjacent counties in West Virginia as described in Section 3.8. The potential for cumulative impacts from these activities in conjunction with the proposed WGC project would relate to the impacts on local traffic due to the operation of logging trucks on the same highway corridors that would be used by trucks transporting coal refuse, ash, and limestone for the WGC facilities. Because timber harvesting is an ongoing activity, logging trucks are included in the background traffic conditions described in Sections 3.13 and are addressed in the traffic impacts analysis in Section 4.13.

Coal mining activities also have occurred historically in Greenbrier County and adjacent counties in West Virginia as described in Section 3.8. Ongoing coal hauling activities would affect the WGC project comparably to timber hauling activities described above, based on the use of the same highway corridors. Hence, the contribution of ongoing coal mining activities to background traffic and potential impacts is likewise addressed in Sections 3.13 and 4.13.

The proposed resumption of mining activities at and near the Anjean site (in an unconnected action) would contribute additional coal-hauling traffic that has not been considered in the baseline traffic conditions. Greenbrier Smokeless Coal Mining, LLC and the Oxford Mining Company have proposed to operate a complex of surface and deep mines along with a coal preparation plant, rail and truck load-out facility, haul roads, and a refuse facility in the vicinity of Anjean under 11 Surface Mine Application permits. Coal from mines in the complex would be transported by belt conveyors and by trucks on haul roads to the proposed Mountaineer No. 1 Preparation Plant. The plant would be located on a 25-acre (10-hectare) site approximately 1.3 miles (2.1 kilometers) northwest of the community of Anjean. A belt conveyor would deliver the prepared coal to a rail and truck load-out facility approximately 1 mile (1.6 kilometers) south of the plant. The load-out facility would be located at an 11-acre (4.5-hectare) site on the northwest side of Anjean Road (CR1) approximately 1.3 miles (2.1 kilometers) west of the community of Anjean. The project proponents currently plan to transport coal from the load-out facility by unit trains on an existing rail line at nearly 100 percent utilization with minimal reliance on trucking. Therefore, the transport of coal for the proposed complex would have a minimal cumulative impact on traffic when considered with the proposed WGC project. Also, the anticipated timing for the proposed mining operations at the Anjean coal refuse site would place these activities and associated hauling traffic ahead of the planned startup of the coal refuse operations supporting the proposed WGC facilities.

Invenergy Wind, LLC of Chicago, Illinois is currently planning a wind-powered electricity generation project in northern Greenbrier County. The project would have a peak generating capacity of approximately 200 MWe, and it would be sited on Field Mountain east of the Grassy Falls Substation. The Invenergy project information was submitted to PJM (Pennsylvania-Jersey-Maryland) Interconnection, and it has been identified as PJM Project #M24. PJM has reviewed the proposed connection to the regional power grid by the WGC power plant based on the anticipated completion and connection of the Invenergy project, and has determined that the projects would not cause conflict in the regional power distribution system.

As described in Sections 2.1.2 and 2.2.1, the planned EcoPark would be developed on approximately 26 acres (11 hectares) of land on the former site of the Meadow River Lumber Company located directly northwest of the WGC plant site across Sewell Creek (Figures 2.2-3 and 2.4-4). Greenbrier Valley

Economic Development Corporation has been planning for the development of the EcoPark property since the early 2000s as discussed in Section 3.9 and has been anticipating the completion of the WGC facility to serve as an anchor for the development. The WGC plant would support the EcoPark by providing electricity, steam, and hot water to potential tenants and by producing cement in a kiln for use in the manufacture of construction materials by potential tenants. As described in Section 4.16.1, local officials and business leaders believe that the EcoPark is needed to counter the decline in regional economic activity and the loss of working-aged population in the area.

Potential commercial activities that may occur at the EcoPark as a result of the completion of the WGC facility generally have been evaluated in Chapter 4 as connected actions. In addition to the cement kiln to be located at the power plant site, such potential tenants at the EcoPark may include a facility for the production of building products using cement from the kiln, a facility to produce farm-raised tilapia fish, and a commercial greenhouse operation. These tenants and potential other commercial and light industrial facilities would utilize byproducts, electricity, and steam generated by the WGC facility and would be served by utility systems and infrastructure provided by Rainelle. Based on the numbers of employees anticipated for these operations, as described in Section 4.13.3.2, potential impacts on local traffic would not be substantially adverse. Furthermore, the proposed EcoPark site is situated on the former property of the Meadow River Lumber Company on land that was previously disturbed and developed for commercial use. Emissions and wastes generated by anticipated commercial and light industrial activities at the EcoPark are not expected to be substantial when compared and added to those of the WGC facility.

Another area of concern with respect to cumulative impacts pertains to the potential for widespread commercial acceptance and application of the I^2CMS technology for CFB power plants due to the reduced costs of construction. Also, by demonstrating economical operations using fuel derived from coal refuse, the project may stimulate the development of comparable facilities throughout regional coal mining areas like those found in West Virginia. The result could lead to increased greenhouse gas emissions from additional CFB power plants, each contributing emissions comparable to the estimated 0.87 million tons (0.79 million metric tons) per year of CO_2 by the Co-Production Facility. Furthermore, mitigation of these emissions would be hindered by the fact that CO2 capture for potential geologic sequestration is not economically favorable using current CFB technology. Sequestration is not favorable for CFB technology because the CO2 is exhausted at low pressure and at dilute concentrations, trace impurities are present that reduce the effectiveness of the CO2 adsorbing process, and due to the parasitic loads associated with compressing the captured CO2 to pipeline pressure (1,200 – 2,000 pounds per square inch). Conversely, with integrated gasification combine cycle (IGCC) technology CO2 can be captured from a synthesis gas (coming out of the coal gasification reactor) before it is mixed with air in a combustion turbine. The CO2 is relatively concentrated (50 % by volume) and at high pressure offering the opportunity for lower CO2 capture cost.

However, as described in Section 4.3.3.2, the Co-Production Facility envisioned by WGC would create offsets to other greenhouse gas emission sources by providing heat recovery and distribution to nearby commercial and industrial customers. This approach would reduce the additional energy requirement that might otherwise be needed to support these businesses and, in effect, reduce the CO_2 emissions that otherwise would be associated with providing the additional energy to these businesses (i.e.; through the burning of fossil fuels). Productive uses for the waste heat associated with the Co-Production Facility are identified in Table 4.3-13. If successfully implemented, the heat recovery and distribution process could effectively offset the power plant's CO_2 emissions by 20 to 35 percent.

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4.17 Relationship between Short-term Uses of the Environment and Long-term Productivity

The proposed action would support the long-term DOE objective of demonstrating and promoting innovative coal power technologies that can provide the United States with clean, reliable, and affordable energy. It would also support the objectives of the WGC sponsor to provide a source of electric power and economic revitalization for the western Greenbrier County region. Local officials, business leaders, and many residents consider the potential environmental impacts that would occur during construction and operation of the WGC facility to be acceptable tradeoffs for the long-term productivity and viability of western Greenbrier County communities. Project aspects that would enhance long-term productivity include:

- The productive reuse of coal refuse piles at Anjean, Joe Knob, Green Valley, and Donegan Mine as fuel sources for the proposed facility;
- The use of waste ash from the proposed facility as a byproduct for the manufacture of cement material for use in construction; and
- The use of excess waste ash from the proposed facility for remediation of acid drainage from coal refuse piles, particularly at the Anjean site.

