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## **Oskarshamn site investigation**

# **Characterisation of Quaternary deposits in Lake Frisksjön and Skettkärret**

Gustav Sohlenius, Anna Hedenström  
Geological Survey of Sweden

Helena Nyman, SWECO Position AB

September 2006

### **Svensk Kärnbränslehantering AB**

Swedish Nuclear Fuel  
and Waste Management Co  
Box 5864

SE-102 40 Stockholm Sweden

Tel 08-459 84 00

+46 8 459 84 00

Fax 08-661 57 19

+46 8 661 57 19



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*Keywords:* Quaternary deposits, Gytja, Peat.

This report concerns a study which was conducted for SKB. The conclusions and viewpoints presented in the report are those of the authors and do not necessarily coincide with those of the client.

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## Abstract

The Quaternary deposits on the floor of Lake Frisksjön have been mapped. The lake floor is flat and to a major part covered by gyttja. Till and bedrock is only present at bottoms situated close to the shoreline. The uppermost gyttja has a high water content and it is consequently likely that there is an ongoing accumulation of sediment on all bottoms covered by gyttja.

The distribution of organic deposits at the arable land in Skettkärret close to the creek Ekerumsbäcken has been characterised. A large part of the arable land is covered by peat, which is underlain by gyttja. The western part of the investigated area is covered by gyttja clay. The occurrence of peat shows that the cultivated area used to be a fen. It is also possible that a lake has covered the area.

## Sammanfattning

Frisksjöns botten har karterats med avseende på jordarter. Sjön har en relativt flack botten som är täckt av gyttja. Endast de mest strandnära bottarna utgörs av morän och berg. Den ytligast liggande gyttjan har en mycket hög vattenhalt och det kan antas att det sker ackumulation av sediment på hela den del av botten som är täckt av gyttja.

De organiska jordarternas fördelning på åkermarken i Skettkärret nära Ekerumsbäcken karakteriserades. Stora delar av åkern täcks av torv som underlagras av gyttja. Den västra delen av åkern utgörs av lergyttja. Förekomsten av torv visar att ett kärr tidigare legat på det idag uppodlade området. Det är även tänkbart att en sjö tidigare legat på platsen.

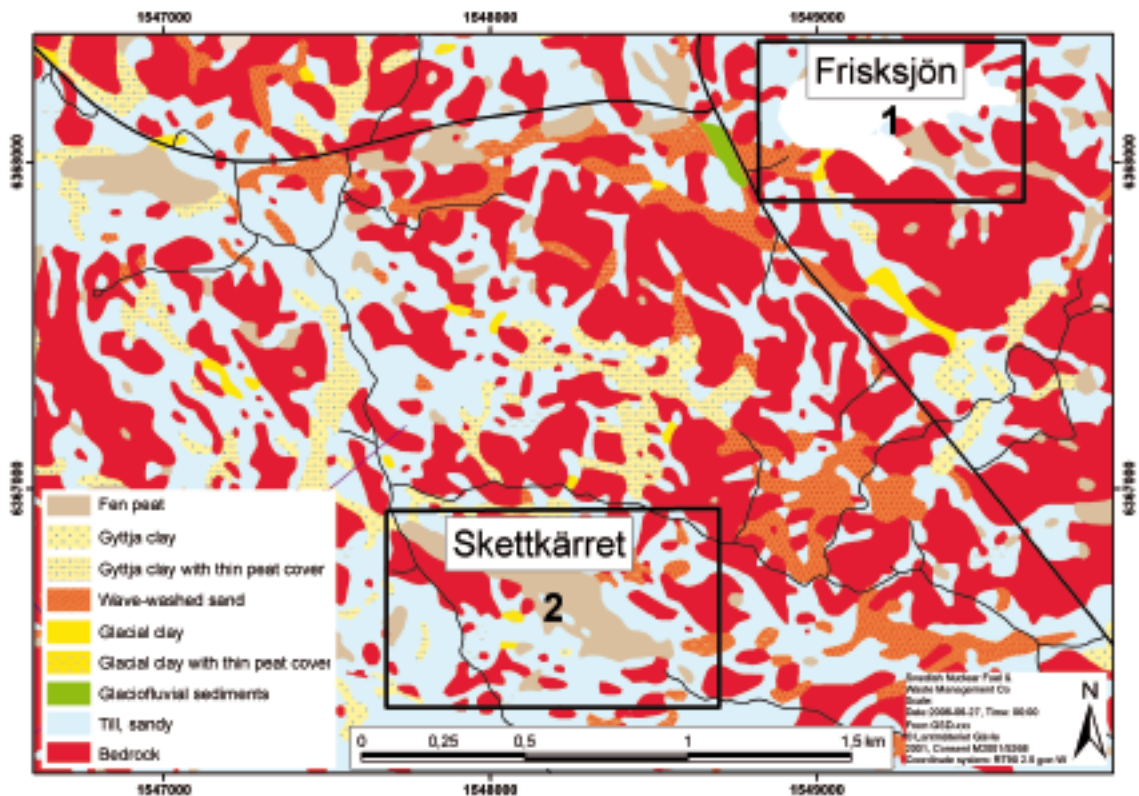
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# 1 Introduction

This document reports the data gained during field investigations in the Laxemar area during three days in June 2006. The activity was performed within the working group Surface Net. The work was carried out according the method description for mapping of Quaternary deposits (SKB MD 131.001, version 1.0).

