

# **THE KALP AND MELCROFT AMD ABATEMENT PROJECTS**

## **LOCATION**

Problem Areas PA 2767 and PA 0429  
Saltlick Township  
Fayette County, Pennsylvania

## **SUBMITTED BY**

Roderick Fletcher, P.E.  
Director, PA-DEP Bureau of Abandoned Mine Reclamation  
Harrisburg, PA 717-783-2267 (rfletcher@state.pa.us)  
and  
Richard Beam, P.G.  
Environmental Services Section, Cambria District Office  
Ebensburg, PA 814-472-1800 (ribeam@state.pa.us)

## **PROJECT START DATE**

July 9, 2005

## **PROJECT COMPLETION DATE**

August 1, 2006

## **CONSTRUCTION COST**

AML Funds - \$ 658,248.00  
USDA NRCS Funds - \$ 446,480.00  
Total Project Cost - \$1,104,728.00

## **PROJECT PARTNERS**

PA-DEP Bureau of Abandoned Mine Reclamation  
USDA Natural Resources Conservation Service  
Mountain Watershed Association, Inc.

## **CONTRACTORS**

Stoy Excavating Inc.  
Somerset, PA

REI Drilling, Inc.  
Salt Lake City, UT

Chemstream  
Boswell, PA

## **DATE SUBMITTED**

March 27, 2007

## **Executive Summary**

The Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation (PA-DEP BAMR), the USDA Natural Resources Conservation Service (NRCS), and the Mountain Watershed Association, Inc. (MWA), a local grassroots group, completed phase I of an innovative mine drainage abatement project. The project involved two abandoned underground mine sites that exhibit significant water quality and public health and safety problems. Both sites are included in the National Abandoned Mine Land Inventory as Problem Areas PA 2767 and PA 0429 and are classified as high-priority problems. The sites are identified as the Melcroft #1 Mine (Kalp site) and the Melcroft #3 Mine (Melcroft site). In 1984 both the Federal Office of Surface Mining (OSM) and PA-DEP BAMR recognized the mine pool at the Kalp site as a significant priority 2 health and safety hazard, because of its impact to adjacent homes, properties and public highways and its potential for a mine pool blowout. In 1991 a worker was fatally injured while attempting to clean iron deposits from the drift opening. In addition, the mine pool at the adjacent Melcroft site was inundating a number of basements and causing considerable damage to homes in the nearby Village of Melcroft. Figure 1 is a photo taken at one of these homes.

Remediation efforts at both sites relied on in-seam directional drilling to facilitate control of the mine pools and collection of the mine discharges. Directional drilling is used extensively in underground mining applications; however, this was the first time that this approach was used on a Pennsylvania AML site to convey and control abandoned mine pool discharges. In-seam directional drilling relocated the current discharges to areas proximal to the proposed (phase 2) treatment systems. Approximately 30 feet of mine pool hydraulic head was gradually and permanently removed at both project sites. Directional drilling provided both a mechanism to address and reduce the blowout potential along with providing a lower cost and minimal disturbance alternative to the construction of overland mine drainage pipelines that would be required in order to route the existing discharges to the treatment areas. Overland pipelines from the current discharge locations would not lower the head in the mines and would result in substantially increased disturbance to properties, homes and public roads located between the discharge areas and the treatment system locations. An overland pipeline would also have required partial dewatering of the mine pools during construction in order to gain access and to stabilize the current discharge locations. During the spring of 2006, after completion of drilling activities, BAMR released two contracts to dewater and chemically treat the Melcroft #1 and #3 Mine pools in order to expeditiously address the aforementioned health and safety concerns and to aid in the design and construction of the pending phase 2 treatment projects.

Beneficial impacts of the Kalp and Melcroft projects include improvement to the safety of local residents. Lowering the hydraulic head in the mine pools has significantly minimized the potential for a mine blowout, thus reducing to the greatest practical extent a documented priority 2 health and safety problem. In addition, solutions to water quality problems provide many associated beneficial impacts in addition to improved water resources. These include increased property values, increased opportunities for economic development, enhanced educational and recreational opportunities and improved aesthetics. Mine reclamation projects often stimulate community revitalization. A cost/benefit analysis conducted by NRCS indicated that each reclamation dollar spent in the Indian Creek Watershed would generate \$2.40 in economic benefit to the community. Opportunities exist to use these restoration and treatment projects as educational tools. MWA has developed and implemented an outreach program to educate local residents and schools about AML problems, water quality and watershed health.