Short-term uses of the environment would pertain to the activities and associated impacts during construction that have been described throughout this chapter and include such effects as:

- Aesthetic impacts from construction affecting nearby residents as described in Section 4.2, including the effects on viewsheds from land-clearing activities and the exposure to emissions of fugitive dust and noise during construction.
- Impacts on air quality as described in Section 4.3, including fugitive dust emissions during construction.
- Erosion and sedimentation impacts on surface waters during construction as described in Section 4.4, which generally would be mitigated through the use of required control measures.
- Reductions in wildlife habitat caused by land-clearing activities as described in Section 4.7.
- Traffic impacts during construction attributable to temporary diversions and the movement of heavy equipment as described in Section 4.13.
- Increased noise from construction activities affecting nearby residents as described in Section 4.15.

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4.18 Irreversible and Irretrievable Commitments of Resources

The proposed action would commit the E&R property as the site of a proposed ACFB power plant for the foreseeable future. Site preparation would include the removal of the remaining portions of a ridge that has already been partially leveled, the filling of low-lying areas, and grading to provide a developable site plan. The site has been disturbed extensively as a result of prior attempts at development, and it does not currently support agriculture, significant wildlife habitat, or other productive uses.

The implementation of the proposed action would potentially result in the irretrievable commitment of building materials for construction of the WGC facilities, although many of the building materials may be recycled at a future date. Operation of the proposed facilities would require the commitment of fuels, limestone, and other materials as described in Chapter 2. However, the fuels required would be derived from the beneficiation of coal refuse generated during historical mining operations.

The construction and operation of the proposed facilities would require the commitment of human resources that would not be available for other activities during the period of their commitment, but this commitment would not be irreversible. Finally, the implementation of the Proposed Action would require the commitment of fiscal resources by the WGC, their lender, and DOE for the construction and operation of the WGC plant. However, these commitments are considered to be necessary investments to achieve the DOE and WGC objectives.

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4.19 Mitigation of Potential Adverse Impacts

For most environmental resources, the mitigation of potential adverse impacts from project activities would be achieved through the implementation of Best Management Practices (BMP) generally required by permitting processes and other federal, state, or municipal regulations and ordinances. Table 4.19-1 outlines specific mitigation measures that WGC would implement for each resource area.

Table 4.19-1. Mitigation Measures for the WGC Co-Production Facility Project

Environmental Resources	Mitigation Measures

Atmospheric Resources	**Construction:** WGC would implement the following measures:
	• Use of dust abatement techniques such as wetting soils, covering storage piles with tarps, enclosing storage piles, and limiting operations during windy periods on unpaved, unvegetated surfaces to reduce airborne dust.
	• Surfacing of unpaved access roads with stone whenever appropriate.
	• Covering construction materials and stockpiled soils to reduce fugitive dust.
	• Minimizing disruption to disturbed areas.
	• Watering land prior to disturbance (excavation, grading, backfilling, or compacting).
	• Revegetating disturbed areas as soon as possible after disturbance.
	• Moistening soil before loading into dump trucks.
	• Covering dump trucks before traveling on public roads.
	• Minimizing the use of diesel or gasoline generators for operating construction equipment.
	Co-Production Facility Operation: WGC would implement the following measures:
	• Use of SNCR and limiting the NOx emission rate to 125.75 lb/hr at the stack.
	• Use of combustion controls and limiting CO emission rates to 215 lb/hr at the stack on a 24-hour basis, and ensuring sufficiently high furnace temperatures to destroy most organic HAP emissions.
	• Use of limestone injection and a flash dryer absorber and limiting:
	  ▪ SO_2 emission rates to 151.68 lb/hr at the stack on a 3-hour and 24-hour basis
	  ▪ H_2SO_4 emission rates to 0.006 lb/MBtu at the stack.
	  ▪ HCl and HF emission rates to 0.01 and 0.016 lb/ton, respectively
	• Use of a baghouse and limiting PM emission no greater than 0.065 lb/MMBtu based on appropriate test method as approved by the WVDEP. The use of this technology would also be used to control Mercury emissions to 0.000003 lb/MMBtu and would limit emissions of individual HAP compounds.
	• Application of drift eliminators with a design drift efficiency of 0.0005 percent for controlling PM emissions from the cooling towers.
	• To the extent feasible, using enclosed systems with fabric filters and exhaust vents for materials handling and storage of coal, limestone, ash, alumina, gypsums and wood chips.
	• To control fugitive dust:
	  ▪ Paving of all major plant roadways
	  ▪ Sweeping and use of wetting agents on roadways and other surfaces as necessary when hauling materials
	  ▪ Covering of trucks with tarps, unless empty
	  ▪ Use of a truck wash station to clean vehicles prior to exiting the site.
	Coal Refuse: WGC would implement the following measures:
	• Application of standard dust suppression techniques (e.g., surfactant-type water spray).
	• Minimizing excavation activities during periods of high surface winds.
	• Applying WVDEP accepted practices and requirements for mining operations.

Table 4.19-1. Mitigation Measures for the WGC Co-Production Facility Project (continued)

Environmental Resources	Mitigation Measures
Surface Waters and Floodplains	**Construction:** • Prior to the commencement of construction, WGC would develop and implement a Storm Water Management and Pollution Prevention (SWMPP) Plan as required by a General Construction Permit from WVDEP under the National Pollutant Discharge Elimination System (NPDES). • WGC would develop and implement an Erosion and Sedimentation (E/S) Control Plan including BMPs as required by the General Construction Permit and based on guidance published by WVDEP and WVDOT. **Co-Production Facility Operation:** • Prior to the commencement of operation, WGC would develop and implement a SWMPP Plan as required by WVDEP for site registration. • WGC would develop and implement a Spill Prevention, Control and Countermeasures (SPCC) Plan covering all facility operations as required by WVDEP under the Clean Water Act. • Storm water management features would direct surface drainage to onsite storm water detention ponds for recycling and reuse; the ponds would be designed to contain runoff from a 10-year storm. • Refer to Atmospheric Resources for examples of BMPs for dust suppression and sedimentation control measures to be implemented by WGC. • WGC would implement a stream gauging program for the Meadow River to ensure that surface water withdrawals for supplemental plant water supply would not cause the river level to fall below 60% of the seasonally adjusted average base flow. **Coal Refuse:** • WGC would develop and implement an excavation and remediation plan as agreed and maintained by WVDEP for each coal refuse site used for fuel supply. The plans would outline measures to minimize impacts on surface waters at each location.
Geology and Groundwater Resources	**Construction:** • Refer to Surface Waters for SWMPP plan and E/S control plan requirements that would minimize potential impacts on groundwater resources. • In the event that blasting activity would be required, WGC would minimize blasting impacts on surrounding properties in accordance with a Blasting Plan required for a permit from the WV Fire Marshall. **Co-Production Facility Operation:** • Prior to the commencement of operation, WGC would develop and implement a Groundwater Protection (GWP) Plan as required by WVDEP for site registration. • WGC would develop and implement a Spill Prevention, Control and Countermeasures (SPCC) Plan covering all facility operations as required by WVDEP under the Clean Water Act. • WGC would implement a groundwater monitoring program to ensure that groundwater withdrawals for supplemental plant water supply would not draw down aquifer levels and threaten public water supplies and private wells. This would include verifying pump depths for the city wells. **Coal Refuse:** • WGC would develop and implement an excavation and remediation plan as agreed and maintained by WVDEP for each coal refuse site used for fuel supply. The plans would outline measures to minimize impacts on geology and groundwater at each location.

