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## Site Description

The general description and overview of the physical and ecological setting in and around the MCCC facility, and a description of facility operations and the October 11, 2000, spill event are briefly summarized in this section. Figures 1 through 6 (see Section 1) depict the different portions of the study area.

### 2.1 Site Location and Setting

The MCCC facility is an underground and surface coal mining facility located near Inez, in Martin County, Kentucky. The surrounding land use consists of natural forested, mixed residential, and some commercial properties.

The facility is bordered by two stream systems: Coldwater Fork to the northeast and Wolf Creek to the south. The surrounding area is generally forested with grassy and shrub vegetation. These forested areas are described as less than 50 years in age with medium to high density of cover. Some residential areas occur within the vicinity of the facility along roads and bordering stream areas. Areas on the facility property include undisturbed areas vegetated with trees and shrubs; disturbed areas undergoing reclamation and currently vegetated with grasses, shrubs, and small trees; and disturbed areas including facility buildings for coal mining, processing, and storage.

### 2.2 Regional Characteristics and Hydrology

#### 2.2.1 Coldwater Fork

The Coldwater Fork drainage is composed of a single channel that is confined by narrow valleys and steep ridges (see Figure 2). The stream area is bordered by man-made features such as roads and residences. The stream bottom is described as sand and gravel beds with little or no boulders present. Banks of the stream are typically composed of sand, making them highly susceptible to erosion. However, floodplain areas are covered with numerous tree and shrub species.

**2.2.2 Rockcastle Creek**

The Rockcastle Creek drainage is the continuation of Coldwater Fork to its confluence with the Tug Fork River (see Figure 3). Rockcastle Creek is bordered by roads and man-made features due to its accessibility to KY Highways 3 and 645 (especially concentrated where it runs through the City of Inez). The stream bottom is described as sand and gravel beds with larger rocks and boulders present near the confluence with the Tug Fork River. Sandy banks in some areas make it susceptible to erosion, especially during high-flow periods.

**2.2.3 Wolf Creek**

The Wolf Creek drainage is composed of a single channel containing bedrock outcroppings within narrow valley areas with extensive development along the banks. The stream is bordered for nearly its entire length by the Norfolk-Southern Railroad. Additionally, there are a large number of residences on Lower Wolf Creek accessed by State Routes 1439 and 1714. Stream bottom characteristics are described as sand and gravel beds with little or no boulders present. Stream banks along Wolf Creek are generally sandy and highly susceptible to erosion. Vegetation in floodplain areas is moderate to dense, consisting of numerous tree and shrub species.

**2.2.4 Tug Fork River**

The Tug Fork River is composed of a large main river channel that forms the border between Kentucky and West Virginia. Characteristics of river banks range from dense forests to small towns in Kentucky and West Virginia. River use in these areas ranges from commercial to recreational. Commercial activities include timber harvesting on the streambanks and dredging within the channel. Bottom characteristics for the Tug Fork River are generally sand with some gravel and a few riffle flows with larger rocks in some areas. The banks of the Tug are steep with few floodplains. River flow is generally precipitation-dominated, with highest flow during storm events. Several structures that pre-existed the release are present at different locations along the river, creating pool habitats and sand bars. Natural erosion and historical timber and mining operations have resulted in coal deposits in the river that are commercially dredged for the recovery of salable coal.

**2.2.5 Big Sandy River**

The Big Sandy River is composed of a large river basin banked by forested areas. These forested areas contain mixed land uses including mining, residential, commercial, and recreational use areas.

Streams in this river basin are stormflow dominated, with generally low base flow conditions. Bottom characteristics for the Big Sandy River range from sand and gravel, to large rocks and boulders overlain on bedrock, creating areas of aquatic habitat around sand bars as shallow pools. Habitat along river banks range from areas of dense tree and shrub overstory to developed areas near the confluence with the Ohio River. Several structures are present at different locations along the river, altering the flow and bottom characteristics of certain areas. Natural erosion and historical mining operations have resulted in coal deposits in the river that are commercially dredged by multiple companies for the recovery of salable coal. The US Army Corps of Engineers maintains the Big Sandy as a navigable channel through dredging up to River Mile Post 8.

### 2.3 Land Use and Environmental Setting

#### 2.3.1 Local Land Use

Martin County covers a total of 230 square miles on the border of Kentucky and West Virginia. The MCCC facility is surrounded by three general land-use types including other commercial operations, residential areas, and natural, undisturbed habitat. Based on 1999 population data, Martin County has an estimated population of 11,901 residents. Inez, Kentucky, which lies directly north of the facility, has an estimated population of 462, and Warfield, which lies to the northeast, has an estimated population of 328. Inez and Warfield are listed as the two primary cities in Martin County, KY (Kentucky State Census Bureau, 2001). Residences of Martin County are served by individual sewage treatment systems, except within the City of Inez. Many of these systems consist of straight pipes discharging to adjacent water bodies. No residential trash collection service is provided to residences of Martin County.

