

CASE STUDY

REPLACING A RADIOACTIVE SOURCE DENSITY TOOL USING WIREBMR™

COIRE GLAS PROJECT, SSE RENEWABLES

THE ABILITY TO MAKE AN INFORMED DECISION RESULTED IN SSE RENEWABLES REMOVING THE RISK OF TRANSPORTING A GAMMA-GAMMA DENSITY RADIOACTIVE SOURCE, WHILST STILL ACQUIRING ACCURATE IN-SITU DENSITY DATA.

SITE PROFILE

The Coire Glas project is a proposed pumped hydro storage scheme with the potential capacity of up to 1500 MW. Situated in the Scottish Highlands, the lower reservoir (Loch Lochy) and new upper reservoir (to be constructed) will result in over 500m of elevation difference between the two reservoirs over a short distance.

Detailed ground investigation, including characterisation of rock properties, are critical for the design and construction of the scheme. As the developer and operator of the project, SSE Renewables commenced ground investigation works including the drilling of boreholes to obtain rock samples, geophysical logs and packer testing, to obtain information on the subsurface rock and in-situ water properties along the proposed project route. Fugro, as lead geo-data service provider and contractor for ground investigation, provided the drilling, wireline geophysical logging, and lab analysis services.



Image 1: Coire Glas Pumped Storage Scheme: over 500m vertical height difference between the proposed upper reservoir and lower reservoir Loch Lochy.

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The use of WIREBmr enabled SSE Renewables to collect in-situ density data for a location where multiple logistical challenges meant that traditional techniques could not be used.

This, in conjunction with other data collected from across the site, will be valuable data for development of the ground model and design for Coire Glas.”

**Jessica Smith,
Senior Engineering Geologist,
SSE Renewables**

THE SITUATION

A key component of ground investigation for geotechnical and geomechanical applications is understanding the in-situ density of the rock formations either directly or indirectly impacted during a project. Traditionally, this data is acquired using a wireline deployed gamma-gamma density probe that requires a radioactive source.

For Coire Glas, this posed a significant logistical challenge for the conveyance of a radioactive source to the upper pore space. When lithological information is available, total porosity can be divided into components such as bound and moveable water, as well as calculate estimates for hydraulic conductivity and transmissivity.

When measured porosity is combined with matrix/grain density (same value required for a gamma-gamma density tool result), the workflow can be reversed, calculating in-situ bulk density.

In this application, Orica Digital Solutions and Fugro proposed to trial the WIREBmr™ tool at Coire Glas as a replacement for the density tool, by utilising the same matrix/grain density information required by the density tool, reversing the workflow and calculating a bulk density from the direct measured total porosity.

THE RESULT

WIREBmr™ was deployed and acquired the data to successfully calculate a continuous in-situ density log. In order to confirm the methodology for the subject region, an initial comparison was run in the Fugro test hole and then repeated onsite in a logging truck accessible drillhole elsewhere at Coire Glas.

Wireline data from gamma-gamma density and WIREBmr™ were compared along with laboratory test density results from core cut from the same borehole for verification. The results of the comparison provided SSE Renewables with the precision and accuracy that could be obtained in local rock formations with WIREBmr™.

The ability to make an informed decision resulted in SSE Renewables and Fugro removing the risk of transporting a gamma-gamma density radioactive source to the upper site while ultimately acquiring accurate, in-situ density data from WIREBmr™.

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Author: Ryan Gee

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costs



Improve
productivity



Increase
safety



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recovery

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