



# HedinEnvironmental

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A consulting firm specializing in mine drainage treatment

## Our Clients

Hedin Environmental was founded by Dr. Robert S. Hedin in 1994 and is located in Mt. Lebanon, PA. The firm specializes in the assessment and remediation of polluted mine drainage, primarily by passive treatment techniques. Our clients include watershed organizations, townships and municipalities, non-profit organizations, mining companies, insurance companies, law firms, engineering firms, and state and federal agencies.

## Our Expertise and Services

Hedin Environmental is a small professional organization. Our three professional employees have 40 years of combined mine drainage experience. Our primary services are related to the restoration of polluted mine drainage. Project activities include: mine discharge characterizations, watershed assessments, stream restoration plans, the design, permitting, and construction of passive treatment systems. Passive treatment is an evolving science and Hedin Environmental is on the cutting edge of technology development. When appropriate, we implement innovative technologies into our restoration plans and projects.

## Hedin Environmental Staff

Hedin Environmental has a full-time staff of professionals as well as several part-time employees. Our employees are based throughout the state to provide timely and personal service to all clients, regardless of location. Our full-time staff include:





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Dr. Robert S. Hedin, President

Theodore Weaver, Project Manager and Geologist

Neil Wolfe, Geoscientist

Kelly Long, Office Manager

For more information, please refer to the individual resumes of our staff members.

## Watershed Assessments and Restoration Plans

Our Restoration Plans provide discharge-specific recommendations with cost estimates and focus on a cost/benefit approach to complete watershed restoration.

***A Restoration Plan for Large Deep Mine Discharges in the Lower Chartiers Creek Watershed, Current.*** Hedin Environmental has teamed with GAI Consultants to develop a restoration plan for lower Chartiers Creek. The plan is being developed for the Chartiers Nature Conservancy through PADEP Growing Greener grants. A completed assessment project determined pollutant loadings for eight large deep mine discharges, as well as the locations and characteristics of the abandoned coal mines yielding the AMD. The team is now working on a restoration plan that will prioritize the discharges and provide treatment recommendations for each.

***Treatment of the Irwin Discharge: a Reassessment, Current.*** The Irwin Discharge is a large flow of polluted water that pollutes Brush Creek in Westmoreland County. Previous assessments have not resulted in remediation because of the high cost of conventional technology. Hedin Environmental is working with the Westmoreland County Industrial Development Corporation to reassess the treatment opportunities in light of recent developments in passive treatment technologies and resource recovery. The project is funded by the PADEP Growing Greener Program.





***Beech Creek Watershed Assessment and Restoration Plan, Current.*** HE is the primary contractor to the Beech Creek Watershed Association in conducting the assessment and formulating a watershed Restoration Plan for this large watershed in Central Pennsylvania. The assessment is on-going. This project was funded by the PA DEP's Growing Greener program and will be completed in 2005.

***North Branch of Bear Creek Assessment and Restoration Plan, 2004.*** HE was the primary consultant to the Butler County Conservation District for this project, which performed a mine drainage assessment of the watershed. Nearly 30 discharges were located and sampled monthly for one year. The Restoration Plan was finalized in June 2004. The project was funded by PA DEP's TAG and Growing Greener programs.

***Soldier Run Assessment and Restoration Plan, 2004.*** HE was the primary consultant to the Sandy Lick Conservation Initiative for this project, which performed a mine drainage assessment of the watershed. Sampling was performed by SLCI and the DEP. The Restoration Plan was finalized in June 2004. The project was funded by PA DEP's TAG and Growing Greener programs.

***Huling Branch Investigation and Remediation Plan, 2004.*** HE was the primary consultant to Trout Unlimited and the Kettle Creek Watershed Association for this project, which was funded by the Growing Greener Program. The purpose of the project was to investigate several sources of pollution to the stream, assess the potential for reclamation to improve the water quality, and offer recommendations. Several collection systems were installed. Final recommendations include remining of the coal crop and land reclamation with alkaline addition. The report was finalized in March 2004.

