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Description of background data in SKB´s database GEOTAB. Version 2

Ebbe Eriksson, Stefan Sehlstedt

SGAB, Luleå

March 1991

SVENSK KÄRNBRÄNSLEHANTERING AB

SWEDISH NUCLEAR FUEL AND WASTE MANAGEMENT CO

BOX 5864 S-102 48 STOCKHOLM

TEL 08-665 28 00 TELEX 13108 SKB S

TELEFAX 08-661 57 19

DESCRIPTION OF BACKGROUND DATA IN THE SKB DATABASE GEOTAB. VERSION 2

Ebbe Eriksson, Stefan Sehlstedt

SGAB, Luleå

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

Information on SKB technical reports from 1977-1978 (TR 121), 1979 (TR 79-28), 1980 (TR 80-26), 1981 (TR 81-17), 1982 (TR 82-28), 1983 (TR 83-77), 1984 (TR 85-01), 1985 (TR 85-20), 1986 (TR 86-31), 1987 (TR 87-33), 1988 (TR 88-32) and 1989 (TR 89-40) is available through SKB.

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DESCRIPTION OF BACKGROUND DATA IN THE SKB DATABASE GEOTAB VERSION 2

Ebbe Eriksson
Stefan Sehlstedt
SGAB, Luleå

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ABSTRACT

During the research and development program performed by SKB for the final disposal of spent nuclear fuel, a large quantity of geoscientific data was collected. Most of this data was stored in a database called Geotab. The data is organized into eight groups (subjects) as follows:

- Background information
- Geological data
- Borehole geophysical measurements
- Ground surface geophysical measurements
- Hydrogeological and meteorological data
- Hydrochemical data
- Petrophysical measurements
- Tracer tests

Except for the case of borehole geophysical data, ground surface geophysical data and petrophysical data, described in the same report, the data in each group is described in a separate SKB report.

The present report describes data within the Background data group. This data provides information on the location of areas studied, borehole positions and also some drilling information.

Data is normally collected on forms or as notes and this is then stored into the database.

The background data group (subject), called BACKGROUND, is divided into several subgroups (methods).

- BGAREA area background data
- BGDRILL drilling information
- BGDRILLP drill penetration data
- BGHOLE borehole information
- BGTABLES number of rows in a table
- BGTOLR data table tolerance

A method consists of one or several data tables. In each chapter a method and its data tables are described.

CONTENTS

1 INTRODUCTION

Since 1977 Swedish Nuclear Fuel and Waste Management Co, SKB, has been performing a research and development program for the final disposal of spent nuclear fuel. One aim of this program is to gain knowledge of different bedrock properties. Measurements for the characterization of geological, geophysical, hydrogeological and hydrochemical conditions are performed in specific site investigations as well as for geoscientific projects.

Large volumes of data have been produced since the start of the program, in the form of both raw data and results. During the course of the research program this data has been stored in various formats by different institutions and companies performing the investigations. It was therefore decided that all data from the research and development program should be stored in a single database. The database, called Geotab, is a relational database, based on a concept from Mimer Information Systems. It has been developed further by Ergodata. The hardware is a VAX 750 computer, located at KRAB (Kraftverksbolagens Redovisningsavdelning AB), in Stockholm. Data is stored on-line on the VAX.

The structure of the Geotab database is described in Figures 1.1-1.4. Geotab is divided into eight groups (subjects), Figure 1.1. These are as follows:

BACKGROUND	Background information
GEOLOGY	Geological data
BHGPHYS	Borehole geophysical measurements
GSGPHYS	Ground surface geophysical measurements
PETRO	Petrophysical measurements
HYDRO	Hydrogeological and meteorological data
CHEMICAL	Hydrochemical data
TRACER	Tracer tests

Each subject is devided into one or several methods and each method contain one or several tables. In Figure 1.2 the methods of the BACKGROUND subject are presented.

Figure 1.3 shows the structure of the method BGHOLE.

The structure of a specific table is illustrated in Figure 1.4. The terms record and field are also defined in this figure.

