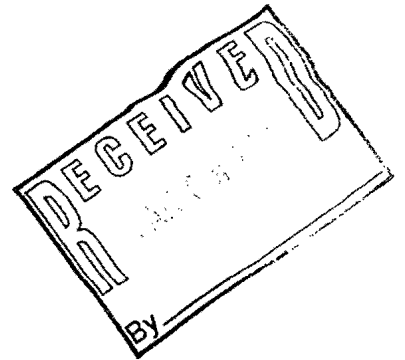




**SUMMIT ENGINEERING, INC.**

January 3, 2011



Mr. (b) (6)(b) (6)  
U.S. Army Corps of Engineers  
Eastern Kentucky Regulatory Office  
845 Sassafras Creek Road  
Sassafras, KY 41759

RE: Laurel Mountain Resources, LLC  
KDNR Permit No: 813-0344  
USACE ID # 200600368  
Construction Report

(b) (6)  
(b) (6) :

On behalf of Laurel Mountain Resources, LLC, please find enclosed the Construction Report for a portion of the mitigation requirements related to the above-referenced project. This project involves the restoration and enhancement of Big Sourwood Branch of Big Caney Creek in Breathitt County, Kentucky as part of the Section 404 permitting process.

After you have reviewed the report, please notify me of any copies or additional information you may need for your records or for the distribution to other agencies. If you have any questions regarding this project or require any additional information, please contact me at (606) 432-1447 ext. 309 or e-mail me at mhamilton@summit-engr.com.

Sincerely,

Misty D. Hamilton  
Biologist

c: file  
Enclosures

**LAUREL MOUNTAIN RESOURCES, LLC  
KDNR PERMIT NO. 813-0344 (formerly 813-0310)  
USACE ID # 200600368**

**LEFT FORK OF BIG SOURWOOD BRANCH – REACH 4**

**1.0 Project Overview**

Laurel Mountain Resources, LLC (LMR) has been charged with performing remedial stream enhancement work as part of a compensatory mitigation package approved in a letter dated July 17, 2006, by the U.S. Army Corps of Engineers (COE) for KDNR Permit No. 813-0310 (transferred to KDNR Permit No. 813-0344), Corps ID No. 200600368. A detailed work plan for all mitigation was outlined in the Compensatory Mitigation Plan prepared by Walturn Engineering, Inc. of Hueysville, Kentucky, dated **March 23, 2006**. The mitigation performed for the Left Fork of Big Sourwood Branch (Reach 4) will serve to partially mitigate losses associated with this project.

In-kind mitigation for both temporary and permanent impacts will consist of an off-site stream restoration and enhancement project located in the Left Fork of Big Sourwood Branch of Big Caney Creek of Quicksand Creek of the North Fork Kentucky River in Breathitt County, Kentucky. Stream enhancement was proposed for approximately 3,510 linear feet of the Left Fork of Big Sourwood Branch. The mitigation project utilizes the East Kentucky Stream Assessment Protocol (EKSAP) to establish both the pre- and post-mitigation work stream function for impacted and mitigated stream reaches as applicable.

As part of the overall mitigation plan for KDNR Permit No. 813-0344 (formerly KDNR Permit No. 813-0310), LMR proposed the use of the East Kentucky Stream Assessment Protocol (EKSAP) to establish the pre and post-mitigation function for the restored stream. The pre-mitigation Ecological Integrity Unit (EIU) value of the stream is 2,527.90 based on EII scores calculated at ten points along the stream reach. The post-mitigation goal is to produce an EII rating of 1.00, resulting in an EIU value of 3,510.00, a net increase of 982.10 EIU's. The EIU gain for the Left Fork of Big Sourwood Branch as proposed will serve to partially mitigate losses associated with this project. The net project EIU loss for KDNR Permit No. 813-0344 is 9,447.58 EIUs. Total EIU gain for both on- and off-site mitigation areas is expected to be 14,444.7 EIUs.

Summit Engineering, Inc. (Summit) was contracted to perform inspection of field construction of the plan implemented as per the engineering designs of Abbott Engineering, Inc. Construction activities were conducted by R&R Excavating of Johnson County, Kentucky. After construction was complete, Summit personnel visited the site to inspect stream gradient, enhancements (pools, riffles, etc.), and other stream characteristics. After initial inspection, R & R Excavating made any changes required, Summit personnel conducted a final inspection, and construction was determined to be complete.