## **Introduction**

The Kalp and Melcroft sites are located in Saltlick Township, Fayette County, Pennsylvania. The receiving stream, Indian Creek, is located in the north central portion of the upper Youghiogheny River Basin. The watershed lies between the Laurel and Chestnut Ridges in the bituminous coal fields of southwestern Pennsylvania. Indian Creek flows south for approximately 26 miles to its confluence with the Youghiogheny River (Ohio River Basin). Abandoned coal mining operations in the central portion of Indian Creek have severely impacted 17.4 miles of the stream. Indian Creek is a high quality cold water fishery upstream of the Village of Melcroft.

The Mountain Watershed Association (MWA) was formed in 1994. MWA and its partners, PA-DEP BAMR and the NRCS recognized the need and advantages of developing a comprehensive plan to address various mine drainage and abandoned mine land problems in the Indian Creek Watershed. To date, much work has been done to identify and address the most significant AML problem areas. Eleven of the 155 AMD discharges identified in the watershed were targeted for remediation because they account for over 95% of the AMD pollution load. The Kalp and Melcroft projects represent significant milestones in a series of projects aimed at restoring the aquatic resources of Indian Creek and lessening the impact of AML problems in this community.

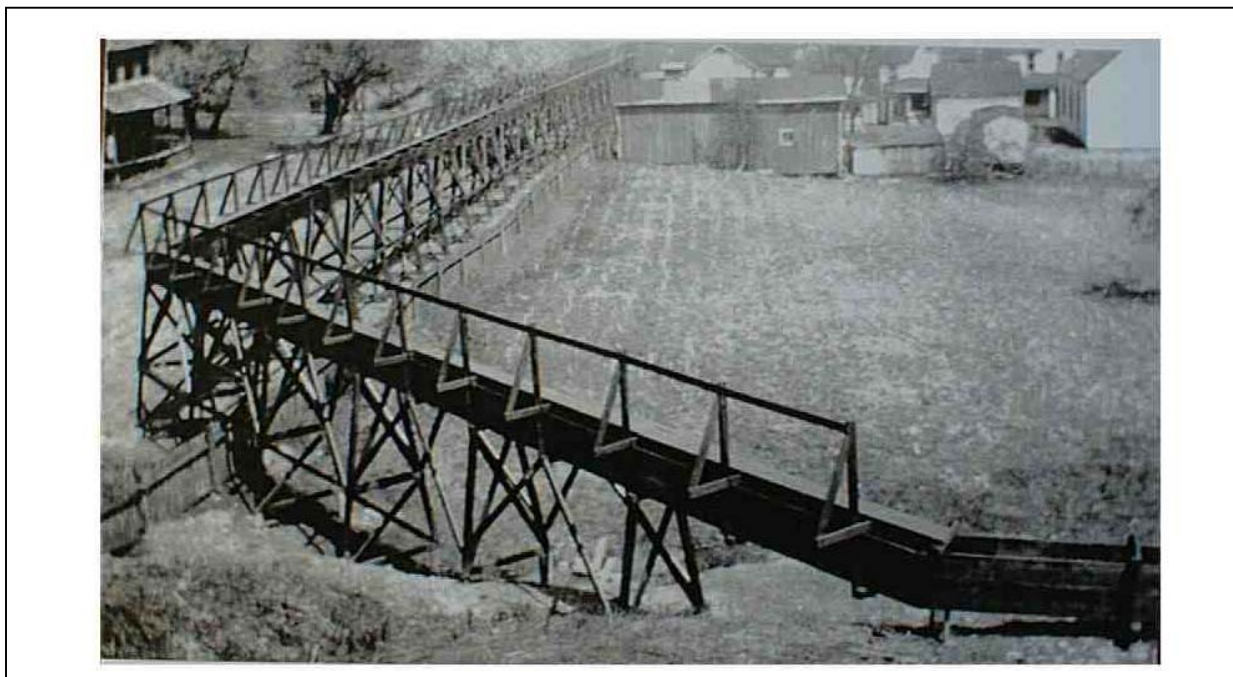


**Figure 1: AMD in home basement Village of Melcroft**

## **Mining History, Description of the Sites and AML Problems**

Underground coal mining began in the Indian Creek valley in the mid to late 19<sup>th</sup> century and continued until the late 1960s. The mines were developed on the Middle Kittanning coal seam (locally known as

