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.

INTENTIONALLY LEFT BLANK

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.

Figure 4.2-1
Properties Closest to the Proposed Plant Site

Map Source: Photo Science, 2004

U.S. Department of Energy
National Energy Technology Lab

Western Greenbrier Co-Production Demonstration Project

Environmental Impact Statement

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.

INTENTIONALLY LEFT BLANK

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.

BACT Analysis and Compliance with the Clean Air Act

In May 2006, the Sierra Club (West Virginia Chapter), West Virginia Highlands Conservancy, and Greenbrier River Watershed Association filed an appeal with the West Virginia Air Quality Board (AQB) against WVDEP's issuance of the air permit. The final court order for this appeal was issued in February 28, 2007, in which the AQB affirmed the WVDEP's issuance of the air permit to WGC (see Appendix O3). According to the final order, it was concluded that WGC conducted the BACT analysis, and WVDEP complied with procedural requirements, in accordance with the applicable laws and regulations. Some of the findings of the AQB's ruling include:

- ***Not enough evidence was provided to support the claim that the BACT analysis was flawed by the use of PM_{10} as a surrogate for $PM_{2.5}$.***
- ***Based on an independent review of the BACT analysis, it was concluded that "serious technical, economic, environmental and energy considerations prevented the selection of: 1) SCR for NO_x removal and 2) Wet Flue Gas Desulphurization Scrubber ('wet scrubber') for removal of SO_2."***
- ***An air quality dispersion modeling expert concluded that the dispersion modeling was conducted in a proper manner and testified that: "both models were simulated according to the guidelines and were even more conservative than necessary, 2) the guidelines require 'representative data' not just on-site (local) meteorology, and 3) predominate wind directions and the size and location of the facility were taken into consideration when determining that pollutant 'puffs' would not rotate in a clockwise direction and move against the predominate wind direction into the area of concern…" (See Appendix O2 for expert witness's testimony).***

HCl and HF Emission Factors in the Air Permit

Air Permit No. R14-0028 issued by WVDEP to WGC specifies emission threshold limits of 0.01 lb of HCl per ton of fuel and 0.016 lb of HF per ton of fuel. Section 4.0 of this permit requires:

- ***Waste coal that WGC would use as fuel should not have a chloride or fluoride content (in percent by weight) that would cause an exceedance of this limit when combusted;***
- ***WGC determines the maximum chloride and fluoride content in a plan submitted to WVDEP for approval at least 12 months prior to initial startup;***
- ***WGC demonstrates continuing compliance with the coal specifications by collecting composite waste coal samples once a day, and tests them using methods specified in the permit; and***
- ***WGC conducts a performance test on the CFB and kiln after achieving the maximum production rate to determine the emissions rate of pollutants, including HCl and HF, and provides the results to WVDEP. The performance test needs to be repeated once a year after initial startup.***

The specified 0.01 lb/ton HCl emission limit in the permit arose as a result of a unit conversion error. Notwithstanding, WGC has concluded that it would be unnecessary to modify the air permit because their investigations have demonstrated that they would anticipate no difficulties in complying with the terms of Section 4.0 (of the air permit) listed above, and with a limit that is lower than they might have otherwise requested. Furthermore, WGC are quite cognizant that they need comply or otherwise face major consequences of a suspension of the air permit (Section 2.5 of the air permit), and

are fully confident that they face no such risk. The investigations that enabled WGC to conclude that that they are not exposed to any risk of non-compliance are summarized below:

- ***The manufacturer of the WGC boiler, Alstom, has reviewed the proposed limits and, based on emission data from similar plants, determined that the system they provided for WGC would be capable of meeting the limits (due to propriety issues these technical data are not publicly available);***
- ***Other similar existing plants using CFB units (e.g., Spurlock Power Station in Kentucky and Sevier Power Company in Utah) have permitted emission rates in the same order of magnitude of WGC's emission limit of 0.01 lb HCl/ton fuel (much lower than AP-42 [EPA, 1985] emission factors discussed later). Consistent with these lower achievable emission rates, emission tests from the Southeast Steam Plant in Minnesota (air emission permit no. 05301050-011) exhibited a range of 0.00046 to 0.0075 lbs of HCl per ton of fuel. In this case, the permit emission limit is 0.054 lbs HCl/ton fuel, thus in actuality this facility is emitting at a significantly lower level.***
- ***WGC reviewed publicly available information (e.g., EPA's National Coal-Fired Utility Projects Spreadsheet [EPA, 2007] and other data for recently permitted CFB projects) and used emission factors that accurately reflected the proposed technology being used for this project to determine the permit limits.***
- ***WGC did not use AP-42 emission factors to determine the HCl and HF emission factors for their permit because these AP-42 factors are based on a 1985 document that WGC believes does not accurately reflect the advanced technology being used for this project. In addition, these emission factors, as indicated in a footnote of Table 1.1-15 in AP-42 (EPA, 1985), are intended to encompass both controlled and uncontrolled emissions, indicating that these factors are representative of uncontrolled conditions that lie outside those of this project.***
- ***WGC has recently tested random samples from the Anjean and Donegan fuel sources and estimated that the chlorine content of the coal refuse would result in annual emissions for HF and HCl emissions well below the threshold considered for a major source designation (URS, 2007).***

Therefore, for all of these reasons DOE concurs that the emission limits listed in the air permit are both reasonable and attainable. More importantly they are enforceable. DOE has reviewed the risk assessment data and assumptions, and has updated it to reflect most recent project data. The revised modeling results have been included in Tables 4.14-4 and 4.14-7 of this volume.

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.

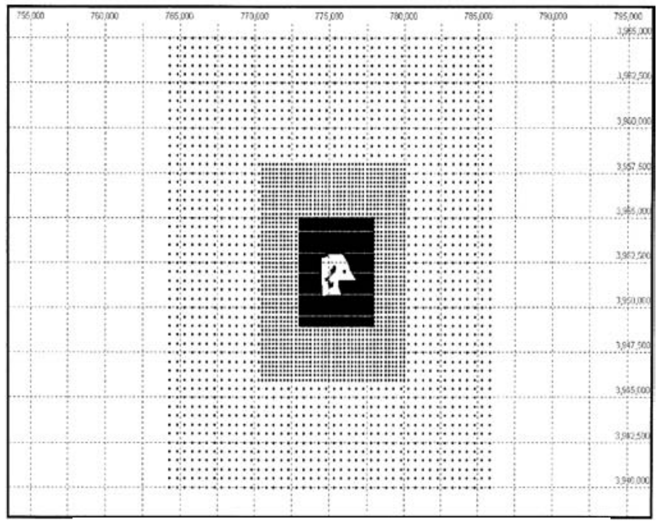

Figure 4.3-1. Receptor Grid

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.

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 SO_4.*
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[a]
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

[a] ***EPA revoked the annual PM_{10} standard of 50 µg/m³ effective December 18th, 2008. As of July 2007 this standard currently prevails under the State of West Virginia Code of State Rules 45 CSR 8, under part 45-8-4.1.a.1.B until updated to reflect part 45-8-1.1 which part states: "The purpose of this rule is to establish ambient air quality standards for sulfur oxides and particulate matter, equivalent to those national primary and secondary ambient air quality standards established by the U.S. EPA."***

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.

Effective December 18, 2006, EPA revoked the 24-hour $PM_{2.5}$ NAAQS of 65 µg/m³ and implemented a revised 24-hour $PM_{2.5}$ NAAQS of 35 µg/m³. Under this new standard, EPA intends to promulgate a final implementation rule in spring 2007 (currently, Greenbrier County is in attainment for $PM_{2.5}$ under the new standard). As a result, upper bound estimates for $PM_{2.5}$ concentration, initially used in the discussion of human health impacts in the Draft EIS (Section 4.14), would exceed the new standard of 35 µg/m³. The principal factor in this potential for exceeding the standard is a result of the comparatively high background concentration of $PM_{2.5}$ (PM data based on monitoring from Kanawha, WVDEP, Division of Air Quality, 2004). When evaluating potential human health effects in the Draft EIS, DOE used a very conservative approach to provide an upper bound for a $PM_{2.5}$ estimate for comparison to the old NAAQS standard. Since this conservative approach did not result in an exceedance of the old NAAQS standard, further analysis was not conducted at that time.

DOE's initial approach was conservative from the perspective that surrogate $PM_{2.5}$ values were based on permit limits for PM_{10} emissions (i.e., an upper bound value for PM_{10}). Furthermore, since modeling of $PM_{2.5}$ was not conducted, DOE used a multiplier of 0.7 (or 70% of the PM_{10} concentration) for developing a $PM_{2.5}$ estimate. However, more current research and data indicate that multipliers in the range of 0.06 to 0.11 can be used to infer or scale $PM_{2.5}$ concentrations from PM_{10} data (USEPA, 2005). When using a more realistic multiplier for relative $PM_{2.5}$, the resulting concentrations of $PM_{2.5}$ for the 24-hour standard would, therefore, not exceed the NAAQS standard of 35 μg/m^3.

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 Annual	22.42 4.34	22.42 4.34	30 17	75% 25%
SO_2	3-Hour 24-Hour Annual	301.76 64.66 12.93	225.16 48.25 9.65	512 91 20	59% 71% 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 Method2 RH=95%	% Change	3.85	3.5	3.2	5	No
	Days >5	0	0	0		
	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)] Method2 RH=95%	% Change	3.97	3.82	**5.53**	5	Yes
	Days >5	0	0	1		
	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.

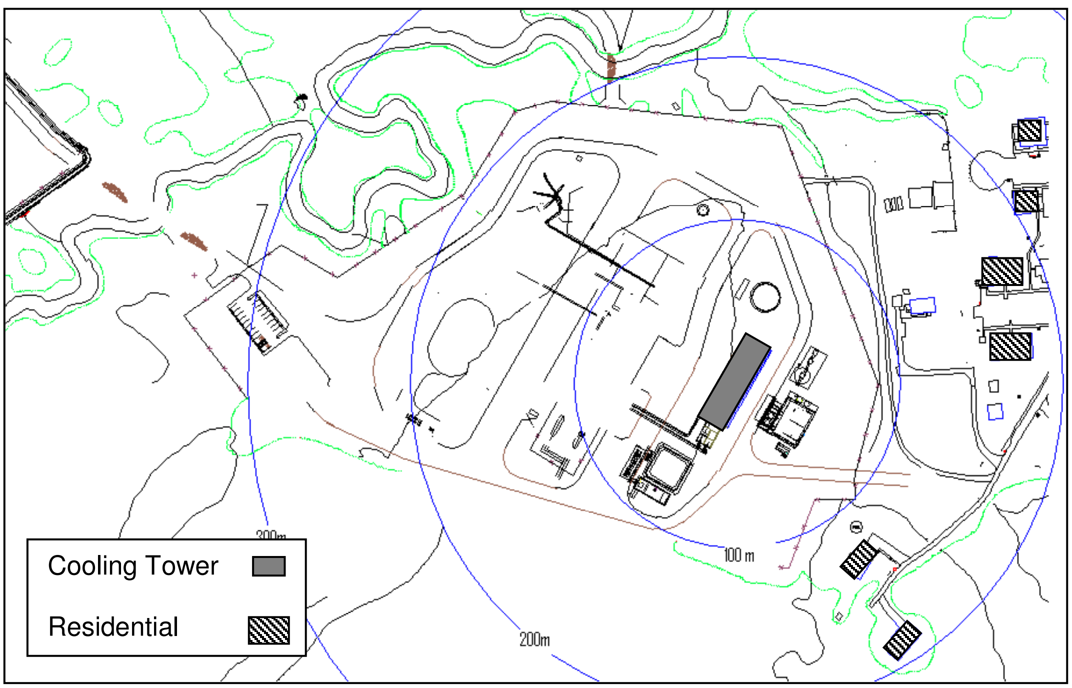

Figure 4.3-2. Cooling Towers and Nearby Residences
Source: Potomac-Hudson Engineering, Inc

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 would 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

Greenhouse gases include water vapor, carbon dioxide (CO_2), methane, nitrous oxide, ozone (O_3), and several chlorofluorocarbons. Water vapor, a natural component of the atmosphere, is the most abundant greenhouse gas. The second-most abundant greenhouse gas is CO_2. It has been estimated that CO_2 concentrations in the atmosphere have increased by 31 percent since 1750 (IPCC, 2001) and by 19 percent from 1959 to 2003 (Keeling and Whorf, 2005). Fossil fuel burning is the primary contributor to increasing concentrations of CO_2 (IPCC, 2007). Although CO_2 is not regulated as an air pollutant, it is generally regarded by a large body of scientific experts as contributing to global warming and climate change (IPCC, 2007). The EPA and local authorities are investigating CO_2 regulations that could become effective in the near future. CO_2 would be the primary greenhouse gas that would be emitted from the Co-Generation Facility. It is estimated that the proposed facility would emit approximately 0.87 million tons per year (0.79 million metric tons) of CO_2 (WGC, 2006c). In West Virginia, the amount of CO_2 emissions from coal combustion was estimated at 101 million tons (92 million metric tons) in 2003 (EIA, 2007). U.S. and global CO_2 emissions from coal consumption totaled approximately 2,300 million tons (2,100 million metric tons) and 10,800 million tons (9,800 million metric tons) in the year 2003, respectively (EIA, 2006).

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. ***Although not a mitigation measure, 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, 2006c

Based on the data provided in Table 4.3-14, WGC could provide up to 285 mmBtu/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, 2006c). 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.

Mitigation of CO_2 emissions via geologic sequestration is not favorable for CFB technology, because the CO_2 is exhausted at low pressure (15-25 psi) and at dilute concentrations (3-15 percent by volume). These factors would cause high parasitic power loads and increased costs associated with compressing the captured CO_2 to pipeline pressure (1,200 – 2,000 pounds per square inch). In comparison, CO_2 from integrated gasification combine cycle (IGCC) technology 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 CO_2 captured from IGCC technology is relatively concentrated (35-50 percent by volume) and at higher pressure (400-700 psi) offering the opportunity for lower CO_2 capture cost. Although oxygen-fired combustion offers a pre-combustion option for producing a pure stream of CO_2 that could be applied to CFB technologies, the concept has been tested only at laboratory scale (3MW). Also, there are substantial increases in cost and decreases in plant efficiency associated with an oxygen-fired combustion CFB application. Although the concept merits further research, it is not a viable or reasonable option for the WGC project at this time.

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 emissions related to these trucks 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 4.3.3.2. 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 Quarry in Alta 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 (ADT) 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.

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.

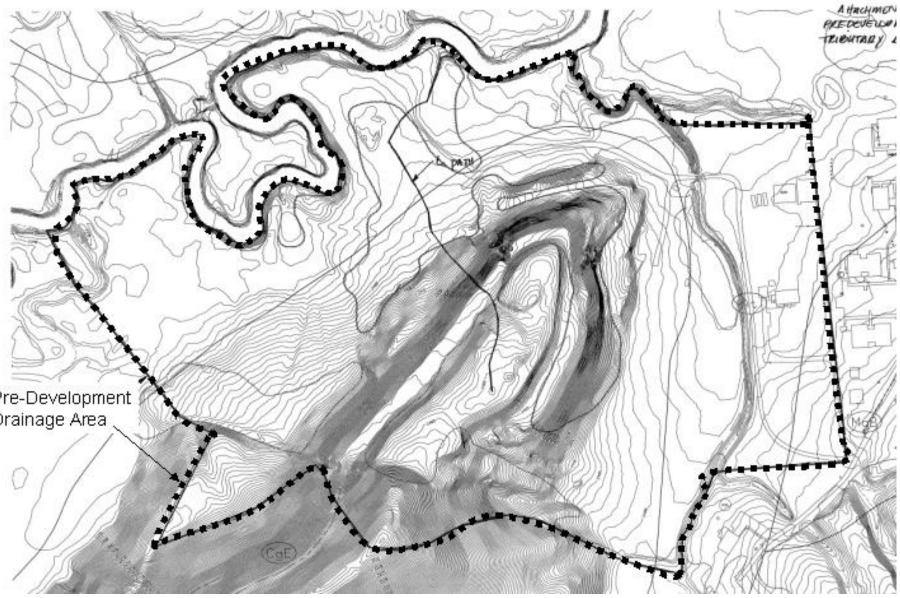

Figure 4.4-1. Pre-Development Drainage Area (PEC, 2005b)

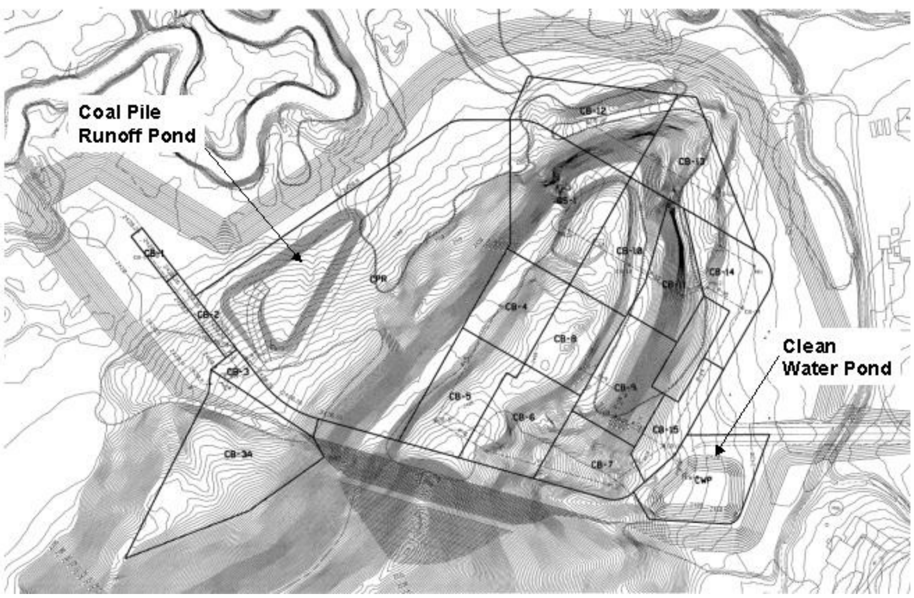

Figure 4.4-2. Post-Development Sub-Drainage Area (PEC, 2005b) (this figure is subject to change based on final storm water design)

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.

