THE KENNECOTT RIDGEWAY MINE
A CASE STUDY IN SUSTAINABLE DEVELOPMENT

Background

Kennecott Ridgeway Mining Company completed gold mining operations in November 1999. Site reclamation focused on tailings impoundment stabilization, overburden storage removal, dismantling and disposal of process facilities, the development of two open pit lakes and an adjoining wetland system. Revegetation of all previously disturbed, and subsequently restored, land surfaces was completed in 2002.

The Ridgeway Mine operated for 11 years, during which time relationships within the local communities changed from one of mixed skepticism and outright opposition to one of mutual support and trust. This was achieved through the active engagement of mine opponents and local community groups in the form of information sharing and regular site meetings to discuss plans and issues of concern.

By mid-year 2001, the physical activities required to create the various components of the reclamation plan were complete. It is anticipated that six to ten additional years will be required to complete the filling of the two main lakes and to allow the wetland system to achieve maturity. While all processing facilities have been removed, the Ridgeway administration and maintenance buildings will remain to provide opportunities for future sustainable development at the site.

Mine Location

The Ridgeway Mine was an open pit, precious metal mine which produced a doré bar composed of approximately 60 percent gold and 40 percent silver. The mine is located in Fairfield County, approximately 20 miles north from Columbia, the capital city of South Carolina.

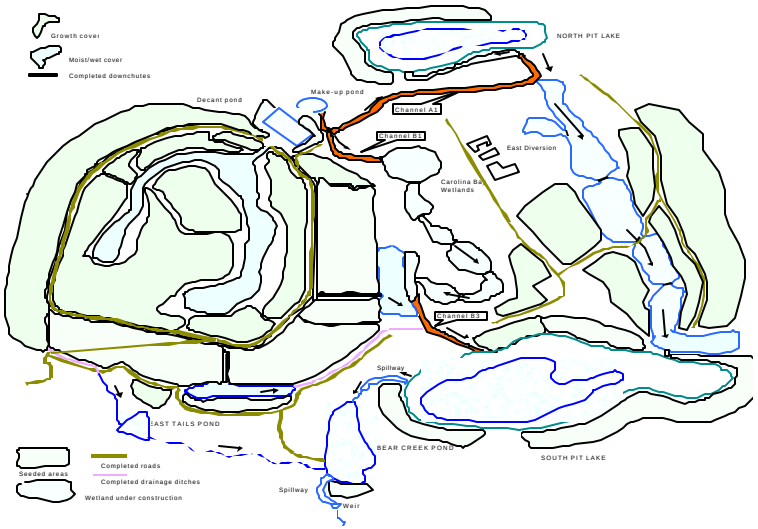
Aerial view of the Ridgeway Mine, tailings and processing facilities before reclamation (2000)

Site Stabilization

Ridgeway's intention has always been to look at opportunities in which the reclaimed mine site could be used for future sustainable environmental, economic and social initiatives. Allowing the site to return exclusively to the native state of mixed forest, typical of the area, was considered to be a less desirable or productive outcome of the post mining land use for the local communities.

The first priority in the Ridgeway Mine closure plan was to ensure the long-term physical, chemical and ecological stability of the site. Achievement of this objective was seen as fundamental to developing future alternative site uses that would be of benefit to the local communities. With this in mind, Ridgeway carefully reviewed all aspects of the reclamation plan and set out to enhance specific components to provide greater levels of site stability. Of prime importance was the stability of the reclaimed tailings impoundment surface cover and creation of wetlands for surface water runoff management and control.

In order to handle the probable maximum precipitation event of 42 inches of rain in a 24-hour period, the height of the tailings impoundment perimeter crest was increased and a new spillway was designed and constructed to handle the huge water flows that were calculated to be produced during such an unlikely event. The entire impoundment surface was then sealed with a clay soil cover ranging from three to six feet thick and successfully revegetated. Downstream from the impoundment, water diversion channels were built to direct the water flows leaving the impoundment to the two lakes created from the north and south open pit mines.



Enhanced Reclamation Plan for the Ridgeway Mine

Reclaimed Tailings Impoundment (Upper Background) and Water Diversion Channel "Carolina Bay" (Foreground) at the Reclaimed Ridgeway Mine (2002)

Wetlands were created linking the two lakes to provide storm water runoff surge capacity and to enhance the overall aesthetics and biodiversity of the site.

