

ANNUAL CMP MONITORING REPORT

APPOLO FUELS, INC.
OSMRE PERMIT #3112
DA #2002-00609
ARAP M2003-04

JELICO STRIP MINE

RESTORATION TO UNNAMED TRIBUTARIES OF VALLEY CREEK,
HURRICANE CREEK, BEAR CREEK AND CLEAR FORK,
CLAIBORNE COUNTY, TENNESSEE

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Project Overview

This is the second annual monitoring report being submitted to fulfill the special requirements of U.S. Army Corps of Engineers **Nationwide Permit #32**, DA File no. 2002-00609. The first annual monitoring report was submitted sometime in 2011 by RLB Engineering, PSC. Appolo Fuels, Inc., the permittee, has since changed consulting firms to Howard Engineering & Geology, Inc. (HEG). Michelle Osborne and Justin Howard of HEG conducted the field investigations for this annual monitoring report between January 21, 2013 and January 28, 2013.

The purpose of the approved mitigation project is to reconstruct and **enhance 18,480 linear feet** of streams to compensate for impacts to waters of the United States caused by surface disturbance associated with the Jellico Strip Mine. **Impacts had occurred to approximately 11,840 linear feet** of streams to unnamed tributaries of Valley Creek, Hurricane Creek, Bear Creek and Clear Fork in Claiborne County, Tennessee.

Compensatory mitigation has occurred/**will occur on site** at the same locations that were impacted. According to the NWP #32 issued July 6, 2011 there are **thirty-eight tributaries in the project area which are considered to be 38 separate ARAP (Aquatic Resource Alteration Permit) areas** by the Tennessee Department of Environment and Conservation (TDEC). Some of the tributaries/ARAP areas contain multiple reaches. This creates some confusion for the purpose of tallying stream data because the **actual number of reaches present varies from 37 to 44 depending on how they are categorized**. Data in this report is reported as if there are **41 mitigated stream locations**: 38 tributaries of which Tributary 6 is comprised of ARAP areas G-5a and G-5b, and Tributary 19/ARAP area G-18 has three separate reaches designated Stream 1, Stream 2 and Stream 3. Access to the site is via Valley Creek Road from the junction of HWY 90 to the west. The mitigated streams are all located in the Clear Fork watershed (HUC-12 #051301010601), which contains the smaller Valley Creek, Bear Creek and Hurricane Creek watersheds, and can be found on the Eagan and Fork Ridge 7 ½ minute topographic maps. A mitigation site map is included in Appendix A for your convenience. Table 1 lists the locations of the restored stream sections and can be found in Appendix B. The mitigation project was approved on July 6, 2011 and is **completed except for the removal of ponds and certain road crossings**.

Twenty (20) streams have either already met their respective five (5) year habitat units goal, or are making progress toward meeting this goal on time. Eight (8) streams may or may not be progressing at a sufficient rate to meet five (5) year habitat unit goals. Without access to the first annual monitoring report or field data sheets submitted by RLB Engineering, PSC, it is difficult to gage the progress of these reaches at the present time. The mitigation of thirteen (13) streams has not yet been implemented because eleven (11) are haul road crossings which have not been removed, and two (2) are in-stream ponds which cannot be removed until approval to do so is granted by the Office of Surface Mine Reclamation and Enforcement (OSMRE). Road crossings and sediment retention pond removal will occur after Phase II Bond Release is granted by OSMRE. The reconstruction and enhancement efforts that have been completed to date indicate that the permittee is making progress toward meeting the habitat unit goals projected for the compensatory mitigation project. It is anticipated that all reaches will meet their targeted habitat units within five (5) years of the time reconstruction is completed for that particular reach. Maturation of the riparian zones will continue with time, gradually increasing the HAV score. Nearly one quarter of the reaches, including all eight (8) of the streams that may not be progressing at a sufficient rate to meet the five (5) year habitat unit goals, need improvements made regarding surface flow or substrate. By correcting substrate deficiencies these reaches can increase their scores in as many as four (4) different parameters, including epifaunal substrate, velocity/depth

regime, channel flow status, and riffle frequency. According to the permittee, no corrective or maintenance activities have been conducted since submission of the previous report.

Specific recommendations for additional remedial actions vary by stream and are addressed in the Summary Data section. Deficient site conditions may require the following corrective measures: planting trees/shrubs in riparian zones, breaking substrate into smaller sizes so that water can flow over it, reinforcing banks with rip-rap, and/or other possible activities. The relevant remedial work will be mentioned in association with the corresponding deficiency when discussing the individual stream conditions.

Requirements

Monitoring requirements and success standards are listed in Table 2 (Appendix B) which compares the performance standards to the conditions and status of the developing mitigation site. Habitat unit goals for the individual streams were found in the EIU Mitigation Summary Chart attached to DA Permit #2002-00609. The habitat index is simply the habitat assessment score divided by 200, the highest possible score. The habitat index is multiplied by the length to determine the habitat units. The permit also contains special conditions in the section titled, *Performance Standards*, requiring that a continuous high water mark be present throughout the restored reaches, restored reaches must function as the intended stream type, riparian zones must function as the intended type, and a 50' riparian buffer zone must be planted from the edge of each bank. The intended stream type of a reach would match the stream type of the natural channel above and below the restored stream segment. The intended type of riparian zone for all reaches in the mitigation project area is riparian forest. The riparian buffer zone is required to extend 50 linear feet from the edge of each stream bank. According to a note at the bottom of the legend in various drawings provided by the previous consultant the riparian zone is to be comprised of a minimum of six (6) tree and shrub species composed of a mixture of at least two (2) hard mast, one (1) soft mast, and three (3) shrub species planted at a 10'x10' spacing. There is no mention of specific species that must be utilized to achieve the six (6) species composition. Revegetation success varies by reach, and is discussed in the Data Summary section. The timing of field investigations made it harder to find and identify leafless saplings, which were not flagged, and were often shorter than the grasses and forbs.

Overall the work thus far completed for the compensatory mitigation project appears to be trending toward success. Current site conditions are compared to pre-impact conditions and projected five year conditions in Table 3 (Appendix B) as a means of indicating progress. Data for the first annual monitoring report is not available, and therefore it is unknown if certain reaches are progressing, retarding or digressing. Streams that have obtained their five (5) year habitat unit goal are obviously progressing, whereas streams which have not met this goal may or may not be progressing. For this report the assumption has been made that if habitat units are significantly higher than the pre-impact habitat units, then the reach is most likely making progress; however, if current habitat units are below or only marginally above the pre-impact habitat units, then the reach probably is not progressing as it should, and the cause needs to be identified and corrective measures must be implemented.

Summary Data

Summary data to substantiate the success and/or potential challenges associated with the Compensatory Mitigation Plan (CMP) is presented for each restored reach individually. Photographs and field data sheets are provided for each stream evaluated in Appendices C and D respectively.

Tributary 1/ARAP Area G-1, Stream 1

ARAP area G-1 originally contained two streams designated as Stream 1 and Stream 2. Hollow fill 1 (HF-1) and Pond 1 were constructed in the G-1 drainage area. Stream 1 restoration involved diverting flow from the Jellico bench, along side of the access road, around the top of HF-1 where it picked up flow from the original Stream 1 and Stream 2 channels, then down a groin ditch that runs along the right side of HF-1 to Pond 1. Pond 1 is still in place, and will be removed when Phase II Bond Release is granted by OSMRE. The number of habitat units has increased from 529 before impacts to 1,275 during this monitoring year. However, it should be noted that the increase in habitat units is due to an increase of 1,815 linear feet of the mitigated reach over the original stream, and not an increase in the habitat index. Water flows continuously from the east stream (original Stream 2) through the new Stream 1 channel to Pond 1. Above the influx of waters from the east stream flow is discontinuous, mainly due to sediment deposition. The substrate in the groin channel is a mix of bedrock, boulders, cobble and gravel. It has abundant epifaunal substrate and riffles, and little sedimentation and embeddedness. The low gradient portion on top of HF-1 has a mixture of small boulders, cobble, gravel and silt for substrate types. The channel substrate is much more embedded due to increased sedimentation, and in places the stream is completely filled in with fine particles. Not much substrate was actually put into the low gradient stream channel. The banks are lined with boulders for stability, but the stream bed is predominately clay or gravel with occasional small boulders placed in an effort to establish cross vanes. This portion of the reach does not offer much epifaunal cover, nor does it create many riffles. Both banks are fairly stable throughout the entire stream. The left bank riparian zone is mature forest which was minimally impacted by construction of HF-1 and Pond 1. The right bank riparian zone has been impacted by construction of the access road, HF-1 and Pond 1. There are no mature trees in the riparian zone, and it is impossible for the riparian zone to be 50' wide along the access road. On the top of HF-1 the riparian zone appears to be less than 50' wide, or thinner than a 10'x10' spacing pattern. On the slope of HF-1 the riparian zone is at least 50' wide. Woody plant species observed in the riparian zone include: *Fagus grandifolia* (American beech), *Platanus occidentalis* (sycamore), *Quercus alba* (white oak), *Sambucus canadensis* (American elderberry), *Liquidambar styraciflua* (sweet gum), *Ulmus alata* (winged elm), *Acer rubrum* (red maple) and *Pinus virginiana* (Virginia pine).