the Miller B Coal) adjacent to the Indian Creek and Champion Creek valleys. Acid mine drainage problems were prevalent as early as during mine development and have continued to the present. In 1924 Melcroft Coal Company and other mining companies were enjoined and restrained from allowing AMD discharges into the upper Indian Creek Watershed by the Fayette County Court of Common Pleas. The order resulted from a lawsuit brought against the various coal companies by the Pennsylvania Railroad and several private water companies. The lawsuit claimed that the mines were causing pollution of the downstream Mill Run Reservoir on Indian Creek. In order to comply with the court, the mining companies constructed a mine drainage “flume” to collect and convey mine drainage to a point downstream of the reservoir. The seven-mile system, originally constructed with wooden flumes Figure 2), used piping to provide connections to and between existing mine workings. The flume system discharged below the reservoir into Charles Run, a tributary of Indian Creek. During the mid 1970s the flume system began to malfunction as a result of deterioration, plugging and lack of any significant maintenance. AMD from these abandoned mines now enters properties throughout the watershed and the main channel of Indian Creek at the down-dip mine entries or as coal crop line discharges.



**Figure 2: Historic photo of a portion of the mine drainage flume**

The Melcroft #1 Mine affected approximately 2500 acres. Room and pillar mining was conducted from the early 1900s through the 1930s and a portion of the mine was reopened in the late 1950s. Approximately 2300 acres of the mine complex are updip and are free draining to a drift entry known as the Kalp opening. The surface elevation of the Kalp opening is 1472 MSL. Mine development extended down structure to elevation 1415 MSL resulting in a 200-acre mine pool situated along the downdip cropline. The Kalp opening was the mine discharge location prior to project implementation and also the original starting point for the flume system.

Prior to project implementation, the mine pool exhibited a hydraulic head of approximately 50 to 60 feet along the downdip coal cropline. Undocumented “country bank” abandoned underground mines exist along the cropline, further jeopardizing the integrity of this barrier. The cropline parallels State Route S.R. 0711/0381. Eighteen homes are located along the roadway at or below the elevation of the cropline. Seepage from the pool was evident in numerous areas. The main Kalp discharge crossed under the

highway through drainage culverts. The culverts required frequent cleaning and replacement. In high flow conditions or as a result of culvert failure or plugging the discharge would overtop the roadway. Especially hazardous wintertime roadway conditions would result.

The Kalp discharge is the largest AMD discharge in the Indian Creek Watershed. It is acidic, with elevated metals concentrations, producing approximately 40% of the total AMD pollution load in the watershed. Indian Creek receives 447 tons of acid, 128 tons of iron, and 20 tons of aluminum from the Kalp discharge every year, impacting the stream for a distance of approximately seven miles.

The Melcroft site was the last operating mine in the Melcroft area. This mine was a room and pillar operation that encompassed approximately 650 acres. It was officially closed on December 23, 1966. Prior to project implementation areas below a coal seam elevation of approximately 1470 feet in the #3 Mine were flooded. The Melcroft No. 3 Mine pool is the source of pollutional baseflow and cropline discharges that adversely impact Indian Creek. In addition, the Melcroft No. 3 Mine pool has caused considerable property damage to a number of residences in the Village of Melcroft by flooding basements. Eight homes in the Village of Melcroft located along the downdip cropline had significant AMD problems due to the 60 to 70 feet of updip mine pool head in the #3 Mine.

