COMPOSITION AND CHARACTERISATION OF TERTIARY COALS IN SPITSBERGEN, NORWAY IMPROVING THE EXPLORATION PLAY MODELS.

Alv Orheim\textsuperscript{1}, Gerd Bieg\textsuperscript{2}, Trond Brekke\textsuperscript{3}, Jørgen Stenvold\textsuperscript{4}

\textsuperscript{1}GeoArktis A/S, P.O. Box 615, N-9170 Longyearbyen, Norway; alv@geoarktis.no
\textsuperscript{2}Ruhranalytik, Wilhelmstr. 98, D-44649 Herne, Germany; Gerd.Bieg@deutsche-steinkohle.de
\textsuperscript{3}Brekke CHEMO, P.O.Box 151, N-6801, Norway; trond.brekke@c2i.net.no
\textsuperscript{4}Store Norske, N-9170 Longyearbyen, Norway; jorgen.stenvold@snsk.no

The northernmost mining community on Earth is situated in Svalbard, a Norwegian archipelago 1100 kilometres from the North Pole. Industrial exploitation in the islands started in the early 1900’s and coal mining has proven to be the only sustainable activity. Through 100 years Store Norske has mined coal at two locations, Longyearbyen and Svea. The annual production used to be less than 0.5 MTy, in recent years it has more than quadrupled.

The harsh and vulnerable Arctic environment has accentuated exploration and mining activities towards making as little environmental impact as possible. Consequently focus is kept on extracting the optimum geological information from every observation during exploration and mining in order to avoid pursuing sub-economical prospects, either due to bad quality or due to difficult mining conditions.

In Svalbard coal horizons are reported from several stratigraphic levels. Two horizons of Upper Devonian age has been identified at Bjørnøya (Bear island) the southernmost part of the archipelago, while mine-able coals of Lower Carboniferous age have been identified both at Bjørnøya and at several locations on the main island, Spitsbergen. The coal measures of the Early Cretaceous were the very first coals to be exploited at Svalbard, in 1896, and indirectly this enterprise led to the discovery of far better Tertiary coals in neighbouring areas.

Coal deposits of Palaeocene age have proven to be the most consistently developed coals. During the first 90 years of operation the mines were drift mines exploiting coal seams above sea level and exposed in the hillsides. As these resources are becoming depleted, coal exploration is moving towards measures at depth, i.e. deposits that may only be identified through core drilling.

At the Longyearbyen mining location 5 distinct coal horizons within the Palaeocene unit are defined, while only 3 of these horizons are distinguishable at the Svea mining location, 50 km south-east of Longyearbyen. At either location only one of the seams has the necessary lateral consistency to allow for modern mining technology and meet present quality requirements from the consumers. Total thickness of the coal-bearing unit is less than 70 meters.

The quality properties, in particular regarding coking, are distinctly different for each seam and detailed petrographic studies of mine samples and drill cores in combination with standardised coal analyses of ash, volatile matter, sulphur and calorific value have