Over 40 Acres of Wetlands Were Created to Enhance Biodiversity at the Reclaimed Ridgeway Mine (2001)

Through very extensive research, followed by thorough and fundamentally sound engineering practices, the mine plan incorporated minimal operational impacts, concurrent reclamation practices and a robust closure plan. Some highlights included:

- Disturbance of only 900 acres out of a potential 2000 acres at the mine site, or approximately 45 percent of Kennecott's land holdings.
- Construction of a tailings impoundment capable of holding 42 inches of precipitation during a 24-hour period, designed to safely manage the Probable Maximum Flood (PMF) event.
- Capping of the tailings impoundment with 3 to 6 feet of low-permeability clayey material to maintain the tailings in a saturated state to minimize the risk of long-term acid rock drainage generation.
- Subaqueous deposition of sulfide waste rock and rapid filling of two open mine pits with water to minimize sulfide oxidation and prevent acid generation.
- Designing and operating a water treatment system that treated almost 100 million gallons of decant water from the tailings impoundment after operations terminated prior to mine closure.
- Creating multiple wetland areas to improve water quality, provide storm surge capacity and create new wetland habitats.
- Partnerships with the SC Department of Natural Resources (DNR) to maintain a 28-acre public dove field as part of a 280-acre wildlife management area, providing recreational resources for community use.
- Providing public presentations and open houses to facilitate open and honest communication with the local communities regarding questions and concerns about mine reclamation and closure.

Sustainability Options

The first concept considered by Ridgeway management, in consultation with local community leaders, was the future beneficial use of the existing Ridgeway Mine buildings and infrastructure. The buildings total 22,000 square feet of mixed industrial and office space. The regulatory requirement of 30 years of post closure environmental site monitoring, on and around the 900 acres of previously disturbed land, influenced assessing the early use of the facility assets by the community. Opportunities for future use of the buildings were further evaluated, engaging various state and local business development organizations, and it quickly became clear that the location of the site was at a considerable disadvantage for industrial development due to the presence of significant quantities of available, unleased business space immediately adjacent to the Interstate 77 highway corridor.

During reclamation presentations to the local communities, one option for future sustainable site use materialized. A local group of educators saw opportunities for the site to be developed as a facility to provide extracurricular outdoor activities for local school children. The focus would be on fitness and health, environmental education and traditional cultural value systems.

Through active engagement with Ridgeway management, this group of educators formed a non-profit organization to further develop these concepts for the Ridgeway Mine reclaimed site. This organization brought forth a post mine land use sustainable development strategy appealing to Kennecott management for which a business plan was requested but did not materialize.

An additional opportunity for sustainable use of the Ridgeway reclaimed mine site developed through interaction with an environmental consulting group contracted to monitor and evaluate lake water characteristics and develop operating strategies for the long-term management of the two pit lakes and wetland system.

Reshaped South Slope of the Ridgeway Mine South Pit Looking West Before Water Recovery (2000)

Reclaimed Slopes of the Ridgeway Mine South Pit Looking East During Water Recovery (2002)

Depiction of the Reclaimed Ridgeway Mine South Pit Looking West at Year ~2012

The consulting group, affiliated with the Southeastern Natural Sciences Academy (SNSA)[1] and to an existing 1,150-acre Nature Park that protects disappearing habitat and teaches the importance of natural resources for future generations, discussed sustainable development opportunities with Ridgeway for the creation of similar facilities at the reclaimed mine site.

In October 2002, Ridgeway signed a Memorandum of Understanding (MOU) with SNSA and in November 2003 entered into a License Agreement to create a sustainable development environmental research and education center; the Center for Ecological Restoration.

Adrian Jackman KMC CEO (left) and Dr. Gene Eidson SNSA Founder and President (right) sign License Agreement in October 2003 creating the Center for Ecological Restoration at Ridgeway

The objectives of the center are to promote a sustainable program for economic growth at the site, balanced with environmental protection and education, achieved by a transfer of knowledge through workshops and seminars coupled with general public interaction. The Agreement created a Community Advisory Committee intended to assist and advise an Operations Committee in guiding future decisions and programs of the center. The early focus would be partnering with local universities to establish certified curricula on the graduate-postgraduate level, and offer a variety of specialized environmental science courses having applied research requirements. The long-term educational opportunities would involve the local school districts and offer K-12 courses and science field trips covering ecology and the environment. The partnership between SNSA and Ridgeway means sustainable use and educational opportunities for the future of the reclaimed mine site. The future potential of the sustainable development environmental education and research center at Ridgeway is without limits.

"This collaboration between Kennecott and the Southeastern Natural Sciences Academy marks an important milestone in the evolution of the Academy research program. The reclaimed Kennecott Ridgeway mine site will provide a unique setting in which reclamation of pit lakes and other site environmental and wildlife matters can be studied and researched."

Fred Davison, former president of the University of Georgia, long-time Academy board member and member of the Operations Committee at the Center

Next Steps

Ridgeway's priority objective remains the achievement of maturity in its ecological systems with the establishment of balanced biological systems and the demonstrated stabilization of the major features of the reclaimed mine site. This will take several years, but as discussions with external stakeholders progress, it would appear that the opportunities described above are compatible with the communities' and Ridgeway's long-term objectives.

A combination of the concepts described above may actually provide early opportunities in fitness, health, environmental education and research as the site reaches stabilization.