This report is being presented to document construction activities and to provide a plan for future monitoring activities for the duration of the period of liability. Portions of this report have been restated verbatim from the Compensatory Mitigation Plan to ensure accuracy.

**2.0 Goals of the Mitigation Project**

Following are the primary goals of restoration and enhancement within the mitigation reach:

- Improve aquatic biodiversity within the watershed;
- Reduce sediment loading by watershed improvements and improving bank stability;
- Improve riparian functions.

### 3.0 Existing Site Description

The Left Fork of Big Sourwood Branch is a third order intermittent / perennial tributary of Big Caney Creek and a regulated jurisdictional stream based on the presence of an ordinary high water mark. The stream has received substantial amounts of sediment from mining and logging activities, which have removed and replaced natural aquatic habitat. See the table below for RBP habitat scores measured at several locations within the stream, along with Habitat Integrity sub-indices and EII scores. Specific conductivity was measured to be 114  $\mu\text{S}/\text{cm}$  at the time of site assessment (November 2, 2005), which resulted in a conductivity sub-index of 1.00 for each site.

Assessment Site	RBP Score	Habitat Integrity Sub-index	Existing EII Score
1	98	0.10	0.55
2	129	0.39	0.70
3	102	0.12	0.56
4	109	0.19	0.60
5	0	0.10	0.55
6	0	0.10	0.55
7	133	0.43	0.72
8	158	0.80	0.90
9	158	0.80	0.90
10	90	0.10	0.55

The RBP habitat evaluation for these sites showed the following trends:

- Epifaunal Substrate/Available Cover scores were in the marginal and sub-optimal ranges, indicating less than desirable habitat availability and removed or disturbed substrate.
- Frequency of Riffles scores were in the marginal and sub-optimal ranges, indicating infrequent occurrence of riffles.
- Embeddedness scores were in the poor and marginal ranges, indicating that gravel, cobble, and boulder particles were at least 50% surrounded by fine sediment.
- Sediment Deposition scored in the marginal range, indicating moderate deposition of sediment within 30 to 50% of the stream channel.
- Bank Stability scores were in the marginal and sub-optimal ranges, indicating moderately unstable banks with 5 to 60% of the reach affected by erosion and some erosion potential during floods.
- Vegetative Protection and Riparian Vegetative Zone Width scores in the sub-optimal and optimal ranges, indicating that the stream banks are at least 70% covered with native vegetation and that the riparian zone is greater than 12 meters wide.
- Two segments of Left Fork of Big Sourwood Branch had RBP scores of 0, indicating that the sites had been so disturbed by previous logging and mining activities that no stream channel was present.

The existing riparian zone of the Left Fork of Big Sourwood Branch consisted of species such as American Beech (*Fagus grandifolia*), Red Maple (*Acer rubrum*), Red Oak (*Quercus borealis*), Tulip Poplar (*Liriodendron tulipifera*), White Oak (*Quercus alba*), American Hornbeam (*Carpinus caroliniana*), Mountain Magnolia (*Magnolia fraseri*), Flowering Dogwood (*Cornus florida*), Sycamore (*Platanus occidentalis*), Redbud (*Cercis canadensis*), American Elm (*Ulmus americana*), Box Elder (*Acer negundo*), Sweet Gum (*Liquidambar styraciflua*), Sourwood (*Oxydendrum arboreum*), Virginia Pine (*Pinus virginiana*), Hemlock (*Pinus canadensis*), Spicebush (*Lindera benzoin*), Umbrella Tree (*Magnolia tripetala*), Pawpaw Tree (*Asimina triloba*), Sugar Maple (*Acer saccharum*), and Sour Gum (*Nyssa sylvatica*). In addition, several non-native or invasive species were noted at the site, including Tree-of-Heaven (*Ailanthus altissima*) and multiflora rose (*Rosa multiflora*).

#### 4.0 Mitigation Work Plan

This mitigation plan proposed stream enhancement of 3,510 linear feet of stream in the Left Fork of Big Sourwood Branch (Reach 4), an intermittent / perennial tributary of Big Caney Creek. The pre-mitigation Ecological Integrity Unit (EIU) value of the stream is 2,527.90 based on EII scores calculated at ten points along the stream reach. The post-mitigation goal is to produce an EII rating of 1.00, resulting in an EIU value of 3,510.00, a net increase of 982.10 EIU's.

