

**WE GET THE BIG PICTURE**

HGI is an innovative, solution-oriented geophysical consulting company and service provider to the environmental, engineering, ground water, mining, oil & gas, and natural resource exploration industries. We specialize in the application of 3D geophysical methods for time lapse subsurface characterization and monitoring of fluid flow through geologic materials.

Innovation, quality of work, detailed focus, and flexibility are hallmarks of HGI's service. Our ability to create custom-fit solutions based on individual client needs makes us an industry leader in the field of geophysics and geosciences.

For more information on HGI's products and services, please visit us at [HGIworld.com](http://HGIworld.com) or call us at: 1-866-647-3315



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# Cover Monitoring

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## hydroGEOPHYSICS

### Are Your Covers Effective?

Waste piles are common facilities at industrial sites, and if left untreated can pose a severe environmental impact. Many of these facilities contain sulfide-rich minerals that when oxidized generate acid rock drainage. One important mechanism for containment is to eliminate the influence of meteoric water by designing a cover system that significantly reduces the vertical hydraulic conductivity.

HGI has over 18 years of experience in monitoring the effectiveness of covers and determining weak spots, focused infiltration, thinning regions from erosion and deep percolation. Our investigative techniques can be applied to landfills, tailings, saline-sodic shale overburden, reclaimed mine lands and pits, industrial waste facilities, coal ash and other similar facilities.

### Methodologies

Seeing an opportunity to apply a more holistic approach to the challenges faced during reclamation, scientists and engineers at HGI have adapted geophysical characterization and monitoring methods to visualize the dynamic movement of moisture within and below cover systems.

There are several geophysical tools available for monitoring covers, including electrical resistivity, induced polarization (IP), ground penetrating radar and electromagnetic induction. Each of these methods measures some aspect of the electrical properties of the subsurface, which are influenced by soil saturation and ionic strength of the pore water. However, resistivity and IP have the distinct advantage of looking through the cover and determining whether infiltration is affecting the waste below it.

"HGI's experience in applying geophysical methods, along with our knowledge of hydrology, has allowed us to solve some of the most difficult reclamation problems."

Dr. Dale Rucker, Chief Technical Officer - hydroGEOPHYSICS

## Subsurface Imaging

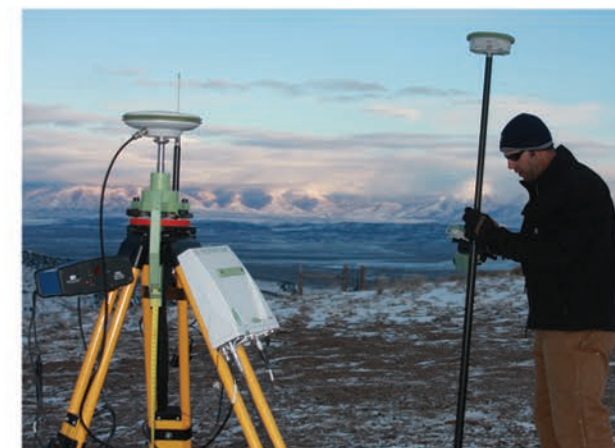
Innovative Solutions

### A Broader Understanding

Waste piles undergo natural seasonal and diurnal cycles that affect internal temperature, moisture, and vapor movement. When combined with external precipitation, monitoring covers to understand performance can be challenging unless a holistic approach is used. Geophysical characterization and monitoring provide information over a broad swath of landscapes, giving perspective to various components affecting cover performance.