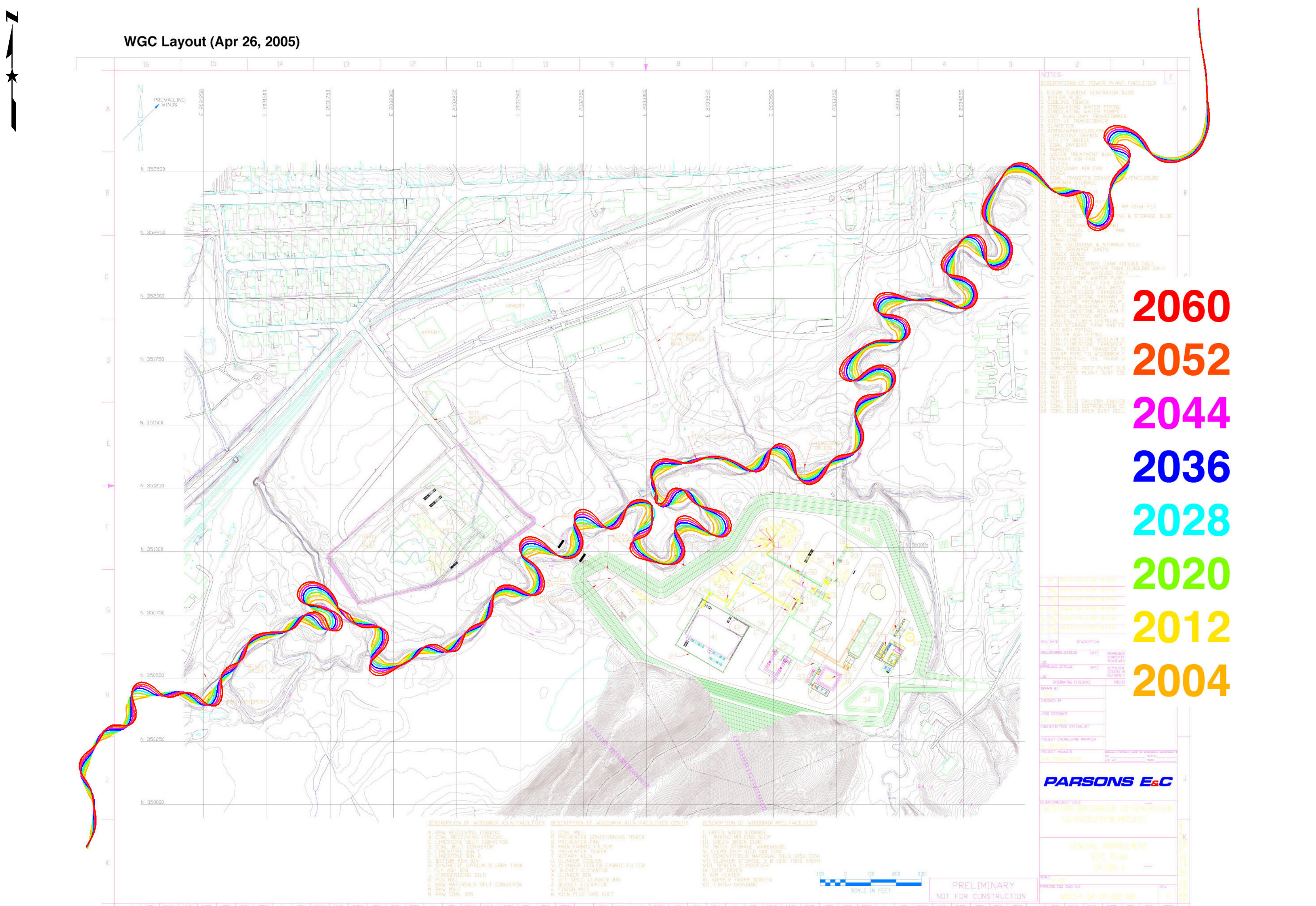

Figure 4.4-3.
Sewell Creek Meander Prediction
Source: Edwards, 2005

U.S. Department of Energy
National Energy Technology Lab

Western Greenbrier Co-Production Demonstration Project

Environmental Impact Statement

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***, in terms of the amount of available dissolved oxygen*****,** for aquatic species downstream.

Minimum day values for Meadow River flow data were extrapolated from the USGS station at Mount Lookout (this station provides approximately 40 years of data; see below for discussion on the comparison of data between the McRoss station near Rainelle and the Mount Lookout station, approximately 30 miles downstream of McRoss). Based on this data the median value for daily low-flow is approximately 8,000 gallons per minute (505 liters per second). Average monthly discharge rates from the RSTP range from 370 to 570 gallons per minute (23 to 36 liters per second) (see Figure 2.4-5 in Chapter 2). Discharge rates of 370 to 570 gallons per minute (23 to 36 liters per second) represent approximately four to seven percent of the median low-flow value of the Meadow River, respectively. 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 ***the average annual or seasonal*** flow (i.e., ***based on the Tennant Method,*** the river flow rate above which adverse water quality and aquatic habitat impacts would not be expected), groundwater would be withdrawn from PW-1, PW-3, and other potential wells as a tertiary source of process water supply. ***Since the Draft EIS was published, river withdrawal guidelines have been developed by the West Virginia Division of Natural Resources (WVDNR), including recommended flow thresholds. The impacts analysis based on these thresholds are discussed in greater detail below. In addition, an ongoing groundwater study referenced in the Draft EIS has now been completed and reviewed by DOE and has been added to the Final EIS (see Appendix D2). This information provides more insight to facilitate WGC's water use decisions and confirms assumptions and impacts as evaluated in the Draft EIS. See Section 4.6.3.4 of this volume for further discussion on the results of this study.***

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 ***D*** (Groundwater Pump ***Studies***). 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.

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.

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). ***Since publication of the Draft EIS, further analysis on streamflow data was conducted to further support that the impacts analysis presented in the Draft EIS was reasonable – see below for details.***

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.

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

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.

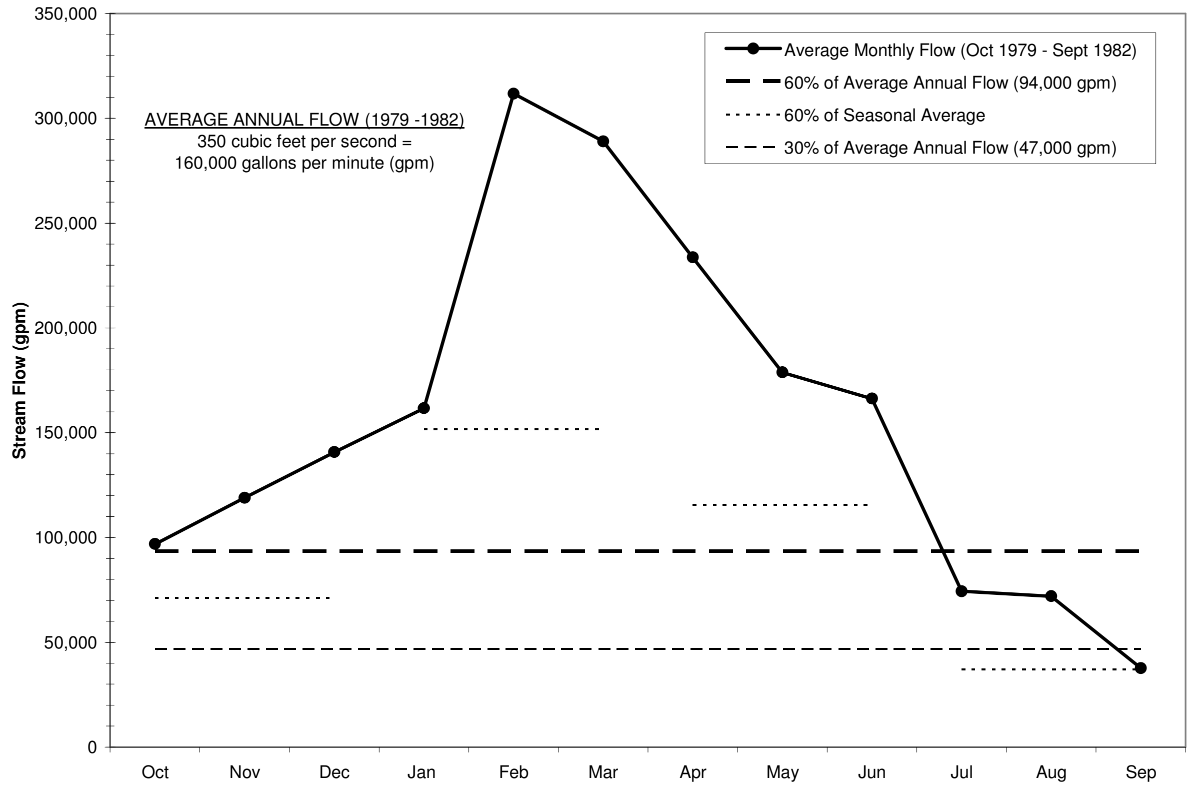

Figure 4.4-4. Meadow River Stream Average Monthly Flow (October 1979 – September 1982)

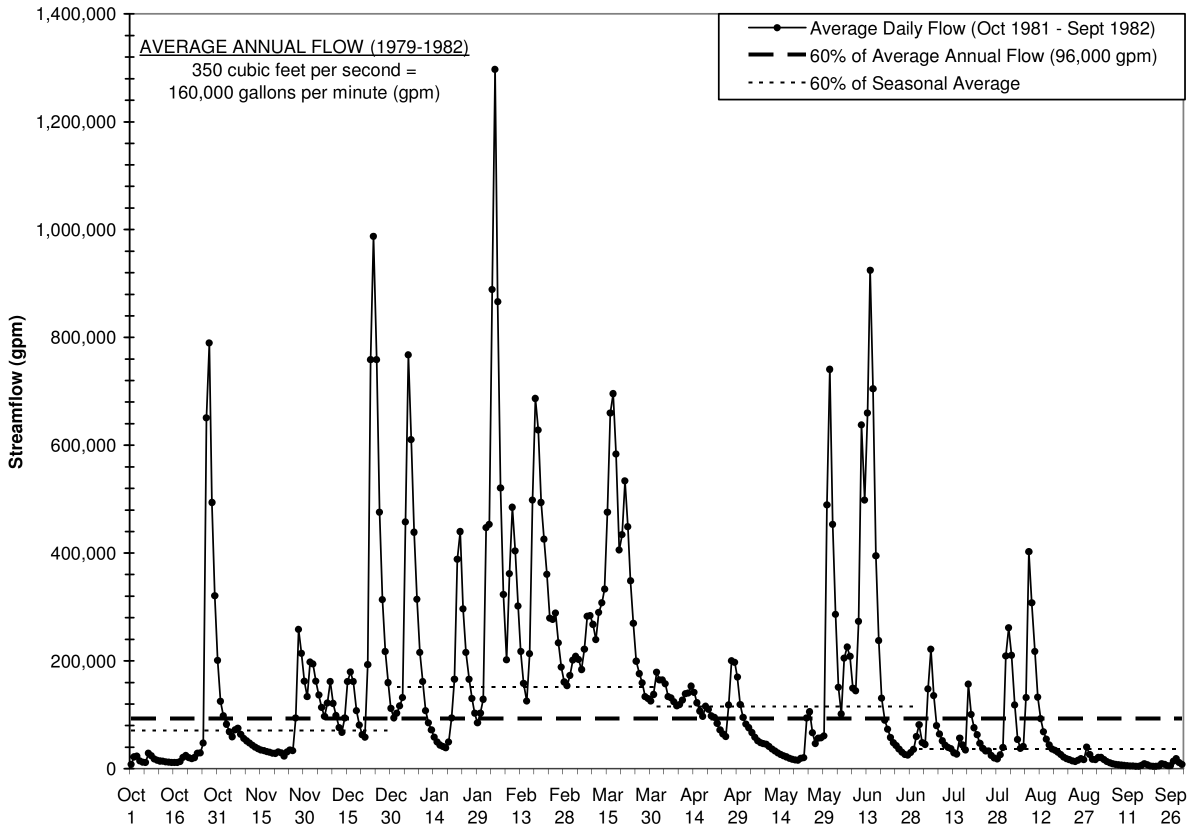

Figure 4.4-5. Meadow River Stream Average Daily Flow (October 1981 – September 1982)

Figure 4.4-5 provides an ***illustrative*** 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 ***for this particular year (Oct 1981 – Sept 1982) (see discussion below for estimates on amount of days Meadow River would be used based on a greater data set and thresholds provided by the state)***.

The streamflow data at the USGS gage station on the Meadow River at McRoss was selected due to its close proximity to Rainelle. To provide further support for the analysis on water resources, a more detailed analysis of historical streamflow data was conducted. Historical streamflow data from the McRoss station was compared to the data available at the Mount Lookout station, which covered approximately 40 years. The drainage area at the Mount Lookout station is larger by a factor of approximately 2.2. Therefore, a larger dataset (approximately 40 years) for the McRoss station was provided by scaling down the flow data at Mount Lookout by a factor of 2.2. The appropriateness of using this scaling factor was confirmed by comparing the three years of actual data from the McRoss station to the flow at the Mount Lookout station over the same period and seeing if the scaling factor held true. It was determined that this scaling factor was reasonably valid (the data from the two gages were tested for correlation). See new text below that describes guidelines provided by WVDNR on the use of the Meadow River and impacts to surface water. New text has been added to Section 4.6 (Geology and Groundwater) that discusses the results of the new groundwater study (Appendix D2; SSP&A, 2007) and an evaluation on the hydraulic connectivity between the Meadow River and the local aquifer.

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., ***July*** 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).

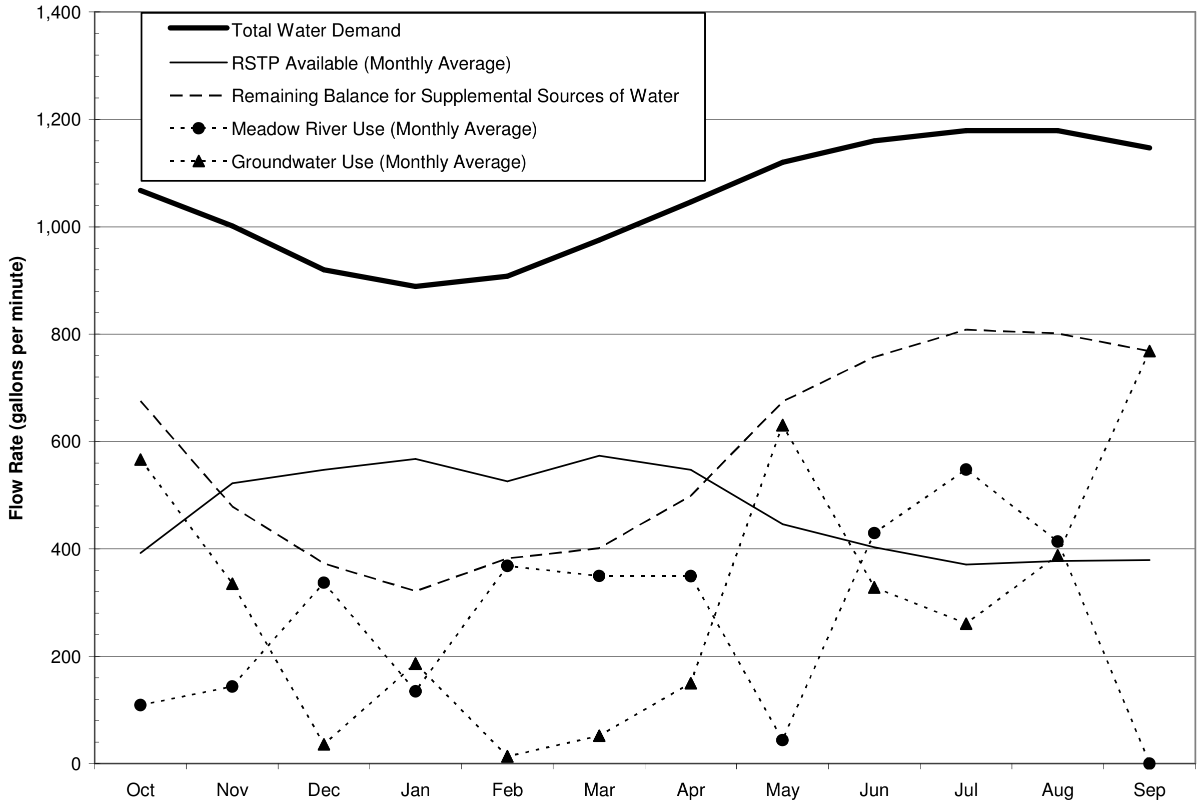

Figure 4.4-6. Water Balance for the WGC Co-Generation Facility under Option B

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. ***See Section 4.6.3.4 of this volume for the results of the updated groundwater study (SSP&A, 2007) and use of the flow data from the McRoss station.***

Since the Draft EIS was published, river withdrawal guidelines have been developed by WVDNR, including recommended base flows. In addition, an ongoing groundwater study referenced in the Draft EIS was completed and reviewed by DOE and has been added to the Final EIS (Appendix D2, SSP&A, 2007). This information provided more insight to facilitate WGC's water use decisions and confirmed assumptions and impacts as evaluated in the Draft EIS.

WVDNR estimated flows in the Meadow River using the Watershed Characterization and Modeling System and determined that the average annual flow for the proposed withdrawal site is approximately 296 cubic feet per second (the Draft EIS used an estimated base flow of 350 cubic feet per second).

WVDNR also reviewed aquatic sampling results immediately downstream from the proposed location of the intake structure on the Meadow River. Thus, based on the Tennant Method and the assumption that outstanding aquatic habitat conditions are to be maintained (i.e., 60 percent of the base flow), WVDNR has prescribed the following guidelines which would be required of WGC to follow:

- ***A flow of 178 cubic feet per second must always be maintained in the Meadow River during the months of April – September (Spring/Summer);***
- ***A flow of 118 cubic feet per second must always be maintained in the Meadow River during the months of October – March (Fall/Winter);***
- ***Approximately 2.7 cubic feet per second is the maximum rate at which WGC is allowed to withdraw water from the river; and***
- ***A flow monitoring gage via a calibrated staff (i.e., a rated staff that relates water levels to corresponding streamflows at a given location) must be implemented to alert operators or inspectors when the flows are at or approaching the thresholds.***

Details of WVDNR's stream studies and modeling, potential impacts, and specific monitoring requirements will be reviewed and made available by WVDEP during the 401 Certification permitting process. Based on these state-imposed limits, it is evident that WGC would only be withdrawing water during high flow conditions, and therefore, would not add adverse biological impacts on the Meadow River to already stressed conditions during low flow scenarios (i.e., droughts). Because the flow maintained, per WVDNR's recommendations, is expected to provide what the Tennant Method describes as "excellent aquatic habitat", impacts to riparian rights downstream, as was initially estimated in Sections 4.4.3.3 and 4.7.3.3 of the Draft EIS, are expected to be minor.

Based on the 40-year streamflow dataset (extrapolated from a USGS station at Mount Lookout) and observing the thresholds recommended by WVDNR, it is estimated that for the Spring/Summer season (April – September), withdrawal from the Meadow River would occur, on average, over approximately 68 days (37 percent of the season) and the wells would be pumped on 115 days (63 percent of the season); during the Fall/Winter season (October – March), river withdrawal would occur on approximately 125 days (68 percent of the season) and the wells would be pumped on 57 days (32 percent of the season). Over the 40-year period, the months of July, August, and September exhibited the greatest frequency of flows that fell below the thresholds provided by WVDNR (approximately 75% of the time). Therefore, it is expected that the majority of the water would come from underground sources during these months. See Figure 4.6-4 (Percent of Days per Season for Groundwater Pumping, 1966 – 2006) and Section 4.6.3.4 for discussion on the potential impacts to the Meadow River from pumping the local aquifer.

According to the guidelines outlined above, the maximum that WGC would be allowed to withdraw from the Meadow River is 2.7 cubic feet per second (or 1,200 gallons per minute), which represents one percent of the river's average annual flow at the withdrawal location. However, the peak demand would likely occur during April through September for the majority of the days when the Meadow River would exhibit lower than normal flows and would not be used. For this period, groundwater would then be the supplemental source because of low flow conditions. Withdrawal from the Meadow River would likely occur during October through March, when the net decrease to the Meadow River would be approximately 2.2 cubic feet per second (includes RSTP flow that would otherwise have been discharged). This flow rate represents 2 percent of the 118 cubic feet per second threshold that must be maintained in the Meadow River during the Fall/Winter season.