Table 4.19-1. Mitigation Measures for the WGC Co-Production Facility Project (continued)

Environmental Resources	Mitigation Measures
Biological Resources and Wetlands	**Construction:** • Refer to Surface Waters for SWMPP plan and E/S Control Plan requirements that would minimize potential impacts on aquatic ecosystems and wetlands. • Refer to Atmospheric Resources for BMPs to be implemented by WGC that would minimize potential impacts on ecosystems and wetlands from fugitive dust emissions. **Co-Production Facility Operation:** • Refer to Surface Waters for SWMPP Plan and SPCC Plan requirements that would minimize potential impacts on aquatic ecosystems and wetlands. • WGC would implement a stream gauging program for the Meadow River to ensure that surface water withdrawals for supplemental plant water supply would not cause the river level to fall below 60% of the seasonally adjusted average base flow. • WGC would ensure that operating personnel would be responsible for avoiding impacts to wetlands and sensitive habitats on or adjacent to WGC areas of activity. **Coal Refuse:** • WGC would develop and implement an excavation and remediation plan as agreed and maintained by WVDEP for each coal refuse site used for fuel supply. The plans would outline measures to minimize impacts on biological resources at each location.
Cultural Resources	**Construction:** • In the event that cultural resources were encountered during construction, WGC would oversee work stoppage and ensure that a qualified cultural resource specialist would be called onsite to evaluate the resources. Appropriate response would be initiated in consultation with the WV SHPO. • In the event that Native American remains or other resources were encountered during construction, WGC would oversee work stoppage and ensure that consultation with the SHPO and tribal representatives would be initiated. Contacts would be identified through research of ethnographic literature, as well as consultation with state and national tribal organizations and with agency and academic anthropologists. **Co-Production Facility Operation:** • WGC would ensure that operating personnel would be responsible for avoiding impacts to known cultural resources on or adjacent to WGC areas of activity. Inadvertent discoveries of potential cultural resources during facility operations would be handled in the same manner as described above for construction. Facility operations would be conducted in compliance with applicable cultural resource laws, regulations, policies and procedures, including DOE Directives. **Coal Refuse:** • WGC would ensure that inadvertent discoveries of cultural resources or Native American artifacts during excavation and remediation operations at the coal refuse sites would be handled in the same manner as described above for construction.
Aesthetics, Socio-economics, Environmental Justice, and Land Use	**Construction:** WGC would implement the following measures: • Maintain buffer zones where practicable to minimize construction impacts on adjacent housing, businesses and community services. • Limit trucking operations for deliveries and removals as practicable to non-peak periods, while avoiding noise-sensitive times of day. • Restrict construction activity to the least noise-sensitive times of day. Refer to Geology for the requirement of a Blasting Plan to minimize impacts on surrounding properties. • Locate stationary construction equipment as far as practicable from property boundaries and adjacent housing, businesses and community services.

Table 4.19-1. Mitigation Measures for the WGC Co-Production Facility Project (continued)

Environmental Resources	Mitigation Measures
	Co-Production Facility Operation: • WGC would ensure that facility operations would be conducted within federal and state regulations and established local ordinances to minimize impacts on adjacent populations, housing, businesses and community services. **Coal Refuse:** • WGC would implement measures during extraction, processing, and remediation at the coal refuse sites and prep plant as described above for construction and operation.
Utilities and Community Services	**Construction:** • Refer to Aesthetics, etc. for measures that would be implemented by WGC to minimize impacts on community services. • WGC would ensure that utility road crossings would be scheduled and conducted at appropriate times to minimize impacts on traffic patterns. **Co-Production Facility Operation:** • WGC would implement a groundwater monitoring program to ensure that groundwater withdrawals for supplemental plant water supply would not draw down aquifer levels and threaten public water supplies and private wells.
Traffic and Transportation	**Construction:** • WGC would coordinate transportation plans with local authorities, especially during the movement of oversize loads, including construction equipment, extra long or wide construction materials, process equipment modules, and other heavy machinery. • Where traffic disruptions would be necessary, WGC would provide detour plans, warning signs, and traffic diversion equipment to improve safety. **Co-Production Facility Operation:** WGC would implement the following measures: • Ensure the completion of traffic impact studies for future land development of the EcoPark, especially at Intersection A (Tom Raine Drive and WV 20), or proposed project changes in fuel and limestone material supply quality and location. • Ensure the assessment of traffic conditions at the intersection of Park Center Drive and US 60. Traffic diversion methods to alter vehicular travel patterns along John Raine Drive would be considered to lessen congestion of this intersection. • Ensure the assessment of entrance conditions to the Green Valley coal refuse site on WV 20. Posting of new traffic signs near the entrance on WV 20 would be considered to warn vehicles traveling on WV 20 of conflicting truck movements. • Request the repair of traffic sign(s) at the intersection of US 60 and CR 1 in Rupert. No signs for CR 1 southbound traffic at this intersection were in place during preparation of this EIS.
Public Health and Safety	**Construction:** WGC would implement the following measures: • Ensure the preparation of a site safety plan that focuses on construction activities and provides for daily safety meetings. • Prepare a safety information center in the site office where employees can review site safety plans, Material Safety Data Sheets (MSDS), and other information. • Ensure that all employees use personal protective equipment appropriate for the hazards encountered on the job site (e.g., hearing protection, gloves, safety shoes, etc.). • Ensure that construction activities comply with OSHA requirements and DOE safety-related directives as they apply to the project.

Table 4.19-1. Mitigation Measures for the WGC Co-Production Facility Project (continued)

Environmental Resources	Mitigation Measures
	Co-Production Facility Operation: • WGC would ensure that the same measures described above for construction would be implemented during all facility operations.
Noise	**Construction:** • Refer to Aesthetics, etc. for measures that would be implemented by WGC to minimize noise impacts for adjacent properties. **Co-Production Facility Operation:** • WGC would incorporate noise attenuation and mitigation measures into the final design that would ensure that operational noise levels at identified sensitive noise receptors would not exceed 60 dBA L_{dn}. • WGC would voluntarily monitor noise levels at sensitive noise receptor locations to ensure compliance.