The low gradient portion of Tributary 1 could benefit from compacting loose soil in the stream bed, removing excessive sediment deposits, adding cobble and other suitable substrate to the bed and from planting additional shrubs in the right bank riparian zone where possible.

Tributary 2/ARAP Area G-1, Stream 2

Compensatory mitigation for 505' of Stream 2 in ARAP area G-1 is to be provided for by reconstructing 490' of stream length after the removal of Pond 1. Pond 1 will be removed upon the issuance of Phase II Bond Release. A field evaluation of Tributary 2 was not conducted because mitigation has not yet commenced.

Tributary3/ARAP Area G-2

ARAP area G-2 is located in Valley Creek at Low Water Bridge 1. Prior to mining the Jellico Strip Mine erosion caused by storm water had occurred both upstream and downstream of the bridge. The permittee has restored the low water bridge and the adjacent stream channel. Ninety-seven habitat units are projected for Tributary 3 in 5 years, and after only 2 years this reach has 106 habitat units.

Valley Creek is a perennial stream that has continuous flow and a continuous high water mark throughout the G-2 area. The riparian zone is greater than 50' wide on either side of the low water bridge, but it is not yet mature. Tree and shrub species found in the riparian zone include *Platanus occidentalis* (sycamore), *Acer rubrum* (red maple), *Rhus copallina* (winged sumac), *Eleagnus angustifolia* (Russian olive), *Juglans nigra* (black walnut), and *Quercus rubra* (northern red oak). The benefits afforded by the riparian zone will increase as the vegetation matures. Nothing further needs to be done by the permittee to increase the quality of Tributary 3.

Tributary 4/ARAP Area G-3

ARAP area G-3 is an intermittent stream that had been mined through during the re-mining of the orphan Rich Mountain seam. Tributary 4 has already surpassed the five (5) year habitat unit goal of 374 by 47 habitat units. The permittee has reclaimed the highwall, so that the reach flows continuously from the un-impacted stream above to the bench pond, BP 3a, which will be removed after Phase II Bond Release. Tributary 4 has a variety of substrate sizes ranging from clay/silt, gravel and cobble in the upper low gradient section, to cobble and boulder with some gravel in the high gradient section. Layering of substrate provides niche spaces for aquatic organisms. The riparian zone is well vegetated and at least 50' wide, however it is immature and therefore not yet functioning at full potential. As the riparian vegetation matures it will provide more benefits to Tributary 4. Observed woody vegetation at the G-3 area were: *Platanus occidentalis* (sycamore), *Quercus acutissima* (sawtooth oak), *Pinus virginiana* (Virginia pine), *Robinia pseudoacacia* (black locust), *Paulownia tomentosa* (princess tree), and *Sambucus canadensis* (American elderberry).

Tributary 4 may need supplemental planting in order to obtain the correct mixture of shrubs, hard and soft mast species if volunteer species do not contribute more shrubs and hard mast species naturally.

Tributary 5/ARAP Area G-4

ARAP area G-4 is an ephemeral stream that was mined through during the re-mining of the orphan Rich Mountain seam. The re-constructed reach currently has 55 fewer habitat units than it did prior to impacts, but it is unknown if there has been an increase in habitat units from last year. The highwall has been reclaimed by the permittee, and there is a continuous high water mark throughout the entire reach. Flow from storm runoff is currently directed to Bench Pond, BP 3a, which will be removed after Phase II Bond Removal. The riparian zone is greater than 70% re-vegetated with immature woody vegetation and grasses, and greater than 50' wide from each bank. The following species were found growing in the riparian zone: *Robinia pseudoacacia* (black locust), *Quercus acutissima* (sawtooth oak), *Pinus sp.* (pine), *Platanus occidentalis* (sycamore), and *Paulownia tomentosa* (princess tree).

Tributary 5 may need supplemental planting in order to obtain the correct mixture of shrubs, hard and soft mast species if volunteer species do not contribute more shrubs and hard mast species naturally.

Tributary 6/ARAP Areas G-5a and G-5b

Prior to impacts ARAP area G-5 had one stream. After re-mining the Rich Mountain seam and reclaiming the pre-law highwall there are two (2) streams designated as G-5a and G-5b. G-5a is approaching its five (5) year habitat unit goal. The reach has two (2) branches which unite to form the main trunk of the intermittent stream through the backfill. The channel substrate is almost entirely made of boulders and cobble. There is a continuous high water mark in the established stream channel. The immature

riparian zone is greater than 50' wide from each bank, and contains the following species: *Quercus falcata* (Southern red oak), *Pinus rigida* (pitch pine), *Ulmus alata* (winged elm), *Acer rubrum* (red maple), *Platanus occidentalis* (sycamore), and *Acer negundo* (boxelder).

G-5b routes intermittent flow from the G-5 area across the backfill to the G-6 area. The habitat units prior to impacts are not designated as G-5a or G-5b, so it is hard to determine if there has been an increase in habitat units from that time. It is also unknown if there has been an increase in habitat units since last year's monitoring report. The stream channel averages around 1.5' wide and is 1-2 inches deep. Over half of the bed material is gravel and fine material, but boulders and cobble have been placed in the channel at regular intervals to create riffles. There is not much epifaunal substrate other than at the riffle sections. Both banks are well vegetated with grasses, and contain a few volunteer saplings (mainly winged elms). The left bank riparian zone only has a few saplings close to the bank, and otherwise is not functioning as a riparian forest. The riparian zone on the right bank resembles that of the left bank for approximately 10', beyond that is mature forest offering shade and buffering capabilities.

The G-5b reach can be greatly improved by layering some cobble in the stream channel to provide epifaunal substrate, and by planting woody vegetation in the left riparian zone.

Tributary 7/ARAP Area G-6

ARAP area G-6 is designed to be a road crossing; however because G-5 is diverted to G-6, and G-5 has been mined through, G-6 has to be temporarily diverted to bench pond, BP 5. The road crossing has already been removed, but a berm is in place to make sure that all surface flow enters the sediment pond. G-6 has been evaluated in its current location, and does meet the 5 year habitat unit goal at this time; however, when BP 5 is removed G-6 may be moved slightly. If so Tributary 7 may need to be re-assessed. Presently G-6 is an intermittent stream channel with a continuous high water mark. There is some heavy sedimentation where G-5b empties into G-6. There is limited vegetation along the left bank where the stream is diverted to BP 5 because the road is right next to the stream. The right bank has woody vegetation that is less than or equal to half the potential stubble height, and the riparian zone is greater than 50' wide. *Acer rubrum* (red maple), *Fagus grandifolia* (American beech), *Platanus occidentalis* (sycamore), *Quercus rubra* (northern red oak), *Pinus virginiana* (Virginia pine), and *Ulmus alata* (winged elm) are the dominant trees in the riparian zone.

Tributary 8/ARAP Area G-7

ARAP area G-7 was a road crossing which has been removed. Tributary 8 is an intermittent stream with continuous flow and an obvious high water mark. There is moderate sediment deposition in the runs and pools. Both riparian zones on either side of the road are greater than 50' wide, and immature. Immediately upstream and downstream of the impacted reach the riparian zone is much more developed, and provides shade for the entire stream much of the time. Riparian vegetation is a mixture of *Fagus grandifolia* (American beech), *Platanus occidentalis* (sycamore), *Eleagnus angustifolia* (Russian olive), *Acer rubrum* (red maple), and *Quercus rubra* (northern red oak). Tributary 8 has already met the mature habitat units goal.

