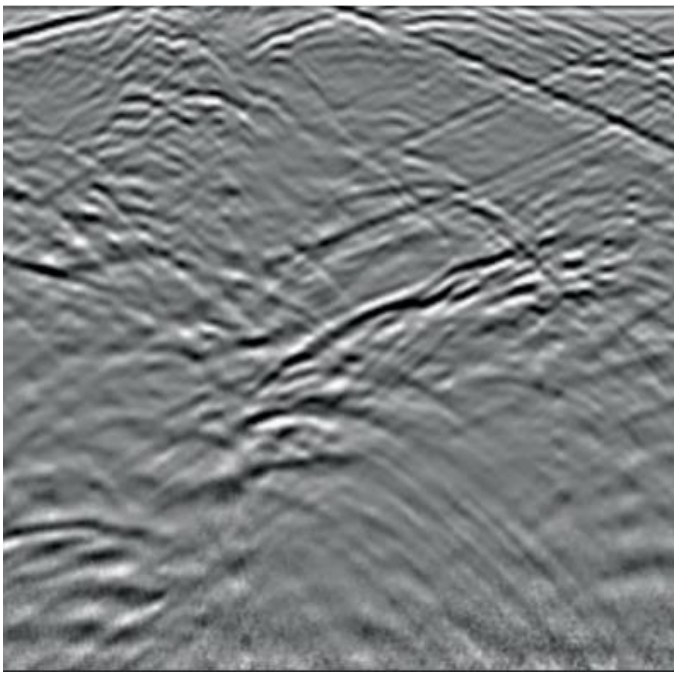
PEJUNI RESOURCES

WIRELINE SERVICES

BOREHOLE RADAR

Tanzania



Wireline logging services for the mineral exploration, mining and geotechnical industry in Africa

Wireline

offers **Borehole Radar logging services.**

What is borehole radar (BHR?)

Ground penetrating radar (GPR) in a drillhole.

It's used to image off hole geological features and anomalies.

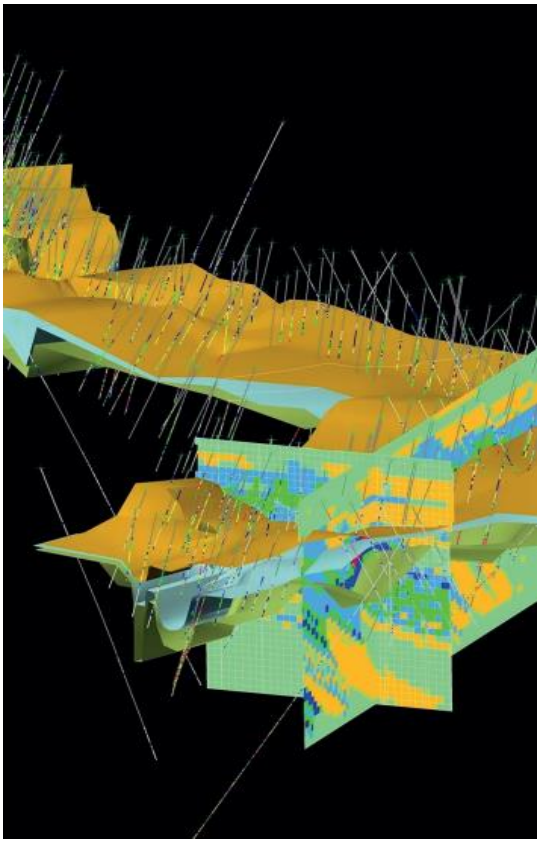
We track the position of known geological formations of interest and those which intersect the borehole.

The reflections indicate a contrast in the electrical properties of the rock, providing detailed continuous reflections from lithology contacts and structures.

Positional placement of targets in 2D or 3D mapping integrated into mining, exploration, resource, and geotechnical models are key deliverables from the data processing service.

INTRODUCTION

Borehole Radar (BHR) data can yield information on geological features such as lithology contacts, fractures, faults, voids, dykes, and ore body geometry.



The tools penetration range of 10m – 50m beyond the borehole is a significant addition to the data set.