***Farmington Township, Assessment of Little Coon Run and Walley Run, 2003.*** Little Coon Run and Walley Run arise in Farmington Township (Clarion County,





PA) adjacent to a sanitary landfill. HE conducted an assessment and formulated a Restoration Plan for this watershed. The project was funded by PA DEP's Growing Greener Program. Growing Greener and the PA Bureau of Abandoned Mine Reclamation (BAMR) have also funded projects for the three highest-priority discharges identified in the Restoration Plan.

***Restoration of the Headwaters of Jonathan Run, 2003.*** Jonathan Run, located in Center County, is degraded by acidic water flowing from fill used to construct Interstate 80 in central PA. HE was the primary contractor to the Beech Creek Watershed Association for conducting an assessment and formulating restoration plans. HE's recommendations will be jointly implemented by BCWA and PennDOT. The project was funded by PA DEP's Growing Greener program.

***GAI Consultants and the Western Pennsylvania Horticultural Society, 2002.*** HE worked with GAI on the assessment of AMD on the future Botanical Garden site and the development of a treatment system design. A vertical flow passive treatment design was developed and delivered to the Horticultural Society for inclusion into the Garden's master plan.

***Assessment of AMD Inputs to Little Elk Run, 2002.*** Little Elk Run, located in Jefferson County near Punxsutawney, is polluted by acid mine drainage. HE conducted an assessment of the problem and developed a restoration plan. The project was funded by PA DEP's Growing Greener program. Growing Greener also funded the top priority project identified and proposed by this plan.

***Lower Kettle Creek Restoration Plan, 2001.*** HE developed a watershed restoration plan for the lower portion of the Kettle Creek Watershed in north central PA as the primary consultant to Trout Unlimited. Recommendations contained in the plan are being implemented.





***East Branch Lake and Johnson Run Mine Drainage Restoration Plan, 2000.*** HE developed a Restoration Plan for the East Branch Lake and Johnson Run in northwestern PA. These watersheds form the headwaters of the East Branch of the Clarion River. The restoration plan was based on two years of flow and chemistry data collected by the DEP. Recommendations based on this plan have been funded and are being implemented.

***Wiconisco Creek Restoration Plan, 1998.*** The Susquehanna River Basin Commission assessed water quality issues in the Wiconisco Creek watershed. HE was retained to assist with mine water aspects of the assessment. Discharges were inspected, historic water quality and mine discharge records were reviewed, and recommendations were made regarding passive treatment opportunities. HE's recommendations were incorporated into the final report and will become the basis for future restoration activities in the watershed.

## **Selected Passive Treatment Systems**

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Our passive treatment systems feature the latest technologies and are designed with a focus on long service life and ease of maintenance.

***LC20D Farmington Township Passive Treatment System and Hydrogeological Investigation, Current.*** HE is the primary contractor to the Farmington Township Supervisors for this project that will result in the plugging of several AMD-producing gas wells and the construction of a large passive treatment system. The projects, which are funded by PADEP BAMR, were identified in the restoration plan was completed by HE in June 2003. The project will also investigate the local groundwater hydrology so that the relationship between artesian flows of acid mine drainage can be better understood and used to advantage in stream restoration planning.





***Audenreid Tunnel Discharge Passive Treatment, Current.*** HE is partnering with RETTEW Associates on this large, innovative project. The Audenreid Tunnel discharge pollutes over 30 miles of Catawissa Creek. The treatment system will consist of three large self-flushing limestone tanks to treat 8,000 gpm of aluminum contaminated water. HE is assisting RETTEW Associates with conceptual design, design document review, and other tasks.

***Passive Treatment of AMD at the K&J Coal Site, Current.*** As part of the settlement between the Commonwealth and Seaboard Insurance regarding the bankruptcy of K&J Coal Company, four AMD seeps at a site in Cambria County will be treated with passive systems. Hedin Environmental led the technical team that assisted Seaboard Insurance in its negotiations, development of the treatment system designs, selection of a construction contractor, and is overseeing the construction process.