Tributary 9/ARAP Area G-8

ARAP area G-8 is an ephemeral stream that flows into bench pond, BP 35. One (1) stream was restored in the G-8 location through the backfill of the reclaimed, pre-law highwall. Flow from the stream is collected in sediment structure, BP 35, which is an in-stream pond. The low gradient section of G-8 on top of the backfill has heavy sedimentation, which during rain events is washing into the high gradient section, where it is being deposited at obstructions. There had been intermittent showers during the previous 24 hours, and water was pooled throughout the reach. There is a continuous high water mark indicating that the channel does conduct flow regularly. The riparian zone is greater than 50' wide from the edge of each bank, but the vegetation is immature. Woody species occurring in the riparian zone include: *Robinia psuedoacacia* (black locust), *Platanus occidentalis* (sycamore), *Rhus glabra* (smooth sumac), *Paulownia tomentosa* (princess tree), *Fagus grandifolia* (American beech), and *Liriodendron tulipifera* (tulip tree).

The number of habitat units created at this mitigation site can be augmented by planting supplemental shrub and hard mast species; and by decreasing the amount of sediment being transported during storm events.

Tributary 10/ARAP Area G-9

Tributary 10 is an intermittent stream that was restored after the pre-law highwall was reclaimed. Water cascades over boulders for the entire reach. Water is collected at the bottom of the cascades in bench pond, BP 34, which will be removed upon approval from OSMRE to do so. The five (5) year habitat unit goal has already been met. A continuous high water mark is forming in the channel. Due to the large size of the substrate, water occasionally flows beneath the boulders, and sometimes fans out over the boulders. The right riparian zone is greater than 50' wide and immature. The left riparian zone mostly consists of grasses for approximately the first 20'. *Paulownia tomentosa* (princess tree), *Rhus glabra* (smooth sumac), and *Robinia psuedoacacia* (black locust) are growing in the riparian zones of Tributary 10.

ARAP area G-9 needs supplemental planting and removal of princess trees which are invasive and out compete native vegetation.

Tributary 11/ARAP area G-10

ARAP area G-10 is the restoration of a low water bridge in Valley Creek. Previous mining had deposited large amounts of sediment into Valley Creek on both sides of Low Water Bridge 2. The permittee repaired the low water bridge and removed the sedimentation from Valley Creek at this location. The five (5) year habitat unit goal has been met. There is a continuous high water mark along the perennial Valley Creek. Both the left and right riparian zones are limited due to the close proximity of Valley Creek Road along the right bank, and an old pond and a gas well site are on the left side of Valley Creek. The vegetation is immature in the area adjacent to the low water bridge where restoration activities took place. *Platanus occidentalis* (sycamore) is the dominant species growing along the banks of ARAP area G-10.

By removing the old pond upstream of Low Water Bridge 2, the riparian zone can be expanded, but this would not greatly increase the amount of habitat units for ARAP G-10 because it is a finite area.

Tributary 12/ARAP Area G-11

ARAP area G-11 cannot be restored until approval is granted by OSMRE to remove Pond 6. Mitigation for Tributary 12 includes relocating and restoring 330' of stream through the Pond 6 location, and 20' of stream through the access road to Pond 6. A field evaluation of ARAP area G-11 was not conducted because the mitigation has not commenced.

Tributary 13/ARAP Area G-12

ARAP area G-12 is an ephemeral stream that is temporarily diverted to bench pond, BP 8. The current number of habitat units is higher than the number of pre-impact habitat units due to the increased length of the reach. The channel substrate is almost entirely comprised of boulders. This makes it hard to discern an actual high water mark since storm flow probably flows through spaces between the boulders during a rain event. The boulders do not seem to be serving the purpose of bank stabilization as is evident by the amount of erosion which has occurred along to the left bank. The riparian zone, although greater than 50' wide, is immature and does not yet offer the benefits associated with a forested riparian zone. Numerous woody plant species were observed in the riparian zone, including: *Quercus acutissima* (sawtooth oak), *Quercus falcata* (southern red oak), *Platanus occidentalis* (sycamore), *Eleagnus angustifolia* (Russian olive), *Betula nigra* (river birch), *Ulmus alata* (winged elm), and *Pinus strobus* (eastern white pine).

In order to improve conditions in Tributary 13, the permittee may need to remove some of the largest boulders from the stream channel and place them on the left bank to provide stabilization. Some of the other large boulders in the channel may need to be broken into smaller "cobble-sized" material. The left bank will likely need additional vegetation planted to provide further protection.

Tributary 14/ARAP Area G-13

Two stream channels were located in the ARAP G-13 area during field investigations, but only one reconstructed stream is mentioned in the CMP, so data was only gathered for that stream. Tributary 14 is an intermittent stream that has a low gradient on top of the backfill, and a high gradient coming off of the top of the backfill all the way to the in-stream bench pond, BP 9. Boulders line the bank of the low gradient section for stability. The channel was built wider than necessary, but the flow has cut a narrower, meandering channel within the artificial channel. The channel substrate on top of the backfill resembles the substrate found in the original channel above the impacts (i.e. mostly gravel and/or finer material, some cobble and heavily embedded due to sedimentation). The substrate in the high gradient section is mostly boulders which water sometimes flows through spaces under the material instead of remaining on the surface throughout. There is an increase in habitat units over the pre-impact quantity indicating that the mitigation is making progress. The continuous high water mark is also progressing. It appears that a slide may have occurred at some point in the past along the left bank. Grass is the only vegetation growing on the left bank and a forested riparian zone is absent. The right bank has a bare patch of rock and soil in one area, but is well-vegetated otherwise. The riparian zone is comprised of: *Quercus acutissima* (sawtooth oak), *Liriodendron tulipifera* (tulip tree), *Eleagnus angustifolia* (Russian olive), *Fagus grandifolia* (American beech), *Pinus strobus* (eastern white pine), *Sassafras albidum* (sassafras), and *Acer rubrum* (red maple).

Tributary 14 is in need of corrective actions. The larger boulders need to be broken into smaller boulders and cobble, some of which could be placed in the low gradient section to increase epifaunal substrate. Supplemental planting is needed to ensure the success of both riparian zones.

Tributary 15/ARAP Area G-14

ARAP area G-14 is a high gradient, intermittent stream. Sediment retaining structure, BP 11, is an in-stream pond at the bottom of the reconstructed portion of Tributary 15. Surface water is very shallow, generally less than 2", and flow is lost due to sedimentation for approximately 20' above BP 11. The left bank is more stable than the right bank, and has more vegetation (grasses) covering the immediate bank, but has no trees or shrubs for approximately 20'-25' from the edge of the bank. The right bank is 50% eroded and is likely the primary contributor to sedimentation in the pools and at constrictions in the stream channel. The riparian zone is greater than 50', and densely populated with *Platanus occidentalis* (sycamore), *Quercus acutissima* (sawtooth oak), *Pinus strobus* (eastern white pine), *Paulownia tomentosa* (princess tree), and *Liriodendron tulipifera* (tulip tree). The current habitat unit value is comparable to the pre-impact value. It is not known if there has been a change in the number of habitat units from the previous year.

Supplemental planting is needed to create a riparian zone along the left bank. Bank stabilization using either boulders, grass, or both is needed to prevent further erosion of the right bank and to decrease sedimentation of the stream channel.

Tributary 16/ARAP Area G-15

ARAP area 15 is an intermittent stream channel that flows through two pipes under the haul road. On the other side it combines with waters from Tributary 17 to flow through a diversion ditch along side of Hollow Fill 3 into sediment trap, ST 44, then into Pond 5. The number of habitat units for G-15 has increased from the pre-impact number of units. There is a continuous high water mark for most of the reach. There is sediment deposition in the pools, at least 25% of the channel substrate is exposed, and a short portion of the channel has no flow. Both banks show signs of erosion. The riparian zone is mostly lacking woody vegetation and is less than 20' wide from each bank. Trees and shrubs that were present included: *Platanus occidentalis* (sycamore), *Sambucus canadensis* (American elderberry), *Rhus sp.* (sumac), *Quercus rubra* (northern red oak), and *Quercus acutissima* (sawtooth oak).

Each bank needs to be reinforced for stability coming down the slope. The substrate in this section needs to be made smaller and the channel needs to be more concave. Additional trees and shrubs need to be planted in the riparian zone.