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6. ACRONYMS AND GLOSSARY

6.1 Acronyms

ACRONYM OR TERM	DEFINITION
ACHP	Advisory Counsel on Historic Preservation
ACFB	Atmospheric Pressure Circulation Fluidized Bed
ADT	Average Daily Traffic
AEP	American Electric Power
AHPA	Archaeological and Historic Preservation Act of 1974
AIRFA	American Indian Religious Freedom Act
APE	Areas of Potential Effect
AN1, AN2, and AN3	Candidate prep plant sites for the Anjean and Joe Knob coal refuse sites
AML	Abandoned Mine Lands
AMD	Acid Mine Drainage
AQRV	Air Quality Related Values
ARPA	Archaeological and Historic Preservation Act of 1979
amsl	above mean sea level
At	Atkins Silt Loam
ATR	Automatic Traffic Recorders
BACT	Best Available Control Technology
Bf	board feet
BFE	Base Flood Elevation
BMP	Best Management Practice
BPH	(see WVBPH)
BOD_5	5-day Biochemical Oxygen Demand
CAA	Clean Air Act
CADNA 3.4	Computer Aided Noise Abatement (version 3.4)
CCPI	Clean Coal Power Initiative
CCT	Clean Coal Technology
CEDON	Community & Economic Development Consultation, Inc.
CEDS	Comprehensive Economic Development Strategy
CEQ	President's Council on Environmental Quality
CESQGs	Conditionally Exempt Small Quantity Generators
CFBC	Circulating Fluidized Bed Combustion
CFR	Code of Federal Regulations
CgE	Calvin and Gilpin Very Stoney Soils
CLRD	Chronic Lower Respitory Disease
CO	Carbon Monoxide
COMS	Continuous Opacity Monitoring System
COPC	Chemicals of Potential Concern
COPD	Chronic Obstructed Pulmonary Disease
C&ORR	Chesapeake and Ohio Railroad

ACRONYM OR TERM	DEFINITION
CR 1	County Route 1
CRTS	Coal Resource Transportation System
CSF	Cancer Slope Factor
CSXT	CSX Transportation
CTDMPLUS	The Complex Terrain Dispersion Model Plus Algorithms for Unstable Situations
CW	City-Owned Wells
CW #	City Well number __
CWA	Clean Water Act
CWIS	Cooling Water Intake Structure
DAQ	Division of Air Quality
dB	decibel
dBA	A-weighted scale in decibels
DHHR	Department of Health and Human Resources
DN1 and DN2	Candidate site for prep plant candidate sites for Donegan coal refuse
DOE	U.S. Department of Energy
DOED	U.S. Department of Education
DOT	U.S. Department of Transportation
DWWM	Division of Water and Waste Management
ECAR	East Central Area Reliability Coordination Agreement
EDT	Eastern Daylight Time
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
EQP	Environmental Quality Board
ESA	Federal Endangered Species Act
EWG	Exempt Wholesale Generators
FBC	Fluidized Bed Combustion
FDA	Flash Dryer Absorber
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rates Map
FIS	Flood Insurance Study
FLC	Falcon Land Company, Inc.
FLM	Federal Land Manager
GARI	Gauley River National Recreational Area
GCCC	Gauley Coal and Coke Company
GCHC	Greenbrier Country Historical Society
GCPC	Greenbrier County Planning Commission
GPDC	Greenbrier Planning and Development Council
G&E	Greenbrier and Eastern (railroad)
GP	Georgia-Pacific
GPS	Global Positioning System

ACRONYM OR TERM	DEFINITION
gpm	gallons per minute
GV	Candidate prep plant site for the Green Valley coal refuse site
GVCC	Green Valley Coal Company
GVEDC	Greenbrier Valley Economic Development Corporation
GWP	Groundwater Protection Plan
GWUDI	Groundwater Under Direct Influence
HAP	Hazardous Air Pollutants
HBI	Hilsenhoff's Biotic Index
HI	Hazard Index
HUD	Department of Housing and Urban Development
Hz	Hertz
I-64	Interstate 64
ICCC	Island Creek Coal Company
IEEE	Institute of Electrical and Electronic Engineers
IM&E	Impingement Mortality and Entrainment
ISCTST3	Industrial Source Complex Short-Term Model (Version 02035)
ITE	Institute of Transportation Engineers
KBKW	see BKW
kph	kilometers per hour
L_{10}	sound of pressure level exceeded 10 Percent of the time
LADD	Lifetime Average Daily Dosage
Leq	continuous equivalent sound level
L_{dn}	day-night equivalent sound level
LKP	PulseJet Fabric Filter
L&L	Loop and Lookout (railroad)
L_{max}	highest sound of pressure level measured
L_{min}	lowest sound of pressure level measured
LOS	Level of Service
LPSOs	Lead Program Secretarial Officers
LQG	Large Quantity Generators
MACT	Maximum Achievable Control Technology
MgB	Monongahela Silt Loam
MGD	million gallons per day
MRC&L	Meadow River Coal and Land Company
mph	miles per hour
MRLC	Meadow River Lumber Company
MSA	Metropolitan Statistical Area
MSDS	Material Safety Data Sheets
MTA	Mountain Transit Authority
MWe	megawatt
NAAQS	National Ambient Air Quality Standards

ACRONYM OR TERM	DEFINITION
NAC	Noise Abatement Criteria
NAD	North American Datum
NAGPRA	National Historic Protection and Repatriation Act of 1990
NAVD	North American Vertical Datum
NAWQA	National Water-Quality Assessment
NEP	National Energy Policy
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Council
NERI	New River Gorge National River
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFIP	National Flood Insurance Program
NF&G	Nicolas, Fayette and Greenbrier (Railroad)
NHPA	National Historic Preservation Society
NO_2	Nitrogen Dioxide
NO	Nitric Oxide
NO_x	Nitrogen Oxide
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NS	Norfolk Southern (Railroad)
NSPS	New Source Performance Standards
NWP	Nationwide Permit
NYC	New York Central
O_3	Ozone
OSHA	Occupational Safety and Health Administration
OSM	U.S. Bureau of Mines and the Office of Surface Mining
OW	Observation Well
OWR	Office of Water Resources
Pb	Lead
PJM	Pennsylvania-Jersey-Maryland Interconnection
$PM_{2.5}$	Particulate Matter (diameter <2.5 Microns)
PM_{10}	Particulate Matter (diameter<10 Microns)
Po	Pope Fine Sandy Loam
POTW	Publicly-Owned Treatment Works
PPV	Peak Particle Velocity
PSM	Process Safety Management
PSC	(see WVPSC)
PSD	Prevention of Significant Deterioration
PSD #	Public Service District #
PW	Production Wells
R4PDC	Region 4 Planning and Development Council
RfD	Reference Dose

