

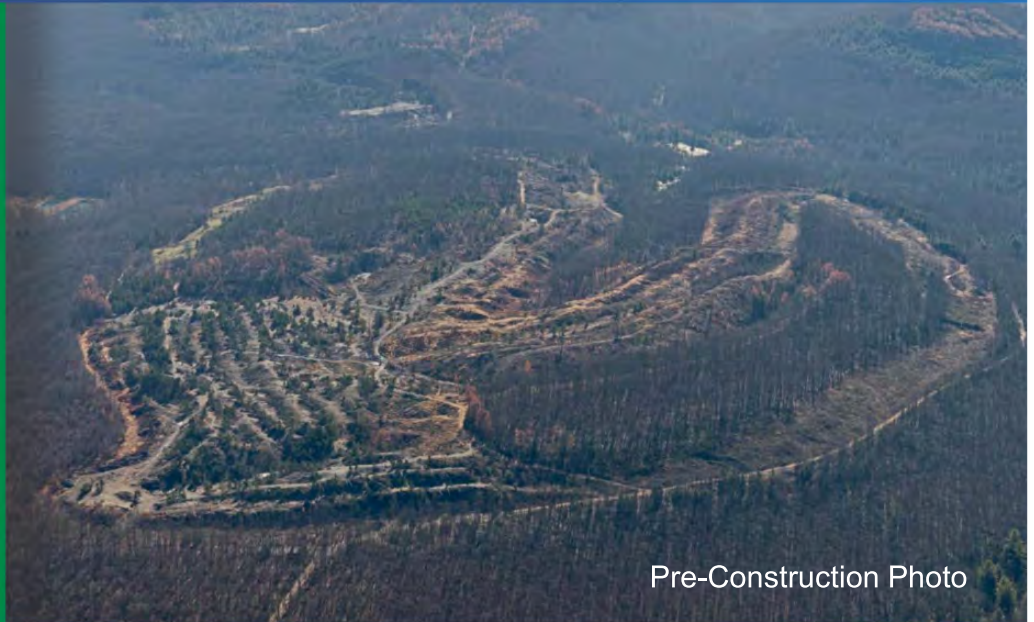
The Huling Branch AML Reclamation/ATV Recreation & Watershed Improvement Project



pennsylvania

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Abandoned Mine Reclamation



Pre-Construction Photo

2017 OSMRE Award Nomination



Post-Construction Photo



Kettle Creek Watershed Association



The Huling Branch AML Reclamation/ATV Recreation & Watershed Improvement Project

LOCATION

Problem Area 6672 (PA 6672)
Noyes and Leidy Townships, Clinton County, Pennsylvania

SUBMITTED BY

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Environmental Program Manager - Dean R. Baker, P.E.
Construction - Bill A. Dadamo, P.E. and Roger L. Rummel, P.E.
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Development - Patrick M. Webb, P.E. and Richard L. Beam, P.G.
Pennsylvania Department of Environmental Protection
Bureau of Abandoned Mine Reclamation, Cambria District Office
Ebensburg, PA 814-472-1800

PROJECT START DATE

September 9, 2013

PROJECT COMPLETION DATE

December 8, 2015

PROJECT COSTS

OSMRE Title IV Health & Safety Funds: \$7,352,587
OSMRE AMD Set-Aside Funds: \$2,000,000 PA State Growing Greener Funds \$1,199,591

PRIMARY PROJECT PARTNERS

PA DEP, Bureau of Abandoned Mine Reclamation	Office of Surface Mining Reclamation and Enforcement
American Chestnut Foundation of Asheville, North Carolina	Michael Hanna, PA State Representative, 76 th Legislative District
PA DCNR, Bureau of Forestry	Trout Unlimited
PA DEP, Moshannon District Mining Office	American Motorcyclist Association
Brandywine Enduro Riders	National Enduro Promotions Group
Kettle Creek Watershed Association	Hedin Environmental

CONTRACTORS

General Contractor - L.R. Costanzo Company Inc., Scranton, PA	Major Subcontractor - Bernier Construction, Inc., Gap, PA
Material Transport - Confer Trucking, Inc., Bellefonte, PA	Tree Planting - Ron Rowles Energy, Curwensville, PA

DATE SUBMITTED

April 24, 2017

Executive Summary

The Huling Branch AML Reclamation/ATV Recreation & Watershed Improvement Project was one of the most extensive and complex surface mine reclamation projects undertaken by the Pennsylvania Abandoned Mine Land (AML) program to date. The project addressed three major concerns that were associated with the 103-acre AML site located in the heart of Pennsylvania's 307,140-acre Sproul State Forest, that is maintained by the Pennsylvania Department of Conservation and Natural Resources (PA DCNR), Bureau of Forestry.

The first and primary concern was to eliminate four Priority 2 (P2) near vertical dangerous highwalls (DHs) from past surface mining that were in excess of 70 feet (ft.) in height and had a combined length of over 6,000 linear feet (L.F.). Associated with the four separate DHs was a massive 103-acre Priority 3 (P3) spoil area (SA) which contained a large amount of acid forming materials. During the surface mining, collapsed entries that were discharging highly contaminated acid mine drainage (AMD) from previously underground mined areas were intersected. The backfilling and reforestation reclamation plan reclaimed the DHs and SA by utilizing both the Forestry Reclamation Approach (FRA) and conventional backfill/compaction methods. Located all around and on top of the DHs and SA were segments of the 50-mile-long PA DCNR Whiskey Springs All-Terrain Vehicle (ATV) trail system and a 40-acre ATV "play area." The recreational use of the trail system and play area had attracted intense public visitation to areas off of the designated trail to the area containing the DHs and SA. The unauthorized use of the AML site by ATV riders and others resulted in numerous ATV accidents and injuries, several of which required a life flight helicopter to transport the victims. The reclamation plan eliminated access to the unauthorized ATV riding areas and re-established and maintained portions of the Whiskey Springs ATV trail that were impacted by the construction of the project.