Tributary 17/ARAP Area G-16

ARAP area G-16 is an intermittent stream that has been restored in the re-mining area, and through an old pit in a pre-law mining area. The flow of G-16 combines with the flow of G-15 in a diversion channel around Hollow Fill 3 into ST 44, then into Pond 5. The current number of habitat units is approaching the 5 year projected number of habitat units. There is a continuous high water mark throughout the reach. The riparian zone on the right bank is greater than 50' wide, whereas it is less than 20' wide on the left bank. Immature woody vegetation occurring in the riparian zones include: *Platanus occidentalis* (sycamore), *Liriodendron tulipifera* (tulip tree), *Quercus acutissima* (sawtooth oak), *Sambucus canadensis* (American elderberry), and *Betula nigra* (river birch).

The riparian zone for Tributary 17 may increase naturally through volunteer species. However, if this does not occur, then supplemental planting may be needed.

Tributary 18/ARAP Area G-17

ARAP area G-17 is a road crossing that has not yet been removed. Monitoring will begin after the culvert is removed and flow is restored across the haul road.

Tributary 19/ARAP Area G-18 Stream 1

ARAP area G-18 is divided into three mitigated stream reaches. Stream 1 begins just below the haul road and borders the entire length of the north side of Hollow Fill 8 and is collected in Pond 7. Much of the reach does not have visible flow. Flow becomes apparent approximately 300' above Pond 7, but most of the surface flow is confined to spaces between and below the boulder substrate. The riparian zone on the right bank is predominately a mature, undisturbed forest, except just above Pond 7. The riparian zone on the left bank is greater than 50' wide, but immature. A variety of mature trees and shrubs are growing in the right bank riparian zone including various oak (*Quercus*) and maple (*Acer*) species, sycamore (*Platanus occidentalis*), sumac, and American beech (*Fagus grandifolia*). The left bank is generally populated by pitch pine (*Pinus rigida*), sawtooth oak (*Quercus acutissima*), and sycamore.

The permittee will need to retain surface flow in Stream 1 in order to increase habitat units for the reach. This may require breaking larger rocks into smaller sizes that the water can flow over, removing excess sediment that has accumulated from the road crossing, compacting soil in the channel to make it less porous, or more intensive remediation if these measures do not achieve the desired goal. The left bank riparian zone may become more diverse as seeds from the trees on the right bank germinate.

Tributary 19/ARAP Area G-18 Stream 2

Stream 2 is an intermittent stream that was reconstructed across the top of the backfill and directly connects to the beginning of Stream 1. There is an obvious high water mark for Stream 2 which retains flow through most of the reach, but it gradually decreases until it disappears just above the road crossing. This occurs below the confluence with Stream 3. The channel substrate is varied, and offers some niche spaces for epifaunal organisms, but sediment deposition and embeddedness reduce the amount of available cover. The right bank has a mature riparian zone that was not altered by OSM 3112 mining operations. The left bank has a limited riparian zone that is under stocked. The left riparian zone only contains a few sycamores (*P. occidentalis*), black locusts (*Robinia pseudoacacia*), and princess trees (*Paulownia tomentosa*).

The loss of surface flow in Stream 2 appears to be due to the water seeping into pore spaces in the unconsolidated back fill. Flow may be retained by simply compressing the soil in the stream bed. If volunteer species do not germinate in the left bank riparian zone, it may be necessary to do supplemental planting.

Tributary 19/ARAP G-18 Stream 3

Stream 3 is an intermittent stream that was created across the top of the backfill to just above the road crossing where it merges with Stream 2. Stream 3 only has flow for approximately the first 100'. The left and right banks have a riparian zone that is greater than 50' wide each, but it is immature and does not yet provide all of the benefits associated with a forested riparian zone. Few dendrological species are present in the riparian zone. *P. occidentalis* (sycamore), *R. pseudoacacia* (black locust), and *P. tomentosa* (princess tree) were discovered in the Stream 3 riparian zone.

Stream 3 will likely require compaction of the stream bed to retain surface flow, followed by removal of the princess trees and supplemental planting of appropriate riparian vegetation.

Tributary 20/ARAP Area G-19

Mitigation (i.e. removal of the road crossing) has not yet been performed at ARAP area G-19.

Tributary 21/ARAP Area G-20

Mitigation (i.e. removal of the road crossing) has not yet been performed at ARAP area G-20.

Tributary 22/ARAP Area G-21

Mitigation (i.e. removal of the road crossing) has not yet been performed at ARAP area G-21.

Tributary 23/ARAP Area G-22

Mitigation (i.e. removal of the road crossing) has not yet been performed at ARAP area G-22.

Tributary 24/ARAP Area G-23

Mitigation (i.e. removal of the road crossing) has not yet been performed at ARAP area G-23.

Tributary 25/ARAP Area G-24

Mitigation (i.e. removal of the road crossing) has not yet been performed at ARAP area G-24.

Tributary 26/ARAP Area G-25

Mitigation (i.e. removal of the road crossing) has not yet been performed at ARAP area G-25.

Tributary 27/ARAP Area G-26

Mitigation (i.e. removal of the road crossing) has not yet been performed at ARAP area G-26.

Tributary 28/ARAP Area G-27

ARAP area G-27 is the perennial stream Bear Creek. The road crossing has been removed from Tributary 28. It is not known if Bear Creek has increased habitat units in the G-27 area since the previous monitoring report was submitted. There is a continuous high water mark in Bear Creek. The only form of vegetation present along the banks above and below the haul road is grass.

Trees and shrubs of the correct species mixture (2 hard mast, 1 soft mast, and 3 shrubs) need to be planted to establish a riparian zone at ARAP area G-27.

Tributary 29/ARAP Area G-28

Mitigation (i.e. removal of the road crossing) has not yet been performed at ARAP area G-28.

Tributary 30/ARAP Area G-29

Mitigation (i.e. removal of the road crossing) has not yet been performed at ARAP area G-29.

Tributary 31/ARAP Area G-32

ARAP area G-32 includes the discharge from BP 29, and a road crossing. The road crossing has not yet been removed. The pond discharge is an intermittent reach designated as G-32 Stream 2. It has a continuous high water mark. The right bank riparian zone is mature and contains *Acer rubrum* (red maple), *Fagus grandifolia* (American beech), *Platanus occidentalis* (sycamore), *Paulownia tomentosa* (princess tree), *Quercus falcata* (southern red oak), *Juniperus virginiana* (eastern red cedar), *Liquidambar styraciflua* (sweet gum), and others. The riparian zone along the left bank is comprised of the same species, but is not fully mature. Stream 2 is only one habitat unit away from meeting the 5 year goal.

Tributary 32/ARAP Area G-33

ARAP area G-33 is further upstream in the same intermittent, unnamed tributary to Valley Creek that ARAP area G-32 is located in. Tributary 32 diverts flow from the stream and routes it around the hill side to BP 29. G-33 has a continuous high water mark throughout. Habitat parameters related to channel substrate, sedimentation, and riparian vegetation vary significantly along the reach. Channel substrate at the beginning of the reach is mostly gravel and silt, with some cobble and a few boulders. Embeddedness is high due to sediment deposition. The riparian zone is greater than 50' wide and more than 50% mature. Morphology of the next stream segment changes because boulders were strategically placed to form step pools and sedimentation is decreased. The vegetation in the riparian zone is less than 50% mature. The stream then enters a stretch of low gradient run over bedrock. There is a thin layer of silt covering most of the bed. Immature riparian vegetation becomes sparse and offers no cover for the stream channel. Before entering BP 29 Tributary 33 resembles the portion of the stream immediately before the low gradient run, but with even less woody vegetation. The riparian vegetation contained many different species, most of which were found at the beginning of G-33. Observed woody species include the following: *Fagus grandifolia* (American beech), *Robinia pseudoacacia* (black locust), *Sambucus canadensis* (American elderberry), *Acer rubrum* (red maple), *Platanus occidentalis* (sycamore), *Ulmus alata* (winged elm), *Paulownia tomentosa* (princess tree), and multiple species of *Quercus* (oak species). The amount of habitat units created by mitigation of Tributary 32 is markedly increased over the pre-impact amount of habitat units as a result of both higher habitat scores and a vastly increased linear footage of stream channel.

The most significant improvement that needs to be made to G-33 is an increase in riparian vegetation in the areas that are lacking tree and shrub species. Improvement can also be made by adding cobble to the long run section to create more epifaunal niche spaces.