ACRONYM OR TERM	DEFINITION
RfC	Reference Concentration (RfC)
ROA	(see KROA)
ROW	right-of-way
RNL #	Rainelle Site number __
RRI	Regional Research Institute (West Virginia University)
RSTP	Rainelle Sewage Treatment Plant
RTO	Regional Transmission Organization
SACTI	Seasonal/Annual Cooling Tower Impact
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Society
SIL	Significant Impact Levels
SIP	State Implementation Plan
SMCRA	Surface Mining, Control, and Reclamation Act
SO_2	Sulfur Dioxide
SNCR	Selective Non-Catalytic Reduction
SPCC	Spill Prevention, Control and Countermeasures
SPL	Sound of Pressure Level
SQG	Small Quantity Generators
st/d	short-tons per day
STG	Steam Turbine Generator
STPs	Shovel Pit Tests
SVRR	Sewell Valley Railroad
SWA	Solid Waste Authority
SWAPP	Source Water Assessment and Protection Program
SWPA	Source Water Protection Area
SWMB	Solid Waste Management Board
SWMPP	Storm Water Management and Pollution
TCLP	Toxic Characteristic Leaching Pollutant
THPOs	Tribal Historic Preservation Officers
TL #	Transmission Line Site number __
TMDL	Total Maximum Daily Load
TNM	Traffic Noise Model
tpd	tons per day
TSD	Treatment, Storage, and Disposal
TSP	Total Suspended Particles
TSS	Total Suspended Solids
TWSC	Two-Way Stop Controlled
UNT	Un-Named Tributary
US 60	US Route 60
US 219	US Route 219
USACE	U.S. Army Corps of Engineers

ACRONYM OR TERM	DEFINITION
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	Volatile Organic Compounds
WGC	Western Greenbrier Co-Generation, LLC.
WMA	Wildlife Management Area
WPCA	Water Pollution Control Act
WV 39/14	West Virginia Route 39/14
WV 12	West Virginia Route 12
WV 20	West Virginia Route 20
WVBPH	West Virginia Bureau of Public Health
WVDEP	West Virginia Department of Environmental Protection
WVDNR	West Virginia Division of Natural Resources
WVDOT	West Virginia Department of Transportation
WVPSC	West Virginia Public Service Commission
WVSCI	West Virginia Stream Condition Index
WVSHPO	West Virginia State Historic Preservation Office
WVU	West Virginia University

6.2 Glossary

TERM	DEFINITION
acid mine drainage (AMD)	Drainage of water from areas that have been mined for coal of other mineral ores; the water has low pH, sometimes less than 2.0 (is acid), because of its contact with sulfur-bearing material; acid drainage is harmful because it often kills aquatic organisms.
air dispersion model	A computer program that incorporates a series of mathematical equations used to predict downwind concentrations in the ambient air resulting from emissions of a pollutant. Inputs to a dispersion model include the emission rate; characteristics of the emission release such as stack height, exhaust temperature, and flow rate; and atmospheric dispersion parameters such as wind speed and direction, air temperature, atmospheric stability, and height of the mixed layer.
air quality	The cleanliness of the air as measured by the levels of pollutants relative to standards or guideline levels established to protect human health and welfare. Air quality is often expressed in terms of the pollutant for which concentrations are the highest percentage of a standard (e.g., air quality may be unacceptable if the level of one pollutant is 150% of its standard, even if levels of other pollutants are well below their respective standards).
alluvium	A general term for the sedimentary material deposited by flowing water.
anthracite	The hardest type of coal, characteristically black in color, lustrous, with a conchoidal fracture (smoothly curved, irregular breakage surface). Anthracite coal consists of 92-98% carbon and less than 8% volatile constituents by weight.
anticline	A geologic fold that is arch-like in form, with rock layers dipping outward from both sides of the axis, and older rocks in the core. The opposite of syncline.
aquifer	A subsurface saturated rock unit (formation, group of formations, or part of a formation) of sufficient permeability to transmit groundwater and yield usable quantities of water to wells and springs.
aquitard	A confining bed and/or formation composed of rock or sediment that retards but does not prevent the flow of water to or from an adjacent aquifer. It does not readily yield water to wells or springs, but stores ground water.
ash	The mineral content of a product remaining after complete combustion.
attainment area	An area considered to have air quality as good as or better than the national ambient air quality standards as defined in the Clean Air Act (CAA). An area may be an attainment area for one pollutant and a non-attainment area for others
baghouse	An air pollution control device that filters particulate emissions, consisting of a bank of bags that function like the bag of a vacuum cleaner; the bags intercept particles that are mostly larger than 10 micrometers in aerodynamic diameter.

TERM	DEFINITION
base flood elevation (BFE)	Refers to the elevation (normally measured in feet above sea level) that the base flood is expected to reach. The regulations of the National Flood Insurance Program (NFIP) focus on development in the 100-year floodplain; however, base flood elevations can be set at levels other than the 100-year flood.
Best Available Technology (BAT)	The current technology available to detect and treat the contaminant of concern.
Best Available Control Technology (BACT)	An emission limitation based on the maximum degree of emission reduction (considering energy, environmental, and economic impacts) achievable through application of production processes and available methods, systems, and techniques. BACT does not permit emissions in excess of those allowed under any applicable Clean Air Act (CAA) provisions. Use of the BACT concept is allowable on a case by case basis for major new or modified emissions sources in attainment areas and applies to each regulated pollutant.
beneficiation	The process of washing or otherwise cleaning coal to increase the energy content by reducing the ash content.
benthic/benthos	An organism that feeds on the sediment at the bottom of a water body such as an ocean, lake, or river.
berm	A mound or wall of earth.
Biochemical Oxygen Demand (BOD)	A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. The greater the BOD, the greater the degree of pollution.
Biochemical Oxygen demand (5-day) (BOD_5)	The amount of dissolved oxygen consumed in five days by biological processes breaking down organic matter.
biota	The animal and plant life of a given region.
blackwater	Water that contains animal, human, or food waste.
blowdown	The portion of steam or water removed from a boiler at regular intervals to prevent excessive accumulation of dissolved and suspended materials.
bottom ash	Combustion residue composed of large particles that settle to the bottom of a combustor from where they can be physically removed.
brackish	Describes water that has high concentrations of salts (typically 1,000 to 10,000 parts per million of dissolved solids) but that may still be suitable for some uses.
cancer slope factor (CSF)	An upper bound, approximating a 95% confidence limit, on the increased cancer risk from a lifetime exposure to an agent. This estimate, usually expressed in units of proportion (of a population) affected per mg/kg/day, is generally reserved for use in the low-dose region of the dose-response relationship, that is, for exposures corresponding to risks less than 1 in 100.