The second concern was to maintain and re-establish 3.6 miles of the project construction site access that is a functioning segment of the Whiskey Springs ATV trail system. Portions of the DHs and SA reclamation plan were intersected by the ATV trail. This section of the trail was closed to the public during construction of the project. The 3.6-mile dual use of the rehabilitated and maintained construction site access/ATV trail was restored after construction to promote recreational and economic redevelopment. The trail is open for recreational use from Memorial Day to the last weekend in September and is reopened mid-January to April 1. Portions of the trail are also used for the annual Rattlesnake National Enduro which is the 5th of 9 rounds of the 2017 Kenda American Motorcyclist Association (AMA) National Enduro Championship Series. The national race begins in Cross Fork, PA, which is one-half hour north of the Huling Branch AML site. The national race is sponsored locally by the Brandywine Enduro Riders (BER) and the National Enduro Promotions Group (NEPG). The reclamation project, including the reconstruction of a portion of the ATV trail system, is contributing to increased economic and recreational opportunities and benefits northcentral Pennsylvania while improving the overall safety for users of the Whiskey Springs ATV trail.

The third and final objective of the project was to reduce AMD impacts upon both surface and groundwater discharges emanating from the project site. This was achieved through alkaline addition and other AMD source abatement/amelioration techniques including hydrologic controls and identification, and removal and/or special handling of acid forming materials. On-site AMD sources included discharges from abandoned underground mine workings, buried coal refuse with a very high sulfur content, and acidic unreclaimed surface mine SA. While it was clear that design elements of the Huling Branch AML Reclamation Project aimed at addressing AMD impacts would not completely eliminate those impacts, it was believed that incorporating these measures into the project reclamation plan would result in a long-term reduction in pollution load and reduce the scope of AMD complexity of future AMD treatment and watershed restoration work. Similar previous Pennsylvania source abatement projects such as the Office of Surface Mining Reclamation and Enforcement's (OSMRE) 2012 National Award Winning Dents Run AML/AMD Ecosystem Restoration Project have produced the proof of concept for this approach. With respect to the Huling Branch AML Reclamation Project, post project monitoring results clearly indicated similar trends in pollution load reduction.

Project Background

Project Location

Figure 1 shows the location of the 103-acre Huling Branch AML Reclamation Project which is situated in Problem Area 6682 (PA 6682), Noyes and Leidy Townships, Clinton County, PA. The AML site is specifically located near the middle of Pennsylvania's Sproul State Forest, that is maintained by PA DCNR, Bureau of Forestry.

Outdoor recreational activities such as ATV riding, fishing, hunting, hiking and camping are highly promoted within the Sproul State Forest.

Additional information about the state forest can be found by accessing the following internet link: "[Sproul State Forest](#)".

Mining History

Directly underneath the Huling Branch AML Reclamation Project, underground mining of the Lower Kittanning Coal Seam began in the early 1900s by members of the Kettle Creek Coal Company, Bitumen, PA as illustrated in Figure 2. The company ceased mining operations prior to 1945. Later, from the 1950s through 1967, the D. G. Wertz and Richmond Coal Companies surface mined the area leaving behind the DHs and acidic SA that the Huling Branch AML Reclamation Project addressed.

Description of AML Problems

As illustrated in Figure 3, PA 6672 is adjacent to Huling Branch, a Trout Stocked Fishery (TSF), located within the Twomile Run Subwatershed (9.15 square miles [mi²]) of Kettle Creek Watershed (244 mi²). Cumulatively, over 6,000 L.F. of 70 ft. high P2 DH was located within the 103-acre P3 SA. The total DH length was comprised of four separate DHs which measured 1,500 L.F., 2,800 L.F., 500 L.F. and 1,200 L.F. respectively. Additionally, within the AML limit of work, a P3 abandoned equipment/facility (EF) and a P3 collapsed mine opening (MO) were also reclaimed within the overall project. Multiple P3 deep mine discharges and mine seeps, inventoried as water area (WA) problems, were scattered throughout the multiple DHs and SA. The AMD from the Huling Branch AML Reclamation Project was a major source of impairment to the Twomile Run Subwatershed and has been a detriment to the lower portion of the Kettle Creek Watershed for decades.

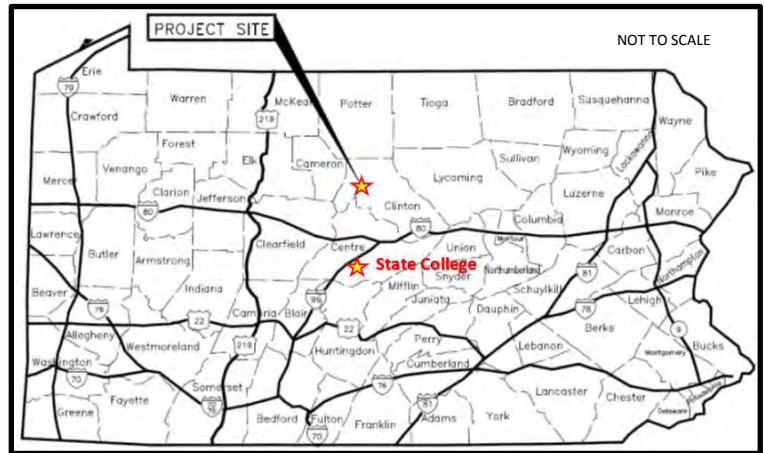


Figure 1



Figure 2



Figure 3

Innovative Use of Current Technology

A combined reclamation and treatment/abatement effort afforded the greatest chance of successful remediation. The rehabilitation plan included the removal of crop coal and buried coal refuse, alkaline materials addition, materials handling technologies and surface and groundwater best management practices. The project provided an opportunity to further examine AMD improvement using alkaline addition and water handling techniques on AML sites.

Along with project partners Trout Unlimited (TU); the Kettle Creek Watershed Association (KCWA); and the Pennsylvania Department of Environmental Protection, Moshannon District Mining Office (PA DEP-MDMO), the Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation (PA DEP-BAMR) evaluated the problems in the watershed and established a water quality and quantity monitoring program. Data analysis indicated that discharges associated with the site were extremely acidic with highly elevated metals concentrations. Consequently, the discharges would have been costly and technically difficult to effectively treat with passive treatment systems alone. It was decided that a combined reclamation and source abatement effort afforded the greatest chance to improve water quality to the point where remaining AMD could be more effectively treated.