The distribution of Quaternary deposits was investigated in two areas in the Laxemar subarea. The first area is Lake Frisksjön and the second area, Skettkärret, is situated on a field used as arable land close to the creek Ekerumbäcken (Figure 1-1).



*Figure 1-1. The two investigated areas. 1, Lake Frisksjön and 2, Skettkärret, which is situated close to the creek Ekerumbäcken. The distribution of Quaternary deposits was mapped by /Rudmark et al. 2005/.*

## 2 Objective and scope

The first objective of this study was to map the distribution of organic sediments at the floor of Lake Frisksjön. The second objective was to characterise the Quaternary deposits situated in Skettkärret, which today is used as arable land. That area is situated close to the small creek Ekerumsbäcken.

The results from Lake Frisksjön will be used to model the carbon budget of the lake.

The results from the second site will be used together with results from forthcoming drillings to model the stratigraphical distribution of Quaternary deposits in the valleys of the Laxemar subarea. The stratigraphical distribution of Quaternary deposits in the Simpevarp area has earlier been discussed by e.g. /Nilsson 2004, Nyman 2005, Lindborg 2006, Sohlenius et al. 2006/.

Both sites are situated in valleys, which may act as discharge areas for groundwater from the underlying bedrock. The distribution of Quaternary deposits in these valleys is therefore of importance for modelling the effect of a leakage of radionuclides from a deep depository.

## **3 Equipment**

### **3.1 Description of equipment/interpretation tools**

The distribution of organic sediments in Lake Frisksjön was investigated using a Russian peat corer, length 1 m, width 5 cm supplied with rods of 1.5 m length. GPS (Garmin 60) and maps of the lakes were used to determine the location of the cored sites /cf. Hedenström 2003, Ising 2006/.

The distribution of Quaternary deposits in Skettkärret was determined with an Edelmann hand-driven probe.



## **4 Execution**

### **4.1 Execution of field work**

The coring in Lake Frisksjön was performed from a small boat. Altogether 30 sites were studied in Lake Frisksjön (Figure 5-1). The aim was to map the distribution of gyttja at the floor of the lake. Most sites are therefore located close to the shore where the transition from hard to soft (gyttja) bottom is situated. The sediments were described in the field. The nomenclature for Quaternary deposits is described in SKB MD 131.001. Also the deposits in Skettkärrret were described in the field. Seven sites were studied in Skettkärrret (Figure 5-2). All sites are situated on arable land, which has been mapped as peat /Rudmark et al. 2005/. The aim was to describe the stratigraphy of the uppermost Quaternary deposits in the whole of Skettkärrret and the investigated sites are therefore distributed all over the field.

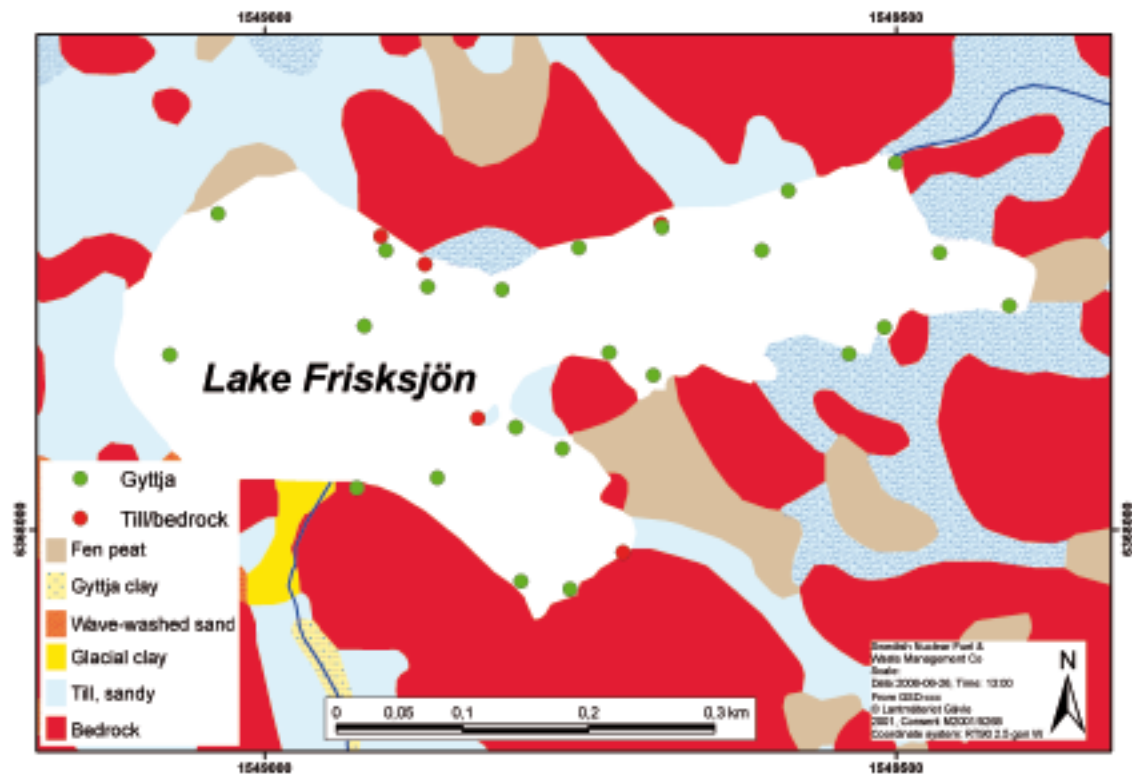
### **4.2 Data handling/post processing**