Tributary 33/ARAP Area G-34

ARAP area G-34 is an ephemeral channel. The reconstructed stream channel travels along the edge of the backfill for about 500' before going through the backfill to BP 31 below. The low gradient section along the top of the backfill is nearly 1' wide and has an obvious high water mark. Gravel is the

dominant bed material in this section, whereas boulders and cobble dominate the high gradient section. Water is pooled despite having had rain on multiple days during the week prior to field investigations, including one day of significant rainfall (defined as $> \frac{1}{2}$ "). The left bank has a mature riparian forest in the low gradient portion of the reach, but it is underdeveloped in the high gradient segment. The riparian zone along the right bank is obviously deficient. The riparian zone includes, but is not limited to, the following species: *Acer rubrum* (red maple), *Pinus rigida* (pitch pine), *Paulownia tomentosa* (princess tree), *Quercus rubra* (northern red oak), *Platanus occidentalis* (sycamore), *Robinia psuedoacacia* (black locust), *Sambucus canadensis* (American elderberry), and *Fagus grandifolia* (American beech). Most species were found in the mature riparian zone.

The previous consultant had predicted that 5 year habitat assessment score for Tributary 33 will be 142. Considering that the natural stream is an ephemeral channel, it would be unlikely that a HAV of 142 could be obtained even at full maturity which is predicted not to be achieved for approximately 20 years. Two hundred forty feet (240') of Tributary 33 received a HAV score of 143 by the previous consultant prior to re-mining impacts. This score seems high for an ephemeral channel. In order to improve the habitat integrity of G-34 cobble needs to be layered in the low gradient section and supplemental planting is needed in the immature riparian zones.

Tributary 34/ARAP Area G-35

ARAP area G-35 is a wide ephemeral channel that extends from the undisturbed stream through the backfill to BP 40. The channel has heavy sediment deposition, especially in the low gradient portion, thus boulders and cobble are greatly embedded. The riparian zone is obviously lacking enough suitable vegetation. Exiguous numbers of the following species were found: *Robinia psuedoacacia* (black locust), *Rhus copallina* (winged sumac), *Fagus americana* (American beech), *Ulmus alata* (winged elm), *Platanus occidentalis* (sycamore), *Sambucus canadensis* (American elderberry), *Pinus rigida* (pitch pine), and *Paulownia tomentosa* (princess tree).

The low gradient section of G-35 needs to have the excessive sedimentation removed and the source of the sedimentation needs to be identified and best management practices need to be utilized to prevent further sediment deposition. Riparian vegetation needs to be planted in sufficient numbers of the appropriate tree and shrub types.

Tributary 35/ARAP Area G-36

ARAP area G-6 was designed to be an intermittent stream that flows through the backfill and contains BP 32. There is inadequate surface flow in the reconstructed stream channel to deem it an intermittent reach. The low gradient channel was constructed too wide, but flow has tried to cut a narrower channel within the larger one. The miniscule amount of flow in the high gradient section almost entirely remains below the channel substrate. The riparian zone in the high gradient stream section is greater than 50' wide, but immature. The riparian zone in the low gradient section is also immature, and in places it is less than 15' wide. The riparian vegetation includes: *Robinia psuedoacacia* (black locust), *Paulownia tomentosa* (princess tree), *Acer rubrum* (red maple), *Platanus occidentalis* (sycamore), and *Oxydendrum arboretum* (sourwood).

Tributary 35 needs to have the large boulders in the high gradient section made smaller or removed so that flow can remain on the surface. The low gradient section needs to be re-constructed narrower, and

with a more compact stream bed to retain surface flow. Supplemental tree and shrub planting may be needed in the riparian zone of the low gradient segment.

Tributary 36/ARAP Area G-37

ARAP area G-37 has two reconstructed stream channels, which merge together on top of the backfill where the gradient is low before flowing over the steep slope to BP 33. Tributary 36 should be an intermittent reach, but neither fork of G-37 retains flow all the way to the confluence where they meet. Flow re-enters the channel just above BP 33. The channels were constructed too wide, and do not contain suitable bed material to retain surface flow. The riparian zone is 80-90% covered with immature, woody vegetation. The following species were observed growing along G-37: *Acer rubrum* (red maple), *Paulownia tomentosa* (princess tree), *Oxydendrum arboretum* (sourwood), *Robinia pseudoacacia* (black locust), *Fagus grandifolia* (American beech), *Quercus alba* (white oak), and *Ulmus alata* (winged elm). It is not known if there has been an improvement in the number of habitat units since the previous monitoring report was submitted.

Tributary 36 needs to have the bed of the reconstructed channel compacted so that surface flow will not be lost in the unconsolidated backfill. Appropriately sized bed materials need to be layered in the stream bed to provide niche spaces for epifaunal organisms.

Tributary 37/ARAP Area I-1

ARAP area I-1 is an intermittent stream that has been restored by removing a road crossing. I-1 has a continuous high water mark. Channel substrate varies from silt to boulder sized material. There is a good riffle to pool ratio. Trees and shrubs growing in the riparian zone immediately adjacent to the road are immature, but the riparian zone is greater than 50' wide. The riparian vegetation is comprised of *Platanus occidentalis* (sycamore), *Rhus glabra* (smooth sumac), *Sambucus canadensis* (American elderberry), *Ulmus alata* (winged elm), *Pinus strobus* (eastern white pine), *Liquidambar styraciflua* (sweet gum), *Rosa multiflora* (multiflora rose), *Rubus allegheniensis* (Allegheny blackberry), and *Cephalanthus occidentalis* (buttonbush). Tributary 37 has already met the five year habitat unit goal. It is expected that conditions at I-1 will continue to improve over time. No additional remedial measures are needed at this time.

Tributary 38/ARAP Area I-2

ARAP area I-2 is an intermittent stream that has been channeled through a diversion ditch around Hollow Fill 3 into ST 43, then into Pond 5. The channel is made of large, single-layered boulders that do not provide much epifaunal substrate or riffle material. Flow is generally under the boulders, or around them and obscured by vegetation. Both banks are well covered with immature woody vegetation. Below the haul road the riparian zone is greater than 50' wide, but above the haul road vegetation is more sporadic. Riparian vegetation included the following species: *Sambucus canadensis* (American elderberry), *Platanus occidentalis* (sycamore), *Betula nigra* (river birch), *Pinus strobus* (eastern white pine), *Quercus acutissima* (sawtooth oak), *Rhus glabra* (smooth sumac), *Fagus grandifolia* (American beech), and *Lindera benzoin* (spicebush). It is unknown whether there has been an increase in habitat units since the submittal of the last monitoring report.

The boulders that form nearly all of the channel substrate need to be reduced to smaller sized rock. This will increase the riffle frequency, and the epifaunal available cover. The epifaunal substrate will likely

continue to mature and increase in diversity. Supplemental planting does not appear to be needed at this time.

Maps and Plans

As required by Regulatory Guidance Letter (RGL) No. 08-03 maps are being provided to show the location of the compensatory mitigation site relative to other landscape features. Map #1 is a copy of the ARAP map previously submitted by the former consultant, RLB Engineering, PSC. It is included as a reference to the general location of the OSM #3112 permit area. The subsequent maps are included to show greater details of the individual tributaries/ARAP areas and are made from the ARAP Area Location Map drawn by RLB Engineering, PSC. Each individual mitigated stream is clearly labeled to show where it occurs within the mining permit boundary. Tributary 2 in ARAP area G-1 has not yet been restored. Tributary 12/ARAP area G-11, although shown on the map with Tributary 11/ARAP area G-10, has not yet been restored. Likewise, Tributaries 29 and 30 are on the map with Tributary 28/ARAP area G-27, but they have not yet been restored. All other tributaries which have not been restored are not in close proximity of ones which have been restored, and are not included on any maps. ARAP areas which have not been included on any maps include: G-17, G-20, G-21, G-22, G-23, G-24, G-25, G-26, and G-27. Tributary 37/ARAP area I-1 is included on the map for Tributary 3/ARAP area G-2 due to the proximity of the reaches. Tributary 38/ARAP area I-2 is included on the map with ARAP areas G-15 and G-16 because they all occur within the same watershed. Stream 3 in Tributary 19/ARAP area G-18 was not shown on the source map, but it appears in a more recent ARAP map. It was added to the Tributary 19 map by the current consultant. All maps are attached in Appendix A.