Figure 4 provides a summary of the data collected at the “Huling Branch Site 4 Discharge” and illustrates the improvement in water quality observed to date. This sampling point receives all of the site’s surface and underground mine discharges. Trends in the data indicate that additional improvement in water quality is likely as the benefits of reclamation and addition of alkaline materials continue to positively influence surface and groundwater within the project area. In summary, the water sample data illustrated in Figure 4 indicates that hot acidity has decreased by 36%, acid loading has decreased by 43%, sulfate concentrations has decreased by 52% and lastly sulfate loading has decreased by 76%. The water sample analysis trends indicate similar watershed improvements to the Dents Run AML/AMD Ecosystem Restoration Project.

The backfilling and reforestation reclamation plan to reclaim the DHs and SA was performed by utilizing both the FRA and conventional backfill/compaction methods. The FRA method ensured groundwater infiltration deep into the alkaline backfill to promote the abatement of the negative impacts of the AMD.

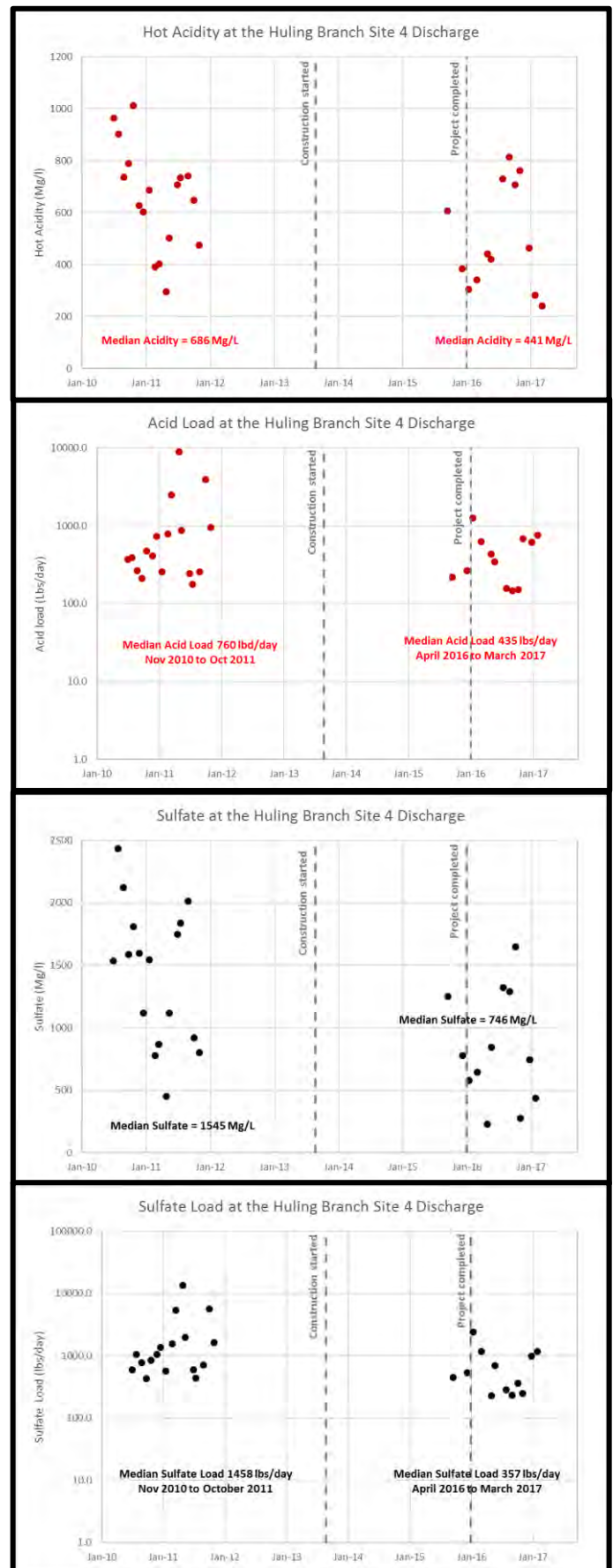


Figure 4

Difficulty of Achieving Reclamation Under Existing Conditions

Special and Unique Considerations

As illustrated in Figure 5, the AML area was first considered by PA DEP-MDMO, TU, KCWA and PA DEP-BAMR as an AML Enhancement Rule project, also known as a Government Financed Construction Contract (GFCC). Due to the large size of the project site, the GFCC option was not economically viable. A permitted coal remining project was also dismissed due to the depressed coal market in this area during the early 2010s. The final decision was for PA DEP-BAMR to initiate an AML reclamation project.