Natural land use areas include steep slopes and mountain tops containing primarily herbaceous/woody forests, representing most of the area outside the facility. This surrounding area is undeveloped due to its steep terrain and inaccessibility. Several stream and seasonal water bodies, fed by high rates of runoff and limited infiltration of soil on steep slopes, are included in these areas.

Commercial land usage in the area includes major and minor coal production facilities; in addition, railroads transect the county. The railroad systems are essential for shipment of coal to customers. The roads are used for truck transportation of coal to the Big Sandy River docks. The area has had substantial surface and underground mining for over 100 years as well as extensive logging and gas well

development. This activity has produced numerous abandoned mines within the Big Sandy watershed. There are multiple mining facilities currently active in the watershed, including Excel Mining and Addington Enterprises, Inc., both located adjacent to Wolf Creek, and Beech Fork and Czar Coal Processing on the Middle Fork of Rockcastle Creek.

### **2.3.2 Ecological Setting**

Several post-release site visits and field surveys have been conducted to characterize the ecology of the areas surrounding MCCC and surrounding stream and river corridors. The characterization involved the identification of plant and animal communities, and the potential for effects from chemical and/or physical stress on ecological resources at the site. In addition, information on sensitive and/or protected species within the study area were obtained from state and federal agencies. This section identifies the ecosystems present, threatened and endangered species, and/or species of concern in the vicinity of MCCC.

#### **2.3.2.1 Ecosystem identification and Characterization**

The area surrounding the MCCC facility can be broken down into three primary categories: Industrial/Commercial (the MCCC facility); terrestrial areas; and stream and river corridors.

#### **MCCC Facility**

The Martin County Coal Corp facility is an active coal mining operation utilizing both surface and underground mining methods and shipping approximately 4 million tons of coal per year. These activities result in undisturbed areas and disturbed areas with constant ongoing reclamation activities.

#### **Terrestrial Areas**

The terrestrial areas consist of both disturbed and natural properties. Banks along a majority of the stream corridors in the study area are developed. These developed areas include residential structures, maintained lawns, commercial developments, roads, and railroads.

The natural terrestrial area immediately surrounding the MCCC facility is generally undeveloped and vegetated with various grasses, shrubs, and trees. The forested areas are dominated by White and Red Oak (*Quercus alba* and *Quercus coccinea*), Yellow Poplar (*Liriodendron tulipifera*), Maple (*Acer saccharum* and *Acer nigrum*), Hickory (*Carya sp.*), and Pine (*Pinus sp.*). Common bird species include American robin (*Turdus migratorius*), downy woodpecker (*Picoides pubescens*), and house sparrow (*Passer do-*

*mesticus*). These terrestrial areas provide essential cover, nesting, and feeding opportunities for local birds and wildlife.

### Stream and River Corridors

Several stream and river corridors are proximate to the MCCC facility. These include Coldwater Fork, Rockcastle Creek, and Wolf Creek. Surface water flow in the vicinity of the facility is east and north, forming the border of West Virginia and Kentucky. All streams and rivers discussed in this work plan are part of the Big Sandy River Watershed. Riparian areas throughout portions of the watershed have been significantly impacted by residential refuse (automobiles, household furniture, appliances, household debris, etc.) which are discarded along the stream banks. Streambeds and bed load materials range from sand and gravel to small cobbles and rocks overlain on bedrock. Bedrock outcrops within stream channels provide for the formation of small pool areas that may be suitable for small fish. However, many of the headwater streams hold little water and have a very low base flow, which limits the amount of habitat available for aquatic wildlife.

Historically and currently, the Tug Fork River is listed on both KY and WV's 303(d) list for impaired water bodies. KY has listed it as impaired for swimming due to the presence of pathogens (fecal coliform). WV has listed it as impaired for aquatic life due to the presence of aluminum, iron, and zinc, and for human health due to the presence of iron. In addition the Big Sandy River is on KY's 303(d) list as impaired for aquatic life due to siltation and metals. Aquatic species that are common to these water bodies include channel catfish (*Ictalurus punctatus*), rock bass (*Ambloplites rupestris*), black-nosed dace (*Rhinichthys atratulus*), emerald shiner (*Notropis atherinoides*), and numerous benthic macroinvertebrate species.

#### 2.3.2.2 Sensitive and Protected Species

The Kentucky State Nature Preserves Commission (KSNPC) was contacted for information on the presence of federally and/or state-listed species within the study area (KSNPC 2001).

Species that have been known to occur within the Big Sandy River watershed include the fanshell mussel (*Cyprogenia stegaria*), with limited historic documented occurrences in the Big Sandy River. However, this mussel species is not present in the vicinity of the site, and is currently listed as extirpated from this river basin.