In addition to the acreage previously used to sustain mining operations, Ridgeway owns significant holdings of "buffer lands", some 1,100 acres in total. Discussions with the groups mentioned previously, and other stakeholders, have included the use of some of these undisturbed assets as a means to bring the first phases of the proposals to fruition, subject to the established processes of community engagement and review, along with Ridgeway's management involvement.

Community Contributions

Delivering on community commitments was an essential element in the development of trust. This build-up of trust within the local communities, along with their input, will help substantially as the company moves forward with developing options for future sustainable site uses.

Over the operating life of the mine Ridgeway was an active supporter of local education. It provided performance-based awards to local teachers and contributed to statewide scholarship funds.

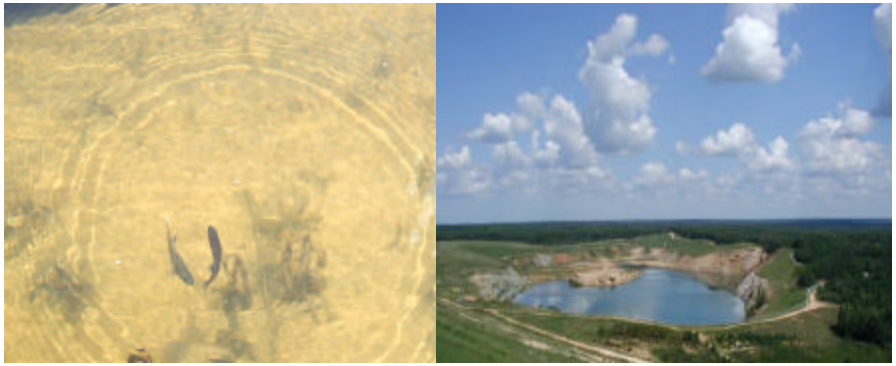
The construction of a four-mile water main pipeline linking the mine site to the Town of Ridgeway allowed local citizens the opportunity to connect to communal water supplies, an example of more substantive community support. There are plans now for the Town of Ridgeway to extend the water service pipeline to additional customers. Ridgeway also made contributions for the purchase of a community ambulance and other emergency service items.

What the Community Now Thinks

Initial adversarial relationships between the citizen's group and Ridgeway evolved into one based on mutual respect and open and honest communication.

- *"They have a supportive attitude for the area in which they operate, which spread all over South Carolina. It's turned into a good asset…A lot of the skeptics I think have come around to thinking well maybe it wasn't so bad. Maybe it was a good thing. It helped our economy. It gave employment where it was needed" – Quay McMaster, Mayor of Winnsboro.*
- *"The way it stands now, the plan, I think should appease those who were worried and I hope that most of the neighbors will be satisfied with the closure. I know that the mine is already revegetating and things look pretty and time will tell…At one point several years ago I was very afraid the mine was going to be bought by another mining company that wouldn't be so conscientious about closure, but Kennecott has done a great job." – Joyce Hampton, Spokesperson for GOLD CAMOUFLAGE Citizen's Action Group.*
- *"The mine has been very civic-minded and community-minded and they have donated each year $5,000 to be utilized for emergency services. And those funds, part of those funds, were utilized to defer part of a cost on a new ambulance." – Avery Frick, Local Emergency Services.*
- *"They have been a good neighbor. They've been a good citizen, a good community supporter." – Snooks Chappel, Fairfield County Business / Educational Partnership.*
- *"They were willing to work at finding a solution that satisfied everybody. Of course, they've been good for the tax base in the county. And, I think the county is probably going to miss them…I think everybody has done their job pretty well. I think the mine has done a job of living up to their promises, and to some extent, exceeding it really. I think the regulatory agencies have done their job in*

trying to make sure everything was done according to plan, according to rules and regulations. I think the citizens group that were watching this have done a pretty good job of trying to make sure everybody else was doing their job. I don't think anybody's tried to get away with anything. I think it's been all around a pretty decent effort." – Landrum Johnson, GOLD CAMOUFLAGE Citizen's Action Group.



Reclaimed South Pit Lake with fish now reproducing (2003)

Summary

Sustainable development at Ridgeway will showcase the ability of a primary resource industry to successfully reclaim a mine site and provide environmental protection and economic growth to benefit local communities for future generations.

Kennecott Minerals Company's implementation of sustainable development principles pertaining to the reclamation and closed properties has provided an opportunity to evaluate past and present sustainable development implementation, providing further opportunities to define continued improvements for the way forward.

Constructed wetlands at the reclaimed Ridgeway Mine site (2003).

Spillway into the South Pit Lake before reclamation (left) and after reclamation (right)

Sign posted at the entrance of the Ridgeway Center for Ecological Restoration

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[1] The Southeastern Natural Sciences Academy is a non-profit 105(c)(3) organization, founded in 1996 and located in Augusta, Georgia, to promote environmental stewardship through education, research and public outreach programs; e-mail: pswampnp@bellsouth.net .

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