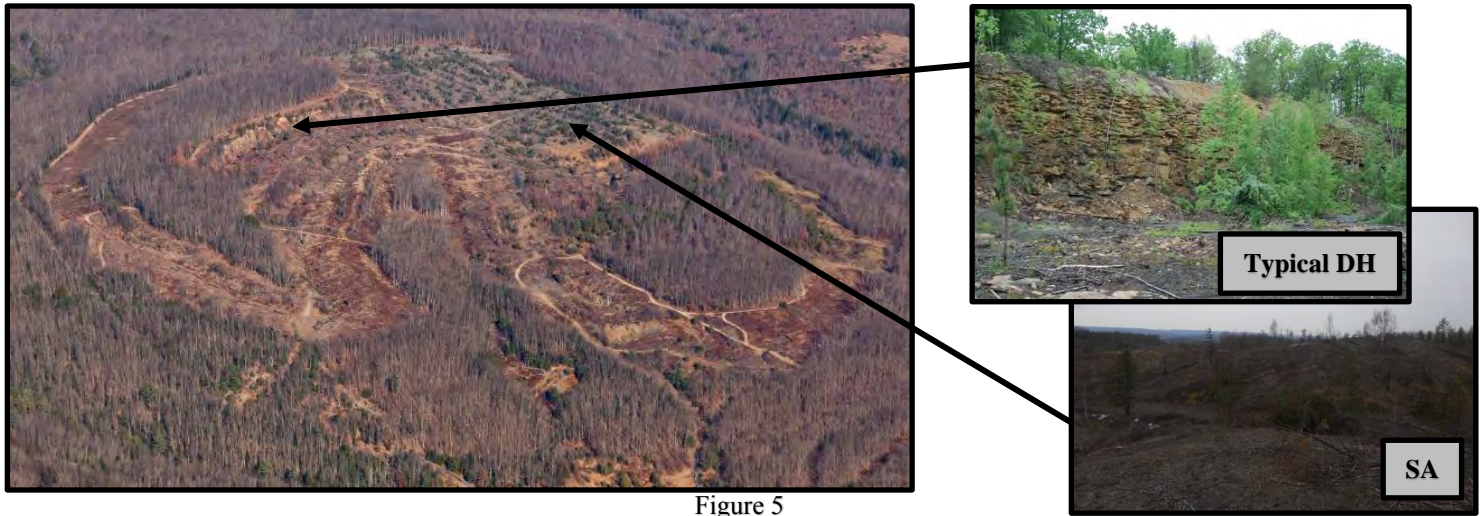


Figure 5

Another consideration was that the deadly timber rattlesnake was prevalent in the vicinity of the AML site and recognized by the Pennsylvania Fish & Boat Commission (PA FBC) as a protected special concern species. Therefore, workers had to be extremely careful not to be injured by the snake while also ensuring that any snakes would not be harmed. A couple of other considerations which increased the project difficulty were the remoteness of the site, the massive amounts of SA grading, coal and refuse removal, and alkaline addition materials to be transported to the site to achieve optimum reclamation and source AMD abatement.

On-site Difficulty of the Project

The Huling Branch AML Reclamation Project site access included 2.5 miles of Two Mile Road that traversed along steep and narrow segments of the Whiskey Springs ATV trail. The contractor performed winter maintenance while transporting nearly 350,000 tons of materials to and from the site. During the late winter and early spring the road would thaw out during the day and become unpassable to heavily weighted construction truck traffic. In order to keep the project on schedule, the contractor was forced to haul only at night while these conditions were present. Because of the road stability condition, the contractor was required to be on-site 24/7 in order to maintain the road and to safely direct truck traffic. Additionally, brutally record breaking cold winters during the two-year construction project also presented a challenge for the contractor. Another difficulty was that PA DEP-BAMR staff, contractors and the trucking/transport company had to use satellite phones to maintain adequate communications to ensure a safe and effective worksite.

Project Start and Completion Dates and Construction Costs

The project started on September 9, 2013, and was completed on December 8, 2015, for a total of \$10,552,178.

Name of the Organizations Responsible for the Reclamation, Including Contractors

The responsible organizations were PA DEP-BAMR, OSMRE, American Chestnut Foundation of Asheville, North Carolina and the PA DCNR, Bureau of Forestry. The general contractor was L. R. Costanzo Company Inc., along with the major subcontractor, Berner Construction, Inc. The massive transportation effort of moving materials to and from the project was performed by Confer Trucking, Inc., while the majority of the contract tree planting was performed by Ron Rowles Energy.

On-site Effectiveness

Effective/Innovative Use of Technology

The Huling Branch AML Reclamation Project was not your typical DH backfill project due to the AMD present at the site. Figure 6 shows the innovative reclamation plan designed by PA DEP-BAMR overlaid on a post reclamation aerial photograph. The highly acidic Lower Kittanning crop coal depicted in “yellow” of over 36,200 tons was removed to the pit floor and lined with alkaline addition material in an effort to abate AMD. Test pits and drilling bore logs depicted in “blue” identify buried coal refuse of over 5,100 tons that was also removed. Coal and refuse removal had uncovered deep mine workings with discharging AMD, depicted as “orange Xs,” that was collected with wet seal installation. From the wet seals, nearly 3,000 L.F. of subsurface pipe drains were installed to direct the AMD south of the project site. Additionally, over 8,000 L.F. of rock underdrains were installed below the pit floor and underneath the backfill. Prior to FRA grading with tree planting and conventional backfilling with revegetation, alkaline addition materials were placed on the pit floors at an 1,800 tons per acre (TPA) rate, followed by blending the alkaline addition with the SA at a 1,200 to 3,000 TPA rate. In total, 310,000 tons of alkaline addition materials (90% calcium carbonate equivalent [CCE]) and 787,000 cubic yards (C.Y.) of SA were blended together over the 103-acre site to achieve a final 3,000 TPA alkaline addition rate. The alkaline addition materials were beneficially reused as a waste lime product. With the consolidation of the site’s in-situ treated AMD within subsurface drains and rock underdrains, all the Huling Branch sites’ AMD is now collected at the Huling Branch Site 4 Discharge for further future treatment, if deemed necessary through continual monitoring by PA DEP-BAMR. Figure 7 (on the following page) contains links to the construction plan and videos to illustrate the on-site effectiveness of the project.