Other species listed by the KSNPC include two endangered—mountain silver bell (*Halesia tetraptera*) and western sand darter (*Ammocrypta clara*). The last observation of the mountain silver

*crypta clara*). The last observation of the mountain silver bell was in 1837, while the western sand darter was last observed in 1938. Two special concern species were also identified by the KSNPC. These include the longsolid (*Fusconaia subrotunda subrotunda*) and northern madtom (*Noturus stigmosus*). The longsolid has not been observed in the area since 1983, while the last observance of the northern madtom was 1980.

Based on the above information, there are no federally or state-listed sensitive or protected species within the stream segments addressed by this Work Plan.

### **2.3.3 identification of Resources Potentially at Risk**

Resources within the Big Sandy watershed that could potentially be impacted by exposure to slurry include biological communities such as fish and benthic macroinvertebrates, and may also include physical resources such as riparian zones, substrate integrity, bank stability, flow regimes, habitat characteristics, and water intake requirements. Turbidity and slurry deposition variations can also result in modifications of benthic community parameters such as species diversity and richness, ratio of sensitive to tolerant organisms, other taxonomic alterations, and fish health impacts. Physical characteristics that may be affected by turbidity and slurry deposition include loss or change of habitat (siltation in riffle areas), scouring of banks, and increased or decreased flow.

During post-spill response actions, toxicity testing was conducted to characterize potential impacts to aquatic life by the released material. Acute toxicity testing was conducted on pore-water and water samples from impacted streams.

Water column and slurry tests to determine chronic effects were also conducted during the initial response phase. Chronic water column testing with fathead minnows (*Pimephales sp.*) included flow-through tests utilizing both filtered and non-filtered water collected near the mouth of Wolf Creek, in a heavily impacted area. The non-filtered sample was mixed throughout a seven-day test to keep the slurry in suspension and simulate in-stream conditions immediately following the spill event. Results indicated that the slurry is not acutely toxic to stream biota. Some mortality occurred in the tests conducted with unfiltered water samples, but no mortality occurred in tests conducted with filtered water. This indicates that the impairment was due to physical effects (i.e., clogging of gills and limited respiration) and not chemical effects.

## 2.4 Facility Overview and Release Summary

### 2.4.1 Facility Description and Operations

MCCC is in its 30<sup>th</sup> year of operation, and produces 3-5 million tons of coal per year. The mine site is located in the highly dissected Cumberland Mountain section of the Appalachian Plateaus. The terrain at the facility and surrounding areas consists of two parallel ridges, Pine Mountain and Cumberland Mountain, ranging from 2,000 feet to 3,000 feet in altitude. An extensive network of streams in the region allows for the formation of very steep valleys with relatively steep gradients. The height of hills above the stream valleys range from 300 feet to 1,000 feet. Alternating benches and slopes form the valley wall areas with massive sandstones forming cliffs on the upper valley wall and steep slopes in the lower valley areas. Seams being mined at MCCC include 5-Block, Clarion, Stockton, and Coalburg.

MCCC continues to conduct surface and underground mining operations at the facility. Mountaintop mining and contour surface mining with point removal is the main form of surface mining. Drift mining with the room and pillar method is the main form of underground mining. Highwall mining has been incorporated over the past several years using the ADDCAR<sup>®</sup> mining system. At the facility, the majority of the surface-mined coal is transported by truck to the docks on the Big Sandy River for transport by barge to customers. The underground-mined coal and approximately 20 percent of the surface mined coal is transported by conveyor belt-line and/or truck haulage for onsite processing by conventional heavy media and thermal drying methods for delivery to utility companies. Processed coal is shipped via rail or truck to MCCC customers. Residual water containing fine refuse material composed of shale, sandstone, silt stone, and clays, from the preparation plant, which is commonly referred to as slurry, is transported by pipeline to the Impoundment for settling. Use of the Impoundment for containment of slurry began in 1985.

### 2.4.2 Release Summary

In the early morning hours of October 11, 2000, there was a sudden, unforeseen release of slurry. Slurry released from the Impoundment entered the 1-C underground Coalburg mine that lies adjacent to the perimeter of the Impoundment. The slurry migrated through an undetermined path in the mine and an indeterminate amount exited from two portals; the No. 2 North Mains Portal and the South Mains Portal. Discharge from the No. 2 North Mains Portal entered Old Road Fork and, following the streambed, migrated to the confluence with Coldwater Fork. Discharge from the South Mains Portal entered Big Andy Branch and then Panther



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Branch, followed by Wolf Creek. MCCC emergency personnel responded immediately by notifying regulatory agencies, monitoring water levels in the streams, and initiating containment activities. The slurry release from the impoundment was stopped at approximately 5:00 A.M. that same morning by filling the breach with rock and dirt from the surface.