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Research on the quality change of DOC in the stored peat

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The controls on production and consumption of dissolved organic carbon in peatlands are complex and the research question is 'what happens to the peat when it is extracted, disrupted and stored'?

The Environmental Research Institute project 'Bog in a Box' – (the effect of peat storage on dissolved organic matter properties) was looking for answers to those research questions through analyzing the method of peat storage and its possible changes within the Shetland Gas Plant (SGP)

When SGP was being constructed, located to the west of the Shetland Islands, one of the first challenges was the extensive peat covering the onshore site. The plan is to restore the site at the end of the plant's operating life and because of that the peat has been excavated and stored on site for site restitution in two purpose built stores. This was considered the best practicable environmental option. The priority has been to ensure the peat remains saturated so that anaerobic conditions are maintained and the peat degradation is minimized.

The Samples results taken from peat storage 1 and peat storage 2 have been compared with the samples taken from the surrounding peatland - reference samples. The UV-Vis spectroscopy method was used for detecting changes in DOC quality between sites, as well as aromaticity, humification and molecular weight.

Based on results, a comparison of peat conditions in peat storage and referent peat was made between shallow and deep layers shown in tables 1 and 2 respectively.

Table 2 – Condition comparison, PS peat- shallow layer (15 cm) and REF peat - shallow layer (15 cm)

PS PEAT- SHALLOW LAYER (15 cm)	REF PEAT- SHALLOW LAYER (15 cm)
Broad range of molecular size	Lower molecular size
Higher degree of aromaticity	Lower degree of aromaticity
Lower amount of lignin	Higher amount of lignin
Higher aerobic conditions	Lower aerobic conditions
Higher aromatic fraction of DOC	Lower acidity
Aromatic compounds	Lower index of humification
More humic acids	More fulvic acids

Table 3 – Condition comparison, PS peat- deep layer (80 cm) and REF peat - deep layer (80 cm)

PS PEAT-DEEP LAYER (80cm)	REF PEAT- DEEP LAYER (80cm)
Higher molecular weight	Lower molecular weight
Higher degree of aromaticity	Lower degree of aromaticity
Higher degradation	Lower of phenolic/quinoid core of humic acids to simpler carboxylic aromatic compounds
Less quantities of aliphatic structures	Large quantities of aliphatic structures
Higher quantities of condensed aromatic structures	Medium degree of condensation of the chain of aromatic carbons of the humic acids
More humic acids	More fulvic acids
DOC of larger molecular size	DOC of smaller molecular size
Higher acidity	Lower acidity

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