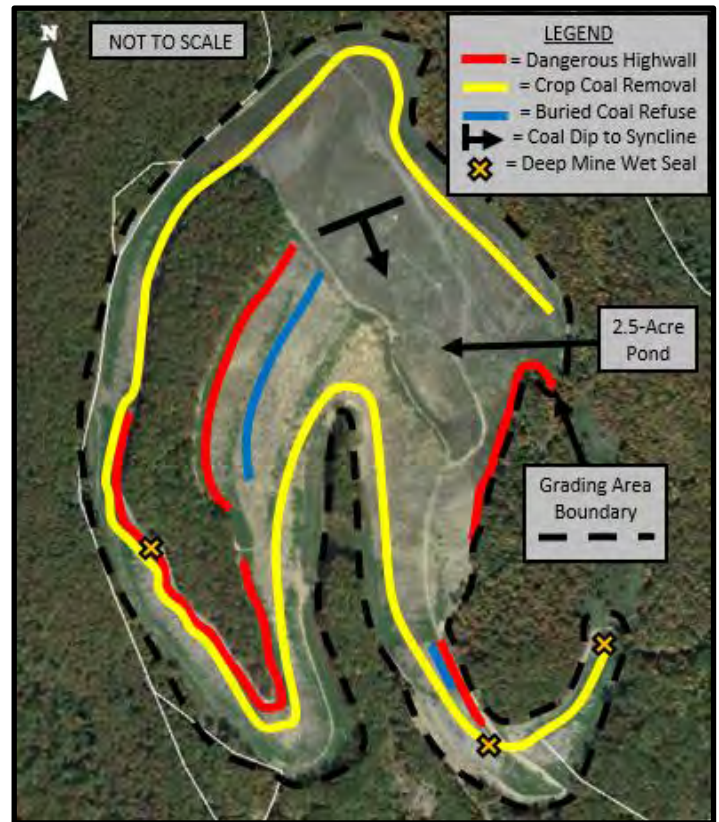


Figure 6

Addition of alkaline materials has been employed on a number of active mine sites in Pennsylvania since the early 1980s. Initial application rates on sites mined or approved prior to 1986 were based upon research conducted by the West Virginia Mine Drainage Task Force and an AMD remediation project associated with the construction of Interstate 80 in Pennsylvania. Both studies suggested that a realistic alkaline application rate was probably a third of the calculated deficiency. Applications at these levels were not successful in abating or significantly ameliorating AMD at the majority of these sites. Adjustments to alkaline addition rates that more closely approximated the calculated deficiency (1:1 addition) at sites also resulted in only limited success. More recent alkaline addition research has indicated a strong correlation between a site’s net neutralization potential (NNP), expressed in tons of calcium carbonate per 1,000 tons of overburden, and the post mining water quality in terms of net alkalinity. These studies evaluated over 120 mine sites with both overburden analysis data and post mining water quality. Their findings indicated that sites having NNP greater than 10 to 30 tons per 1,000 tons of overburden (T/TT) produced net alkaline drainage, whereas sites with a NNP less than 10 T/TT frequently exhibited net acidic water. Based on this research and the conditions documented at the Huling Branch Project site, alkaline addition requirements of 3,000 TPA were calculated to achieve an NNP of greater than 12 tons per 1,000 tons of overburden. Best management practices were developed for incorporating the alkaline material into the backfill in the most efficient and effective manner.

Landscape Conforms to the Natural Environment

Roughly two thirds of the site were ripped and backfilled with hummocky piles of woody material through the FRA grading and tree planting method, and over 48,150 mixed tree seedlings species were planted. The FRA method is endorsed by OSMRE and the Appalachian Regional Reforestation Initiative (ARRI) through the following internet link: ["OSMRE and ARRI"](#). Additionally, over 100 American Chestnut seedlings were donated for planting by the American Chestnut Foundation of Asheville, North Carolina. The FRA method ensured groundwater infiltration deep into the alkaline backfill to abate the negative impacts of AMD. Results of annual tree surveys have indicated an 80% success rate of tree survival since initial planting. The remaining one third of the site was backfilled and compacted conventionally before being revegetated with grasses and legumes to promote wildlife habitat. Additionally, a 2.5-acre erosion and sedimentation control shallow pond was left in place after construction to enhance wildlife habitat. In general, the pond, the reforested area and open rangeland area will support Sproul State Forest’s wildlife species of deer, elk and other animals for years to come.

Elimination of Significant Health and Safety Problems

Figure 6 (on the previous page) illustrates the four 70 ft. high P2 DHs, shown in red, which measured 1,500 L.F., 2,800 L.F., 500 L.F. and 1,200 L.F. respectively. The DHs were eliminated through backfilling with the 103-acre alkaline blended SA. Located all around and on top of the DHs and SA were segments of the 50-mile-long PA DCNR Whiskey Springs All-Terrain Vehicle (ATV) trail system and a 40-acre ATV “play area.” The recreational use of the trail system and play area had attracted intense public visitation to areas off of the designated trail to the area containing the DHs and SA. The unauthorized use of the AML site by ATV riders and others resulted in numerous ATV accidents and injuries, several of which required a life flight helicopter to transport the victims. The reclamation plan eliminated access to the unauthorized ATV riding areas and re-established and maintained portions of the Whiskey Springs ATV trail that were impacted by the construction of the project.

Huling Branch AML Reclamation Project Illustrations of On-site Effectiveness and Innovative Use of Technology
Official Construction Plan - "View Contract Drawings"
During Construction - "View Coal Removal Video"
During Construction - "View Pit Lining with Alkaline Addition Video"
During Construction - "View Flooded Mine Entry Video"
During Construction - "View Subsurface Drain Installation Video"
During Construction - "View Rock Underdrain Installation Video"
During Construction (DRONE Video) - "View Site Central Grading, Alkaline Addition and Site Overview Video"
During Construction (DRONE Video) - "View DH Pit Backfill, Alkaline Addition and Site Overview Video"
During Construction (DRONE Video)- "View West Side FRA Grading and Site Overview Video"
During Construction - "View FRA Cross Ripping Backfill for FRA Tree Planting Video"
During Construction - "View Completed FRA Grading Video"
During Construction - "View FRA Tree Seedling Planting Video 1"
During Construction - "View FRA Tree Seedling Planting Video 2"
During Construction - "View Seeding Conventional Backfill / Compacted Area Video"
During Construction - "View "The Record Online Video Report" Near the Bottom of the Web Page"
Post Construction - "View FRA Grading Area in March 2017 Video"
Post Construction - "View Conventional Backfill / Compacted Area in March 2017 Video"
Post Construction - "View Huling Branch Site 4 Discharge Video"
Post Construction - "View Huling Branch Stream at the Mouth of Twomile Run Video"

Figure 7

Funding

Effective Use of Funds

The Huling Branch AML Reclamation Project has been the largest and most complex project performed to date within the Twomile Run Subwatershed. Because of the intense recreational site visitation all around and on top of the P2 DHs and SA and due to the proximity of the Whiskey Springs ATV trail, elimination of health and safety hazards was the primary focus of the project. The use of the Title IV Funds, identified in Figure 8, served to both eliminate the P2 DHs and to abate AMD. Without the benefit of OSMRE project funding, the Huling Branch AML Reclamation Project likely would not have been implemented.

Leveraging – Use of Partners for Funding or Technology

Since 2000, including the Huling Branch AML Reclamation Project, up to 11 AML/AMD projects within PA 6672, PA 0888 and PA 1122 (shown in Figure 3 on Page 2) have been completed. These P2 AML and P3 innovative AMD abatement projects and studies were performed by PA DEP-BAMR, TU and KCWA. Figure 9 represents the funding contributions from all 11 projects. Currently, almost \$13.5 million dollars of combined partner funding has been invested to combat the AML health and safety and AMD impacts of pre-1977 coal mining activities in the watershed. Again, without the benefit of SMCRA Title IV AML project funding the Huling Branch AML Reclamation Project likely would not have been implemented.