#### 4.1 Goals

The mitigation work plan contains the following guidelines and goals for stream restoration and enhancement:

- The affected stream channel will be restored to an environmentally acceptable alignment, longitudinal profile, and cross-section, including aquatic habitats.
- The final restored stream channel will have aquatic functions and values greater than those existing at the site.
- LMR will improve the existing riparian zone at all segments by the planting of native riparian species where necessary to improve habitat and functional value. The riparian zone will be improved to a minimum width of 50 feet beyond each stream bank.
- Sediments will be removed from the stream channel to the extent possible. At least two rock cross vanes, placed at the beginning and end of the project, will be constructed to flush remaining sediments and to increase the sediment transport capacity of the restored stream. Additional rock cross vanes will be placed should actual field conditions require. LMR will utilize shot rock from the permit area to construct cross vanes. Rock chosen for cross vane construction will have chemical and physical characteristics which do not adversely affect the receiving waters and do not cause violations of water quality standards.
- Substrate replacement material will be heterogeneous. LMR will utilize shot rock from the permit area to replace pre-mining substrate material. Rock chosen for substrate replacement will have chemical and physical characteristics which do not adversely affect the receiving waters and do not cause violations of water quality standards. Rock chosen for substrate replacement will closely approximate the pre-mining substrate size range of gravel to boulders. Smaller rock will be placed along the center of the restored channel. Larger rock and boulders will be placed along the edges and banks of the restored channel. Rock placed along the stream bank will be set into the earth so that rock is "tied" to the bank.

- In the reconstruction of the stream, pools will be replaced at the bend locations and riffles will be in the transition areas. To provide additional stability to the pools, J-hooks will be added. In the event the reconstructed stream appears to need additional structures, such structures such as deflectors, weirs, or vanes will be added. Large woody debris will be introduced into the stream by the J-hook structures. Enhancement structures will be placed such that the angle to bank will be from 20 to 30 degrees. The exact locations and types of enhancement structures installed will be determined by field conditions.

#### 4.2 Riparian Zone Revegetation Plan

The Mitigation Work Plan details the Riparian Zone Revegetation Plan as follows:

LMR will improve and/or restore the riparian zone by the planting of native riparian species to improve habitat and functional value of the affected stream segments. The riparian zone will be improved / restored to a minimum width of 50 feet beyond each stream bank. Riparian species will be chosen according to the following chart.

RIPARIAN ZONE REVEGETATION PLAN							
GROUND COVER SPECIES	choose four or more	Rice Cutgrass	Slender Lespedeza	Spangle Grass	Black-eyed Susan	Woolgrass	Smartweed
		Alsike Clover	Switchgrass	Annual Rye	Wild Rye	Deertongue Grass	Bottlebrush Grass
TREE SPECIES	choose two or more	Black Walnut	Bur Oak	Cherrybark Oak	Northern Red Oak	Pin Oak	Black Walnut
		Shellbark Hickory	Shingle Oak	Shumard Oak	Swamp Chestnut Oak	Shagbark Hickory	Buckeye
	choose two or more	American Elm	American Hornbeam	Red Elm	Green Ash	American Beech	Box Elder
		Red Maple	River Birch	Black Willow	Yellow Poplar	Redbud	Sycamore
							Blackgum
SHRUB SPECIES	choose three or more	Alder	American Plum	Arrow-wood	Deciduous Holly	Viburnums	
		Gray Dogwood	Silky Dogwood	Spicebush	Persimmon	Elderberry	
Note: List incorporates recommendations from KYDFWR and the USFWS concerning the use of native riparian species.							

At least six species of trees and shrubs, including at least two hard mast species, one soft mast species, and three shrub species must be chosen. Tree and shrub species will be mechanically or manually seeded/planted on a maximum ten foot by ten foot spacing pattern resulting in 436 trees and shrubs per acre. Tree (not shrub) species must comprise at least 75 percent of the total stock.

#### 5.0 Completed Mitigation Work

Mitigation construction was conducted during the fall and winter of 2010 by R & R Excavating, with field visits and inspection conducted by Summit Engineering, Inc. personnel.