The results have been delivered to SKB in Excel files and are stored in the SICADA database.

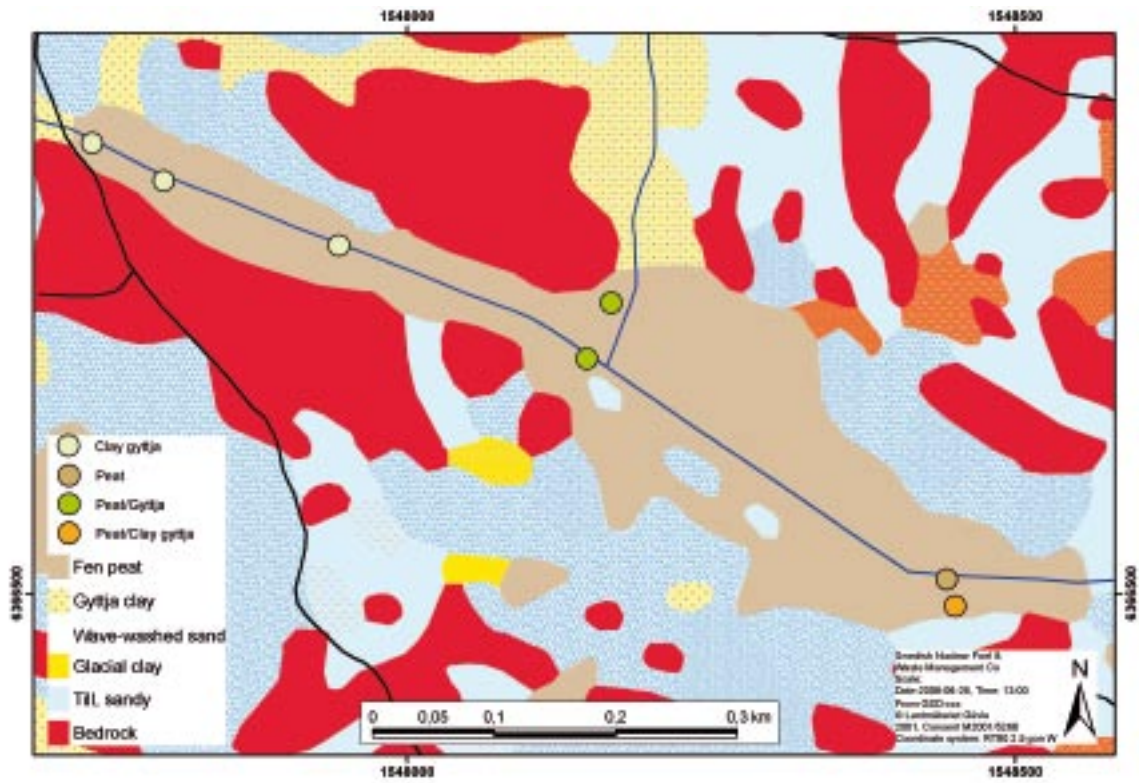
## 5 Results

The results show that the floor of Lake Frisksjön is almost completely covered by gyttja sediments (Figure 5-1). The water depth varied between 1.5 and 3.0 m at the bottoms covered by gyttja. The lake floor at more shallow depths consists of bedrock or till. A study by /Nilsson 2004/ has shown that the total thickness of gyttja in Lake Frisksjön exceeds 7 m in the central part of the lake. The gyttja layer is probably thinner closer to the shores of the lake. The uppermost gyttja has a high water content and it is consequently likely that there is an ongoing accumulation of sediment on all bottoms covered by gyttja.

The second investigated site is used as arable land and is to a large part covered by peat, which is underlain by gyttja (Figure 5-2). The peat layer shows that the investigated site is a former fen. Ditches have artificially lowered the groundwater table and drained the fen. The gyttja layer has been deposited in a former lake or in the narrow bay, which have existed at the site. The distribution of Quaternary deposits in the Laxemar area has earlier been mapped by /Rudmark et al. 2005/. However, /Rudmark et al. 2005/ has overestimated the coverage of peat in Skettkärrret (Figure 5-2).



*Figure 5-1. The investigated sites in Lake Frisksjön. Gyttja (green) was found at most of the sites.*



*Figure 5-2. The investigated sites in Skettkärret. The sites classified as Peat/Gyttja and Peat/Clay gyttja have a peat layer which is thinner than 0.5 m.*

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