In this report all methods and tables within the background data subject (BACKGROUND) are described.

Table 1.1 Structure of the BACKGROUND subject

Subject	Method	Table
BACKGROUND	BGAREA	AREA
		AREALIM
		AREAREF
		AREAFIXP
	BGDRILL	DRILL
	BGDRILLP	DRILLPF
		DRILLPD
	BGHOLE	BHNAME
		BOREHOLE
		HOLEDIAM
		COREDIAM
		CASEDIAM
		CASETOP
		BHCOORD
		BHHIST
	BGTABLES	ROWTAB
	BGTOLR	TOLR

The database is continuously updated. Methods, tables or columns may change. This report will be updated accordingly.

Some Technical Reports dealing with different data sets stored in the Geotab database will be updated/written and printed during 1991. Among these are:

TR91-01. Description of geological data in the SKB database Geotab. Stefan Sehlstedt and Tomas Stark.

TR91-02. Description of geophysical data in the SKB database Geotab. Stefan Sehlstedt.

TR91-05. Description of tracer data in the SKB database Geotab. Peter Andersson and Margareta Gerlach.

TR91-07. Description of hydrogeological data in SKB's database Geotab. Bengt Gentzschein.

Protocols for collection of background information is available through the authors.

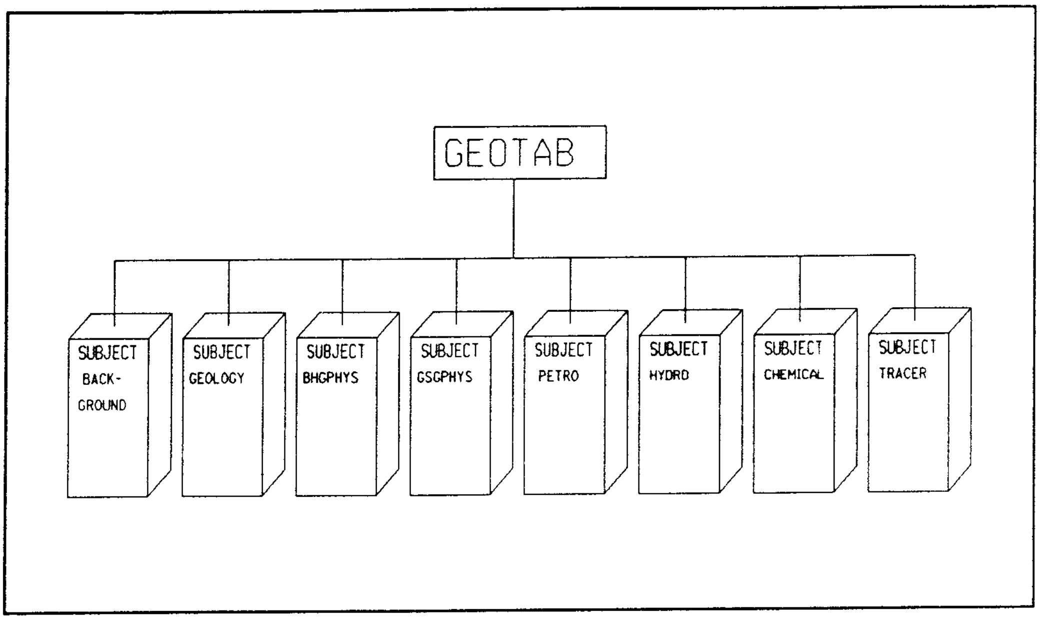

Figure 1.1 Structure of the Geotab database.