Benefits to the Community

Community Support for the Project

Since 2000, KCWA, TU and PA DCNR have been strongly interested in reducing the negative impacts of AMD and eliminating pre-1977 P2 health and safety hazards adjacent to the highly utilized recreational areas of Pennsylvania’s Sproul State Forest. As illustrated within the following media internet links: ["The Record Online Video Report"](#) , ["The Record Online Article"](#) and ["The TU Report"](#), the local communities in Clinton County and project partners were kept informed on the status of the project and were eager to have the project implemented. Several national ATV clubs promote the Whiskey Springs ATV trail through videos, pictures and trail ratings in the following internet link: ["Riderplanet USA"](#). Figure 10 illustrates the AML site portion of the trail that is west of Parking Area 36. All of Pennsylvania’s trail maps and brochures can be viewed by accessing the following internet link: ["Pennsylvania's State Forest ATV Trails"](#).

Huling Branch AML Reclamation/ATV Recreation & Watershed Improvement Project			
OSMRE Title IV Health & Safety Funds	OSMRE AMD Set-Aside Funds	PA State Growing Greener Funds	Project Total Cost
\$7,352,587	\$2,000,000	\$1,199,591	\$10,552,178
69.7%	19.0%	11.3%	
88.7%			

Figure 8

Funding Summary Table of the Twomile Run Subwatershed AML & AMD Projects (11 completed since 2000)			
Funding Source		Funding Percent	
OSMRE Funds	OSMRE Title IV Health & Safety Funds	54.70%	76.39%
	OSMRE AMD Set-Aside Funds	19.83%	
	Watershed Cooperative Agreement Program	1.86%	
Other Source Funds	Pennsylvania State Growing Greener Funds		20.57%
	Foundation of Pennsylvania Watersheds		1.50%
	Richard King Mellon Foundation		0.65%
	United States Army Corps of Engineers		0.41%
	National Fish & Wildlife Foundation		0.39%
	Stream Restoration Incorporated		0.09%

Figure 9

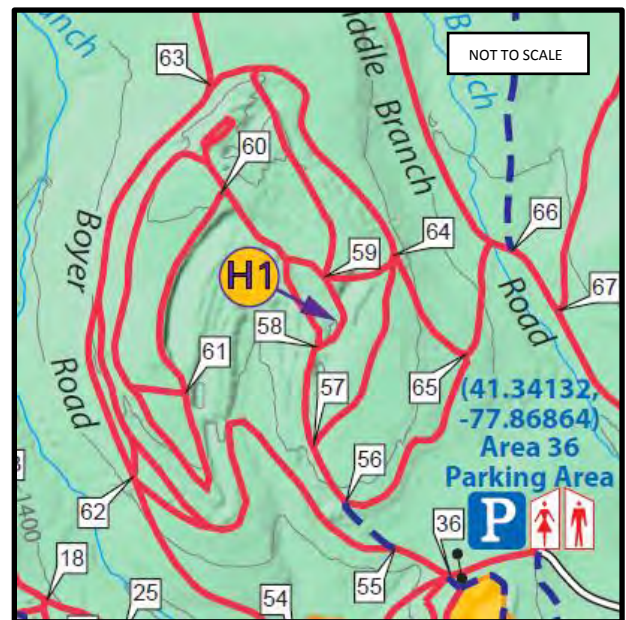


Figure 10

Long-Term Benefits to the Community

The long-term benefits to the community will be limitless now with elimination of the P2 DHs within the Huling Branch AML Reclamation Project. The impact of the AMD from the deep mine discharges and the highly acidic SA have been significantly reduced through alkaline addition, and the AMD discharges have been consolidated to one location for further future treatment, if deemed necessary, through continual monitoring by PA DEP-BAMR.

Figure 11 illustrates the 2016 version of the Brandywine Enduro Riders (BER) trail map. A full size version of the map can be found by accessing the following internet link: "[BER Trail 2016](#)". The BER trail is used for the annual Rattlesnake National Enduro which is the 5th of 9 rounds of the 2017 Kenda AMA National Enduro Championship Series. Portions of the national race run through Parking Area 36 of the Whiskey Springs ATV trail, as illustrated in "yellow" in Figure 11. This year's event will be held on Sunday, July 23, 2017, from 9:00 a.m. to 4:00 p.m., with the high potential that the 2017 version of the BER course will lead the enduro riders through and around the reclaimed Huling Branch AML Reclamation Project site.

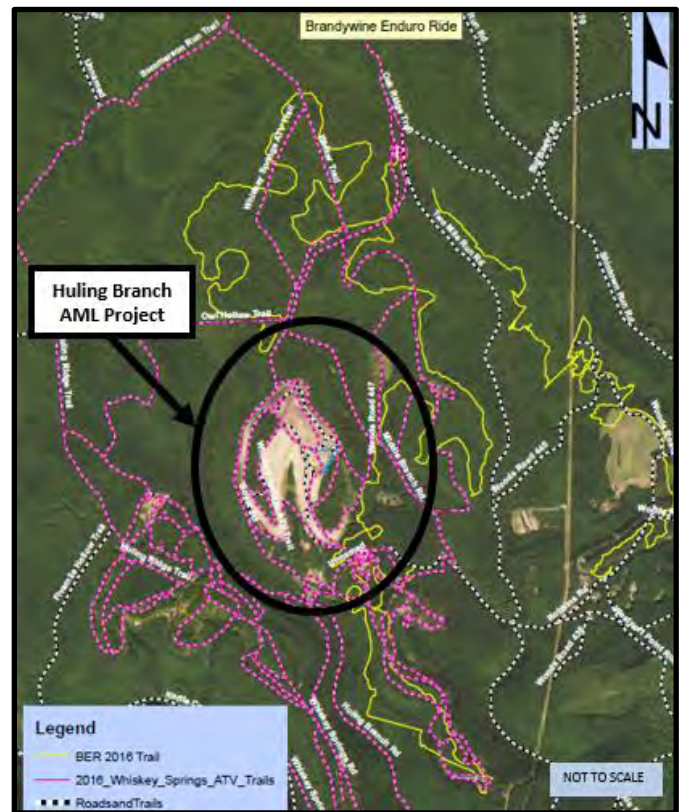


Figure 11

Additional information concerning the Rattlesnake National Enduro race, including 2017 registration, an event brochure, 2016 racing footage and 2016 racing results can be found by accessing the following internet links: "[2017 Race Registration](#)", "[2017 Kenda Brochure](#)", "[RATTLESNAKE 2016 Video](#)" and "[2016 Results](#)". This national race is sponsored locally by BER and begins in Cross Fork, PA, which is one-half hour north of the Huling Branch AML site. Last year's event generated a \$200,000 boost to the local economy during the three-day event that was comprised of lodging, food consumption and gas usage. This annual event draws in over 1,800 visitors and almost 600 participants that includes both males and females ranging in ages from 16 to 75 years old.