Accurate

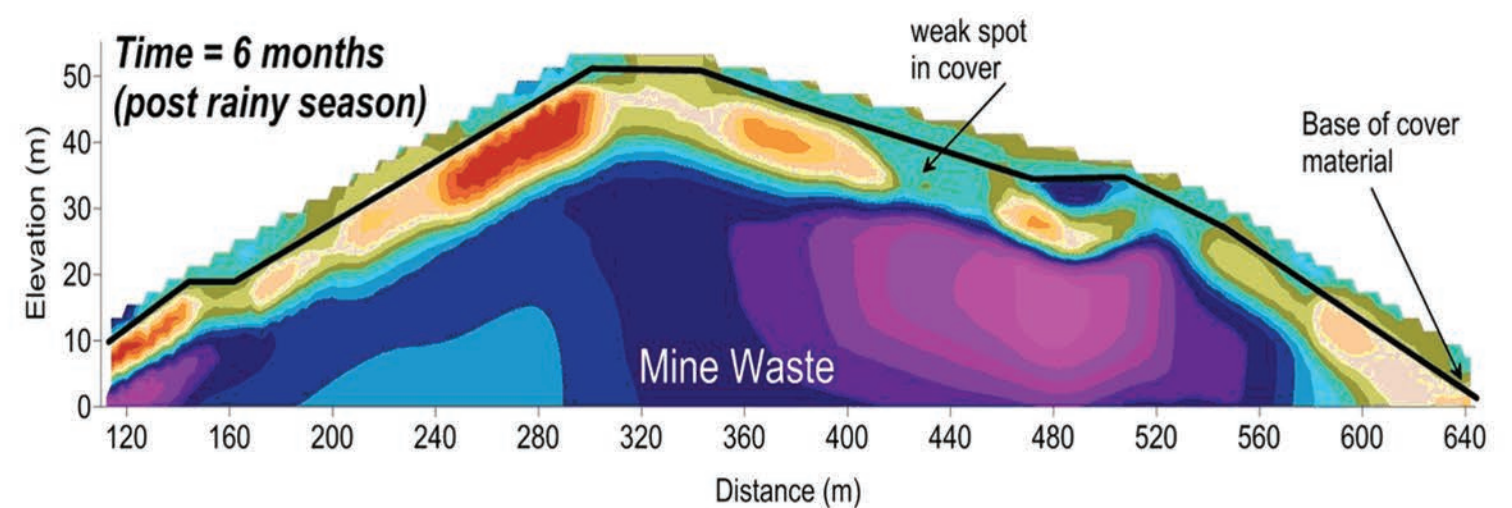
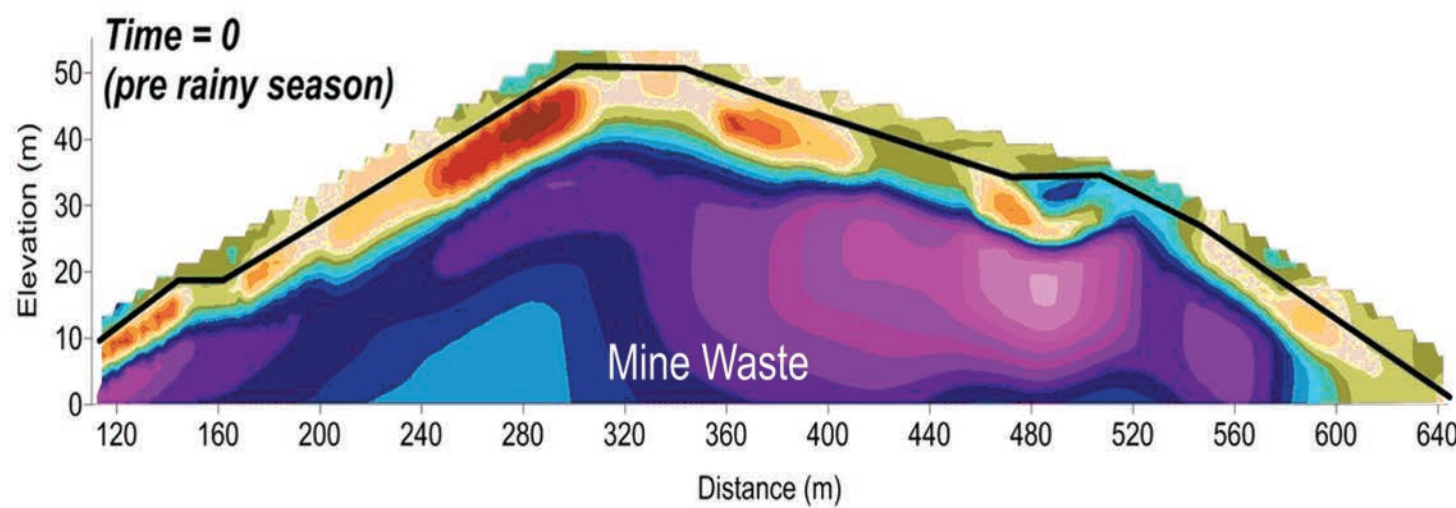


Innovative



Performance

HGI professionals have the skills and experience to support every aspect of your project from concept and design to acquisition and interpretation.



The example above shows seasonal changes occurring in the waste and cover. With the exception of a small weak spot, the cover appears to be working properly.

### Our Clients

- Apollo Gold / Jipangu
- ASARCO
- Freeport McMoRan
- Cotter Corporation
- Inland Explorations
- Kennecott Mining
- Rio Tinto
- Alamos Gold
- Anglo Gold
- Barrick
- Coeur Mining
- Kinross Gold
- KGHM
- Newmont Mining
- Sago Mine
- Pacific Copper