

CASE HISTORY

Application: **Mining**

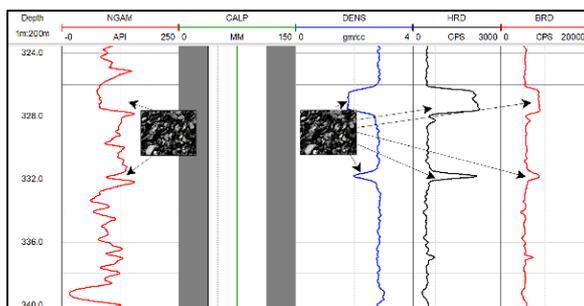
Technology: **Density gamma ray logging through coal seams**

Location: **Lochinvar Coal, Scotland**

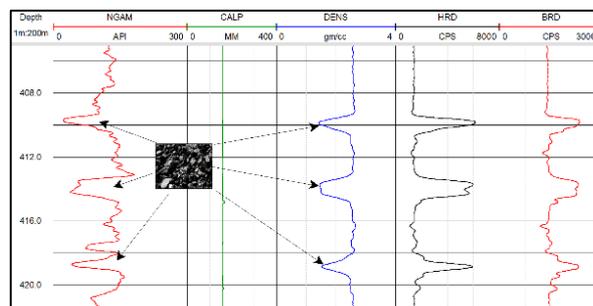
Ten exploration boreholes were drilled (Ranging from 271m to 446m TD) to identify the depth and thickness of potential coal seams. The majority were open hole with a few being cased. Although most holes were cored, the addition of wireline logging was able to accurately provide the client with data where core recovery was poor or missing altogether where fractures/cavities were present.

To achieve this Robertson Geo deployed the Formation Density probe (The tool of choice for coal logging). The active windows of the source and detectors are maintained in contact with the borehole wall by a motorised caliper arm. With its three sodium iodide crystal detectors, all of which are able to penetrate steel pipe in cased holes, making this a versatile probe.

1. **Natural Gamma:** The log records the natural gamma radiation from the surrounding borehole formation. Coal generally has low natural radioactivity as compared with other formations showing a drop in counts at coal seams.
2. **HRD and LSD:** The density log measures the bulk density of the coal seam. The density probe uses a gamma ray source placed a distance from the gamma ray detectors, which measures gamma ray counts that is an inverse function of the density of the coal or associated rocks. The more gamma rays that are absorbed in denser rocks, the lesser is the ray count transmitted to the detectors. The majority of coal seams have low density (e.g. 0.7–1.8 g/cc) compared to adjoining lithologies, which make it a valuable probe to identify coal.
3. **BRD:** Bed thickness: The bed resolution detector is able to give excellent vertical resolution to resolve thin beds/seam thickness.



Density logging through a fully steel cased borehole. Note the drop in Natural Gamma and Density values at 327m and 332m.



Open hole log.

Left to right: Natural Gamma, Caliper, Density, High resolution density and bed resolution density.

End value to client:

Robertson Geo provided the client with data allowing them to identify accurately the depth and thickness of the coal seams in situ. In addition to this the density values in open holes helped to estimate the grade of the coal present, and hence the commercial viability of the project.