Conclusions

The compensatory mitigation project for the Jellico Strip Mine, permit #OSM 3112, is generally progressing toward the five year goals based on the number of reaches which have either already met their five year habitat unit goal, or are making progress toward meeting the goal. Thus far 67% of the impacted reaches have been restored to varying degrees. Generally, the sediment ponds still need to be removed from these reaches, and this will be accomplished as soon as Phase II Bond Release is granted by OSMRE. Of the remaining areas that have yet to be restored, all but two are simple road crossing removals. Road crossing removals tend to have the most successful mitigation outcome because the stream impacts are minimal. The other two tributaries require pond removal before restoration can commence. Of the streams which have been mitigated, 25% have met the five year habitat unit goal and 46% are making progress toward meeting this goal by showing improvement over the initial habitat units calculated prior to impacts. The remaining 29% have lower quantities of habitat units compared to what they had prior to impacts. It is unknown if the habitat unit numbers for these reaches are an improvement over last year because that data is unavailable. Therefore the actual amount of progress or lack thereof cannot be definitively computed.

The average scores for each parameter of the field data sheets were all in the Sub-optimal or Marginal tiers, except for the Bank Stability parameter which had an average rank of Optimal. The mean total HAV score was 116, which is a low Sub-optimal score. Noted deficiencies were related to substrate, flow and riparian revegetation. Substrate and flow are closely interconnected. Without the proper substrate it is difficult to maintain surface flow. Without surface flow riffle substrate and epifaunal available substrate is limited. Riparian vegetation at this stage is immature. As time progresses, the riparian vegetation will continue to mature naturally. Corrective measures specific to individual tributaries were mentioned in the Summary Data section.

Insufficiencies related to channel substrate and flow can be remediated a number of ways.

Unconsolidated backfill can be compacted to help maintain surface flow. In some cases where flow is still being lost, a clay liner may be needed to make the bed impervious. Large boulders can be broken into smaller boulders, cobble and gravel which can be layered in the stream bed. By using smaller rocks that mimic the natural channels above the impacted reaches, improvements can be made in areas such as epifaunal available cover, embeddedness, channel flow, frequency of riffles, and in some cases sediment deposition. This should occur prior to any additional revegetation efforts that are needed, and may cause disturbances in the riparian zone which will need to be repaired. All in-stream work shall be conducted during low flow conditions to minimize sedimentation being transported downstream.

The riparian zones can be enhanced by supplemental planting of approved species during the spring or fall planting season. The number and kind of species (i.e. hard or soft mast or shrub) planted will vary and is dependent upon the needs of the individual tributary. There should be a mixture of no less than six species comprised of two hard mast producers, one soft mast producer, and three shrub species planted on a 10' x 10' spacing. Invasive species, such as *Paulownia tomentosa* (princess tree), encountered in the field should be removed by appropriate means.

With successful remediation, Appolo Fuels, Inc. can meet all of the performance standard goals within five years of completed restoration and enhancement work.

Appendix B

Tables

Table 1 – Locations of Mitigated Reaches			
Reach Identification	Location	Latitude	Longitude
Trib.1 (G-1, Stream 1)	UT Clear Fork	36.56552	-83.92365
Trib.2 (G-1, Stream 2)	UT Clear Fork	36.56523	-83.92683
Trib. 3 (G-2)	Valley Creek	36.56942	-83.91084
Trib. 4 (G-3)	UT Valley Creek	36.56336	-83.91467
Trib. 5 (G-4)	UT Valley Creek	36.56173	-83.91271
Trib. 6 (G-5a)	UT Valley Creek	36.56447	-83.90157
Trib. 6 (G-5b)	UT Valley Creek	36.56379	-83.90163
Trib. 7 (G-6)	UT Valley Creek	36.56397	-83.90163
Trib.8 (G-7)	UT Valley Creek	36.56126	-83.89430
Trib. 9 (G-8)	UT Valley Creek	36.55807	-83.89608
Trib. 10 (G-9)	UT Valley Creek	36.55826	-83.89416
Trib. 11 (G-10)	Valley Creek	36.56281	-83. 89117
Trib. 12 (G-11)	UT Valley Creek	36.55942	-83.89037
Trib. 13 (G-12)	UT Valley Creek	36.55364	-83.88418
Trib. 14 (G-13)	UT Valley Creek	36.55072	-83.87816
Trib. 15 (G-14)	UT Valley Creek	36.54869	-83.87427
Trib. 16 (G-15)	UT Valley Creek	36.54575	-83.86877
Trib. 17 (G-16)	UT Valley Creek	36.54531	-83.86742
Trib. 18 (G-17)	UT Valley Creek	36.54805	-83.86162
Trib. 19 (G-18, Stream 1)	UT Hurricane Creek	36.54967	-83.85728
Trib. 19 (G-18, Stream 2)	UT Hurricane Creek	36.54984	-83.85584
Trib. 19 (G-18, Stream 3)	UT Hurricane Creek	36.54886	-83.85648
Trib. 20 (G-19)	UT Hurricane Creek	36.55458	-83.85193
Trib. 21 (G-20)	Pigeon Roost Branch	36.55796	-83.85632
Trib. 22 (G-21)	UT Hurricane Creek	36.55426	-83.85997
Trib. 23 (G-22)	UT Hurricane Creek	36.55347	-83.86176
Trib. 24 (G-23)	UT Valley Creek	36.55755	-83.87003
Trib. 25 (G-24)	UT Valley Creek	36.55999	-83.87130
Trib. 26 (G-25)	UT Valley Creek	36.55933	-83.87405
Trib. 27 (G-26)	UT Valley Creek	36.56974	-83.87439
Trib. 28 (G-27)	Bear Creek	36.56974	-83.87439
Trib. 29 (G-28)	UT Bear Creek	36.56963	-83.87568
Trib. 30 (G-29)	UT Bear Creek	36.56847	-83.87737
Trib. 31 (G-32)	UT Valley Creek	36.54979	-83.85712
Trib. 32 (G-33)	UT Valley Creek	36.57213	-83.90547
Trib. 33 (G-34)	UT Valley Creek	36.57856	-83.90289
Trib. 34 (G-35)	UT Clear Fork	36.58037	-83.90156
Trib. 35 (G-36)	UT Clear Fork	36.58242	-83.89817
Trib. 36 (G-37)	UT Clear Fork	36.58518	-83.89462
Trib. 37 (I-1)	UT Valley Creek	36.56651	-83.91222
Trib. 38 (I-2)	UT Valley Creek	36.54560	-83.86598

*NAD83 geologic coordinates.