### 5.1 Stream Bank Stabilization

A variety of bank stabilization measures were installed in conjunction with restoring stable grades for stream banks. The stabilization measures primarily utilized are commonly termed "bioengineering" materials, including native woody plants and natural biodegradable materials (rootwads, wood logs, rock etc.). These types of materials provide a soft, flexible and ecologically beneficial alternative to the more traditional engineering approaches to bank stabilization. The stream enhancement plan used the following types of materials to stabilize stream banks in areas where needed:

- **Cribbing / Bank Revetment Logs** to provide temporary (1-2 years) protection of exposed soils on regraded stream banks until woody and herbaceous plant covers are well established.
- **Seeding** of re-graded/disturbed stream banks with a seed mix comprised of a nurse crop of appropriate grasses and other herbaceous vegetation.

### 5.2 Natural Stream Enhancement Structures

The bank stabilization measures described above should also improve the quality of the stream habitat. Reducing the rate of bank erosion and sedimentation will improve water quality and stream bottom habitats. As woody vegetation becomes established on the banks and matures, it will serve to provide cover for aquatic organisms, shade the stream, thereby, maintaining lower water temperatures, and contribute particulate organic materials to the detrital food chain of the stream.

In addition to these habitat improvements, structural habitat improvement features have also been incorporated in the stream enhancement design and include the following structures:

- **Boulder Clusters** - Placement of boulders in the stream channel to diversify the stream bottom habitat and to provide controlled scour and depositional zones at appropriate locations in the stream channel.
- **Single and Double Deflectors** - Single and double log deflectors to maintain a narrow and deeper low flow channel cross section in wider sections of stream.
- **Logs Sills** - Log sills placed in the channel profile, shallow riffles, straight reaches and meanders are designed to create plunge pool formations below the structure. These structures are commonly constructed using a single log notched in the middle and placed within the channel. Typically log sills are anchored into place using steel rods.
- **Step Pools** - Steps were constructed within the stream channel to create zones in which sediment will be trapped in order to prevent sediment loading from occurring throughout the stream.
- **Root Wads** - Bank materials are installed to provide cover and to protect unstable banks by diverting rapidly flowing waters away from those areas more prone to erode. These materials are generally placed along the outside bend of a meander and anchored in place to prevent scouring behind or underneath them.
- **Rock Riffles** - Riffles will be created utilizing a mixture of one-half inch to three inch diameter stones made of local rock. The riffle bed will be first prepared with larger bedding stone being "worked-in" by backhoe bucket or "walked-in" by equipment treads or tires.

### 5.3 Riparian Zone

The riparian zones established along the stream extend 50 feet from the edge of the low flow channel on each side and consist of vegetative types observed within the existing riparian zone of the Left Fork of Big Sourwood Branch and other native vegetation as indicated in the Compensatory Mitigation Plan. A continuous corridor of native grass, shrub, and tree communities was established along the stream channel. Groundcover was planted as soon as practical after stream bank construction, and consisted of an even mix of Annual Rye (*Secale cereale*), Virginia Wild Rye (*Elymus virginicus*), Deertongue Grass (*Dichanthelium clandestinum*), and Redtop (*Agrostis stolonifera*). Although some portions of the riparian zone have been severely disturbed, areas of little disturbance also exist. Construction activities were conducted in such a way as to retain as much of the existing vegetation in these areas as possible. In the disturbed areas, shrubs and trees will be planted in the next available planting season.

### 6.0 Success Criteria

During the final year of the five year monitoring period, LMR will perform a final investigation to demonstrate replacement of lost aquatic functional values. Project success will be based upon attainment of the predicted increases in aquatic functional values.

Should mitigated channel conditions indicate a loss or failure to attain projected increases of aquatic functional values, contingency plans will be employed to ensure replacement of all lost aquatic functional values.

Success standards for all on-site mitigation areas will be based upon attainment of the RBP habitat parameter values to be in-place at the end of the five year monitoring period. The total predicted RBP habitat values to be in-place at the end of the five year monitoring period are described in the table below. It will be acceptable for an individual habitat parameter to be less than predicted as long the resulting loss is offset by an unpredicted gain in one or more other parameters. Increase in RBP habitat value will be verified through field investigations.

The predicted RBP habitat parameter values for all mitigation areas at the end of the 30 year maturity period are predicted to be a result of the initial "lift" in aquatic values present at the end of the five year monitoring period.