TERM	DEFINITION
capacity factor	The percentage of energy output during a period of time compared to the energy that would have been produced if the equipment operated at its maximum power throughout the period.
carcinogenic	Capable of producing or inducing cancer.
census tract	A small, relatively permanent statistical subdivision of a county. Census tracts, which average about 4,000 inhabitants, are designed to be relatively homogeneous units with respect to population characteristics, economic status, and living conditions.
chemical of potential concern (COPC)	A chemical that is potentially site related and of sufficient quality to quantify risk. Chosen primarily on the basis of an evaluation of the chemical analytical data and relationship of measured levels to background levels. Health and ecological effects may be considered in the selection of COPCs, but only to reduce their number to one that is convenient for the baseline risk assessment.
circulating fluidized bed combustion (CFBC)	Circulating fluidized bed combustion is a clean coal technology process that produces a mixture of coal and limestone in a liquid state by vertically moving air. The process effectively removes sulfur and nitrogen from coal, thus reducing sulfur dioxide and nitrogen oxide from coal-burning emissions.
Class I Area	Under the Clean Air Act, an area in which visibility is protected more stringently than under the national ambient air quality standards; includes national parks, wilderness areas, monuments, and other areas of special national and cultural significance.
Class II Area	Areas protected under the Clean Air Act, but identified for somewhat less stringent protection from air pollution damage than a Class I Area, except in specified cases.
Clean Coal Technology (CCT)	Any technology not in widespread use prior to the Clean Air Act (CAA) Amendments of 1990. This Act will achieve significant reductions in pollutants associated with the burning of coal.
cogeneration	The consecutive generation of useful thermal and electric energy from the same fuel source.
combustor	Equipment in which coal or other fuel is burned at high temperatures.
confined aquifer	An aquifer that is bounded by two confining units, and in which the water level in wells usually rises above the top of the aquifer.
confining unit	A geologic formation or bed that has lower permeability than layers above and below it, and therefore restricts vertical water movement. (Confining units are also called aquitards.)
contaminant	A substance that contaminates (pollutes) air, soil, or water. It may also be a hazardous substance that does not occur naturally or that occurs at levels greater than those that occur naturally in the surrounding environment.

TERM	DEFINITION
contamination	The intrusion of undesirable elements (unwanted physical, chemical, biological, or radiological substances, or matter that has an adverse effect) to air, water, or land.
Continuous Opacity Monitoring System (COMS)	Equipment used to sample and condition, analyze, and provide permanent record of emissions or process parameters that reduce the transmission of light and obscure the view of a background object.
cooling tower	A structure that cools heated condenser water by circulating the water along a series of louvers and baffles through which cool, outside air convects naturally or is forced by large fans.
cooling tower blowdown	Liquid discharge released from a cooling tower to maintain proper water mineral concentration. This discharge is typically high in non-hazardous dissolved solids.
cooling water	Water that is heated as a result of being used to cool steam and condense it to water.
criteria pollutants	The 1970 amendments to the Clean Air Act (CAA) required EPA to set National Ambient Air Quality Standards for certain pollutants known to be hazardous to human health. EPA has identified and set standards to protect human health and welfare for six pollutants: ozone, carbon monoxide, total suspended particulates, sulfur dioxide, lead, and nitrogen oxide. The term, "criteria pollutants" derives from the requirement that EPA must describe the characteristics and potential health and welfare effects of these pollutants. It is on the basis of these criteria that standards are set or revised.
drawdown	With respect to groundwater, this is the drop in the water table or level of water in the ground when water is being pumped from a well.
endangered apecies	Animals, birds, fish, plants, or other living organisms threatened with extinction by anthropogenic (man-caused) or other natural changes in their environment. Requirements for declaring a species endangered are contained in the Endangered Species Act.
entrainment	To trap objects/organisms in water either mechanically through turbulence or chemically through a reaction. Entrainment can occur when aquatic organisms, eggs and larvae are drawn into a cooling system, through the heat exchanger, and then pumped back out.
entrapment-impingement	The blocking of larger entrained organisms that enter the cooling water intake by some type of physical barrier.
floodplain	The flat or nearly flat land along a river or stream or in a tidal area that is covered by water during a flood.
floodway	The National Flood (NFIP) floodway definition is "the channel of a river or other watercourse and adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot.

TERM	DEFINITION
endangered species	A species that is in danger of extinction throughout all or a significant part of its range; a formal listing of the U.S. Fish and Wildlife Service under the Endangered Species Act.
environmental justice	The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, state, local, and tribal programs and policies. Executive Order 12898 directs federal agencies to make achieving environmental justice part of their missions by identifying and addressing disproportionately high and adverse effects of agency programs, policies, and activities on minority and low-income populations.
evapotranspiration	The amount of water removed from a land area by the combination of direct evaporation and plant transpiration.
Exempt Wholesale Generator (EWG)	A non-utility electricity generator that is not a qualifying facility under the Public Utility Regulatory Policies Act of 1978.
fault	A fracture or fracture zone in rock along which the sides have been displaced vertically or horizontally relative to one another.
floodplain	The strip of relatively level land adjacent to a river channel that becomes covered with water if the river overflows its banks.
floodway	One of two main sections that make up the floodplain. Floodways are defined for regulatory purposes. Unlike floodplains, floodways do not reflect a recognizable geologic feature. For National Flood Insurance Program (NFIP) purposes, floodways are defined as the channel of a river or stream, and the overbank areas adjacent to the channel. The NFIP floodway definition is "the channel of a river or other watercourse and adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot."
flue gas	Residual gases after combustion that are vented to the atmosphere through a flue or chimney.
fluidized bed combustion (FBC)	A clean coal technology process that removes sulfur from coal during combustion. In a fluidized bed boiler, crushed coal and limestone are suspended in the boiler by an upward stream of hot air. The coal is burned in this ebullient, liquid-like mixture, hence the name "fluidized." As the coal burns, sulfur gases from coal combine with limestone to form a solid compound that is recovered with ash.
fly ash	Combustion residue composed of fine particles (e.g., soot) that are entrained with the draft leaving the combustor.

TERM	DEFINITION
formation	The primary unit associated with formal geological mapping of an area. Formations possess distinctive geological features and can be combined into "groups" or subdivided into "members."
freshwater	Water with a low concentration of salts (typically less than 1,000 parts per million of dissolved solids).
fugitive dust	Particulate matter composed of soil; can include emissions from haul roads, wind erosion of exposed surfaces, and other activities in which soil is removed and redistributed.
fugitive emissions	Emissions released directly into the atmosphere that could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening.
groundwater	Water contained in pores or fractures, in either the unsaturated zone or saturated zone, below ground level.
groundwater under direct influence (GWUDI)	Any water beneath the surface of the ground with: 1) significant occurrence of insects or other microorganisms, algae, or large-diameter pathogens; 2) significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions. Direct influence is determined for individual sources in accordance with criteria established by a state.
hazard index (HI)	Sum of two or more hazard quotients for chemicals of concern and/or multiple exposure pathways for a particular receptor.
hazardous air pollutant (HAP)	Air pollutants not covered by ambient air quality standards but which may present a threat of adverse human health effects or adverse environmental effects, and are specifically listed on the Federal list of 189 hazardous air pollutants in 40 CFR 61.01.
hazardous waste	A category of waste regulated under the Resource Conservation and Recovery Act (RCRA). To be considered hazardous, a waste must be a solid waste under RCRA and must exhibit at least one of four characteristics described in 40 CFR 261.20 through 40 CFR 261.24 (i.e., ignitability, corrosivity, reactivity, or toxicity) or be specifically listed by the Environmental Protection Agency in 40 CFR 261.31 through 40 CFR 261.33.
Hilsenhoff's Biotic Index (HBI)	an indicator of organic pollution which uses tolerance values to weight taxa abundances; usually increases with pollution.
hydrology	(1) The study of water characteristics, especially the movement of water. (2) The study of water, involving aspects of geology, oceanography, and meterology.
infiltration	The process of water entering the soil at the ground surface and the ensuing movement downward. Infiltration becomes percolation when water has moved below the depth at which it can return to the atmosphere by evaporation or evapotranspiration.
karst	A geologic formation of irregular limestone deposits with sinks, underground streams, and caverns.