Significant withdrawal of the river can also impact recreational water users as low stream levels can impair travel or fishing in the river. According to WVDEP's water use survey, there are no large water users (persons who withdrew and/or consumed more than 750,000 gallons of water in any month) within the Meadow River watersheds (WVDEP, 2006). Because most of the withdrawal activity

would take place during high flow conditions, adverse flow impacts to the river are expected to be minor. The degree of impact on downstream users is lessened even further downstream, where the Meadow River flow increases significantly near its confluence with the Gauley River, approximately 40 miles downstream from Rainelle.

From the perspective of flows downstream, the median flows of the Meadow River at the Mount Lookout station from April through September was approximately 170 cubic feet per second and from October through March it was approximately 615 cubic feet per second (based on approximately 40 years of data). This gage is near the confluence of the Meadow River and Gauley River, about five miles below the Summersville Dam. The Gauley River has been regulated by the dam since 1966 for the main purpose of flood control. According to a WVDNR report, it was determined that although the Meadow River adds significant flows, the dam's influence on the Gauley River (and therefore, the Gauley River National Recreation Area [GRNRA]) is overshadowed by the presence of the Summersville Dam (Bennett et al., 2006). Therefore, the net decrease of flow on the Meadow River (which would occur during high flow seasons), is expected to have negligible impacts to recreational activities at the GRNRA. The average annual flows of the Gauley River below the Summersville Dam ranged from approx 1,200 to 2,600 cubic feet per second. Annual average flows of the Gauley River above Belva ranged from 1,500 to 4,000 cubic feet per second. Thus, the maximum rate at which WGC would be allowed to withdraw from the Meadow River (2.7 cubic feet per second) represents less than 0.5 percent of the average flows in the GRNRA.

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 ***(see Appendix N for Anjean's Memo of Understanding, an agreement between WVDEP and WGC)***. 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 acid mine drainage (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. ***See Section 4.6.3.5 of this volume and General Response 4.2.3 of Volume 3, which discusses the remediation techniques and anticipated outcome of the ash application as a method to treat AMD. Case studies on the use of ash application as a remediation technique are also provided in Appendix P.***

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. ***See Section 4.7 of this volume for new text on impacts to wetlands features and aquatic habitats within the new transmission corridor.***

4.5 Floodplains

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) ***(Haestad Methods, 2003)***. 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 ***(Haestad Methods, 2003)***. 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 ***(Haestad Methods, 2003)***, 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.

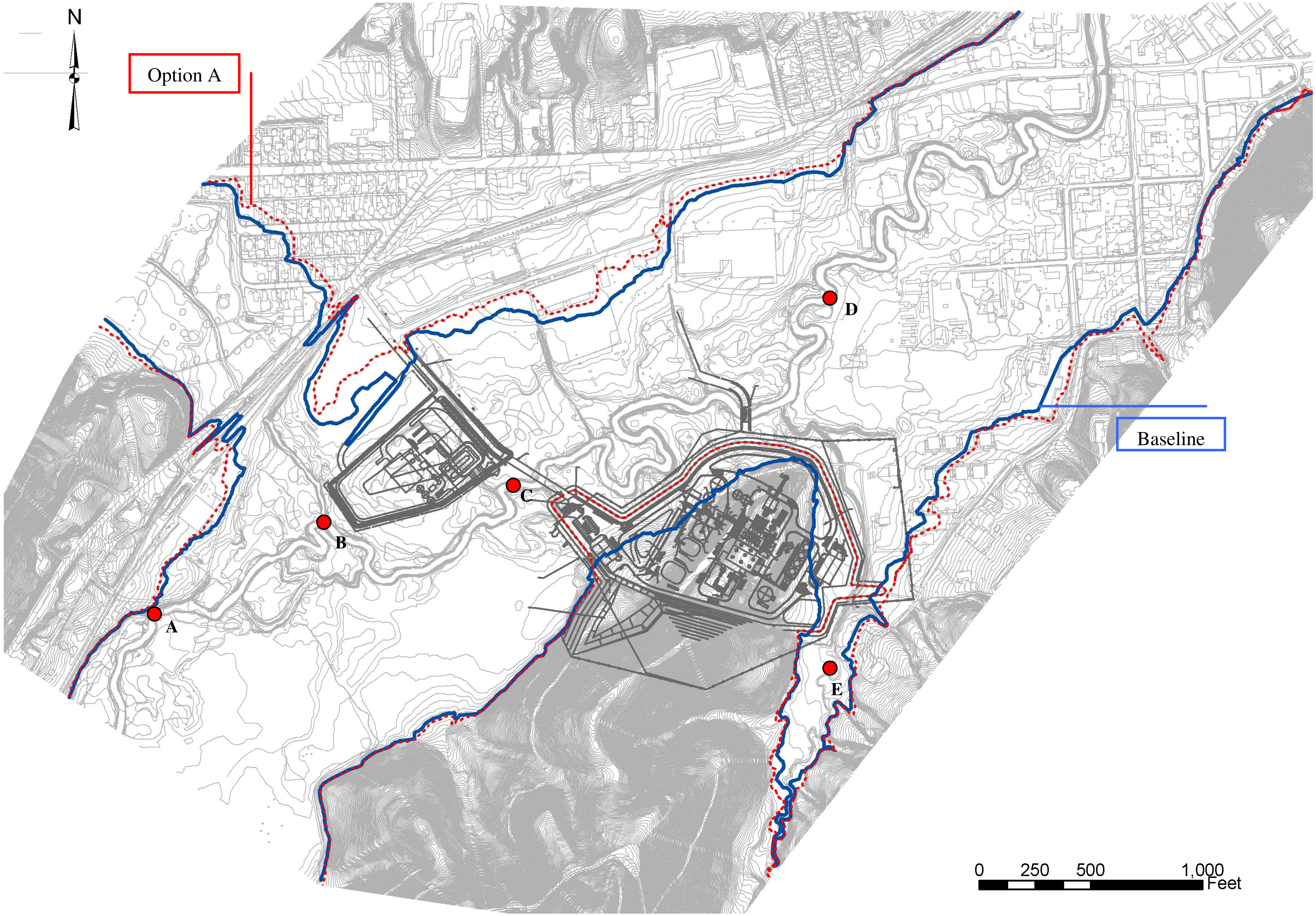

Figure 4.5-1
Predicted 100-year flood level (Option A)
Map source: Postesta, 2004; Site Layout: Parsons E&C, 2005

U.S. Department of Energy
National Energy Technology Lab

Western Greenbrier Co-Production Demonstration Project
Environmental Impact Statement

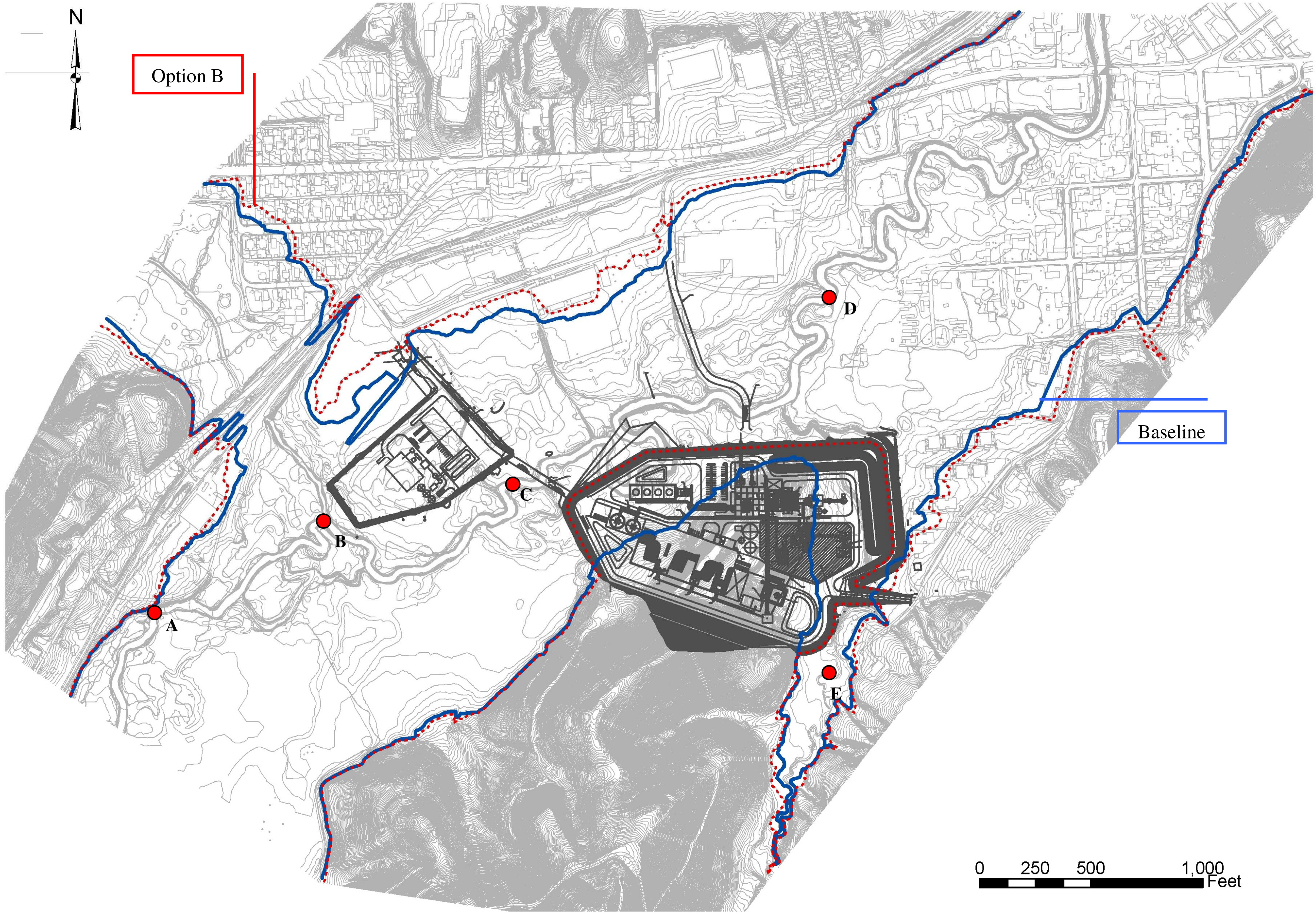

Figure 4.5-2
Predicted 100-year flood level (Option B)
Map source: Postesta, 2004; Site Layout: Parsons, 2004

U.S. Department of Energy
National Energy Technology Lab

Western Greenbrier Co-Production Demonstration Project
Environmental Impact Statement

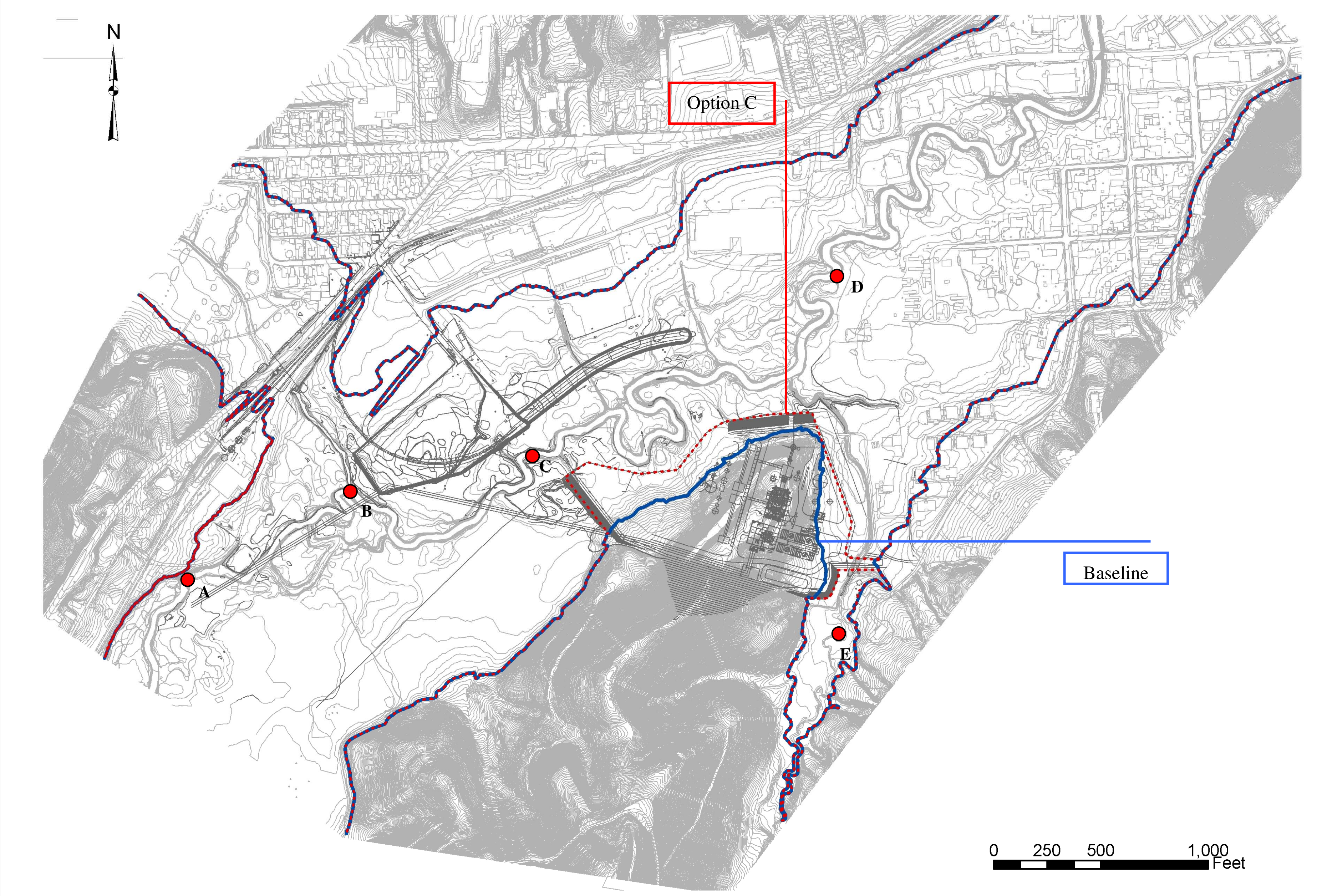

Figure 4.5-3
Predicted 100-year flood level (Option C)
Map source: Postesta, 2004; Site Layout: Parsons, 2004

U.S. Department of Energy
National Energy Technology Lab

Western Greenbrier Co-Production Demonstration Project
Environmental Impact Statement

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.

The construction at the power plant site is not expected to disturb any soils classified as prime farmland soils or farmland of statewide importance. Construction and/or routine vegetative maintenance of the new transmission corridor could impact a maximum of 2.5 acres of soils classified as prime farmland soils or farmland. These soils would require special consideration if disturbed during construction.

Construction along the new corridor would require clearing and grubbing to clear all vegetation. The proposed poles would be constructed at existing grade. The disturbance of soils would be expected to be limited to those areas around the new poles. The potential for erosion would be reduced by implementing pre- and post-construction BMPs. Once the construction is completed, all of the disturbed areas would be re-graded and re-vegetated.

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 (***up to approximately 1.5 cubic feet per second)***, 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 ***the average annual or seasonal*** flow (i.e., ***based on the Tennant Method*****,** the river flow rate above which adverse water quality and aquatic habitat impacts would

not be expected), groundwater would be withdrawn from PW-1, PW-3, and other potential wells as a tertiary source of process water supply. ***Since the Draft EIS was published, river withdrawal guidelines have been developed by WVDNR, including recommended base flows. In addition, an ongoing groundwater study referenced in the Draft EIS has now been completed and reviewed by DOE and has been added to the Final EIS (Appendix D2; SSP&A, 2007). This information provided more insight to facilitate WGC's water use decisions and confirmed assumptions and impacts as evaluated in the Draft EIS.***

Option B is the preferred option because it provides 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 ***(Appendix D1; SSP&A, 2005)*** 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 ***storage*** 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, adverse impacts associated with sustained pumping over time would ***be smaller under Option B***.

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 ***(Appendix D1; SSP&A, 2005 and Appendix D2; SSP&A, 2007)***. These studies have provided useful information for assessing the potential impacts that would occur on the aquifer under normal conditions and operations; however, ***in the Draft EIS,*** 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) ***were presented. The new groundwater study referenced in the Draft EIS was conducted to confirm that the impacts analysis in the new study is bounded by the assumptions and impacts initially presented in the Draft EIS. The new study was completed and reviewed by DOE and has been added to the Final EIS (Appendix D2; SSP&A, 2007). Additionally, the West Virginia Division of Natural Resources (WVDNR) has prescribed to WGC the guidelines for use of the Meadow River; see Section 4.4.3.3 of this volume for details on WVDNR's guidelines. The new groundwater study analyzed different pumping scenarios based on WVDNR's prescribed withdrawal limits on the river. The results are discussed later in this section.***

Although the groundwater resources in the planning area are relatively plentiful, the ***deep confined*** 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 (1.8 cubic feet per second or 3,000 liters per minute) and 760 gallons per minute (1.7 cubic feet per second or 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). ***In the updated groundwater modeling report (Appendix D2, SSP&A 2007), the average seasonal pumping rates used for Option B were weighted to reflect the operating schedule of the wells as a function of the number of days the wells would be turned on (as a result of low flow conditions in the river, according to WVDNR's prescribed flow limits – see Section 4.4.3.3 of this volume). Based on this analysis, the weighted seasonal pumping rates for Option B is 707 gallons per minute (1.58 cubic feet per second) for the period April-September, and 280 gallons per minute (0.62 cubic feet per second) for the period October-March.***

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 ***(Appendix D1; SSP&A, 2005)***. 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 ***(Appendix D1; SSP&A, 2005)*** 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 ***(the "jumps" observed from CW-1 and OW-1D in Figure 4.6-1 and PW-1 in Figure 4.6-2 result from the pumping at CW-1).***