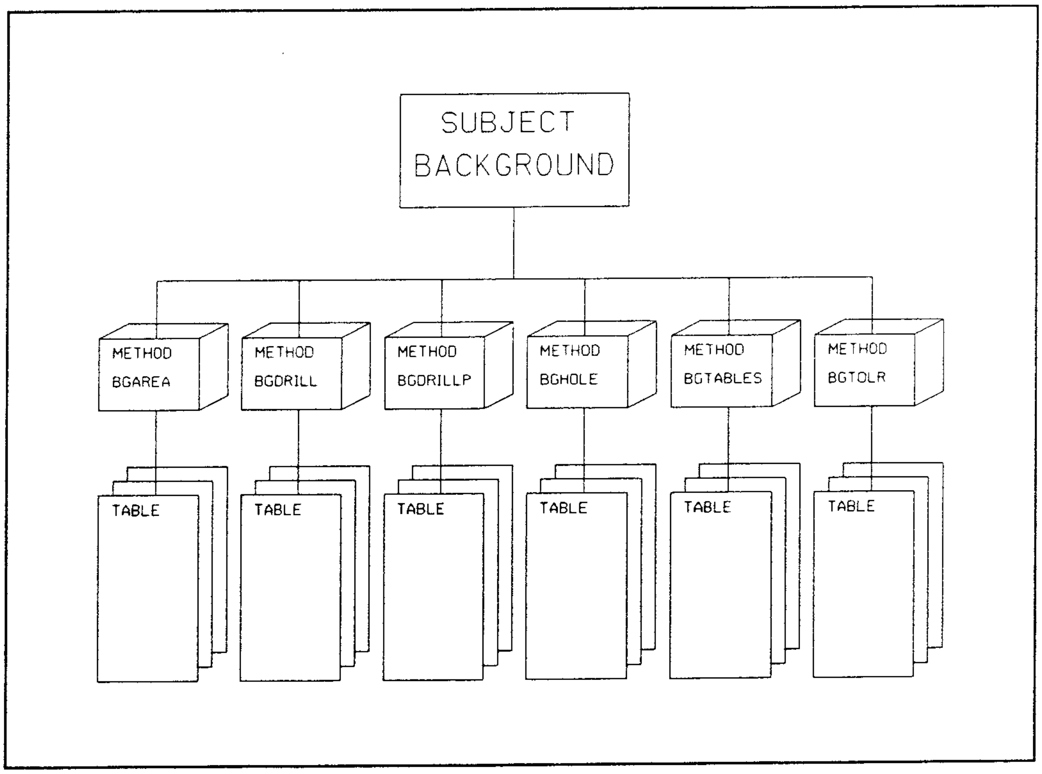

Figure 1.2 Structure of the subject BACKGROUND

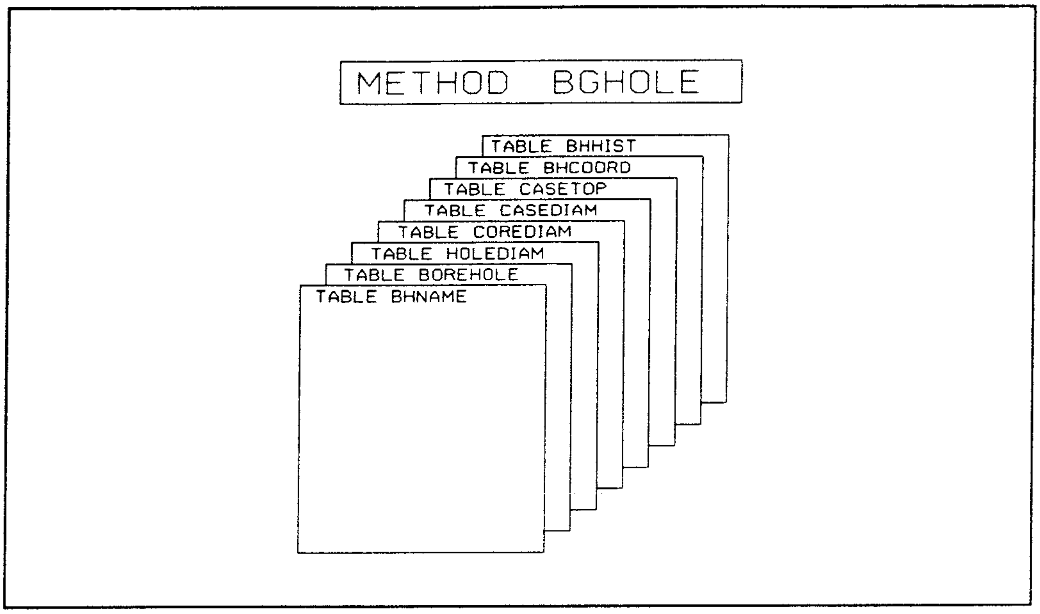

Figure 1.3 Structure of the method BGHOLE

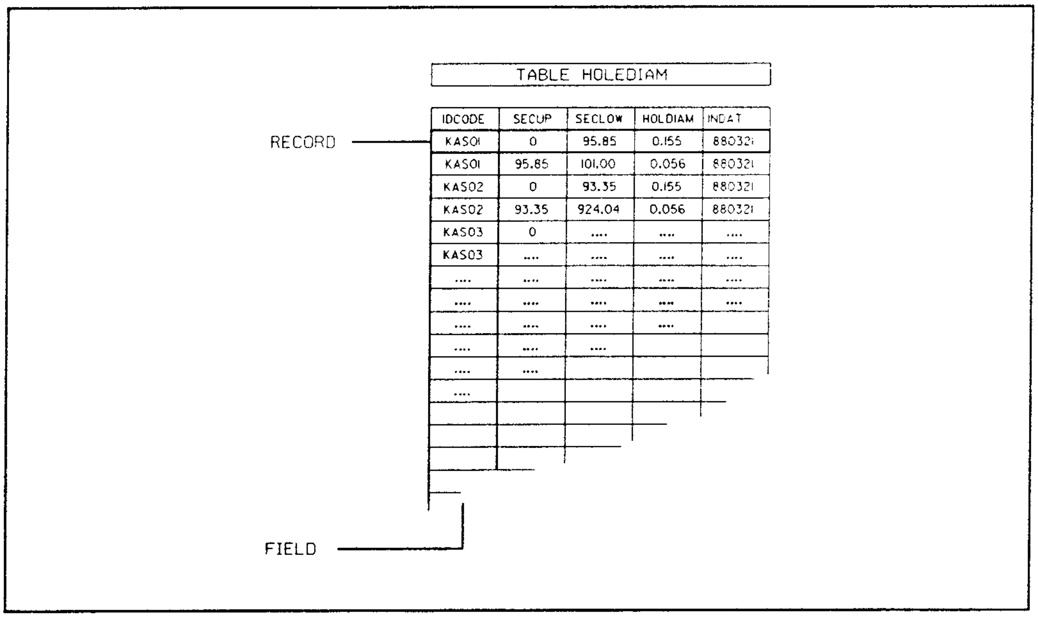

Figure 1.4 Structure of the table HOLEDIAM

2 BGAREA -- BACKGROUND AREA BACKGROUND DATA

The BGAREA method provides information on areas where different types of investigations have been conducted or are still on-going. Results from these investigation are stored under other subjects in the database.

The BGAREA - method contains the following tables:

- AREA Area and areacode connection
- AREALIM Grid corner coordinates
- AREAREF Area reference points
- AREAFIXP Area fixpoints

A short list from each table is found in Appendix A.

The areas concerned are of five different types.

- Reconnaissance areas where limited investigations have been conducted. Some ground geophysical profiles were usually measured.

- Investigation areas with one drilled borehole but without a local grid net. Some geophysical logging and hydrogeological investigations in the borehole and core mapping of the drill core have been undertaken.

- Investigation areas with a local grid net. In these areas, a large ground geophysical survey has usually been conducted. Geological mapping has also been performed and a series of percussion and core boreholes have been drilled. Geophysical logging, geological core mapping, hydrogeological measurements and geochemical measurement have been carried out in the boreholes.

- Areas associated with construction sites. The investigations performed at these sites may differ from those described earlier.

- Sites where measurement were taken for consultant assignments. These sites are usually located in Finland.

2.1 AREA

The table AREA contains the area name, the area code and also the name of the topographic map covering the area considered.