TERM	DEFINITION
laydown area	Material and equipment storage area during the construction phase of a project.
leachate	Solution or product obtained by leaching, in which a substance is dissolved by the action of a percolating liquid.
leaky confined aquifer	A leaky confined aquifer or semi-confined aquifer is an aquifer that has aquitards either above or below that allow water to leak into or out of the aquifer depending on the direction of the hydraulic gradient.
loam	A soil composed of a mixture of clay, silt, sand, and organic matter.
material safety data sheets (MSDS)	A compilation of information required under the OSHA Communication Standard on the identity of hazardous chemicals, health, and physical hazards, exposure limits, and precautions. Section 311 of SARA requires facilities to submit MSDSs under certain circumstances.
Maximum Achievable Control Technology (MACT)	The maximum degree of reduction in emissions for new and existing air pollution sources, taking into consideration cost, non-air quality health and environmental impacts, and energy requirements.
Maximum Contaminant Level (MCL)	The maximum permissible level of a contaminant in water delivered to any user of a public system. MCLs are enforceable standards.
mining district	An area usually designated by name with described or understood boundaries where minerals are found and mined under rules prescribed by the miners, consistent with the General Mining Law of 1872.
minority population	A community in which the percent of the population of a racial or ethnic minority is 10 points higher than the percent found in the population as a whole.
mixing height	The height in the lower atmosphere within which relatively vigorous mixing of pollutant emissions occurs.
National Ambient Air Quality Standards (NAAQS)	Standards established by EPA that apply for outdoor air throughout the country.
National Emissions Standards for Hazardous Air Pollutants (NESHAPS)	Standards set by EPA for an air pollutant not covered by NAAQS that may cause an increase in fatalities or in serious, irreversible, or incapacitating illness. Primary standards are designed to protect human health, secondary standards to protect public welfare (e.g. building facades, visibility, crops, and domestic animals).
National Pollutant Discharge Elimination System (NPDES)	A provision of the Clean Water Act which prohibits discharge of pollutants into waters of the United States unless a special permit is issued by EPA, a state, or, where delegated, a tribal government on an Indian reservation.
New Source Performance Standards (NSPS)	National EPA air emission and water effluent standards which limit the amount of pollution allowed from new sources or from modified existing sources.

TERM	DEFINITION
New Source Review (NSR)	A Clean Air Act (CAA) requirement that State Implementation Plans (SIPs) must include a permit review that applies to the construction and operation of new and modified stationary sources in nonattainment areas to ensure attainment of national ambient air quality standards.
noise	Any sound that is undesirable because it interferes with speech and hearing; if intense enough, it can damage hearing.
particulate matter (PM)	Fine liquid or solid particles such as dust, smoke, mist, fumes, or smog, found in air or emissions.
pH	A measure of the relative acidity or alkalinity of a solution, expressed on a scale from 0 to 14, with the neutral point at 7. Acid solutions have pH values lower than 7, and basic (i.e., alkaline) solutions have pH values higher than 7.
plume	In atmospheric terms, a visible or measurable, elongated pattern of emissions spreading downwind from a source through the atmosphere.
PM10/PM2.5	PM10 is measure of particles in the atmosphere with a diameter of less than ten or equal to a nominal 10 micrometers. PM2.5 is a measure of smaller particles in the air. PM10 has been the pollutant particulate level standard against which EPA has been measuring Clean Air Act compliance. On the basis of newer scientific findings, the Agency is considering regulations that will make PM2.5 the new "standard".
point source	A stationary location or fixed facility from which pollutants are discharged; any single identifiable source of pollution; e.g. a pipe, ditch, ship, ore pit, factory smokestack.
potentiometric surface	Imaginary surface defined by the elevations to which the groundwater in an aquifer would rise in wells completed in the aquifer.
Prevention of Significant Deterioration (PSD)	EPA program in which state and/or federal permits are required in order to restrict emissions from new or modified sources in places where air quality already meets or exceeds primary and secondary ambient air quality standards.
Publicly Owned Treatment Work (POTW)	A waste-treatment works owned by a state, unit of local government, or Indian tribe, usually designed to treat domestic wastewaters.
pumping test	A test conducted to determine aquifer or well characteristics
recharge	The process by which water is added to a zone of saturation, usually by percolation from the soil surface; e.g., the recharge of an aquifer.
reference concentrations	Estimates of continuous inhalation exposure to human population (including sensitive subgroups) that are likely to be without an appreciable risk of deleterious effects during a lifetime.

TERM	DEFINITION
region of influence	The physical area that bounds the environmental, sociologic, economic, or cultural features of interest for the purpose of analysis.
rime ice	An opaque coating of tiny, white, granular ice particles, caused by the rapid freezing of supercooled water droplets on impact with an object.
riparian	Of, on, or pertaining to the bank of a river or stream, or of a pond or small lake.
scrubber	An air pollution device that uses a spray of water or reactant or a dry process to trap pollutants in emissions.
seismic	Pertaining to, characteristic of, or produced by earthquakes or earth vibrations.
selective catalytic reduction (SCR)	A system to reduce NO*x* emissions by injecting a reagent such as ammonia into exhaust gas to convert NO*x* emissions to nitrogen gas and water via a chemical reduction reaction.
sensitive receptor	As used in this EIS, it is any specific resource (i.e., population or facility) that would be more susceptible to the effects of the impact of implementing the proposed action than would otherwise be.
sludge	A semi-solid residue containing a mixture of solid waste material and water from air or water treatment processes.
slurry	A watery mixture or suspension of fine solids, not thick enough to consolidate as sludge.
State Implementation Plan (SIP)	EPA approved state plans for the establishment, regulation, and enforcement of air pollution standards.
storativity	The volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer, per unit change in head. It is equal to the product of specific storage and aquifer thickness. In an unconfined aquifer, the storativity is equal to the specific yield.
tailings	Residue of raw material or waste separated out during the processing of crops or mineral ores.
Tennant Method	A quick and practical method for determining streamflow requirements for protecting aquatic resources in cold- and warm-water streams. Also referred to as the Montana Method.
threatened species	A species that is likely to become an endangered species within the foreseeable future throughout all or a significant part of its range.
Total Maximum Daily Load (TMDL)	The allowable loadings or other quantifiable parameters for a waterbody to meet the U.S. EPA's TMDL Program, authorized under Section 303(d) of the Clean Water Act (CWA), water quality standards. The CWA addresses waters in the nation that do not meet the national goal of "fishable, swimmable," despite implementation of nationally required levels of control pollution technology that requires each state to identify and develop TMDLs.