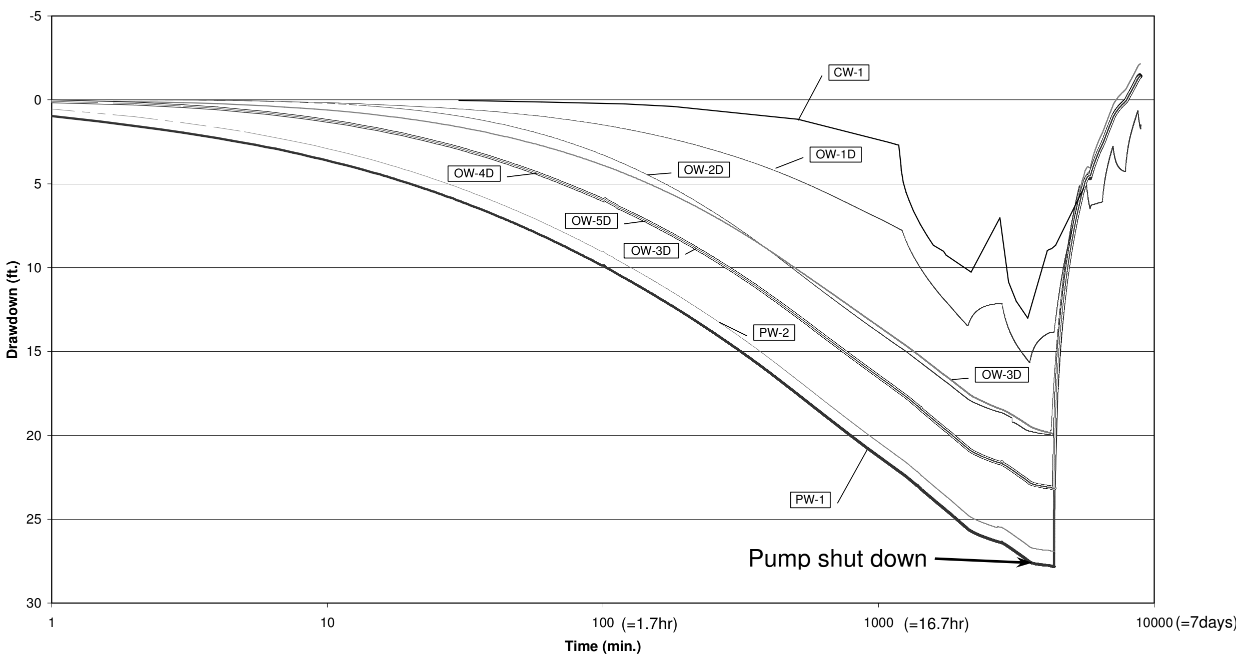

Figure 4.6-1. Drawdown Observations for 72-Hour Pump Test at PW-1 (SSP&A, 2005)

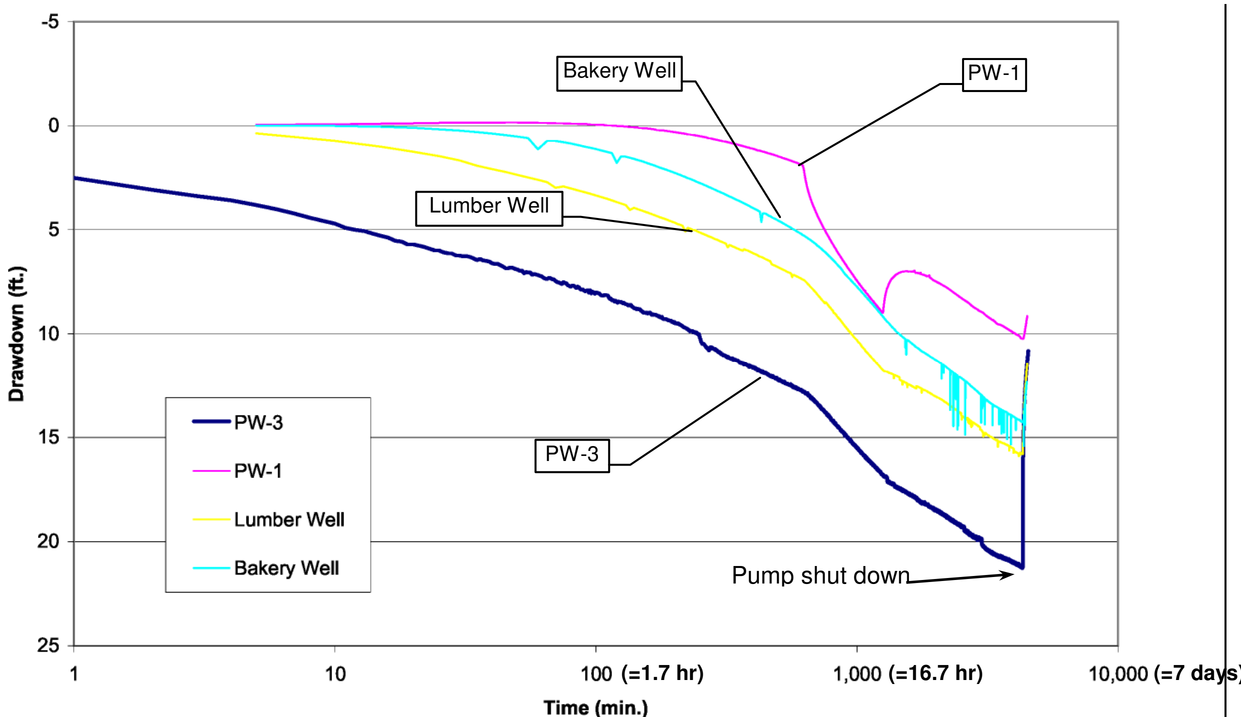

Figure 4.6-2. Drawdown Observations for 72-Hour Pump Test at PW-3 (SSP&A, 2005)

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 ***(Appendix D; SSP&A, 2005)***. 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 *x* 10^{-6}, respectively. The effective transmissivity and storativity in the vicinity of PW-3 were found to range from ***470*** ft^2/day to 1,070 ft^2/day (***44*** 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 ***(Appendix D1, SSP&A 2005)***. The layers were used to represent the surficial alluvial aquifer, the intervening aquitard ***(low permeability unit)***, 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 model was calibrated to aquifer test data from PW-1 and PW-3 independently and the calibration results were very similar with respect to horizontal hydraulic conductivities in the valley areas but the corresponding vertical hydraulic conductivities in the valley differed by almost an order of magnitude.***

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, 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 ***valley*** 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. ***The drawdown values from the model simulations (SSP&A, 2005), which provided a range of expected drawdowns over a period 25 years, were combined with the maximum water level fluctuation (an additional 12-foot maximum possible drawdown, the maximum water level fluctuation, was added to the maximum calculated drawdown) to obtain a range of potential drawdowns over the same period. The results are*** summarized in Table 4.6-1**.**

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	***36*** - 57
PW-3	380	***36*** - 56
CW-1	250	***33*** - 54
CW-2	0	***33*** - 53

Source: SSP&A, 2005; 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 ***(SSP&A, 2005)*** indicated 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 ***(SSP&A, 2005)***.

The ***initial*** groundwater model ***(SSP&A, 2005) was*** 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 was considered 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 ***initial*** groundwater model was 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 ***initially predicted. As a mitigation measure***, 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.

The groundwater flow model was revised and recalibrated based on the lithologic logs from two new monitoring wells (OW-8, OW-9) and with data obtained from a long-term (60-day) aquifer pump test (Appendix D2; SSP&A, 2007). The scale and resolution of the model, as well as the model structure and the distribution of the hydraulic properties more accurately represents the hydrogeologic conditions. These new data have greatly increased the reliability of the groundwater model. The new model better incorporates regional hydrogeologic conditions. Simulations of long-term pumping were conducted considering groundwater as a primary source of water (Option A) and surface water from Meadow River as primary source of water, with supplemental withdrawals for groundwater (Option B). In addition, long-term impacts on streamflow from pumping were calculated for both scenarios.

The data from the remote monitoring wells and the aquifer response to pumping at those wells provided additional information regarding the hydrogeologic conditions within an area much larger than in the original model. This additional information helped to revise the conceptualization of the regional stratigraphy and the aquifer hydraulics. For this reason, the modified conceptual model was based on a new interpretation of the orientation (strike) of the geologic units and the corresponding aquifer hydraulics. According to the new data, the wells in the valleys of Sewell Creek and Little Sewell Creek, despite their similar total depths, tap different geologic units with distinctly different hydraulic properties.

Unlike the measured drawdown values at the monitoring wells during the short-term aquifer tests, the measured drawdowns during the 60-day aquifer test level off, as shown in Figure 4.6-3 (note that due to a transducer malfunction, no recovery data is available for CW-1, i.e., after 60 days). This is an indication that the aquifer can sustain pumping rates of magnitude such as those of the aquifer test, over a long period of time.

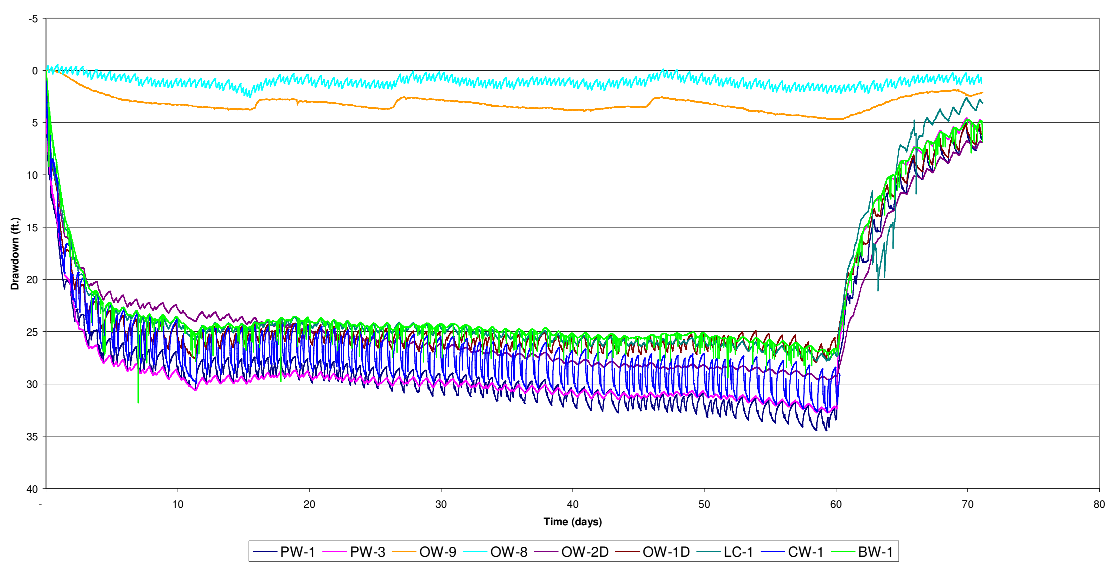

Figure 4.6-3. Drawdown Observations for the 60-day Pump Test at PW-1 and PW-3 (SSP&A, 2007)

The conceptual model of the groundwater system developed previously was modified to reflect the findings from the boring logs of the two new monitoring wells. The groundwater system is now

conceptualized as consisting of four major units, to represent the surficial alluvial aquifer, the intervening aquitard (low permeability unit), the fractured sandstone aquifer (the water source) and an interbedded sand and shale unit underlying the fractured sandstone aquifer. The production and deep observation wells are open to both the low permeability unit and sandstone unit. The deeper fourth unit was added to the model for consideration of the data from the monitoring well at Little Sewell Creek.

Model calibration to the aquifer test data provided strong agreement between measured and calculated values of drawdown at all the monitoring wells, validating the choice of model structure, resolution, and hydraulic parameter distribution. Although fracture nature and orientation vary significantly in microscale, the effects of these variations in the model scale are insignificant, as their spatial characteristics and their effects on groundwater flow are being represented in a meaningful way by the hydraulic parameter distribution and values in the model. Therefore, the model provides a reliable tool for the evaluation of pumping effects to the public supply wells and streamflow.

Under Option A, the groundwater model was run for the combined annual average pumping rate of 1,049 gallons per minute and for the combined annual maximum pumping rate of 1,179 gallons per minute. The calculated drawdown after 25 years of pumping at well CW-1 was 53 to 62 feet, as shown in Table 4.6-2. The calculated drawdown at production well PW-1 was 59 to 69 feet and the calculated drawdown at production well PW-3 is 53 to 64 feet.

For Option B, the seasonal pumping rates were determined based on the analysis of available streamflow data. Historic streamflow data was analyzed and compared against the minimum streamflow requirements that would be imposed by the State. The number of days per season per year that groundwater should be pumped because of low flow in Meadow River are shown in the Figure 4.6-4, as a percentage of the total number of days per season. This analysis was used to estimate the number of days per year in which water could be pumped from the Meadow River and the number of days in which low flows would prevent direct withdrawals from the river. The groundwater model was run based on this analysis with a combined weighted annual seasonal pumping rate of 707 gallons per minute during the summer period and 280 gallons per minute during the winter period. The calculated drawdown after 25 years of pumping at well CW-1 is approximately 33 feet. The calculated drawdown at production well PW-1 is approximately 36 feet and the calculated drawdown at production well PW-3 is approximately 33 feet, as shown in Table 4.6-2.

Table 4.6-2. Results of Additional Groundwater Modeling (Calculated Drawdown)

Well	Pump Rate (gpm)	25-Year Drawdown (ft)
Option A: PW-1 and PW-3 Used As Primary Sources		
PW-1/PW-3	1,049 – 1,179	59 – 69 (PW-1) 53 – 64 (PW-3)
CW-1	250	53 – 62
Option B: PW-1 and PW-3 Used As Secondary Sources		
PW-1/PW-3 (April-Sept)	707 (April-Sept) 280 (Oct-March)	36 (PW-1) 33 (PW-3)
CW-1	250	33

Source: SSP&A, 2007; Notes: To convert gpm to L/min, multiply by 3.79. To convert ft to m, multiply by 0.305.

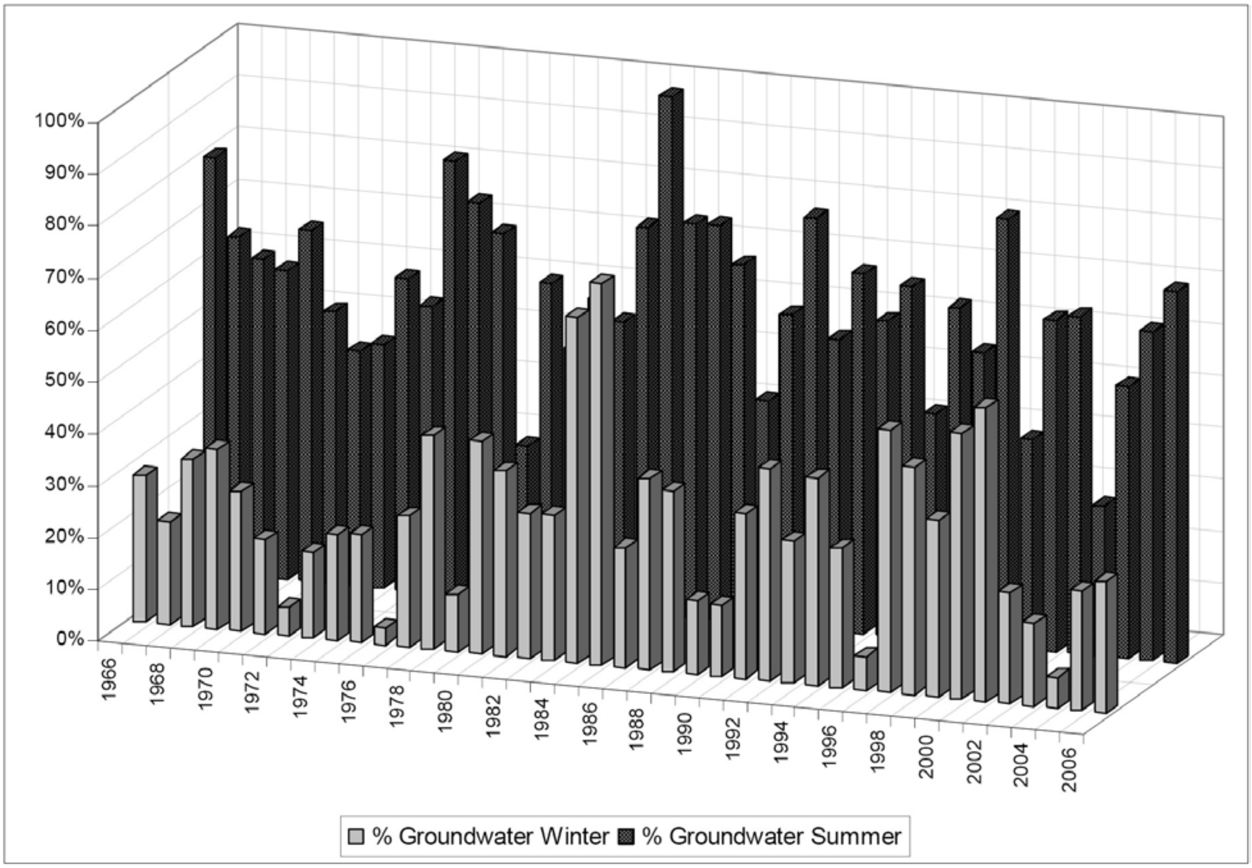

Figure 4.6-4. Percent of Days per Season for Groundwater Pumping (1966 – 2006) (SSP&A, 2007)

The updated groundwater model (Appendix D2; SSP&A, 2007) demonstrates that both of the options for obtaining water (Options A and B) are feasible. The model shows that Option B would have less of an impact on the water table (groundwater surface) and that both options would not cause unacceptable levels of drawdown. The city well would still be able to safely meet the city water demand since, based on information obtained from the Rainelle Water Department, the wells are approximately 200 feet deep and the pump is set at a depth greater than 100 feet below ground surface (bgs). In addition, the water level prior to the 60-day pump test was at approximately 25 feet bgs, which suggests that the estimated potential drawdown is not expected to have an adverse impact on the city well operations.

As part of pump testing efforts, DOE made several efforts to identify wells in the project area (e.g., through review of public records and interviews with local officials and drillers), and evaluated the potential for impact on those wells as part of the EIS. Because the town of Rainelle was constructed to support the Meadow River Lumber Company, and water was initially supplied to the town by this company and now by the town, residential and private wells are not prevalent in the area. Although not considered likely, if an unknown or unrecorded well is present in the area where drawdown would occur, it could be impacted if the well pump is placed at a level at or above the drawdown levels resulting from the project. Under these circumstances, the well pump would need to be lowered and possibly the well deepened.

The new groundwater modeling (Appendix D2; SSP&A, 2007) was also used to analyze the relationship between aquifer storage depletion and reduced river discharge. The analysis shows that most of the pumped water comes initially from aquifer storage; only after the initial eight to nine years

of pumping is it demonstrated that the amount of water coming from the storage equaled the amount of water drawn from the river. Option B would have less of an impact on the river because water would be pumped from the aquifer only when the river flow falls below a certain threshold. Under Option A, the streamflow would be reduced by a maximum of approximately 1.6 to 2.0 cubic feet per second at the end of the 25-year horizon. Under Option B, the streamflow reduction would be approximately 0.8 cubic feet per second at the end of the same period.

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 4.6-3.

Table 4.6-3. 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, ***with the exception of arsenic that may have potential to leach at higher pH, 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) ***(also referred to as circulating fluidized-bed [CFB])*** 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).

CFB ash application has been carried out at several former coal mining sites in Pennsylvania and other states (Menghini et al., 2005; Murarka et al., 2006; Kania et al., 2004). Among 16 identified coal ash placement cases for which sufficient information was available (see Table 1 in Appendix P), the results at three sites in Pennsylvania have been included in the EIS (see Appendix P) because the operations carried out at these sites most closely resemble the Proposed Action. In general, water quality at two of the three sites has improved significantly, while the third site has shown no change. Since CFB ash is a cement-like material and can be compacted to achieve extremely low porosity, co-disposal of ash and coal refuse significantly reduces water infiltration and, consequently, the volume of AMD generation. Furthermore, the alkaline CFB ash neutralizes any AMD that does form within the co-disposed piles.