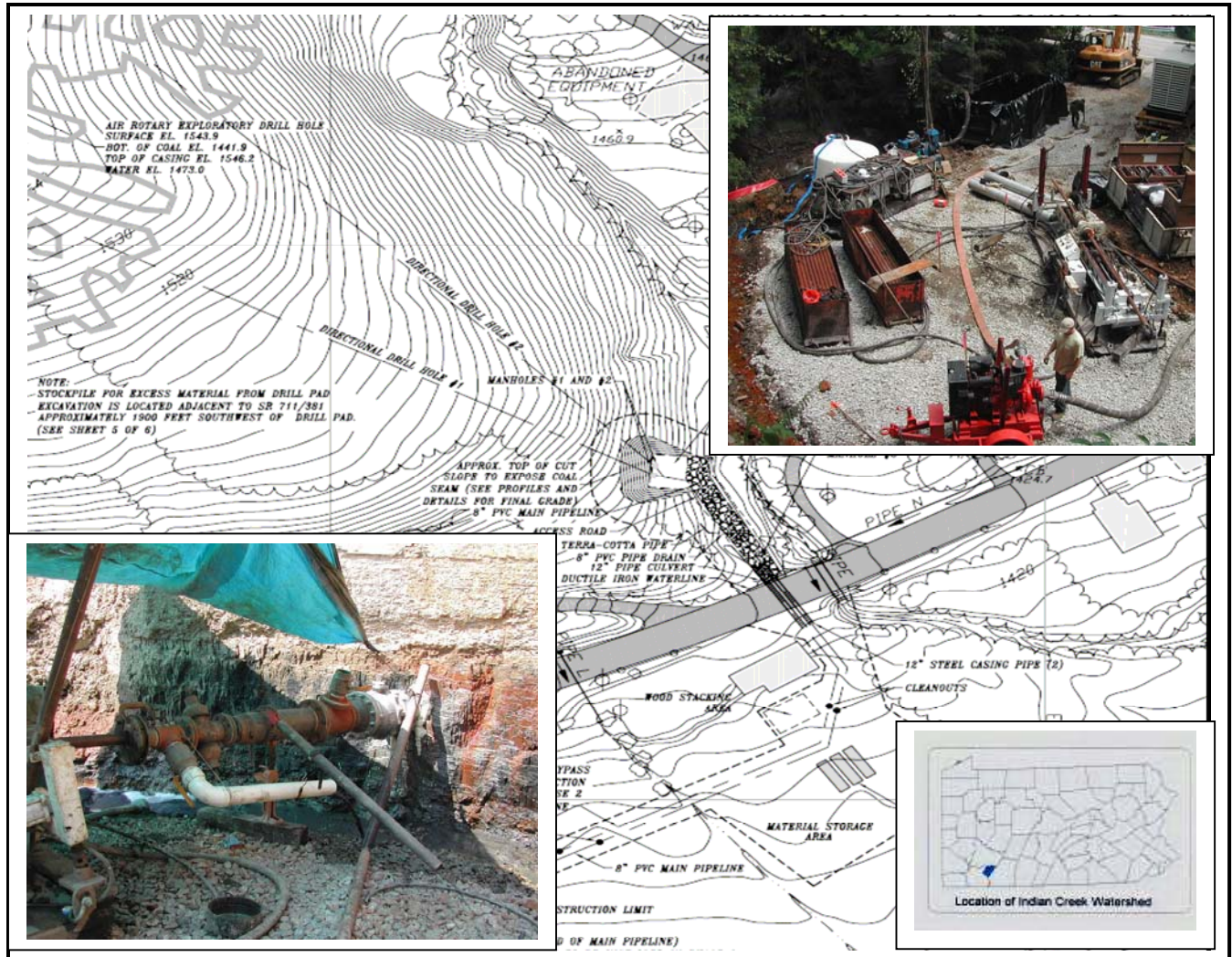
Both mine pools were causing considerable property damage to a number of nearby residences. Mine drainage was partially flooding basements, inundating yards and damaging public highways. In 1984, both OSM and the PA-DEP BAMR identified the mine pool at the Kalp site as a significant priority 2 health and safety hazard because of its impact to adjacent homes, properties and public highways and the potential for a mine pool blowout.

### **Project Design and Construction Summary**

Many challenges existed during the development and implementation of the Melcroft and Kalp projects. The project partners employed a collaborative methodology in addressing these. Project funding from PA-DEP BAMR, NRCS and private funds, leveraged by the watershed association, were combined to fund project design and construction. Additionally, staff resources and technical expertise of the partners were combined to address specific needs. Examples include:

- MWA led the effort to obtain community support, perform archeological surveys, secure landowner agreements and negotiate for and acquire property for the project. OSM and PA-DEP BAMR funds were combined with private funds for property purchase. PA-DEP BAMR real estate staff and contract surveying and mapping contractors assisted in this effort. Part of the MWA outreach strategy included engaging community members in lobbying for the reauthorization of the AML Reclamation Fund, highlighting the critical role that SMCRA serves in the restoration of coalfield communities.
- A project team consisting of management staff and professional engineers and geologists from NRCS and BAMR worked together on all aspects of project design. Because the implementation of directional drilling technology for mine pool control and facilitation of treatment was new to both agencies, significant research and consultation with directional drilling companies was required, resulting in the development of very unique and detailed contract specifications.
- PA-DEP BAMR exploratory drilling contract services, aerial photography and mapping contracts were used to provide critical project design information. In addition these air rotary drill holes served the project by providing mine pool elevation monitors. At the Kalp site they were also used as injection wells during the directional drilling operation. Solids from the drilling operation were captured in portable containers and the drilling water was decanted and pumped back into the mine

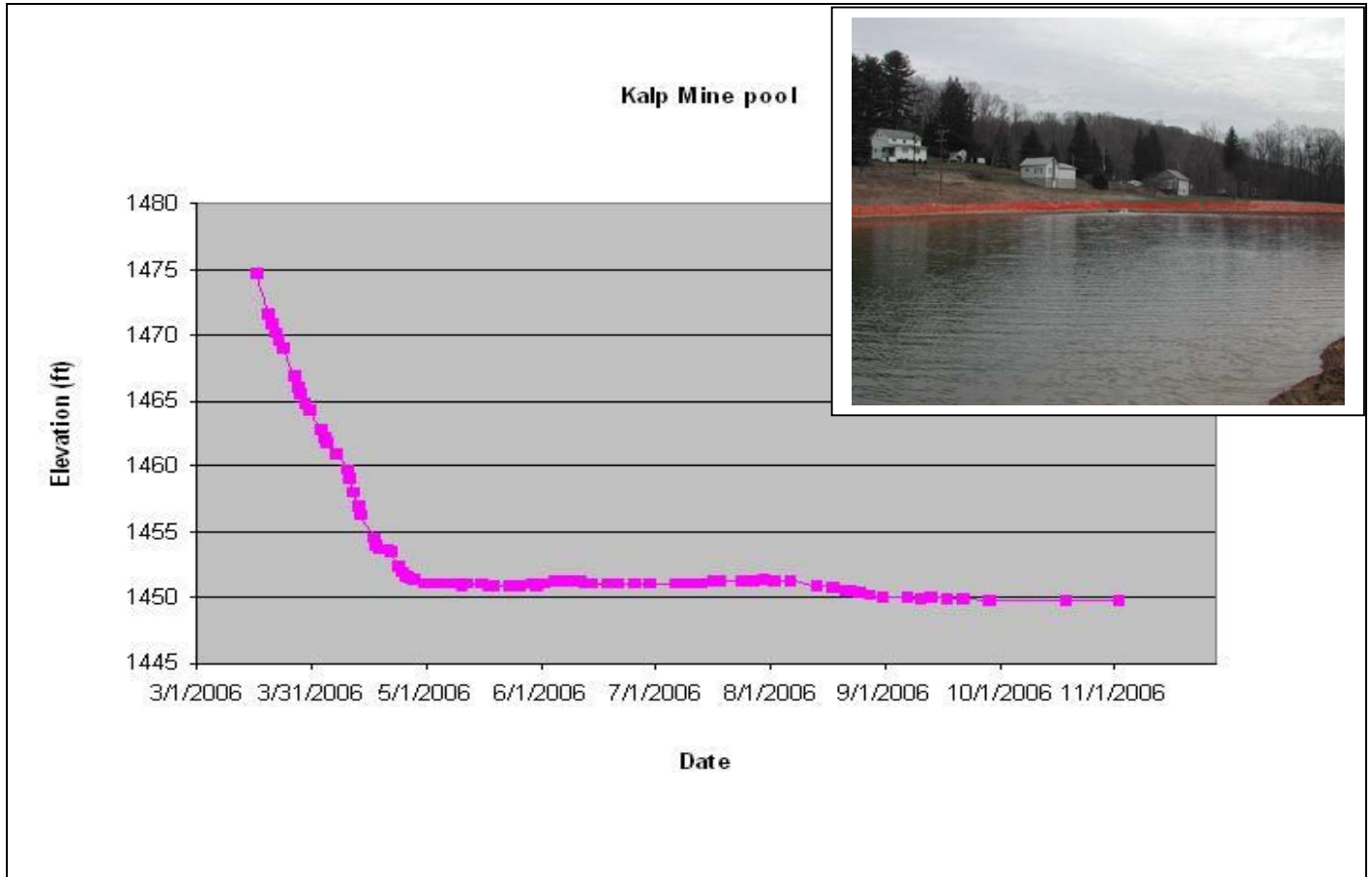
pool. This resulted in a significant cost savings for the project in that treatment of a discharge during drilling operations was not needed. Figure 3 shows the Kalp site drilling area. Given the space limitations at this site, injection of the drilling water into the pool also minimized the construction footprint.