TERM	DEFINITION
transmission corridor	Area used to provide separation between the transmission lines and the general public and to provide access to the transmission lines for construction and maintenance.
transmissivity	The product of hydraulic conductivity and aquifer thickness; a measure of a volume of water to move through an aquifer. Transmissivity generally has the units of ft2/day or gallons per day/foot. Transmissivity is a measure of the subsurface's ability to transmit groundwater horizontally through its entire saturated thickness and affects the potential yield of wells.
water table	(1) The upper limit of the saturated zone (the portion of the ground wholly saturated with water). (2) The upper surface of a zone of saturation above which the majority of pore spaces and fractures are less than 100 percent saturated with water most of the time (unsaturated zone) and below which the opposite is true (saturated zone).
wetlands	Areas that are inundated by surface water or groundwater with a frequency sufficient to support, under normal circumstances, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, sloughs, potholes, wet meadows, river overflow areas, mudflats, and natural ponds.
Wildlife Management Area (WMA)	Parcels of land owned by the Wildlife Department, and managed to provide quality wildlife habitat and conserve significant natural communities. These areas are often managed specifically for important game species, such as deer, moose, snowshoe hare and ruffed grouse, and thus are favorite haunts of hunters and trappers. Many other wildlife species also benefit from management activities, and these areas are also used for bird watching and hiking. In order to maintain a self-reliant outdoor experience in as natural a setting as possible, there generally are no developed trails or facilities on WMA's. WMA's are not to be confused with Wildlife Management Units (WMU), which are regions with similar physiographic characteristics that were created for the purpose of establishing hunting seasons and issuing special hunting permits (such as antlerless deer permits).
wind rose	A graph in which the frequency of wind blowing from each direction is plotted as a bar that extends from the center of the diagram. Wind speeds are denoted by bar widths and shading; the frequency of wind speed within each wind direction is depicted according to the length of that section of the bar.

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Elected Officials

Senator Robert C. Byrd
Senator John D. Rockefeller IV
Governor Joe Manchin III
Representative Alan B. Mollohan
Representative Shelley Moore Capito
Representative Nick Joe Rahall, II
Senator Jesse Guills
Senator Don Caruth
Delegate Tom Campbell
Delegate Ray Canterbury
Mayor Eugene Wright (Quinwood)
Mayor Eugene McKenzie (Rainelle)
Mayor Charles Mundy (Rupert)

State Agencies

John Preston
U.S. Army Corps of Engineers
Huntington District, West Virginia

Teresa Spagna
U.S. Army Corps of Engineers
Huntington District, West Virginia

Ron Hilliard
U.S. Department of Agriculture
Natural Resources Conservation Service, West Virginia

John Perez
U.S. Department of the Interior
National Park Service, New River Gorge National River

Thomas Chapman
U.S. Department of the Interior
U.S. Fish and Wildlife Service, West Virginia Field Office

John A. Benedict
West Virginia Department of Environmental Protection
Division of Air Quality

Ken Ellison
West Virginia Department of Environmental Protection
Division of Land Restoration

Randy Huffman
West Virginia Department of Environmental Protection
Division of Mining and Reclamation

Lyle Bennett
West Virginia Department of Environmental Protection
Division of Water and Waste Management (DWWM)
Special Projects

West Virginia Department of Environmental Protection
DWWM/Abandoned Mine Lands and Reclamation

Paul A. Mattox, Jr.
West Virginia Department of Transportation
Division of Highways

John F. Herholdt, Jr.
West Virginia Development Office

Jennifer Murdock
West Virginia Division of Culture and History

Susan M. Pierce
West Virginia Division of Culture and History

Paul Johansen
West Virginia Division of Natural Resources
Wildlife Management

Barbara Sargent
West Virginia Division of Natural Resources
Wildlife Resources Section

Curtis I. Taylor
West Virginia Division of Natural Resources
Wildlife Resources Section

Scott Simonton
West Virginia Environmental Quality Board

Richard E. Hitt
West Virginia Public Service Commission

Randy Plum
West Virginia Rural Utilities Programs

Local Agencies/Offices

Betty Crookshanks
Greenbrier County Commission

Lowell Rose
Greenbrier County Commission

Brad Tuckwiller
Greenbrier County Commission

Susan L. Rosshirt
Greenbrier County Housing Authority

Greenbrier County Historical Society

Margaret Janes
Appalachian Center for the Economy and the Environment

Marcia and Jim Leitch
WV Interfaith Global Climate Change Campaign

James Kotcon
Sierra Club – West Virginia Chapter

Susan Schneider
Mountaineer Audubon Society

Rodney Bartgis
The Nature Conservancy of West Virginia

The Nature Conservancy of West Virginia
Charleston, West Virginia Office

Ken Ward
Charleston Gazette

Joe Myers
Beckley Register

Nongovernmental Organizations

Louis Zeller
Blue Ridge Environmental Defense League

Randy Rawson
American Boiler Manufacturers Association

David Goss
American Coal Ash Association

Shauna Larsen
American Public Power Association

John Bowman
Environmental Defense

Jim Mosher
The Izaak Walton League of America, Inc.

Robert A. Beck
National Coal Council

David Brunner
National Fish and Wildlife Foundation

Moya Phelleps
National Mining Association

Libby Fayad
National Parks Conservation Association

Rae Cronmiller
National Rural Electric Cooperative Association

Jim Lyon
National Wildlife Federation

Steve Malloch
Trout Unlimited, Western Water Project Counsel

Tom Bancroft
The Wilderness Society, Ecology and Economics Research Department

Richard M. Loughery
Edison Electric Institute

Barbara Bauman Tyran
Electric Power Research Institute

David Hawkins
Natural Resources Defense Council

Barry K. Worthington United States Energy Association

Other Interested Parties

Pete Adams
John M. Adkins
Rodger Ash
Carson Blankenship
George R. Brooke
William L. Butler
David J. Cottrill
Debbie Crookshanks
Aaron A. Davidson
W.E. Deegans
John N. DuHaime
Gary Graham
Roy G. Hicks
Eric R. Johnson
Judy Koehler
Lynn Lewis
Joe Lovett
Franklin F. Manspil
Leslee McCarty
Ben McGraw
Brian Neely
Mary Nutter
Fred Patterson
Ray E. Ratliff, Jr.
Frank Stacy
Jerry Searles
Shenda Smith
Christy Stoll
William Stone
Marilyn Trout
Dalphine Vandall
April Vestal
Mark J. Vestal
Duke Walczak
Robert H. Wollard
William E. Zopp