The potential adverse environmental impacts of ash disposal were also examined by the General Assembly of Pennsylvania in deciding whether to impose a statewide moratorium on the use of ash in mine reclamation projects (see Appendix P). After reviewing available studies, the Pennsylvania Department of Environmental Protection (PADEP) monitoring data, and public testimony, the General Assembly concluded that, while improper use of ash could constitute an environmental hazard, data from several sites in Pennsylvania suggests that ash can be used effectively and safely when properly managed.

To evaluate the potential for arsenic leaching, additional tests on ash from the coal refuse piles under a variety of conditions were conducted (see results in Table 4.6-4). These tests were designed to mimic the effects of rainfall as well as simulated acid and alkaline environments. For all tests, the concentrations of arsenic leached were lower than EPA's standards for toxicity under the Resource Conservation and Recovery Act (RCRA), although the concentrations were higher than drinking water standards. The concentration of arsenic observed in these tests represents the potential concentration of leachate from 100 percent ash and does not account for mixture of ash with materials at the coal refuse site, or pozzolanic effects that could occur at the site.

As indicated above, there are conditions which could result in the mobilization of arsenic. DOE reviewed a report produced by the Agency for Toxic Substances and Disease Registry (ATSDR) that referenced a 1997 study indicating that liming of mine tailings as a remediation technique could result in the mobilization of arsenic (DHHS, 2005). In addition, DOE reviewed the supporting 1997 study, "Arsenic Transport in Contaminated Mine Tailings Following Liming" (Jones et al., 1997). The supporting study, based on mining sites in the Clark Fork Basin in Montana, indicated that soluble arsenic levels did not correlate with total arsenic concentrations, and were more strongly correlated with solution pH and adsorption-desorption reactions of oxide minerals, leading to the conclusion that the distribution of soil bound arsenic is important for determining mobilization following liming The process of liming mine tailings, although similar to the Proposed Action, may not be directly applicable to the use of CFB ash as the process may not have the same pozzolanic effects that have been observed with the application of CFB ash. However, the study does provide insight to circumstances under which arsenic could leach and the importance of evaluating the distribution of soil-bound arsenic when developing remedial plans.

Table 4.6-4. Analytical Data from Leaches and Total Arsenic

Sample Description	Test (units)	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
50% Fly ash:50% Bottom ash	TCLP Leach (mg/L)	0.75	< 2	< 0.1	< 0.5	< 0.5	< 0.001	< 0.5	< 0.05
50% Fly ash:50% Bottom ash	SPLP Leach (mg/L)	< 0.5	< 2	< 0.1	< 0.5	< 0.5	< 0.001	< 0.5	< 0.05
50% Fly ash:50% Bottom ash	Water + CO_2 Leach (mg/L)	0.17	0.089	< 0.01	< 0.01	< 0.073	0.00016	< 0.1	< 0.03
50% Fly ash:50% Bottom ash	Water Leach (mg/L)	< 0.05	0.44	< 0.01	0.017	< 0.073	< 0.0001	< 0.1	< 0.03
RCRA Regulatory Limits	Standard (mg/L)	5.0	100	1.0	5.0	5.0	0.2	1.0	5.0
EPA Maximum Contaminant Levels (MCL)	National Primary Drinking Water Regs (mg/L)	0.010	2	0.005	0.1	0.2	0.002	0.05	--
50% Fly ash:50% Bottom ash	Total Arsenic Only (mg/kg)	59	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom ash	Total Arsenic Only (mg/kg)	55	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fly ash	Total Arsenic Only (mg/kg)	86	N/A	N/A	N/A	N/A	N/A	N/A	N/A

TCLP - Toxicity Characteristic Leaching Procedure; SPLP - Synthetic Precipitate Leaching Procedure (SPLP is identical to the TCLP with regards to the sample processing and extraction process. The difference lies in the extraction fluid used. While the TCLP fluids are highly buffered and mildly acidic using acetic acid, the SPLP uses an extraction fluid based on the physical location of the site to be characterized (east or west of the Mississippi River). The solution used in the east is an unbuffered solution of sulfuric and nitric acids, at a slightly more acidic pH. The SPLP typically is employed to more closely simulate groundwater leaching effects than the TCLP.)

Notes: "Less than" values are below the Lower Quantitation Limit (LQL) of the analytical method.
N/A: No assay performed on these dry samples.
Water + CO_2 Leach leached performed at Hazen as 2983-88-1
Water Leach performed at Hazen as 2983-88-2
All 50/50 ash blend leach samples were adjusted to 7.5% free lime before leaching.
The 50/50 blended ash sample for total arsenic analysis was adjusted to 7.5% free lime before the analysis.

In the absence of data related to the leaching of arsenic from the existing coal refuse piles, DOE reviewed available literature and case studies related to the leachate potential from CFB ash applications (see Appendix P). A recent report from the Pennsylvania General Assembly noted that in general, arsenic present in coal ash is less mobile than arsenic in coal refuse, and therefore, less likely to leach (PGA, 2004) (see Appendix P). Based on the review of case studies and the report from the Pennsylvania General Assembly, DOE believes that CFB ash can be used to remediate coal refuse sites in a manner that does not degrade groundwater resources through the leaching of arsenic or other metals. The ultimate potential for the leaching of metals would be dictated by remedial plans in the context of local conditions at the coal refuse site (e.g., geology and hydrology). However, it is expected that the potential for mobilizing arsenic and other metals would be carefully evaluated as part of the remediation planning efforts overseen by WVDEP.

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. ***These plans would also carefully evaluate the potential for arsenic and other metal leaching and incorporate measures to minimize or eliminate this potential.*** 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. ***DOE recognizes that the successful use of CFB ash in mitigating AMD and improving water quality at the coal refuse sites depends on a number of factors, including the specific practices employed during coal refuse removal, processing, and CFB ash co-disposal. Specific reclamation plans for the coal refuse piles would not be developed until completion of design for the WGC Project and, therefore, details of these operations are not available for inclusion in the EIS. Mitigating existing AMD is a primary goal of the project, however, and WVDEP would direct and supervise the development and implementation of site-specific reclamation plans. Available information on other successful coal refuse reprocessing and CFB ash co-disposal projects, in conjunction with a framework for WVDEP oversight, has provided DOE with sufficient information to determine that significant adverse impacts are unlikely.***

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.

INTENTIONALLY LEFT BLANK

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.

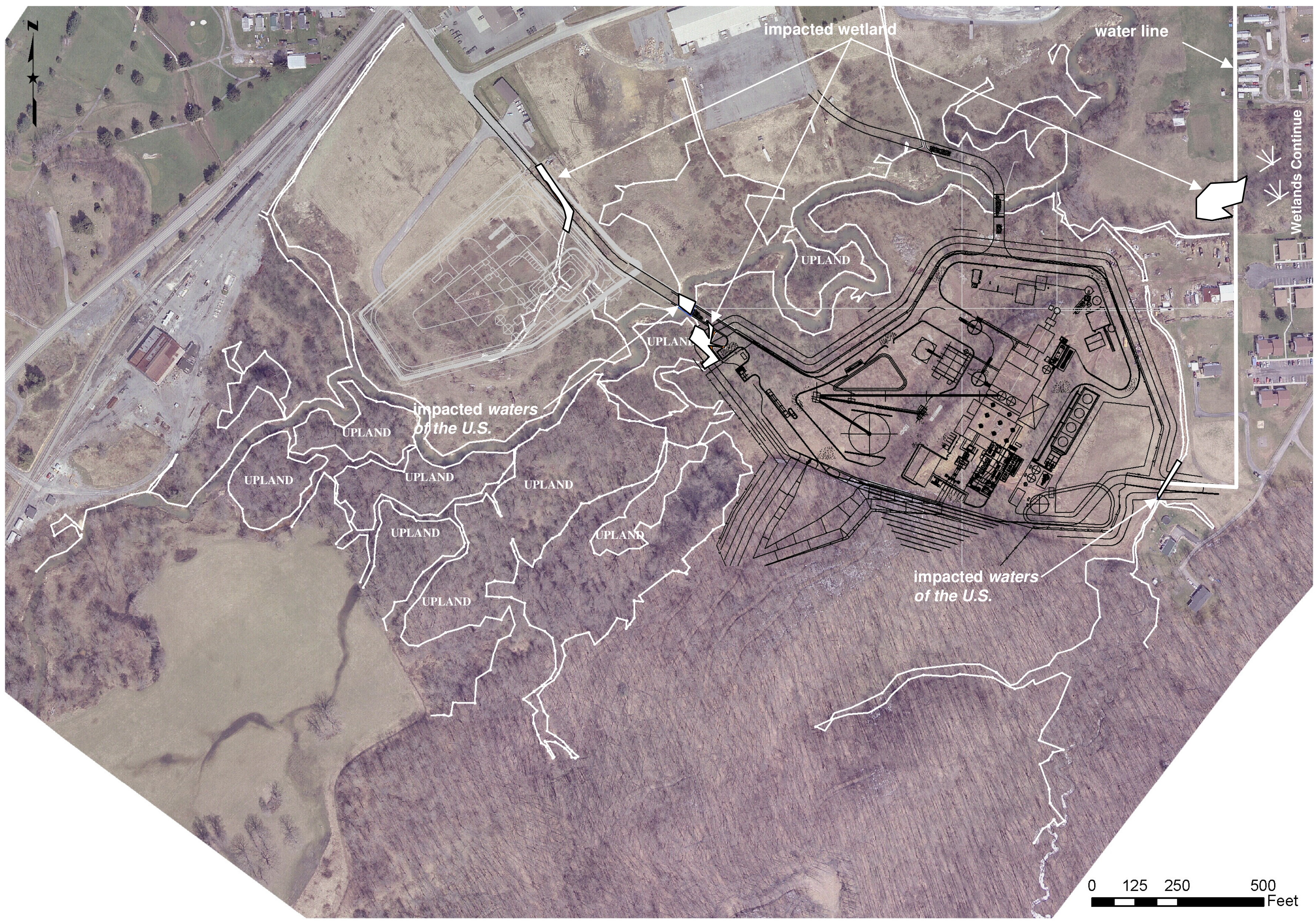

Figure 4.7-1
Jurisdictional Wetlands Boundaries (Option A)

Map Source: Photo Science, 2004; Site Layout: CH2MHill/Lockwood Greene, 2006

U.S. Department of Energy
National Energy Technology Lab

Western Greenbrier Co-Production Demonstration Project

Environmental Impact Statement

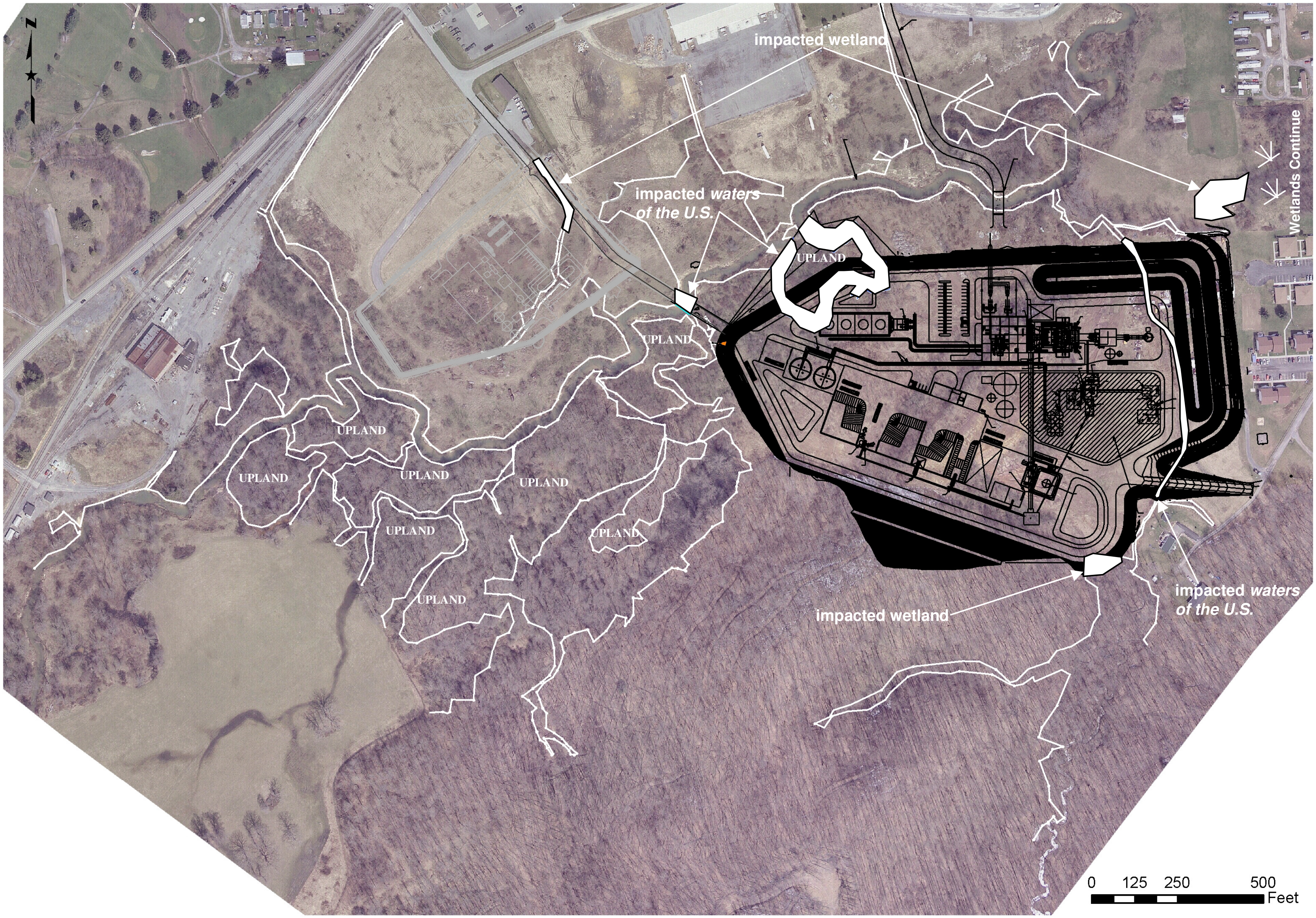

Figure 4.7-2
Jurisdictional Wetlands Boundaries (Option B)

Map Source: Photo Science, 2004; Site Layout: Parsons, 2004

U.S. Department of Energy
National Energy Technology Lab

Western Greenbrier Co-Production Demonstration Project

Environmental Impact Statement

Figure 4.7-3
Jurisdictional Wetlands Boundaries (Option C)

Map Source: Photo Science, 2004; Site Layout: Parsons, 2004

U.S. Department of Energy
National Energy Technology Lab

Western Greenbrier Co-Production Demonstration Project

Environmental Impact Statement

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 ***0.258*** acres (***1,044*** 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. ***To date, WGC has prepared and submitted state and federal wetland encroachment permit applications (401 and 404) associated with unavoidable wetland impacts. The permit applications contain more refined site-specific information related to the proposed facility and transmission corridor, and hence, there are slight acreage differences between what is listed in the EIS and the permit applications. The updated acreages of wetland impacts at the power plant site that are listed in the applications are presented in Table 4.7-3 below.***

Table 4.7-3. Wetland Areas/*Waters of the U.S.* Affected by Facility Component Footprint (Option A)

Facility Component or Feature	*Type*	Approximate Area in Acres	Approximate Area in Hectares
Ditch crossing ***(north of Sewell Creek for construction of access road)***	***wetland ditch***	***0.028***	0.01
Power Plant ***Site (south side of Sewell Creek)***	***forested wetland***	***0.13***	***0.05***
Stream Crossing ***(placement of a permanent bridge accessing the site during construction across Sewell Creek)***	***perennial stream***	0.03	0.01
West of permanent bridge ***(and on the south side of Sewell Creek)***	***emergent wetland***	0.01	0.004
Tributary Impact ***(culvert placed beneath the fill to allow flow from the un-named tributary to continue to Sewell Creek)***	***intermittent stream***	0.02	0.01
Temporary Road ***(placement of a temporary access road across Sewell Creek north of the plant site during construction)***	***emergent wetland***	0.01	0.004
Water Supply Line	***emergent wetland***	0.03	0.01
Total Area		***0.258***	***0.10***

Preliminary evaluation of the project site plans revealed potential impacts to wetland areas, as follows:

- A ***0.028*** acres wetland ditch would be impacted by the construction of a road crossing accessing the site facility north of Sewell Creek.
- Approximately ***0.13*** acre***s*** 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 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 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 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 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. ***The riparian zone to Sewell Creek is characterized as a fallow field vegetated by persistent and non-persistent upland herbaceous plants. Shading provided by the bridge may also result in a minor secondary impact.***
- A 0.03-acre 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.

Impacts to wetland areas generally impair or remove wetland functions, either temporarily or permanently. These impacts generally decrease a wetland's ability to provide food, water, or cover for wildlife. Building structures near wetland areas or across streams could destabilize soils and slopes, and increase sedimentation. Wetland areas overloaded with sediments may lose their ability to filter nutrients and pollutants, which affects water quality. Filling wetlands, even partially, may decrease flood flow attenuation and wildlife habitat functions. When wetlands adjacent to creeks are impacted, their ability to slow in-stream flow and decrease stream bank erosion can be impaired.

Out of a total of 0.258 acres of wetlands, 0.068 acres would be temporary emergent wetland impacts, which would be restored to its pre-disturbance condition once land disturbing activities cease. Two areas mentioned in Table 4.7-3 (perennial and intermittent streams) encroach on other "waters of the U.S." One stream impact would span Sewell Creek (perennial), and the second stream impact crosses an un-named tributary (intermittent) to Sewell Creek. The length of streams affected by the project total 40 and 100 linear feet for the perennial and intermittent streams, respectively. The wetlands impacts associated with the proposed water intake structure and transmission corridor (Segment C) are discussed later in this section (Sections 4.7.3.3 and 4.7.3.4, respectively).

During construction, BMPs, such as silt fencing, hay bales, and construction mats, would be employed around streams and wetlands to minimize sedimentation into aquatic resources and soil compaction. Therefore, potential construction-related impacts to aquatic resources are expected to be minor and temporary. Impacts to emergent wetlands would be temporary, and would be restored to the conditions preceding construction activities. These areas would be re-vegetated using a wetland seed mixture common to the region of influence, and would include plants that benefit wildlife and provide water quality functions. Seeding and stabilizing recently disturbed areas with an annual and perennial grass seed mixture would minimize the potential introduction of nuisance or invasive non-native plant species.

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.

Because project development activities tend to be an ongoing process and often involve the reconfiguration of proposed project components, changes to original wetland impact estimates are common. To date, the final location for the water intake structure and an associated road has not been finalized, although, final location decisions would be based on minimum disturbance to wetlands (see Section 4.7.3.3). Likewise, refinement of the transmission corridor (Segment C) is currently ongoing and final alignment decision criteria include minimum impacts to wetlands (see Section 4.7.3.4). Consequently, WGC is in the process of consulting with the USACE for the wetland permitting process to identify wetland impacts and methods for avoiding and minimizing impacts and developing suitable forms of wetland mitigation. See Section 4.7.4 below for an updated discussion on the current status of the permit applications and wetlands mitigation plans for the project.