Segment	Length	Existing		Post-Work (5 Years)		At Maturity (30 Years)		
		EII	EIUs	EII	EIUs	EII	EIUs	Net Gain
1	120	0.55	66.00	0.72	86.40	1.00	120.00	54.00
2	280	0.70	196.00	0.75	210.00	1.00	280.00	84.00
3	350	0.56	196.00	0.72	252.00	1.00	350.00	154.00
4	200	0.60	120.00	0.72	144.00	1.00	200.00	80.00
5	230	0.55	126.50	0.72	165.60	1.00	230.00	103.50
6	370	0.55	203.50	0.72	266.40	1.00	370.00	166.50
7	120	0.72	86.40	0.74	88.80	1.00	120.00	33.60
8	820	0.90	738.00	0.93	762.60	1.00	820.00	82.00
9	670	0.90	603.00	0.93	623.10	1.00	670.00	67.00
10	350	0.55	192.50	0.72	252.00	1.00	350.00	157.50
Total / Average	3,510	0.66	2,527.90	0.77	2,850.90	1.00	3,510.00	982.10

In addition, the Compensatory Mitigation Plan calls for the following mitigation success goals:

- Mitigation areas should show no signs of substantial erosion.
- Stream enhancement structures should be in-place and properly functioning.
- Determination of successful tree and shrub stocking of the revegetated area will utilize the following standards:
  - A minimum stocking density of 300 trees or trees and shrubs per acre determined with a statistical confidence of 90 percent, with tree (not shrub) species comprising at least 75 percent of the total stock, shall be achieved on at least 70 percent of the area stocked.
  - At least 6 species of trees and shrubs shall be planted in a mixed distribution pattern with each of the 6 species comprising at least 10 percent of the total stock; however, none of the species shall comprise more than 50 percent of the total stock.
  - Should unwanted invading non-native non-riparian vegetative species become prevalent within any area, they will be controlled or eliminated by mechanical or manual methods.
  - Volunteer native riparian vegetation will be encouraged.

## 7.0 Mitigation Monitoring Plan

Following completion of mitigation operations, LMR will begin a five year long annual monitoring and management plan. The monitoring and management plan will evaluate the success of the mitigation work and will allow for any necessary adjustments to assure success of the mitigation site.

Short term plans for all mitigation sites are limited to achieving the required improvement and/or attainment of performance standards and aquatic functions as described within this application.

### 7.1 Monitoring Methods

An annual site visit will be conducted in order to determine the progress of the mitigation project. This site visit will include the following:

- RBP habitat assessments at each of the previously-determined evaluation sites, to be compared to the pre-work habitat values.
- monitoring of conductivity levels
- photographic documentation of stream bank stabilization measures, enhancement structures, riparian vegetation, etc.

In addition to the annual site visit which produces the monitoring report, LMR will conduct at least two additional cursory site visits. These cursory site visits will be performed to visually identify any conditions requiring additional maintenance or management activities.

Conditions warranting additional maintenance or management activities include the following:

- unauthorized in-stream and/or riparian zone activities conducted by third parties
- sediment discharges emanating from third party activities conducted outside the channel and riparian zone
- damage to or failure of stream enhancement structures



- damage to or failure of revegetated areas
- the presence of invasive non-native non-riparian vegetative species
- areas indicating the adverse effects of substantial erosion

## 7.2 Annual Reporting

Annual monitoring reports will be submitted to the Louisville District Office of the COE no later than December 31 of the year following completion of mitigation measures. Monitoring reports will, at a minimum, include the following information:

- a restatement of the compensation site plan goals, objectives, and performance standards
- a site map and/ or plan view drawings depicting the location of photographs and data collection points
- a description of any management activities and/or corrective measures that were implemented during the previous year
- identification of any structural failures or external disturbances on the site
- an assessment of the presence and level of occurrence of invasive species
- an assessment of the degree to which performance standards are being met
- proposed corrective actions to improve attainment of performance standards if necessary
- a narrative summary of the results and conclusions of the monitoring

These investigations will be utilized to demonstrate successful channel mitigation efforts and document the achievement of predicted functional values. Should channel mitigation conditions indicate failure to attain performance standards and replace lost functional values, contingency plans will be employed.