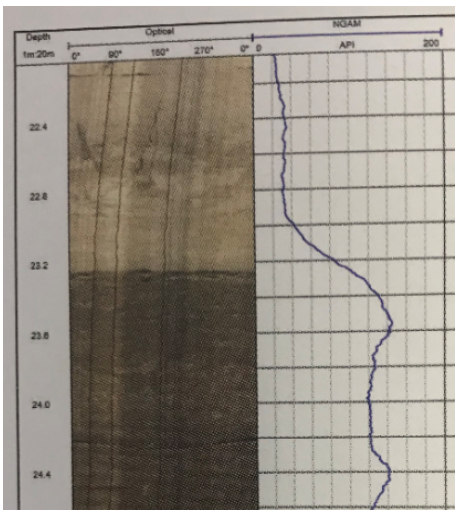
CASE HISTORY

Application:	**Geotechnical**
Technology:	**Chalk characterisation**
Location:	**Structural Soils, Stonehenge, England**

As part of ground investigations for a 3km tunnel 18 boreholes were drilled ranging from 146mm OD bores to 335mm OD wells. Depths varied from 35m to 70m. The client was particularly interested in a >20m thick layer of phosphatic chalk and its structural impact on the project. The key physical characteristics of chalk are high porosity and permeability with soft friable and soluble nature – which can be challenging for ground stability and foundation design. This character allows dissolution in chalk beds that can create irregular, unpredictable subsurface voids and cavities leading to reduced rock strength and vulnerability to ongoing dissolution. These voids are extremely difficult to detect from the surface. The objective was to determine the location and thickness of these phosphatic deposits.

To achieve this Robertson Geo ran its 3-Arm Caliper probe which contains a sodium iodide natural gamma crystal. The natural radiation emitted in a boreholes formation is detected by scintillation: the production of a tiny flash of light when gamma rays strike the crystal. The light is converted into an electrical pulse by a photomultiplier tube. The pulses are then counted by the probe's microprocessor. The probe is calibrated in accordance with the industry standard API unit.



The Natural Gamma reading illustrating an increase in counts at a change in chalk bedding.

End value to client:

Natural gamma values in chalk are nominally very low (< 20 API) due to the sparsity of potassium and heavier elements. Where phosphatic chalk is present the natural gamma level can rise significantly, up to 140 API or more. The accurate gamma ray readings provided enabled the client to precisely determine this sharp increase along with the exact depth and thickness.