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. ***In addition, WGC would limit construction of the water intake structure at the Meadow River to occur outside the spawning seasons (e.g., May and June) as a mitigation factor, to minimize adverse impacts to aquatic resources.***

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. ***To date, the USFWS has reviewed the report. The USFWS has confirmed that no federally-listed threatened and endangered species were found during the survey and has determined that no further consultation under Section 7 of the Endangered Species Act is required at this time (see Appendix B for consultation letter).***

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. From the CWIS, the water pipeline would generally traverse in a southwestern direction and cross Sewell Creek beneath an existing railroad track. From the railroad track, the pipeline would continue along Sewell Creek and connect into 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 ***of the water intake structure***, 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). ***The current conceptual design for the intake structure would be approximately 16 feet wide and 56 feet long. Based on the conceptual plan and field studies of the proposed location, the intake structure could impact approximately 60 linear feet of the Meadow River. The floodplain channel bank would taper landward for an approximate distance of 22 feet. Design modifications to the intake structure are ongoing and would likely change toward a smaller footprint than the current conceptual plan.***

Field studies indicate that the upgrade and extension of an existing road (that would provide maintenance access to the intake structure) would not impact any wetlands. The proposed access road, approximately 15 feet wide, would cross over railroad tracks and enter a vacant field. From this point, the proposed access road would travel northwest and pass through a young forest using an abandoned road leading to the intake structure. The last 200 to 300 feet of the proposed access road would require the removal of mid-sucessional trees, and thus, may result in habitat fragmentation.

During construction, BMPs, such as silt fencing, hay bales, and construction mats, would be employed to minimize sedimentation into aquatic resources and soil compaction. Therefore, potential construction-related impacts to aquatic resources are expected to be minor and temporary. Impacts to emergent wetlands would be temporary, and would be restored to the conditions preceding construction activities. These areas would be re-vegetated using a wetland seed mixture common to the region of influence, and would include plants that benefit wildlife and provide water quality functions. Seeding and stabilizing recently disturbed areas with an annual and perennial grass seed mixture would minimize the potential introduction of nuisance and/or invasive non-native plant species.

See Section 4.7.4 below for an updated discussion on the current status of the permit applications and wetlands mitigation plans for the project.

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 ***or seasonal*** 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. ***Since publication of the Draft EIS, WVDNR has provided guidelines on the use of the Meadow River. Details on prescribed base flows that must be observed in the river, limits of use, and monitoring guidelines are included in the recommendation letter for which WVDEP is in the process of reviewing in conjunction with the 401 certification permit. See Section 4.4.3.3 of this volume for WVDNR's guidelines and further discussion on impacts to the Meadow River.***

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 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 18-mile (29-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. ***Approximately 60 percent of the land within Segment C is currently managed by or belongs to timber companies. It is assumed that areas owned by the timber companies contain marketable timber, which would be harvested and sold prior to construction of the proposed transmission line corridor. Clear-cut marketable trees would be stacked and eventually hauled away for sale. Stumps removed from upland areas would be placed at the edge of the ROW with wildlife breaks at least every 300 feet, if needed. It is assumed that because most of the land owned by the timber companies would eventually be disturbed, the magnitude of impacts to vegetation and wildlife as a result of a new transmission corridor is expected to be minor and impacts would result primarily from routine maintenance of vegetation within the ROW.***

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.***

Construction of a new transmission corridor (Segment C) could affect migratory birds utilizing forested areas within the region of influence. Impacts to migratory birds would be in the form of habitat fragmentation and potential loss of habitat. The majority of the forested areas along the ROW are either open fields or wooded areas that have become established within the past 25 years. Therefore, large tracts of land within the ROW have trees with an even age size class and a small diameter at breast height that benefits a select number of species. Generally, these trees would not be large enough to provide habitat for cavity nesting, dwelling species, such as woodpeckers or similar wildlife. As a mitigation factor, construction of the transmission corridor could take place outside the migratory bird-nesting season (i.e., during the winter months), thereby minimizing adverse impacts to nesting neotropical and migratory birds. Maintenance could also be conducted during the winter months to be in compliance with the federal Migratory Bird Treaty Act. Although habitat fragmentation could occur, forest dependant wildlife would continue using the adjacent large tracts of forest land.

During construction, poles supporting the transmission line would be designed to avoid direct impacts to wetlands and streams within the proposed ROW. Since the transmission line would be suspended from pole to pole, there would be no direct impacts to vegetation and soils, except at the pole locations. Wetland impacts could be further minimized by adjusting the distance between pole spans to avoid placing poles in wetlands where feasible. BMPs, such as silt fencing, hay bales, and construction mats, would be employed during construction around streams and wetlands to minimize sedimentation into aquatic resources and soil compaction. Therefore, potential construction-related impacts to aquatic resources are expected to be minor and temporary.

Common secondary wetland impacts, such as habitat conversion from one wetland type into another (forested to scrub-shrub or emergent), could occur within the 100-foot wide ROW. Wetland habitat conversions within the 100-foot ROW, would not involve the removal of below ground biomass (i.e., roots) or disturbance of soil; however, as previously mentioned, the habitat conversion would alter the magnitude and type of functions provided by wetlands. Examples of modified wetland functions include wildlife habitat, flood flow attenuation, and sediment stabilization and retention functions.

Impacts to the emergent wetlands would be temporary, and would be restored to the conditions preceding the construction of the transmission line. These areas would be re-vegetated using a wetland seed mixture common to the region of influence, and would include plants that benefit wildlife and provide water quality functions. Seeding and stabilizing recently disturbed areas with an annual and perennial grass seed mixture would minimize the potential introduction of nuisance and/or invasive non-native plant species.

Operational impacts associated with the proposed transmission corridor include maintenance of the vegetated ROW. Maintenance, such as mowing and use of herbicides, would be routinely performed to ensure that trees do not grow into the wire security zone. As a result, streams adjacent to woody riparian zones could experience introduction of herbicide and an increased exposure to sunlight. This would result in increased water temperatures that in turn could adversely impact the benthic community composition by altering species diversity and could affect the types of fish utilizing the local areas. WGC's objective is to provide minimum maintenance of the ROW through careful use of a combination of mechanical, chemical and ecological controls. The proposed method for maintenance uses integrated vegetation management, which combines the technique of carefully applied mechanical (cutting) and chemical (herbicide) treatments to control the growth of trees, while encouraging the dense growth of low-growing shrubs and herbs. This dense growth of plants whose heights are compatible with transmission lines would help retard the growth of trees, allowing utilities to use less herbicide over time, thus minimizing the potential of adverse impacts to water quality.

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 approximately ***3.07*** acres (***1.24*** hectares) ***of wetlands***. 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. ***During construction, placement of the poles supporting the transmission line would be designed to avoid direct impacts to wetlands or other "waters of the U.S." occurring within the proposed ROW. Since the lines would be suspended from pole to pole, there would be no direct impacts resulting from the transmission line crossings and direct impacts to vegetation and soils would, therefore, be avoided as discussed above.***

Common secondary wetland impacts during construction of a new transmission line, identified as the conversion from one wetland type into another (primarily forested and scrub-shrub wetland conversion into emergent or open water systems), would occur within the ROW. The potential of habitat conversion due to the removal of woody vegetation and proposed continual maintenance of vegetation with the 100-foot ROW, which does not involve the removal of below ground biomass (i.e., roots) or disturbance of soil, would occur. Initially, wetlands would be converted from one vegetative class into another; scheduled maintenance of the ROW would result in the permanent conversion of the cover types. Consequently, the types and magnitude of wetland functions would change. Typical examples of changed wetland functions could include wildlife habitat, flood flow attenuation, and sediment stabilization and retention functions. Areas affected by the removal of vegetation could also be subjected to increased thermal variations during the summer and winter. During the summer months the ground surface would be subject to increased thermal temperatures from the loss of shade trees lost; the area could experience decreased temperatures during the winter months due to limited coverage and the effects of increased wind velocities.

The construction activities would be regulated under a CWA Section 404 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.

To date, estimates for the acreages for wetlands impacted within the transmission line corridor for Segment C total 3.074 acres, of which 0.786 acres are open water, 1.479 acres are emergent, 0.4 acres are scrub-shrub, and 0.379 acres are forested wetlands. Most of the wetlands impacts would be temporary and the areas would be restored to their pre-existing conditions when construction activities have ceased. Impacts to forested wetlands would result in a permanent habitat conversion and a change in wetland functions would occur. Over time the restored wetlands would develop a similar or greater functional capacity compared to the pre-disturbance condition. Operational wetland impacts in the transmission corridor would consist of maintaining vegetated areas as a scrub-shrub cover type, which would prevent wooded areas from transitioning into a forested cover type.

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 Mountain has not yet been reclaimed and acid mine drainage (AMD) problems continue to exist at Anjean and the coal refuse piles at Joe Knob, Green Valley, and Donegan. The use of alkaline ash – as described in Chapter 2 and Section 4.6.3.5 of Volume1, General Response 4.2.2 of Volume 3, and as stated in the MOU – is anticipated to reduce the acidity in soils and improve the water quality of the runoff. TCLP test results, as discussed in Section 4.6.3.5 (Volume 1), indicate that the leaching of metals is considered unlikely. Additionally, it is***

expected that the potential for mobilizing arsenic and other metals would be carefully evaluated as part of the remediation planning efforts overseen by WVDEP (see discussion in Section 4.6.3.5). Therefore, remediation at the coal refuse piles could provide an opportunity to restore the biological environment at the sites as capable for providing several functions such as wildlife habitat and flood flow attenuation.

Generally, because of AMD, the existing vegetation at the coal refuse sites can be described as a pioneer community tolerant of a low pH and as having low water quality functions. As described later in this section, one small isolated emergent wetland was identified at the Anjean site; however, because the site was created to deposit coal fines, it is unlikely that the wetland would be considered a jurisdictional water resource subject to regulation by the USACE.

Extraction of coal refuse from Joe Knob, Green Valley, and Donegan is not expected to occur within the next five years. Because USACE-verified wetland boundary determinations are valid for a five-year period and wetland boundary conditions can change over time, extensive investigations for wetlands at the remaining coal refuse sites were not conducted for this EIS. However, prior to any disturbance activities at these sites, WGC would conduct a wetland investigation and identify potential wetlands that could be affected by the anticipated disturbance. Potential site-specific impacts to existing wetland features and streams at the coal refuse piles are discussed below.

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.

4.7.4 Wetlands Permitting and Mitigation

To date, WGC has submitted a revised permit application to WVDEP and USACE. Initially, WGC had submitted wetland encroachment permit applications for commercial and institutional development permit (Nationwide General Permit 39) and a utilities line permit (Nationwide General Permit 12) for the project. However, the cumulative wetland impact exceeded 0.5 acres, which necessitated WGC's submission of an Individual Permit (IP) application. Both the state (401) and federal (404) wetland permit applications discuss temporary and permanent wetland impacts, BMPs and include a

compensatory conceptual wetland mitigation plan for impacted wetlands. The conceptual wetland replacement design would be finalized once WVDEP approves the plan.

The WVDEP's wetland replacement criteria indicate that: forest wetlands impacts must be mitigated at a 3:1 replacement ratio; scrub-shrub wetlands must be mitigated at a 1.5:1 replacement ratio and emergent wetlands must be mitigated at a 1:1 replacement ratio. Therefore, the wetland mitigation for the power plant site would require a total 0.448 acres of replacement wetlands. WGC proposed a 1:1 replacement ratio for wetlands disturbed by the transmission line corridor because there would be no net loss of wetlands; however, WVDEP is requesting a 3:1 replacement ratio because forested wetlands would be impacted and functions would be altered.

The USACE has decided to evaluate the WVDEP's response regarding the compensatory wetland replacement design before it would issue a jurisdictional determination on wetlands delineated by WGC. Therefore, at this time it is unclear how either government agency would respond to the revised wetland mitigation. Identifying wetland impacts and determining an appropriate form of wetland mitigation is an ongoing process with frequently changing results. Therefore, WGC would be required to continue consultation with the USACE and identify methods for minimizing wetland impacts and establishing a suitable form of wetland mitigation during the permitting phase.

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. ***Since the publication of the Draft EIS, the Greenbrier County Historical Society and the WV SHPO have sent comment letters on the Draft EIS (see Appendix B). The Greenbrier County Historical Society did not have any comments. The WV SHPO did not identify any specific concerns, but stated that they would complete their review upon receipt of public comments and the Phase I transmission survey, which was completed in October 2006 (see Appendix G). Due to refinements of the transmission corridor, additional Phase I surveys will be conducted and submitted to WV SHPO as an addendum to the October 2006 report; therefore, DOE and WGC will continue consultation with WV SHPO under the NHPA Section 106 review process with respect to public comments and ongoing refinement of the transmission line location (Segment C).***

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.

A Phase I survey report for the new transmission corridor (Option C) was completed and is included in Appendix G. The survey resulted in the identification of one archeological site (identified as Site 46NI655 in the report), also referred to as Hominy Mill. Based on background research and field observations discussed in the report, this site is recommended eligible for the National Register under criterion "d" (information potential). Because this site is located within the proposed corridor, ground disturbance within the corridor could disturb the integrity of the features, artifact scatters, and archeological deposits within the site boundaries. Additionally, the WV SHPO has reviewed the Phase I survey and concurs with the conclusions of the report (see Appendix B for the consultation letter). Therefore, WGC has decided to reroute the corridor around this site to avoid potential impacts to any archeological resources. Another Phase I survey for the rerouted segment and any other refinements to the proposed corridor would be conducted and submitted to the WV SHPO as required under the NHPA Section 106 review process.

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. ***Since the publication of the Draft EIS, the Greenbrier County Historical Society and the WV SHPO have sent comment letters (see Appendix B). The Greenbrier County Historical Society did not have any comments. The WV SHPO indicated that they would complete their review upon receipt of public comments and the Phase I transmission survey, which was completed in October 2006 (see Appendix G); therefore, DOE and WGC will continue consultation with WV SHPO under the NHPA Section 106 review process with respect to public comments and ongoing refinement of the transmission line location (Segment C).***

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.

Figure 4.8-1.
Rainelle Historic District

Map Source: Sources: USGS Rainelle NE, WV

U.S. Department of Energy
National Energy Technology Lab

Western Greenbrier Co-Production Demonstration Project

Environmental Impact Statement

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.

INTENTIONALLY LEFT BLANK

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. ***The proposed truck storage area in Charmco is a vacant and disused former commercial property.***

INTENTIONALLY LEFT BLANK

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.

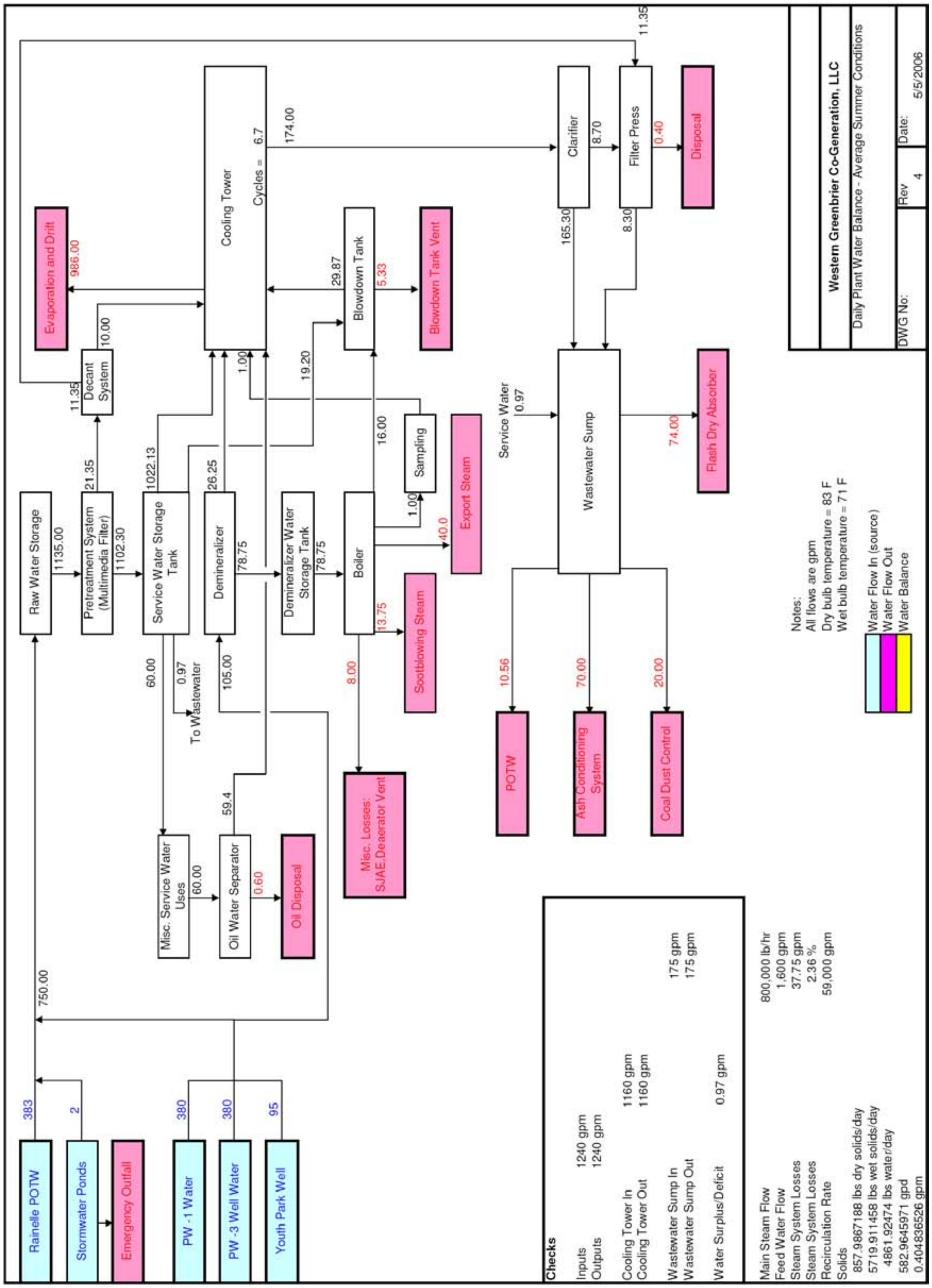

Figure 4.12-1 – Water Supply Requirements for Co-Production Facility Operations During Average Flow Conditions