Table 2 - Performance Standards

Reach ID	Habitat Unit Goal	Continuous High Water Mark	Functioning as Intended Stream Type	Riparian Zone Functioning as Intended Type	50' Riparian Buffer Zone On Each Bank
Trib. 1/G-1, S-1	Making progress	Yes	No	Making progress	Making progress
Trib. 2/G-1, S-2	Not yet restored	N/A	N/A	N/A	N/A
Trib. 3/G-2	Goal met	Yes	Yes	Making progress	Yes
Trib. 4/G-3	Goal met	Yes	Yes	Making progress	Making progress
Trib. 5/G-4	Unknown	Yes	Yes	Making progress	Making progress
Trib. 6/G-5a	Making progress	Yes	Yes	Making progress	Making progress
Trib. 6/G-5b	Unknown	Yes	Yes	Making progress	Making progress
Trib. 7/G-6	Goal met	Yes	Yes	Making progress	Making progress
Trib. 8/G-7	Goal met	Yes	Yes	Making progress	Yes
Trib. 9/G-8	Making progress	Yes	Yes	Making progress	Yes
Trib. 10/G-9	Goal met	Making progress	Yes	Making progress	Making progress
Trib. 11/G-10	Goal met	Yes	Yes	Limited	Limited
Trib. 12/G-11	Not yet restored	N/A	N/A	N/A	N/A
Trib. 13/G-12	Making progress	Making progress	Yes	Making progress	Making progress
Trib. 14/G-13	Making progress	Making progress	Yes	Making progress	Making progress
Trib. 15/G-14	Unknown	Making progress	Yes	Making progress	Making progress
Trib. 16/G-15	Making progress	Making progress	Yes	No	No
Trib. 17/G-16	Making progress	Yes	Yes	Making progress	Making progress
Trib. 18/G-17	Not yet restored	N/A	N/A	N/A	N/A
Trib. 19/G-18, S-1	Making progress	Yes	Yes	Making progress	Making progress
Trib. 19/G-18, S-2	Making progress	Yes	Yes	Making progress	Making progress
Trib. 19/G-18, S-3	Slight progress	Yes	No	Making progress	Making progress
Trib. 20/G-19	Not yet restored	N/A	N/A	N/A	N/A
Trib. 21/G-20	Not yet restored	N/A	N/A	N/A	N/A
Trib. 22/G-21	Not yet restored	N/A	N/A	N/A	N/A
Trib. 23/G-22	Not yet restored	N/A	N/A	N/A	N/A
Trib. 24/G-23	Not yet restored	N/A	N/A	N/A	N/A
Trib. 25/G-24	Not yet restored	N/A	N/A	N/A	N/A
Trib. 26/G-25	Not yet restored	N/A	N/A	N/A	N/A
Trib. 27/G-26	Not yet restored	N/A	N/A	N/A	N/A
Trib. 28/G-27	Unknown	Yes	Yes	No	No
Trib. 29/G-28	Not yet restored	N/A	N/A	N/A	N/A
Trib. 30/G-29	Not yet restored	N/A	N/A	N/A	N/A
Trib. 31/G-32	Making progress	Yes	Yes	Making progress	Making progress
Trib. 32/G-33	Making progress	Yes	Yes	Making progress	Making progress
Trib. 33/G-34	Making progress	Yes	Yes	Making progress	Making progress
Trib. 34/G-35	Unknown	No	Yes	Making progress	Making progress
Trib. 35/G-36	Unknown	Making progress	No	Making progress	Making progress
Trib. 36/G-37	Unknown	Making progress	No	Making progress	Making progress
Trib. 37/I-1	Goal met	Yes	Yes	Making progress	Making progress
Trib. 38/I-2	Unknown	Making progress	Making progress	Making progress	Making progress

Table 3 – Habitat Unit Progress Relative to Five Year Goal

Reach Identification	Restored Length	2 nd Annual HAV Scores	2 nd Annual Habitat Index	2 nd Annual Habitat Units	Projected Mature HAV Scores	Projected Mature Habitat Index	Projected Mature Habitat Units
UT Clear Fork Trib. 1 (G-1, Stream 1)	2,550'	100	0.50	1,275	132	0.66	1683
UT Clear Fork Trib. 2 (G-1, Stream 2)	490'	N/A	N/A	N/A	132	0.66	323
Valley Creek Trib. 3 (G-2)	120'	176	0.88	106	161	0.805	97
UT Valley Creek Trib. 4 (G-3)	585'	144	0.72	421	128	0.64	374
UT Valley Creek Trib. 5 (G-4)	520'	97	0.85	252	139	0.695	361
UT Valley Creek Trib. 6 (G-5)	G-5a – 190' G-5b – 380'	G-5a – 125 G-5b – 81	G-5a – 0.625 G-5b – 0.405	G-5a – 119 G-5b – 154	G-5a – 128 G-5b – 128	G-5a - 0.64 G-5b - 0.64	G-5a – 122 G-5b – 243
UT Valley Creek Trib. 7 (G-6)	140'	125	0.625	88	122	0.61	85
UT Valley Creek Trib. 8 (G-7)	150'	153	0.765	115	135	0.675	101
UT Valley Creek Trib. 9 (G-8)	515'	84	0.42	216	134	0.67	345
UT Valley Creek Trib. 10 (G-9)	325'	136	0.68	221	131	0.655	213
Valley Creek Trib. 11 (G-10)	100'	155	0.775	78	136	0.68	68
UT Valley Creek Trib. 12 (G-11)	350'	N/A	N/A	N/A	140	0.70	245
UT Valley Creek Trib. 13 (G-12)	360'	104	0.52	187	135	0.675	243
UT Valley Creek Trib. 14 (G-13)	470'	104	0.52	244	139	0.695	327
UT Valley Creek Trib. 15 (G-14)	395'	106	0.53	209	140	0.70	276
UT Valley Creek Trib. 16 (G-15)	250'	100	0.50	125	148	0.74	185
UT Valley Creek Trib. 17 (G-16)	1,420'	136	0.68	966	158	0.79	1,122
UT Valley Creek Trib. 18 (G-17)	100'	N/A	N/A	N/A	146	0.73	73
UT Hurricane Creek Trib. 19 (G-18)	Str. 1 - 1,230' Str. 2 – 400' Str. 3 – 600'	Str. 1 – 100 Str. 2 – 118 Str. 3 – 98	Str. 1 – 0.50 Str. 2 – 0.59 Str. 3 – 0.49	Str. 1 – 615 Str. 2 – 236 Str. 3 – 294	Str. 1 - 148 Str. 2 - 148 Str. 3 - 148	Str. 1 - 0.74 Str. 2 - 0.74 Str. 3 - 0.74	Str. 1 – 910 Str. 2 – 296 Str. 3 – 444
UT Hurricane C. Trib. 20 (G-19)	100'	N/A	N/A	N/A	150	0.75	75
Pigeon Roost C. Trib. 21 (G-20)	120'	N/A	N/A	N/A	146	0.73	88
UT Hurricane C. Trib. 22 (G-21)	100'	N/A	N/A	N/A	144	0.72	72
UT Hurricane C. Trib. 23 (G-22)	105'	N/A	N/A	N/A	148	0.74	78
UT Valley Creek Trib. 24 (G-23)	105'	N/A	N/A	N/A	148	0.74	78
UT Valley Creek Trib. 25 (G-24)	100'	N/A	N/A	N/A	149	0.745	74
UT Valley Creek Trib. 26 (G-25)	100'	N/A	N/A	N/A	148	0.74	74
UT Valley Creek Trib. 27 (G-26)	100'	N/A	N/A	N/A	152	0.76	76
Bear Creek Trib. 28 (G-27)	100'	125	0.625	63	147	0.735	73
UT Bear Creek Trib. 29 (G-28)	100'	N/A	N/A	N/A	149	0.745	74
UT Bear Creek	100'	N/A	N/A	N/A	139	0.695	69

Trib. 30 (G-29)							
UT Valley Creek Trib. 31 (G-32)	Str. 1 – 175' Str. 2 – 200'	Str. 1 – N/A Str. 2 – 137	Str. 1 – N/A Str. 2 – 0.685	Str. 1 – N/A Str. 2 – 137	Str. 1 – 138 Str. 2 – 138	Str. 1 – 0.69 Str. 2 – 0.69	Str. 1 – 121 Str. 2 – 138
UT Valley Creek Trib. 32 (G-33)	890'	124	0.62	552	134	0.67	596
UT Clear Fork Trib. 33 (G-34)	740'	84	0.42	311	142	0.71	525
UT Clear Fork Trib. 34 (G-35)	535'	62	0.31	166	138	0.69	369
UT Clear Fork Trib. 35 (G-36)	560'	100	0.50	280	145	0.725	406
UT Clear Fork Trib. 36 (G-37)	480'	100	0.50	240	137	0.685	329
UT Valley Creek Trib. 37 (I-1)	235'	161	0.805	189	148	0.74	174
UT Valley Creek Trib. 38 (I-2)	1,800'	107	0.535	963	157	0.785	1,413
TOTAL	18,480'			8,822			13,038

Reach Identification	Impact Length	Pre-Impact Hab. Assessment scores & Hab. Index	Pre-Impact Hab. Units	Restoration Length	Projected 5 yr. scores Hab. Assessment scores & Hab. Index	Projected Hab. Units 5 years after restoration
Unnamed Tributary to Clear Fork Trib 1 (Area G-1, Stream 1)	P-735'	144 (.72)	529	2550'	132 (.66)	1683
Unnamed Tributary to Clear Fork Trib 2 (Area G-1, Stream 2)	P-505'	145 (.725)	366	490'	132 (.66)	323
Valley Creek Trib 3 (Area G-2)	P-120'	P- 130 (.65)	78	120'	161 (.805)	97
Unnamed Tributary to Valley Creek Trib 4 (Area G-3)	P- 300' N-105'	P- 70 (.35) N-140 (.70)	105 73	585'	128 (.64)	374
Unnamed Tributary to Valley Creek Trib 5 (Area G-4)	P- 200' N-320'	P- 93 (.415) N-140 (.70)	83 224	520'	139 (.695)	361
Unnamed Trib to Valley Creek Trib 6 (Area G-5)	P- 150' N-230'	P- 99 (.495) N-142 (.71)	74 163	570'	128 (.64)	365
Unnamed Tributary to Valley Creek Trib 7 (Area G-6)	P-140'	P- 109 (.545)	76	140'	122 (.61)	85
Unnamed Tributary to Valley Creek Trib 8 (Area G-7)	P-150'	P- 143 (.715)	107	150'	135 (.675)	101