The data can be used for mapping structural and geotechnical information, imaging mineralization, identifying hazardous anomalies ahead of mining, fracture and void detection.

BHR has been used for:

Mapping of voids and sinkholes.

Geological Holes drilled ahead of mining and development to map reef position and anomalies in reference to the borehole.

Mining Panels / Development Surveying from groups of holes and imaging ahead of mining to identify potholes and/or geological anomalies, aiding in early decision making to maximize efficiency of development.

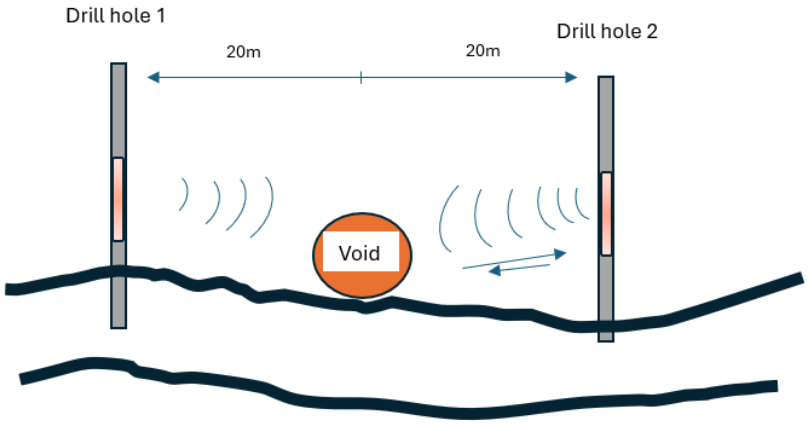
3D imaging of ore body positioning in relation to mine models.

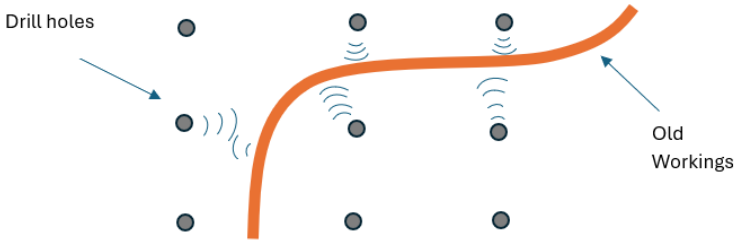
Cover Holes drilled ahead of mining to identify off-hole water bearing fissures and hazardous anomalies, specifically targeting cover holes drilled close to mineralization.

Directionally drilled holes in seam along long wall sections to identify faulting and intrusions between roof and floor and mapping the location of roof and floor in relation to borehole.

BHR samples a vast volume, 360 degrees around the borehole.

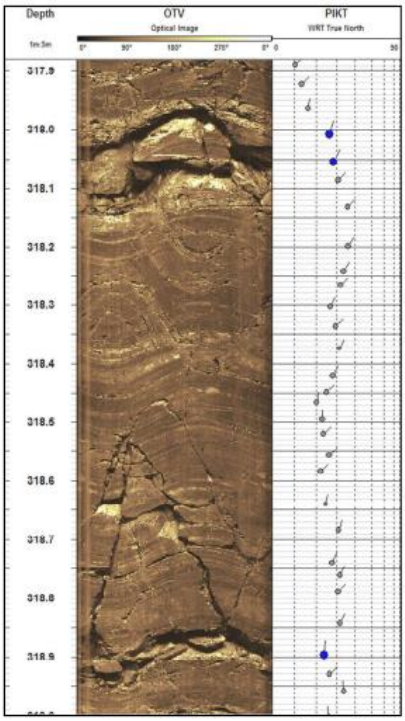
Anomaly targeting is easily achieved with closely spaced drill holes.





Where high precision targeting is required, the use of Televiewer probes and borehole structure logs are used.

These measurements, combined with BHR may also improve confidence in classifying geological structures and highlighting possibly missed events or events near hole, but not intersected by the drill hole.