***Lowber Iron Recovery Passive Treatment System, 2001 – Current.*** HE is the prime contractor to the Sewickley Creek Watershed Association for the design, permitting, bidding and construction oversight for a passive system that will treat water through the production of marketable iron sludge. The project follows up on HE's recovery and sale of 1,200 tons of "waste" iron sludge from the site. The project is funded by the PADEP Growing Greener Program.

***Robbins Hollow Headwaters Systems, 2004.*** HE was the primary contractor for this project for four small systems to treat seepage and discharges to the headwaters of Robbins Hollow, a tributary of Two Mile Run in the Kettle Creek Watershed. Two of the systems are vertical-flow type systems while two involve oxic limestone detention ponds for marginally-contaminated flows. These projects were funded by the Growing Greener Program and the Office of Surface Mining. The systems were constructed in 2004.

***Wingfield Pines, 2004.*** HE was the primary contractor to the Allegheny Land Trust for this treatment system design. The discharge is a large, alkaline flow





from a deep mine. The system has been designed to provide educational opportunities and to produce a marketable iron product. The system design was funded by a grant from the PADEP Growing Greener Program. A separate grant will be applied for in order to construct the system.

***Anna S Mine Passive Treatment Complex, 2004.*** HE was the primary consultant to Babb Creek Watershed Association for this system, which is one of the largest passive treatment systems in Pennsylvania. The project was funded by the DEP Growing Greener Program and the Office of Surface Mining. It consists of three mine opening collection systems, 8 vertical flow ponds, 4 wetlands and 2 flush ponds, as well as extensive plumbing networks. HE performed the conceptual design and oversaw all phases of final design, permitting, bidding, and construction oversight.

***Little Elk Run MD20 Passive Mine Drainage Treatment System, 2004.*** HE was the primary contractor to Young Township for designing, permitting, bidding and performing construction oversight for this passive treatment system. The system was identified as the top priority watershed project in the restoration plan developed by HE in 2002. The system has an innovative design that is modeled on vertical flow pond technologies. However, the compost and limestone are in separate units for easy access and maintenance. The project was funded by the PADEP Growing Greener program.

***Johnson Run Passive Treatment Complex, 2002.*** HE was the prime contractor to Elk County Fishermen for the design, permitting, bidding, and construction oversight of a passive treatment system. The project was identified in a restoration plan prepared by HE in 2002. The system contains several innovative features that are intended to prolong the lifetime of the system. The raw water is pretreated with a passive self-flushing limestone system that discharges into a conventional vertical flow system equipped with a manually-operated flushing system. The flushing technologies are intended to manage





the high levels of aluminum present in the AMD at the site. The project was funded by the PADEP Growing Greener program.

***Continued Restoration of Beaver Run, the Conifer East Passive System, 2002.***

Hedin Environmental designed, permitted, bid, and oversaw construction of a passive system on Beaver Run (Jefferson County). The system treats three flows from abandoned deep mines. An existing degraded wetland was reconstructed with a limestone substrate. The discharge from the wetland flows through an oxic limestone bed. The project was funded by a grant from the PADEP Section 319 Program.

***Little Hefren Run Restoration Project, PA Bureau of Watershed Conservation, 2001.***

Hedin Environmental was awarded a Section 319 grant to design and construct a passive mine water treatment system in Cook Forest State Park (Clarion County, PA). The system consists of an anoxic limestone drain, sedimentation pond, and constructed wetland. The successful operation of the passive system has resulted in the restoration of Little Hefren Run and eliminated degradation to Toms Run.

***Conifer Treatment Complex, 1999.*** As part of a consent decree with the Commonwealth of Pennsylvania, Hanley Brick Company is obligated to decrease mine drainage pollution to Redbank Creek in the vicinity of Summerville PA. HE was retained to investigate passive treatment opportunities in the Beaver Run watershed. A stream restoration plan was developed and a 3-acre passive mine water system was constructed with HE oversight.

***C&K Coal Pit 601, 1998.*** Hedin Environmental was retained by C&K Coal Company to investigate an under-performing passive treatment system in the Mill Creek watershed (Jefferson County). The system was redesigned to include an anoxic limestone drainage and reshaped constructed wetlands. The system was constructed in 1998 and has operated successfully since with minimal operation and maintenance.