Surface Mining Control and Reclamation Act (SMCRA)

Exceeds the Spirit and Intent of SMCRA

Reclaiming the multiple P2 DHs while improving over 103 acres of highly acidic SA and associated deep mine discharges contaminating the groundwater of the Huling Branch AML Reclamation Project not only exceeds the spirit and intent of SMCRA, it truly defined SMCRA. The high multi-modal recreational use of PA DCNR's Whiskey Springs ATV trail had drawn outdoor enthusiasts to unauthorized areas off of the designated trail and into the dangerous AML site since the development of the Pennsylvania Sproul State Forest. Coupled with the annual Rattlesnake National Enduro, the unlimited number of outdoor recreational options that the state forest offers have been beneficially enhanced since the completion of the Huling Branch AML Reclamation Project. Additionally, the Huling Branch AML Reclamation Project transformed 103 acres of AML back to the original intent and usage for forestland, wildlife habitat enhancement and outdoor multi-modal recreation. The Kettle Creek Watershed will improve over time aided with the blended SA alkaline addition materials perpetually working within the water table system. Financially, the reclaimed AML site will increase revenue for goods and services that are essential to support tourism and the outdoor recreation within the state forest. The reclamation of the Huling Branch AML site is a general welfare and social economic success story and is a template to be followed for future AML and AMD abatement projects.

Increased Public Awareness of SMCRA

Through ongoing tourism of the Sproul State Forest, recreational and environmental enthusiasts who know all too well the negative impacts of pre-1977 mining practices will now be able to enjoy the restored AML site. Due to the immense size, scope and complexity of the Huling Branch AML Reclamation Project, public awareness of SMCRA and AML reclamation was expanded. The Huling Branch AML Reclamation Project demonstrated how P2 health and safety problems can be eliminated in conjunction with watershed restoration resulting in significant increases in tourism and outdoor recreational opportunities. As illustrated in Figure 12, evidence of public awareness of SMCRA was increased during a TU and KCWA bus tour of the Huling Branch AML site in May of 2014 during construction. The bus tour was highly attended by media, federal, state and local organizations and was documented within the following media internet links: ["The Record Online Video Report"](#) , ["The Record Online Article"](#) and ["The TU Report"](#).



Figure 12

Transferability to Other AML Projects

The alkaline addition method to abate AMD from the Huling Branch AML Reclamation Project was identical to PA DEP-BAMR’s Dents Run AML/AMD Ecosystem Restoration Project. Figure 13 illustrates that the effluent water properties of the Huling Branch Site 4 Discharge have improved similar to the Dents Run effluent water quality. The water quality of Dents Run has slowly and continuously improved since completion of reclamation in 2012, and the same improvement is anticipated for the Huling Branch site as well.

Because of the alkaline addition success of both the Dents Run and Huling Branch AML Reclamation Projects, PA DEP-BAMR has transferred the same alkaline addition method to reclaim the proposed FY 2016 AML Pilot Program Project of Fran Contracting Camp Run No. 2. The Fran AML Pilot project will reclaim up 50 acres of highly acidic SA and acidic draining groundwater that has been negatively impacting the fish and other aquatic life within the Rock Run and Camp Run Watersheds for decades. The project is located nearby in East Keating Township, Clinton County, Pennsylvania and will be advertised to contractors on April 28, 2017. Construction will begin during the fall of 2017, and the project will take approximately one and one-half years to complete.

Pre 2010 to Post 2016 Water Quality Monitoring Values (Identical Alkaline Addition Rate) of The Dents Run AML/AMD Ecosystem Restoration Project Versus The Huling Branch AML Reclamation Project									
Point Description	# of samples (N)	Pre / Post	pH	Alkalinity (mg/l)	Hot Acidity (mg/l)	Total Fe (mg/l)	Mn (mg/l)	Al (mg/l)	Sulfate (mg/l)
Point 8 Left fork of 1st upstream trib	15	Pre 2010 Median	3.5	0	66	3.9	7.8	1.7	271
	4	Post 2010 Median	3.5	0	38.3	1.7	4.5	1.1	195
	% Change					-42%	-56%	-42%	-35%
Point 9 Right fork of 1st upstream trib	15	Pre 2010 Median	3.5	0	122.1	3.3	13.0	11.9	543.2
	4	Post 2010 Median	3.7	0	85.5	1.8	7.9	8.1	450.5
	% Change					-30%	-45%	-39%	-32%
Point 11 Trib mouth north PA 3897	14	Pre 2010 Median	3.7	0	132	7.5	45.3	2.6	2042.15
	5	Post 2010 Median	4	1	68	0.28	20.0	2.4	1109
	% Change					-48%	-96%	-56%	-8%
Point 13 Pond discharge PA 3898	12	Pre 2010 Median	3.7	0	210.4	2.0	18.6	27.5	731.65
	4	Post 2010 Median	4.3	7.9	87.7	0.53	8.5	11.5	487
	% Change					-58%	-74%	-54%	-58%
Point 14 Pit Discharge PA 3898	10	Pre 2010 Median	2.8	0	615	29.2	23.3	62.2	1083.65
	3	Post 2010 Median	4	0	112	0.34	5.8	7.8	1142
	% Change					-82%	-99%	-75%	-87%
Point 15 Trib Mouth PA 3898	12	Pre 2010 Median	3.4	0	228	4.2	29.2	25.7	1300
	4	Post 2010 Median	4.1	2.9	78	0.66	19.4	8.7	1076
	% Change					-66%	-84%	-34%	-66%
Point 17 Discharge PA 1934	43	Pre 2010 Median	2.8	0	1433.2	300	24.3	102.7	2950.3
	11	Post 2010 Median	2.8	0	1599	300	26.2	114.5	2887
	% Change					12%	0%	8%	11%
Point 19 Discharge PA 1934	15	Pre 2010 Median	3.1	0	369	15000	45.4	33.2	1564.4
	4	Post 2010 Median	3.4	0	145	7828	25.7	13.4	1235
	% Change					-61%	-48%	-43%	-60%
Point 20 Artesian Discharge PA 3897	14	Pre 2010 Median	5.8	31	287	18.5	33.3	0.61	2025.9
	4	Post 2010 Median	6.0	66.5	280	16.8	31.8	0.51	2189
	% Change					-2%	-9%	-5%	-16%
Huling Branch Site 4 Discharge	17	Pre 2010 Median	2.6	0	686	58.3	28.1	52	1545
	13	Post 2010 Median	2.7	0	441	53	17.1	23.6	741
	% Change					-36%	-9%	-39%	-55%