**Figure 3: Directional drilling at the Kalp project site**

- An NRCS design and competitive bid contract was used to obtain construction services for the directional drilling and ancillary construction. Both the Kalp and Melcroft project sites were included in one contract so as to take advantage of economies of scale. Cost was shared between the agencies.
- Project team members shared construction inspection and project oversight duties. As construction progressed, several aspects of the project design required modification in order to address field conditions. In these instances both the general contractor, Stoy Excavating Inc. and the directional drilling contractor, REI Drilling, provided invaluable advice and worked with team members in finding solutions.
- After completion of drilling activities BAMR released two contracts to dewater and chemically treat the Kalp and Melcroft mine pools. Twin objectives were to expeditiously address the

aforementioned health and safety concerns and to aid in the design and construction of the pending phase 2 treatment projects. At the Kalp site a total of 80,655,000 gallons of mine pool water has been removed and chemically treated. At the Melcroft site a total of 48,630,000 gallons of mine pool water was removed and chemically treated. The directional boreholes functioned flawlessly in dewatering and controlling the mine pool discharges.



**Figure 4: Dewatering and chemical treatment of the Kalp Mine pool**



**Figure 5: Typical cropline discharge area before and after dewatering**

## **Outcome**

At the Kalp site crop line seeps and discharges, including the original discharge point for the mine (Kalp discharge), have been eliminated. The potential for a mine pool blowout has been significantly reduced and homeowners who had been experiencing problems with mine drainage in their yards and basements no longer are subject to these problems. Figure 5 is a before and after photo showing one of the crop area discharges. The mine is currently discharging from the directional boreholes at its baseflow condition.

Significant reduction of flow has been noted in existing discharges from the mine complex at the Melcroft site (Melcroft #3 Mine). Homeowners have reported substantially improved conditions. Monitoring of impacts of these sites and of adjacent homes with mine drainage problems is continuing.

## **Summary**

A phase 2 passive treatment project is currently in construction at the Kalp site and design of the Melcroft passive treatment system is currently underway. Application of directional drilling technology has provided a mechanism to address and reduce the blowout potential and furnished a lower cost and minimal disturbance alternative to route and consolidate AMD discharges for treatment. Beneficial impacts of the Kalp and Melcroft projects encompass both the safety of local residents and substantial environmental restoration.

The Kalp discharge marred a federally designated Scenic Byway. This will no longer be the case. The improvement in the watershed is already substantial enough that community residents have stopped at the MWA office to remark about it. The new treatment system is located near a floodplain with wetlands that once flowed red with iron. The system will ultimately blend into the landscape as a series of ponds frequented by wildlife against a backdrop of mountains. After successful plantings at another remediation site, MWA staff were told that the area was pastoral and no longer an eyesore.

The long-term benefits to the Indian Creek Watershed are the restoration of miles of coldwater fishery. The long-term benefits to the community are: an increase in property values; the ability to fish in the streams; an economic benefit of more than \$500,000 annually based on a cost/benefit analysis; a reduction of health impacts from metals in the water; and an improvement in community self-esteem. For a small, rural, southwestern Pennsylvania community, this result amounts to a priceless long-term benefit.



**Additional Project Photos**



**Directional drilling at Melcroft #1 Mine (Kalp site)**



**Reclaimed drill site at Melcroft #1 Mine (Kalp site)**

**Additional Project Photos**



**Mine pool dewatering and chemical treatment at Melcroft #1 Mine (Kalp site)**



**Mine pool dewatering and chemical treatment at Melcroft #1 Mine (Kalp site)**

**Additional Project Photos**



**Directional Drilling at Melcroft #3 Mine (Melcroft site)**



**Completed Directional boreholes at Melcroft #3 Mine (Melcroft site)**

## Additional Project Photos



**Treated discharge during mine pool dewatering**



**Passive treatment construction area at the Kalp site**