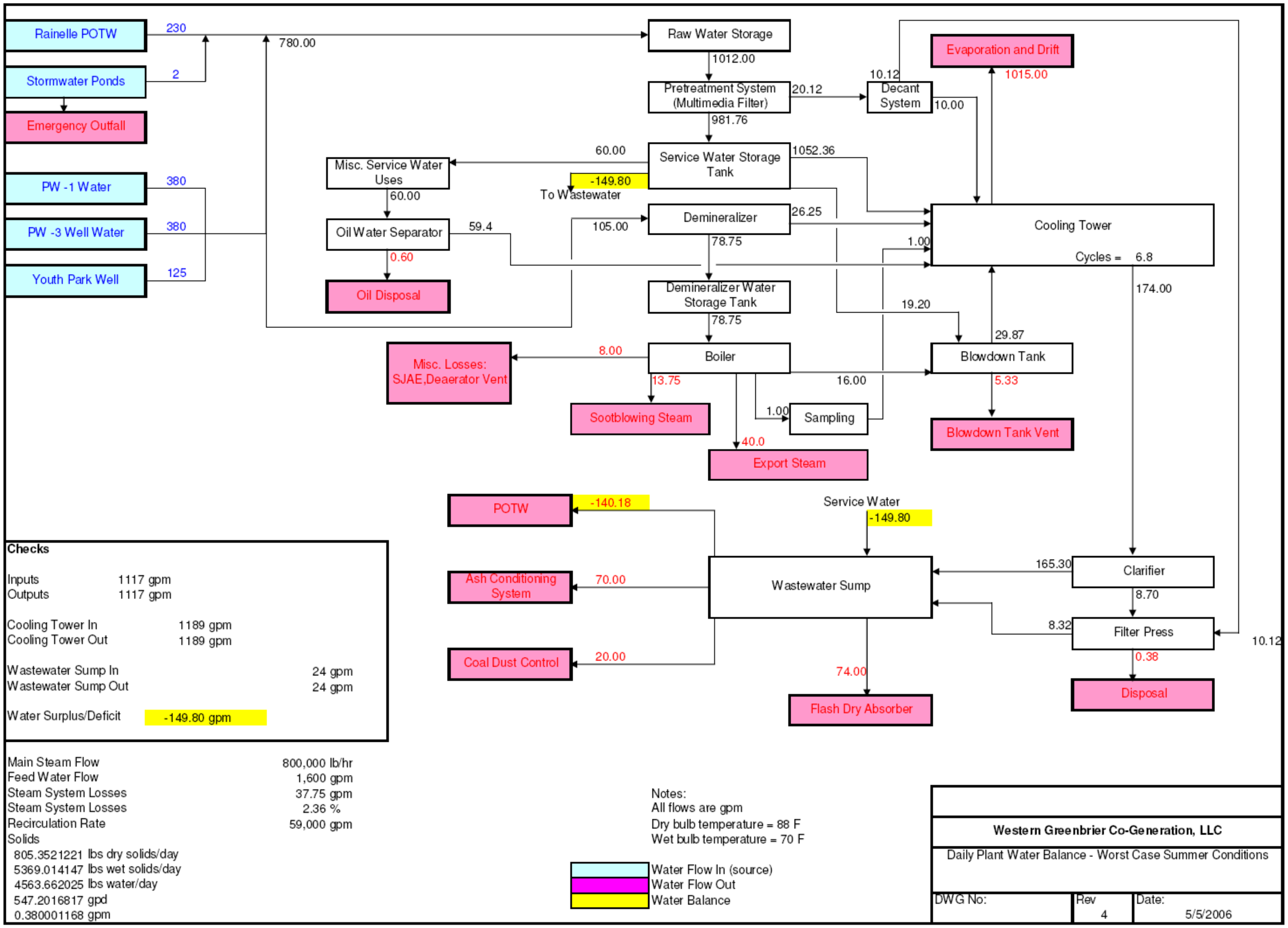

Figure 4.12-2 – Water Supply Requirements for Co-Production Facility Operations During Worst-Case Conditions (Summer)

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. ***Chemical makeup of prep plant spoils cannot be determined until the plant has been designed and the specific chemical processes and quantities are defined. This data will not be available until the next phase of the project.*** It is assumed that during the beneficiation process the spoils would be separated into two streams: rejected aggregates and pyritic solids. ***The intent is that*** 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. ***This characterization data would be presented to WVDEP as part of the reclamation planning and implementation process, and if the spoil materials were determined to have toxic characteristics or pose a threat to groundwater resources, WGC would evaluate the use of alternative process chemicals to remove toxicity concerns, or would develop alternative disposal methods for this material (e.g., disposal in a permitted landfill facility.*** 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).

INTENTIONALLY LEFT BLANK

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 ***C or better***. 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)	***B*** (***B***)	479 (540)	A (***B***)	513 (577)	***B*** (B)
C: US 60 & Locust Street & Park Center Shopping Complex	662 (745)	*B* (B)	988 (1,112)	***C*** (***C***)	849 (955)	B (B)
D: US 60 & 7^{th} St	525 (591)	*B* (B)	729 (820)	B (B)	723 (813)	B (B)
E: US 60 & CR1 (Anjean Rd)	744 (837)	***B*** (B)	627 (706)	***B*** (***B***)	797 (898)	B (B)
F: US 60 & WV 20 in Charmco	564 (635)	***B*** (***B***)	520 (585)	***B*** (***B***)	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 the Boxley ***Quarry in*** Alta (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. ***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 Boxley Quarry in Alta.*** 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 Quarry in Alta 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.

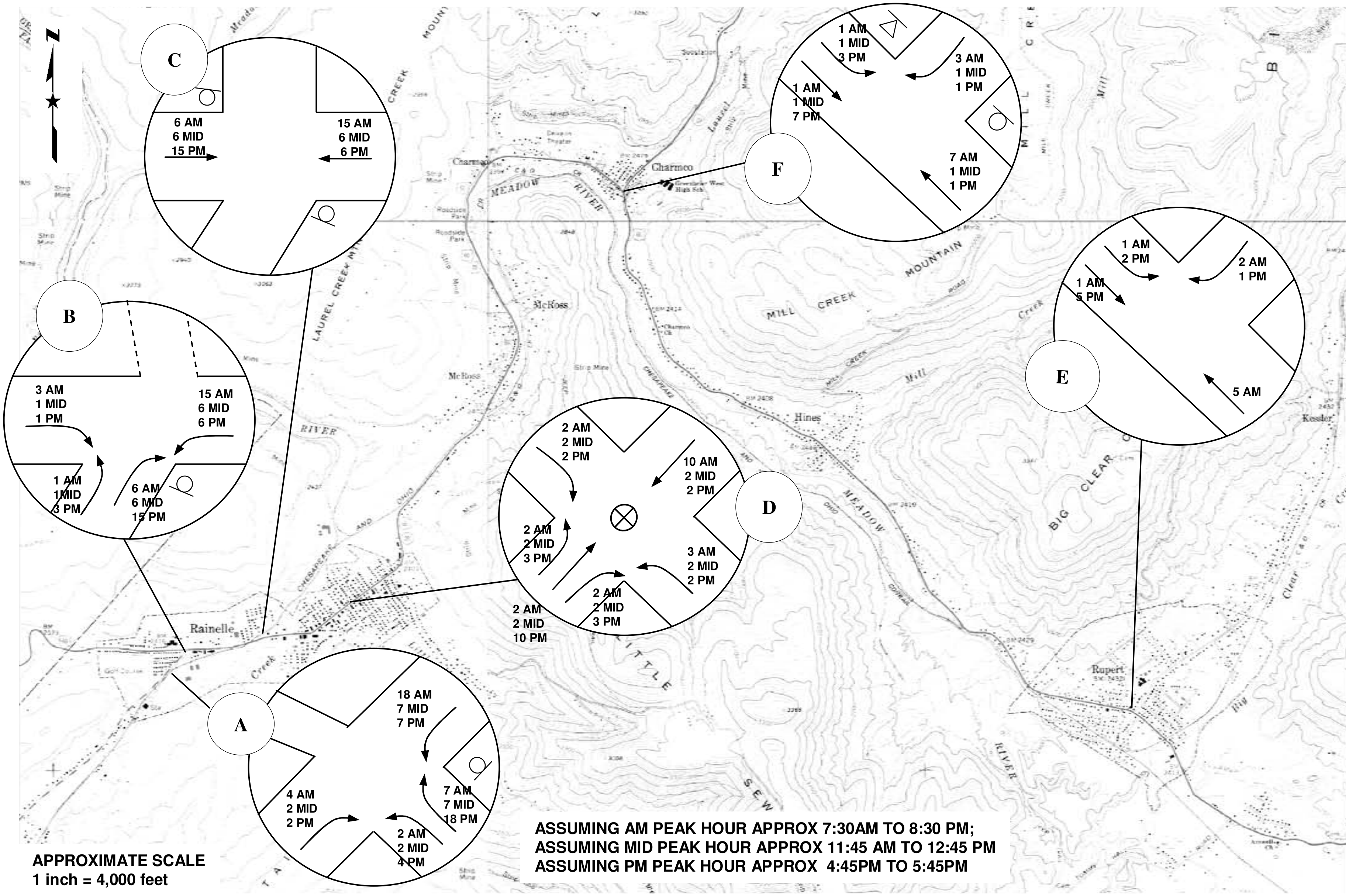

Figure 4.13-1.
Employee-Generated Trips and Distribution for AM, MID, and PM Peak Hours
Map Source: USGS topo (1:24,000) Rainelle (1976)

U.S. Department of Energy
National Energy Technology Lab

Western Greenbrier Co-Production Demonstration Project
Environmental Impact Statement

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.

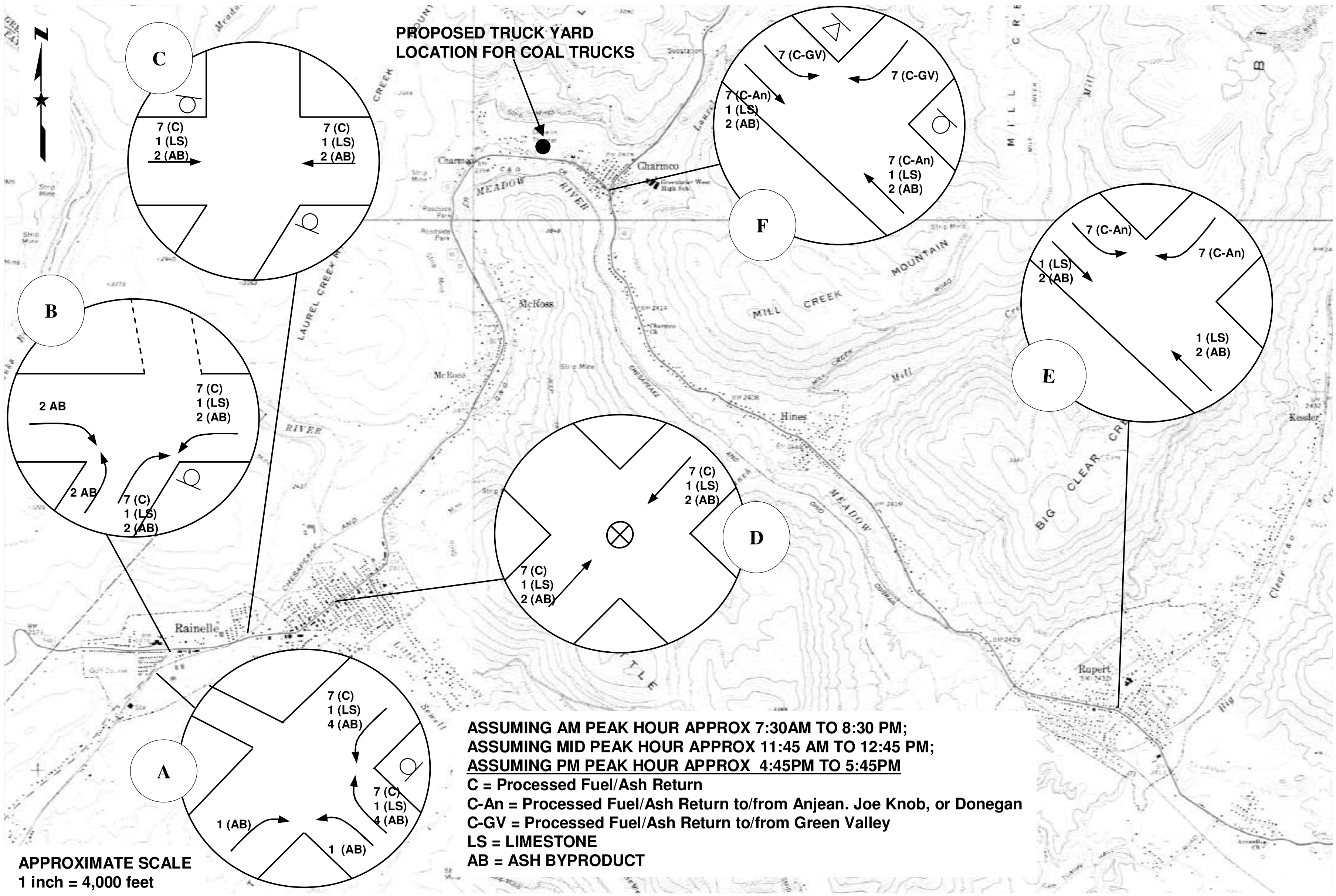

Figure 4.13-2.
Truck-Generated Trips and Distribution
for AM, MID, and PM Peak Hours
Map Source: USGS topo (1:24,000) Rainelle (1976)

U.S. Department of Energy
National Energy Technology Lab

Western Greenbrier Co-Production Demonstration Project

Environmental Impact Statement

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 ***C or better***. 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)	***9.3***	***9.4***	***10.0***	***9.7***	***9.9***	***10.2***	***9.8***	***10.0***	***10.1***
Intersection LOS	A	A	***B***	A	A	***B***	A	A	***B***
B: US60 & WV20 (S. Sewell St.)									
Traffic Volume	550	619	668	479	540	577	512	577	625
Average Control Delay (veh/s)	***10.0***	***10.3***	***10.6***	***9.8***	***10.1***	***10.4***	***9.9***	***10.1***	***10.5***
Intersection LOS	***B***	***B***	***B***	A	***B***	***B***	A	***B***	***B***
C: US60 & Locust St. & Park Center									
Traffic Volume	663	746	787	988	1112	1144	849	954	996
Average Control Delay (veh/s)	***13.1***	***14.0***	***14.5***	***18.0***	***21.3***	***22.3***	***13.5***	***14.9***	***15.5***
Intersection LOS	B	B	B	***C***	***C***	***C***	B	B	***C***
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)	***11.9***	***12.8***	***13.1/13.1***	***11.0***	***11.6***	***11.8/11.8***	***13.4***	***14.7***	***15.1/15.2***
Intersection LOS	***B***	B	B/B	***B***	***B***	B/***B***	B	B	***C/C***
F: US60 & WV20 (in Charmco)									
Traffic Volume	564	635	671	520	585	611	602	677	710
Average Control Delay (veh/s)	***11.1***	***11.6***	***11.9***	***11.0***	***11.6***	***12.0***	***12.5***	***13.5***	***13.0***
Intersection LOS	***B***	***B***	***B***	***B***	***B***	***B***	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.

4.14.1.2 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's 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)			

*** Emission factors for these chemicals were based on average baghouse outlet emissions of chemicals that were measured during the Pilot-Scale Boiler Emissions Test conducted by TRC Environmental Corporation on September 17, 2004**

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 ***methods of*** exposure for each of the receptor types are described in Table ***4.14-2***.

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 ***(DOE has reviewed the risk assessment data and assumptions, and new values in the table reflect the most recent project data).*** 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 ***air*** 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.

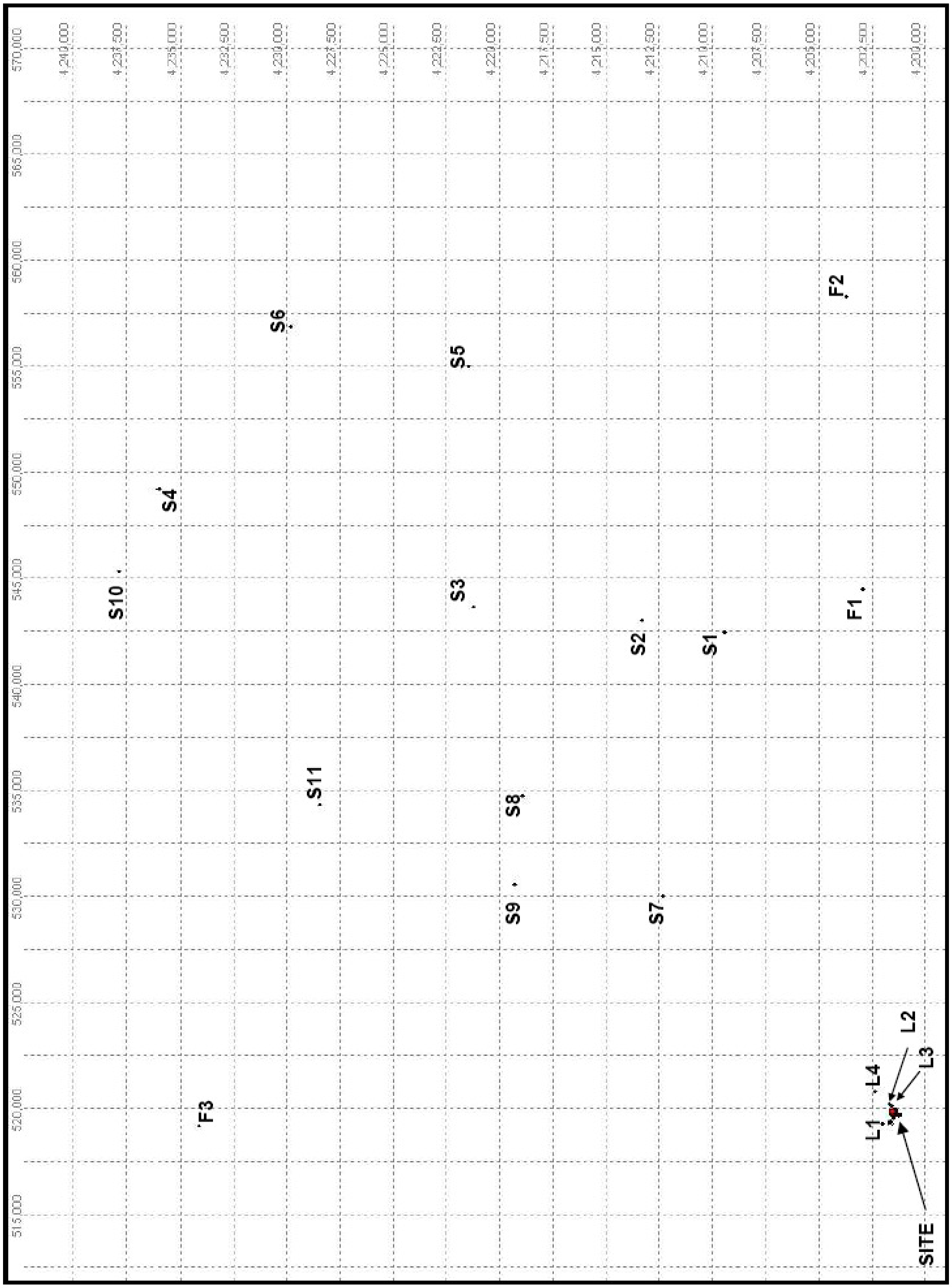

Figure 4.14-1. Relative Location of Receptor Points

Thus, pollutant concentrations ***in air (μg/m³)*** 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[a]	WET[b]	CONC[c]	TOTAL	DRY[d]	WET[e]	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	***0.00238***	***0.03367***	***0.00181***	***0.06977***	***0.00244***	***0.06733***	0.0019	0.02624	0.00036	0.02589
L2	Nursing Home	***0.00008***	***0.04945***	***0.00007***	***0.10439***	***0.00008***	***0.10431***	0.00003	0.03954	0.00001	0.03953
L3	Sewell Landing Apts	0	***0.06581***	0	***0.14704***	0	***0.14704***	0	0.05349	0	0.05349
L4	Downtown Rainelle	***0.01146***	***0.02186***	***0.0084***	***0.05054***	***0.0109***	***0.03964***	0.0091	0.01811	0.00168	0.01643
Farm Receptors											
F1	Williamsburg	***0.00177***	***0.00011***	***0.00117***	***0.00055***	***0.00047***	0.00008	0.00167	0.00018	0.00010	0.00008
F2	Falling Spring	***0.0011***	0.00005	***0.00071***	0.00024	0.00021	0.00003	***0.00103***	***0.00009***	0.00005	0.00004
F3	Canvas	***0.00112***	0.00005	***0.00084***	0.00025	0.00022	0.00003	***0.00108***	0.00009	0.00005	0.00005

		VAPOR PHASE				PARTICULATE PHASE				PARTICULATE-BOUND	
ID	**RECEPTORS**	**CONC[a]**	**WET[b]**	**CONC[c]**	**TOTAL**	**DRY[d]**	**WET[e]**	**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)
Trout Stream Receptors											
S1	Flynn Creek	***0.00321***	0.00014	***0.00206***	***0.00073***	0.00064	0.0001	***0.00303***	0.00025	0.00014	0.00011
S2	Job Knob Branch	***0.00371***	0.00013	***0.00239***	***0.00079***	***0.0007***	0.00009	***0.00349***	0.00026	***0.00015***	***0.00010***
S3	Middle Branch	***0.00359***	0.00012	***0.00228***	***0.00063***	***0.00055***	0.00008	***0.00338***	0.00022	0.00013	***0.00010***
S4	Hanging Rock Branch	***0.00293***	***0.00006***	***0.00189***	***0.00035***	0.00032	***0.00003***	***0.00275***	0.00013	***0.00007***	0.00006
S5	Big Run	***0.00193***	0.00006	***0.00116***	***0.00031***	0.00028	0.00003	***0.00180***	0.00011	0.00007	0.00005
S6	Dogway Fork	***0.00246***	0.00005	***0.00152***	***0.0003***	***0.00027***	0.00003	***0.00229***	0.00011	0.00007	0.00005
S7	Brown Creek	***0.01516***	***0.00067***	***0.01128***	***0.00371***	***0.00317***	***0.00054***	***0.01456***	***0.00113***	0.00066	***0.00047***
S8	Beech Run	***0.00614***	***0.00024***	***0.00423***	***0.00125***	0.00109	0.00017	***0.00585***	0.00042	***0.00023***	0.00019
S9	Bushy Meadow Creek	***0.00786***	***0.00027***	***0.00613***	***0.00164***	***0.00145***	0.00019	***0.00760***	***0.00052***	***0.00030***	0.00022
S10	Barrenshe Run	***0.00428***	0.00008	***0.00285***	***0.00047***	***0.00043***	***0.00004***	***0.00403***	***0.00017***	***0.00010***	0.00007
S11	Cranes Nest Run	***0.00953***	0.0002	***0.00701***	***0.00121***	***0.0011***	0.00012	***0.00909***	0.00041	***0.00024***	0.00016

Some values were updated based on most recent project data.