Note: This subset of sample points represent only reclamation areas where source abatement and alkaline material addition techniques were deployed. No passive or active treatment is occurring in connection with these locations. The 320 acre Dents Run AML/AMD Ecosystem Restoration Project started in October 2002 and was completed in March 2012.

Figure 13

Summary/Conclusion

The Huling Branch AML Reclamation Project was a success story which included eliminating a combined length of over 6,000 L.F. of P2 DHs while improving the AMD impacts into the Twomile Run Subwatershed of Kettle Creek. The Whiskey Springs ATV trail within the Sproul State Forest will continue to bolster the local economy and will provide unlimited fun and safe recreational outdoor multimodal opportunities to all who visit. The Huling Branch AML Reclamation Project site provides a terrific example of AML/AMD abatement accomplishments in Pennsylvania and the potential to transfer this approach to other AML sites throughout the county.

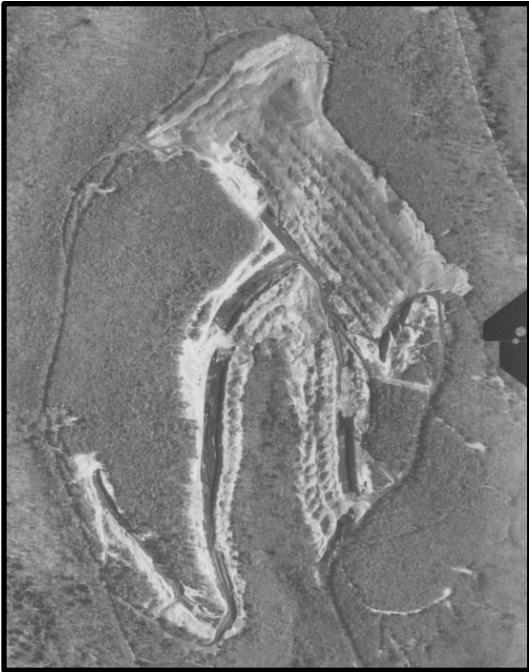


Figure 14 – Pre-Construction 1959 Aerial Image



Figure 16 – (November) Pre-Construction 2012 Aerial Image

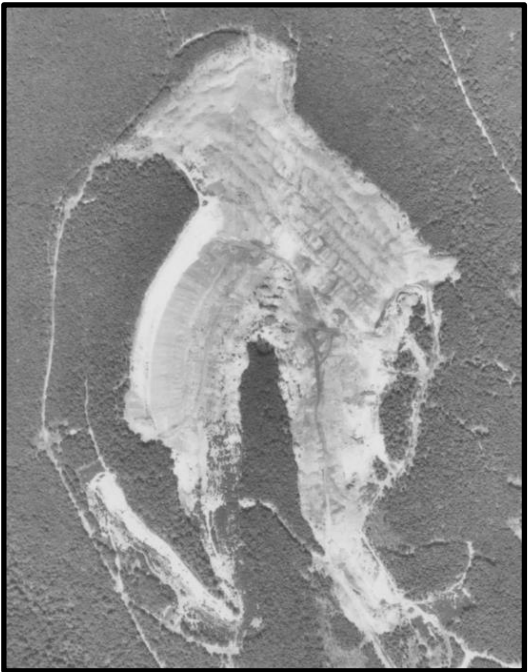


Figure 15 – Pre-Construction 1968 Aerial Image



Figure 17 – (November) Pre-Construction 2012 Aerial Image



Figure 18 – Pre-Construction 2012 Typical Dangerous Highwall



Figure 20 – Pre-Construction 2012 Typical Dangerous Highwall



Figure 19 – Pre-Construction 2012 Typical Spoil Area



Figure 21 – Pre-Construction 2012 Typical Spoil Area



Figure 22 – During Construction, Coal Removal



Figure 24 – During Construction, Coal Screening



Figure 23 – During Construction, Buried Coal Refuse Removal



Figure 25 – During Construction, Deep Mine Wet Seal and Subsurface Drain



Figure 26 – During Construction, Rock Underdrain



Figure 28 – During Construction, Backfilling and Alkaline Addition Blending



Figure 27 – During Construction, Alkaline Addition



Figure 29 – During Construction, Backfilling and Alkaline Addition Blending



Figure 30 – During Construction, Seeding of Conventional Backfill Area



Figure 32 – (June) Post-Construction, Conventional Backfill Area and Pond



Figure 31 – During Construction, FRA Grading Prior to Tree Seedlings Planting



Figure 33 – (June) Post-Construction, Conventional Backfill Area



Figure 34 – (June) Post-Construction, Conventional Backfill Area



Figure 36 – (March) Post-Construction, FRA Grading and Tree Seedlings



Figure 35 – (March) Post-Construction, FRA Grading and Tree Seedlings



Figure 37 – (March) Post-Construction Conventional Backfill Area and Pond



Figure 38 – (March) Post-Construction 2017 Aerial Image



Figure 39 – (March) Post-Construction 2017 Aerial Image



Figure 40 – Kettle Creek Watershed Sign Along Whiskey Springs ATV Trail



Figure 42 – Parking Area 36 Along Whiskey Springs ATV Trail



Figure 41 – Huling Branch Site 4 Discharge Monitoring Point



Figure 43 – 2016 Rattlesnake National Enduro Competitor - Shan Moore, #31