Projected Scores for streams #3112

Unnamed Tributary to Valley Creek Trib 9 (Area G-8 - Stream 1)	P- 80' N-250'	P- 128 (.64) N-150 (.75)	51	Str. 1- 320' Str. 2 -195'	Str.1- 134 (.67) Str.2 – 134 (.67)	214 131
Unnamed Tributary to Valley Creek Trib 10 (Area G-9)	P-190' N- 55'	P- 135 (.675) N-145 (.725)	128 40	325'	131 (.655)	213
Unnamed Tributary to Valley Creek Trib 11 (Area G-10)	P-120'	P- 135 (.675)	81	100'	136 (.68)	68
Unnamed Tributary to Valley Creek Trib12 (Area G-11)	P- 20' N-330'	P- 93 (.465) N-146 (.73)	9 241	350'	140 (.70)	245
Unnamed Tributary to Valley Creek Trib 13 (Area G-12)	P- 55' N-190'	P- 111 (.555) N-155 (.775)	31 147	360'	135 (.675)	243
Unnamed Tributary to Valley Creek Trib 14 (Area G-13)	P- 75' N- 235'	P- 109 (.545) N-149 (.745)	41 175	470'	139 (.695)	327
Unnamed Tributary to Valley Creek Trib 15 (Area G-14)	P- 115' N-205'	P- 110 (.55) N-147 (.735)	63 151	395'	140 (.70)	276
Unnamed Tributary to Valley Creek Trib 16 (Area G-15)	200'	P- 100 (.50)	100	250'	148 (.74)	185
Unnamed Tributary to Valley Creek Trib 17 (Area G-16)	P- 200' N-185'	P- 114 (.57) N-167 (.835)	114 154	1420'	158 (.79)	1122
Unnamed Tributary to Valley Creek	100'	P- 100 (.50)	50	100'	146 (.73)	73

Projected Scores for streams #3112

Trib 18 (Area G-17)						
Unnamed Tributary to Hurricane Creek	420' HF& Pond8	157 (.785)	330	Str.1- 1230'	Str.1- 148 (.74)	910
Trib 19 (Area G-18)- Stream 1	320' Bench	108 (.54)	173	Str.2 - 400'	Str.2 - 148 (.74)	296
	360' Cut above existing wall	163 (.815)	293	Str. 3- 600'	Str. 3- 148 (.74)	444
Unnamed Tributary to Hurricane Creek	100'	115 (.575)	57	100'	150 (.75)	75
Trib 20 (Area G-19)-						
Unnamed Tributary to Pigeon Roost Creek	120'	156 (.78)	94	120'	146 (.73)	88
Trib 21 (Area G-20)						
Unnamed Tributary to Hurricane Creek	100'	151 (.755)	75	100'	144 (.72)	72
Trib 22 (Area G-21)						
Unnamed Tributary to Hurricane Creek	105'	152 (.76)	80	105'	148 (.74)	78
Trib 23 (Area G-22)						
Unnamed Tributary to Valley Creek	105'	108 (.54)	57	105'	148 (.74)	78
Trib 24 (Area G-23)						

Projected Scores for streams #3112

Unnamed Tributary to Valley Creek Trib 25 (Area G-24)	100'	124 (.62)	62	100'	149 (.745)	74
Unnamed Tributary to Valley Creek Trib 26 (Area G-25)	100'	155 (.775)	77	100'	148 (.74)	74
Unnamed Tributary to Valley Creek Trib 27 (Area G-26)	100'	160 (.80)	80	100'	152 (.76)	76
Bear Creek Trib 28 (Area G-27)	100'	154 (.77)	77	100'	147 (.735)	73
Unnamed Tributary to Bear Creek Trib 29 (Area G-28)	100'	101 (.505)	50	100'	149 (.745)	74
Unnamed Tributary to Bear Creek Trib 30 (Area G-29)	100'	134 (.67)	67	100'	139 (.695)	69
Unnamed Tributary to Valley Creek Trib 31 (Area G-32)	P-175'	P- 114 (.57)	100	Str. 1- 175' Str. 2 -200'	Str.1- 138 (.69) Str.2 – 138 (.69)	259
Unnamed Tributary to Valley Creek Trib 32 (Area G-33)	P-40'	P- 109 (.545)	22	890'	134 (.67)	596

Projected Scores for streams #3112

Unnamed Tributary to Clear Fork Trib 33 (Area G-34)	P- 190' N-240'	P- 104 (.52) N-143 (.715)	99 172	740'	142 (.71)	525
Unnamed Tributary to Clear Fork Trib 34 (Area G-35)	P- 175' N-270'	P- 115 (.575) N-154 (.77)	101 208	535'	138 (.69)	369
Unnamed Tributary to Clear Fork Trib 35 (Area G-36)	P-115' N-370'	P- 110 (.55) N-152 (.76)	63 281	560'	145 (.725)	406
Unnamed Tributary to Clear Fork Trib 36 (Area G-37)	P- 120' N-360'	P- 120 (.60) N-152 (.76)	72 274	480'	137 (.685)	329
Unnamed Tributary to Hurricane Creek Trib 37 (Area I-1)	P -235'	P- 121 (.605)	142	235'	148 (.74)	174
Unnamed Tributary to Hurricane Creek Trib 38 (Area I-2)	P-200' N-1600'	P- 112 (.56) N-168 (.84)	112 1344	1800'	157 (.785)	1413
TOTAL	11,840		8,016	18,480'		13,038

Appolo Fuels, Inc.			OSM 3112				DA File #2002-00609			ARAP #M2003-03	
Habitat Assessment Value Scores											
Reach	Epifaunal sub.	Embed.	Depth regime	Sed. deposit.	Flow status	Channel alt.	Riffle frequen.	Bank stability	Veg. protect.	Riparian zone	Total
G-1, S-1	8	6	8	8	8	8	8	18	14	14	100
G-1, S-2											
G-2	15	19	20	19	20	15	20	20	10	18	176
G-3	13	16	10	16	15	15	17	16	10	16	144
G-4	5	13	0	13	0	15	5	20	10	16	97
G-5a	13	10	5	10	8	15	19	18	11	16	125
G-5b	6	8	5	6	11	5	5	18	10	7	81
G-6	9	9	9	10	19	15	15	18	10	11	125
G-7	13	14	10	14	20	19	19	18	10	16	153
G-8	5	7	1	8	2	15	5	15	10	16	84
G-9	8	20	5	20	10	15	20	16	11	11	136
G-10	15	19	20	19	18	15	19	18	10	2	155
G-11											
G-12	5	19	0	19	0	17	5	14	9	16	104
G-13	11	13	4	13	8	15	7	15	9	9	104
G-14	11	17	3	16	6	15	10	14	7	7	106
G-15	10	10	4	11	10	17	15	11	8	4	100
G-16	12	15	7	18	14	17	18	16	10	9	136
G-17											
G-18, S-1	10	7	3	10	6	15	6	18	13	16	104
G-18, S-2	8	10	4	10	10	16	16	20	14	10	118
G-18, S-3	7	12	3	10	5	16	7	18	10	10	98
G-19											
G-20											
G-21											
G-22											
G-23											
G-24											
G-25											
G-26											
G-27	8	15	10	13	20	19	14	18	8	0	125
G-28											
G-29											
G-32	11	16	5	14	15	10	20	18	13	15	137
G-33	13	10	8	10	18	10	15	18	12	10	124
G-34	3	15	1	15	2	13	1	16	11	7	84
G-35	3	8	0	5	0	15	1	18	6	6	62
G-36	6	13	3	11	5	15	5	20	12	10	100
G-37	5	11	3	8	6	15	6	18	10	18	100
I-1	13	16	8	15	20	19	19	19	14	18	161
I-2	6	10	3	18	6	15	5	20	10	14	107
Average	9.00	12.79	5.79	12.82	10.07	14.68	11.50	17.36	10.43	11.50	115.93