Data Used in Human Exposure Models:

- ***a – Normalized vapor phase air concentration (for everything except inorganics)***
- ***b – Normalized yearly wet deposition from vapor phase (for PCBs only)***
- ***c – Normalized particle phase air concentration (for PCBs and inorganics)***
- ***d – Normalized yearly dry deposition from particle phase (for PCBs and inorganics)***
- ***e – Normalized yearly wet deposition from particle phase (for PCBs and inorganics)***

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 had 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

4.14.3.1 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, 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 (NHTSA, 2004a). 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.

4.14.3.2 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.

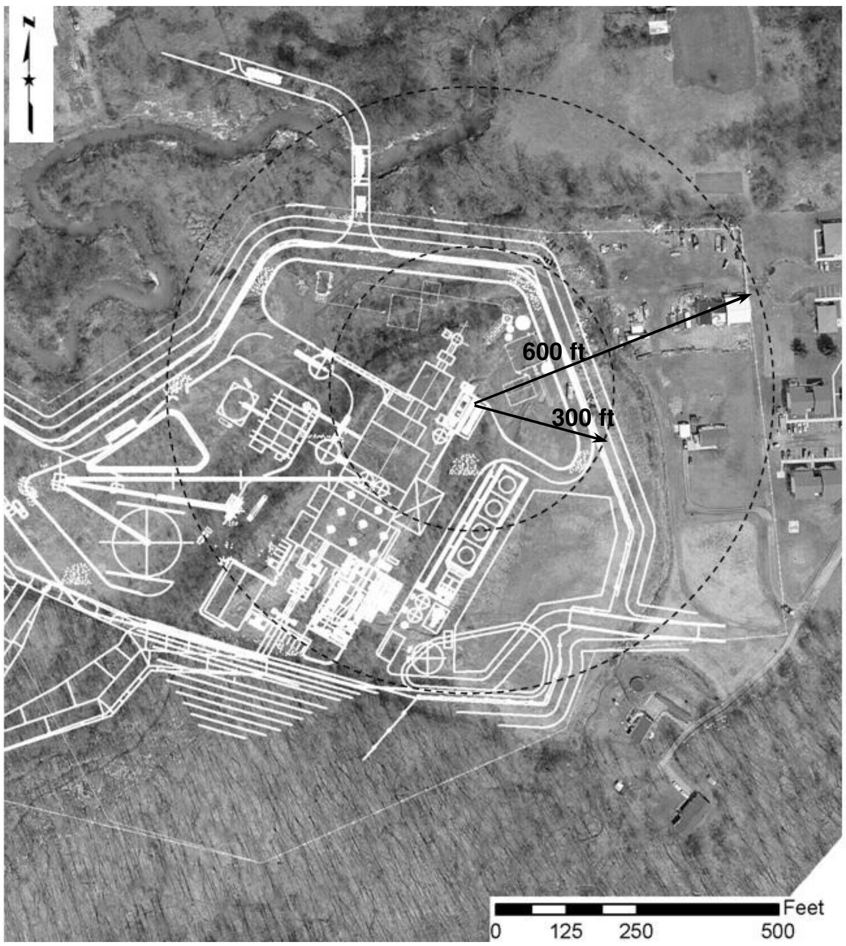

Figure 4.14-2. Worst-Case and Alternative Release Impact Areas for an Accidental Ammonia Spill

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. ***Table 4.14-1 lists the COPCs that were analyzed for this EIS.***

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. ***In general, the U.S. EPA recommends a target cancer risk range of 1×10^{-6} to 1×10^{-4} as threshold values for potential human health risks. Specifically, the basis of 10^{-6} to 10^{-4} risk criteria is that for individual chemicals, the risk shall not exceed 1×10^{-6}, and the total risk from all chemicals shall not exceed 1×10^{-4}.***

DOE has reviewed most recent project data and assumptions, and has updated the risk assessment. The revised modeling results have been included in Tables 4.14-4 and 4.14-7 in this section. Based on these revisions, Total Risk and the Hazard Index values are still well below the U.S. EPA criteria, and the conclusions presented in Section 4.14 of the Draft EIS remain unchanged. None of the risks attributable to individual chemicals exceeded 1×10^{-6} for any of the receptors, nor did total risks attributable to all chemicals combined exceed 1×10^{-4} for any receptor. It should be noted that the numbers preceding "$x10^{-4}$" in the Total Risk column in Table 4.14-7 below are all significantly less than 1. In fact, as indicated in Appendix I (Tables 1 through 5), total risks for each of the receptors were consistently less than 1×10^{-6}.

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.

Table 4.14-7. Total Cancer Risks and Non-Cancer Hazards

Receptor	Total Risk* (cancer)	Hazard Index* (non-cancer)
Resident/Home Gardener		
Adult	***0.00076×10^{-4}***	***0.01972***
Child	***0.00023×10^{-4}***	***0.02347***
Subsistence Farmer		
Adult	***0.0002×10^{-4}***	***0.00043***
Child	***0.000051×10^{-4}***	***0.00063***
Subsistence Fisher		
Adult	***0.0011×10^{-4}***	***0.00269***
Child	***0.00035×10^{-4}***	***0.00381***
School/Day Care Child	***0.000019×10^{-4}***	***0.0002***
Hospital Patient/Extended Care Resident	***0.0000016×10^{-4}***	***0.0000002***
U.S. EPA Criteria (Acceptable Risk Defined as Less Than)	1×10^{-4}	1.0

New values reflect new remodeling efforts based on most recent project data

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.

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 µg/m^3 (= 23.32 [modeled] + 50 [background]). For the annual averaging period, the total PM_{10} concentration was predicted to be 26.8 µg/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.

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[b]	***73.3***	48.9%
	Annual	50[c]	4.7[a]	22.1[b]	26.8	53.6%
$PM_{2.5}$	24-hour	***35***	***2.29***[d]	29.4[b]	***31.7***	***90.5%***
	Annual	15	***0.48***[d]	9.8[b]	***10.3***	***68.7%***

[a] *Source of PM_{10} modeled concentration data - WGC, November 2005, Addendum to May 2005 Permit Submittal, Table 6-3.*

[b] *Source of PM_{10} data from Kanawha **and source of $PM_{2.5}$ data**, WV collected in 2004. West Virginia Department of Environmental Protection, Division of Air Quality*

[c] ***EPA revoked the annual PM_{10} standard of 50 µg/m^3 effective December 18th, 2008.***

[d] ***$PM_{2.5}$ emissions were not modeled. Concentrations are the maximum calculated based on mean ratio of $PM_{2.5}$ to PM_{10} ranging from 0.06 to 0.11 (USEPA, 2005).***

Effective December 18, 2006, EPA revoked the 24-hour $PM_{2.5}$ NAAQS of 65 µg/m^3 and implemented a revised 24-hour $PM_{2.5}$ NAAQS of 35 µg/m^3. As a result, upper bound estimates for $PM_{2.5}$ concentration, initially used in the discussion of human health impacts in the Draft EIS, would exceed the new standard. The principal factor in this potential for exceeding the standard is a result of the comparatively high background concentration of $PM_{2.5}$ (PM data based on monitoring from Kanawha, WVDEP, Division of Air Quality, 2004). When evaluating potential human health effects in the Draft EIS, DOE used a very conservative approach to provide an upper bound for a $PM_{2.5}$ estimate for comparison to the old NAAQS standard. Since this conservative approach did not result in an exceedance of the old NAAQS standard, further analysis was not conducted at that time.

DOE's initial approach was conservative from the perspective that surrogate $PM_{2.5}$ values were based on permit limits for PM_{10} emissions (i.e., an upper bound value for PM_{10}). Furthermore, since modeling of $PM_{2.5}$ was not conducted, DOE used a multiplier of 0.7 (or 70 percent of the PM_{10} concentration) for developing a $PM_{2.5}$ estimate. However, more current research and data indicate that multipliers in the range of 0.06 to 0.11 can be used to infer or scale $PM_{2.5}$ concentrations from PM_{10} data (USEPA, 2005). When using a more realistic multiplier for relative $PM_{2.5}$, the resulting concentrations of $PM_{2.5}$ for the 24-hour standard would, therefore, not exceed the NAAQS standard of 35 ug/m^3.

For the 24-hour averaging period, the ***maximum*** total $PM_{2.5}$ concentration was predicted to be ***31.7*** µg/m^3 (= ***2.29*** [derived] + 29.4 [background]). For the annual averaging period, the ***maximum*** total $PM_{2.5}$ concentration was predicted to be ***10.3*** µg/m^3 (= ***0.48*** [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 ***annual or 24-hour*** NAAQS.

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. ***However, the 24-hour $PM_{2.5}$ NAAQS is approaching the NAAQS and this is a result of the current ambient concentrations approaching the standard. Furthermore, the $PM_{2.5}$ estimates were derived using maximum values of PM_{10} (i.e., permit limits), and therefore, represent conservative estimates.*** Since the NAAQS were established to be protective of human life, hazardous impact to human life should be ***minimal***. 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.

INTENTIONALLY LEFT BLANK

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.

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.*

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 4.15-5 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.

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.*

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.

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.

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.

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

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.

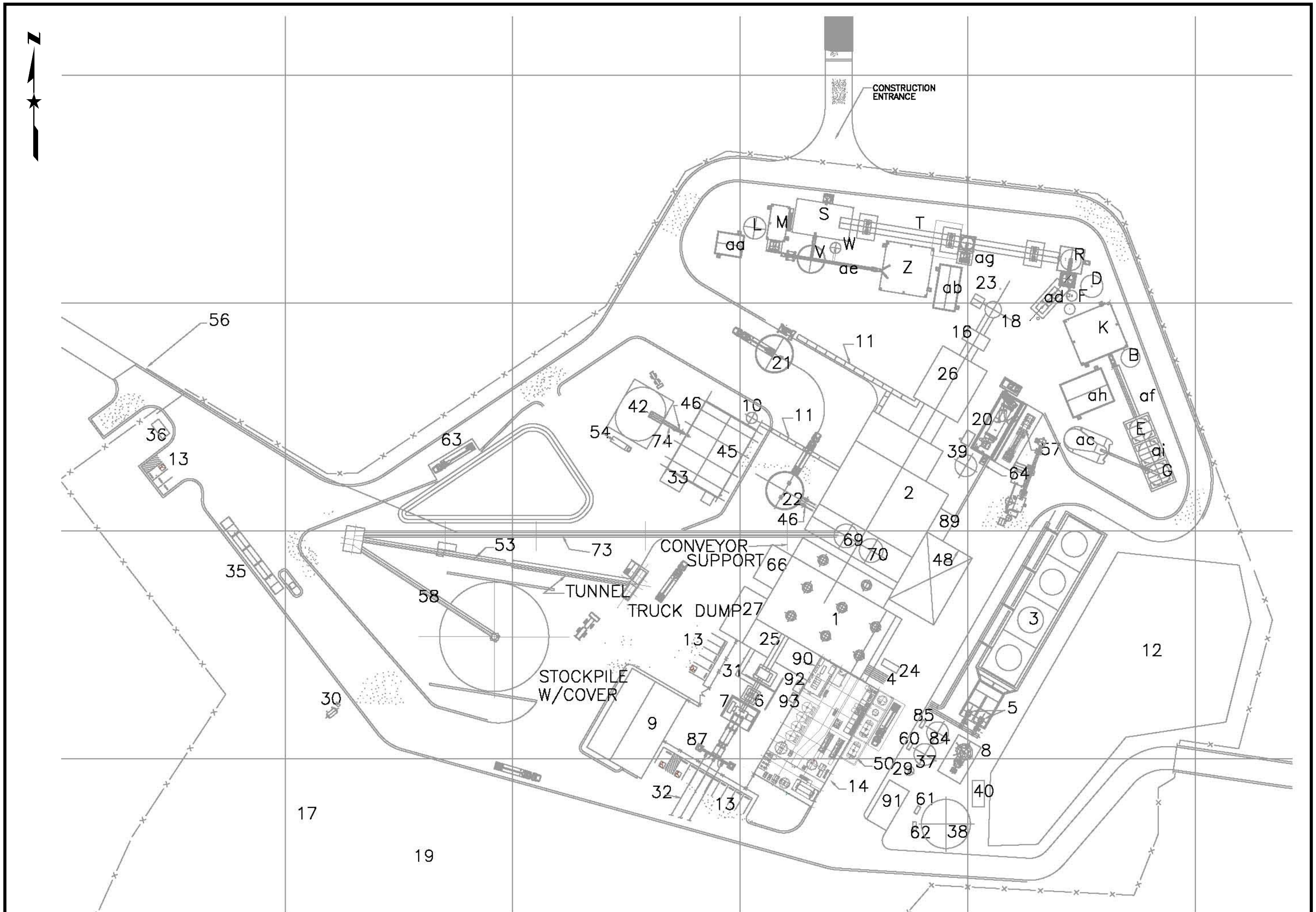

Figure 4.15-1
WGC Power Plant – Buildings and Equipment

Source: CH2MHill/Lockwood Greene, 2006 (Rev D – May 09, 2006)

U.S. Department of Energy
National Energy Technology Lab

Western Greenbrier Co-Production Demonstration Project

Environmental Impact Statement

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° F to 250° F (1,260° C to 121° 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.

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*

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.

The potential blow-off and start-up noise of 133 dB is a linear parameter, not an A-weighted level. Noise levels from blow-off are typically in the range of 115 to 125 dBA at a distance of approximately 3 feet (1 meter) from the source (W&P, 2007). As a mitigation measure, temporary venting silencers could be installed that would reduce the A-weighted noise level by 30 dBA. Thus, the noise level of 125 dBA would be reduced to 95 dBA, which would attenuate at a rate of 6 dBA per distance doubling. Based on the source height (120 feet [37 meters]), the shortest horizontal distance to the property line (about 270 feet [82 meters]), and the elevation of the plateau (about 20 feet [6 meters]), the resulting potential noise level at the plant property line would be approximately 77 dBA with the silencers in place. The short duration of this noise level would not constitute a danger to health, and the blow-off activities would not be carried out at night. Furthermore, the walls and windows of a typical home

would provide additional attenuation of 10 to 20 dBA, which means a resident inside a home at the plant property line would experience a noise level of approximately 57 to 67 dBA.

Additionally, would back-up alarms would sound from on-site trucks. Sounds from back-up alarms are pure tones in the 1350 or 4000-5000 Hz range. Due to their high frequency, they would attenuate quickly with distance. CADNA modeling shows that a noise level of 96 dB for these tones would attenuate to 51 dBA or less at a distance of 165 feet (50 meters) from the source. No sensitive receptors are within such a close distance to these activities. In addition, on-site buildings would serve as barriers to block much of the sound from back-up alarms.

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.

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.

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.*

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 (WGC, 2006c). Furthermore, mitigation of these emissions would be hindered by the fact that CO_2 capture for potential geologic sequestration is not economically favorable using current CFB technology ***(see Section 4.3.3.2, under Greenhouse Gases)***. Sequestration is not ***viable*** for CFB technology because the CO_2 is exhausted at low pressure and at dilute concentrations, trace impurities are present that reduce the effectiveness of the CO_2 adsorbing process, and due to the parasitic loads associated with compressing the captured CO_2 to pipeline pressure (1,200 – 2,000 pounds per square inch). Conversely, with integrated gasification combine cycle (IGCC) technology CO_2 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 CO_2 is relatively concentrated (50 percent by volume) and at high pressure offering the opportunity for lower CO_2 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 4.3-14. If successfully implemented, the heat recovery and distribution process could effectively offset the power plant's CO_2 emissions by 20 to 35 percent.

INTENTIONALLY LEFT BLANK

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.

INTENTIONALLY LEFT BLANK

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.

INTENTIONALLY LEFT BLANK

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.
	• ***Use of low-sulfur fuels for trucking and construction equipment use and consideration of adopting anti-idling control measures.***
	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 gaging 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 ***WVDNR's recommended flow thresholds***. ***WGC would implement a digital monitoring device with a 'low flow' alarm.*** **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 ***WVDNR's recommended flow thresholds.*** • 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. • ***Construction of the transmission corridor outside the migratory bird-nesting season (i.e., during the winter months)*** • ***Construction of intake structure outside spawning season (e.g., months of May and June)*** **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.

Table 4.19-1. Mitigation Measures for the WGC Co-Production Facility Project (continued)

Environmental Resources	Mitigation Measures
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. **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.

Table 4.19-1. Mitigation Measures for the WGC Co-Production Facility Project (continued)

Environmental Resources	Mitigation Measures
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. **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. • ***Consideration of installing temporary venting silencers during the steam blow-offs.***