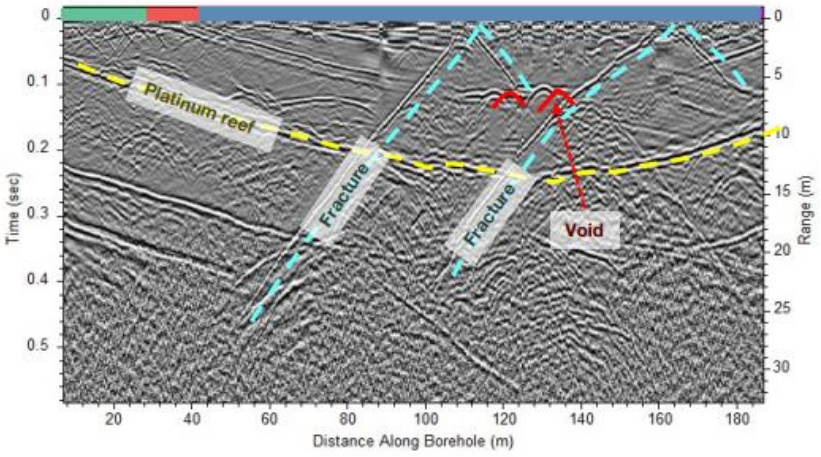
Optical televiewer structure log

The key deliverable of BHR is extension to see beyond the borehole.

Examples:

The client needed to accurately detect voids and fractures which were to increase mine safety and improve mine efficiency.

The Figure below is a geological log overlaid above the radar section. The range, or radial distance, is the BHR signal penetrated from the borehole - in this instance 32 metres.



As we can see above, features detected by borehole radar include a platinum reef, fractures, and voids.

Fractures and voids imaged with the borehole radar were gas-filled, providing excellent contrast to surrounding lithology.

Air, gas, water and mud-filled anomalies provide excellent reflectance.

Below is the core sample from the borehole with the fracture at 108m identified.

Figure 2: Core samples at key depths

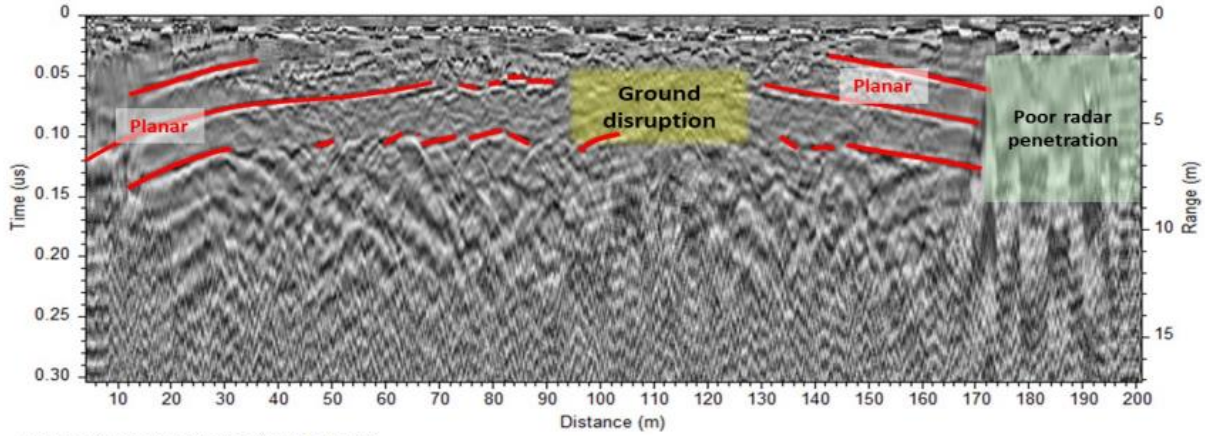
Fracture identified by BHR

An example from a potash mine:

In order to mitigate associated risks and minimize unexpected interruptions, the client needed to identify suspected ground disruptions in the vicinity of the ongoing potash mining operations.

Specifically, determining dissolution voids, which result in unstable ground conditions, disruptions, and possible ore reserve losses.

In this example below, the layout of the borehole was such that the borehole was subparallel to the suspected ground disruption, which provided a clear radar-reflecting surface. Planar radar reflections, which discontinued at a borehole depth of about 110m and a radial range of about 10 m - were observed, inferring disrupted ground in that area.



Example of a radargram detecting disrupted ground in a potassium mining environment