***Design and Construction of the SR101–A Passive Treatment System, 1996***

HE worked with Biomost, Inc and Slippery Rock University to design and construct a passive system for a discharge in the headwaters of Slippery Rock Creek. The design included an anoxic limestone drain, settling pond, and constructed wetlands. The system has operated successfully with minimal operation and maintenance. The project was funded by a grant from the PADEP 319 Program to Slippery Rock University.

***Design of Passive Systems at the Sequatchie Valley Coal Sites, Dunlap, Tenn.***

**1996.** Hedin Environmental performed discharge studies and developed passive treatment plans for a large surface mine site in Tennessee. HE worked with the Client's engineers to develop construction plans for a large system that was constructed in 1995. The system consists of a 4000 ton anoxic limestone drain followed by two settling ponds and a large constructed wetland. The system has met permit standards since it was constructed with only routine O&M.

***Design and Construction of the SR114 Treatment Systems, 1995.***

HE teamed with CDS, Inc. and Jestead Excavating to design, permit, and construct two passive systems in the headwaters of Slippery Rock Creek. Each system contains an anoxic limestone drain followed by settling ponds and wetlands. The systems have operated successfully with little operation and maintenance. The project was part of a bond forfeiture settlement negotiated between the PADEP and Utica Insurance.





## Other Projects

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Our professional staff apply their knowledge and experience to a wide variety of projects.

***Technical Assistance Grant Program, Current.*** HE is the primary subcontractor to Trout Unlimited, Inc, which received a Technical Assistance Grant to provide expert mine drainage assistance to groups throughout Pennsylvania, with a special focus on the West Branch of the Susquehanna River. Through this program, TU is able to provide quick responses to requests for help with discharge investigation, watershed snapshots and conceptual treatment system design.

***Remediation of the Moran Tunnel Discharge, Current.*** Hedin Environmental has teamed with SES Environmental (Kansas City) to assist the US Bureau of Land Management with the remediation of AMD flowing from the Moran Tunnel, near Arco, Idaho. The HE/SES team is evaluating remediation alternatives that include in-mine biological treatment, renovation of an existing passive treatment system, and enhancement of natural remediation processes in an adjacent wetland.

***Tangascootack System Autopsy and Redesign, Beech Creek, PA, Current.*** HE is part of a team assembled to study a failed vertical flow pond system. The system was constructed by NRCS in 1998 and failed shortly thereafter. The pond has been drained and samples of compost and limestone will be analyzed. HE will provide recommendations for the reconstruction of the system.

***Iron Recovery Projects, Various Locations in PA, 1995 – 2004.*** HE has developed a technology that produces marketable iron products from mine water. The original R&D was supported by Phase I and II Small Business Innovation Research awards from the US Department of Agriculture. Pilot scale testing occurred jointly through the Sewickley Creek Watershed Association and Southern Alleghenies Conservancy using funds provided by the US Office of





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Surface Mining Resource Recovery Program, the PADEP Growing Greener Program, and the Western Pennsylvania Watershed Program. 1,500 tons of iron oxide have been recovered and sold. In 2000, Iron Oxide Recovery, Inc. was formed to take over the R&D and production activities.

***Technical Assistance Grant Program, 2001 – 2003.*** HE was the primary subcontractor to Stream Restoration, Inc, which received a Technical Assistance Grant to provide expert mine drainage assistance to groups throughout Pennsylvania. Through this program, HE provided quick responses to requests for help with discharge investigation, watershed snapshots and conceptual treatment system design. Many groups used the information provided through this program to secure full-scale grants from DEP and other entities.

***Waste Management, Inc., Philadelphia, PA, 1997 – 2003.*** HE operated an AMD treatment system at a site in central PA. While managing the site to assure cost-effective compliance with applicable discharge permits, HE also explored the feasibility of moving the treatment responsibilities to a location where treatment would provide significant benefits to a highly valued stream.