If investigation of an area has reached the point where ground geophysical measurements will be taken, a grid net must be available. If possible, the direction of the grid net is selected so that the ground geophysical profiles measured will intersect geological formations (dykes or fracture zones) perpendicularly.

The grid net is established by using a theodolite to construct a frame work (T-lines), and a compass and wooden sticks to mark intersecting lines (H-lines). The grid net is used to define coordinates of boreholes, measuring points, geological observations etc within the area to be examined. Different measurements are then easily related to each other. An example of a grid net plan is shown in Figure 2.2.

Areas with data stored in the database are presented in Figure 2.1. The different areas investigated are listed in Appendix A.

GEO_DB .AREA Area and areacode connection
(see record underlined in Appendix A page 1)

Column	Key	Text	Example
AREAC	*	area idcode	AS
AREAN		area name (geographical)	ÄSPÖ
MAPNAME		mapsheet (map name)	6H
PMAP		square in map	3A
XZERO		RAK x-coordinate where local coordinate are (0,0)	6360253
YZERO		RAK y-coordinate where local coordinate are (0,0)	1550813
ZERO		Z-coordinate(m.a.s.l) where local coordinate are (0,0)	
DIRGRID		grid-system direction, angle between RAK north direction and grid north direction. Negative west of north RAK direction.	-11.77
DEV		angle between RAK north direction and magnetic north direction. Negative west of north RAK direction.	-0.8
RAKDEF		RAK coordinate definition P=definition towards RAK fixpoint O=true RAK fixpoint D=definition on topographic map 1:50000 E=definition on topographic map 1:20000 F=definition on topographic map 1:10000 G=definition on topographic map 1:8000 H=definition on topographic map 1:4000 I=definition on topographic map 1:2000	I
ZDEF		Altitude definition P=definition towards RAK fixpoint O=true RAK fixpoint D=definition on topographic map 1:50000 E=definition on topographic map 1:20000 F=definition on topographic map 1:10000 G=definition on topographic map 1:8000 H=definition on topographic map 1:4000 I=definition on topographic map 1:2000	
COMMENT		comment	GRID IDENTICAL TO AV GRID NET
INDAT		data input date to geodatabase	871104

AREAC the areacode is a unique two letter code from the area name. All codes used to date are presented in Appendix A.

AREAN the area name is chosen from the topographical map.

MAPNAME a topographical map has a map name consisting of a code (1-2 figures and 1 letter) and a geographical name, i.e. 4F Lessebo.

PMAP each topographic map is divided into 25 (1:20000) or 100 (1:10000) economic maps. These maps are coded in the interval 0a-9j , i.e. 9H. This code is called PMAP in the database.

XZERO each grid net is positioned in the National Co-ordinate System (RAK Rikets Allmänna Koordinater). XZERO is the north-south RAK co-ordinate of the origin (0 N / 0 E) of a grid net.

YZERO each grid net is positioned in the National Co-ordinate System (RAK Rikets Allmänna Koordinater). YZERO is the east-west RAK co-

	ordinate of the origin (0 N /0 N) of a grid net.
DIRGRID	angle between RAK north and grid net north. Grid net north is the direction of the side of the grid net which is closest to RAK north. This means that grid net north is always less than 45 degrees in a 360 degree system. DIRGRID is positive east and negative west of RAK north.
DEV	angle between RAK north direction and magnetic north direction (360 degree system). DEV is positive east of RAK north and negative west of RAK north.
RAKDEF	defines the origin of the x- and y- co-ordinates. Indirectly, this gives the accuracy of the co-ordinates.
ZDEF	defines the origin of the altitude above sea level.
COMMENT	additional relevant information
INDAT	date information was loaded to the database

It has normally not been considered necessary to make a complete geodetic measurement regarding the position of the local grid net relative to the National Co-ordinate System (RAK). Instead, several points in the local grid net which were easily identified in the terrain were marked on field maps. It was then possible to calculate an RAK co-ordinate for the origin of the grid net from the map. The accuracy of that co-ordinate depends of course on the resolution of the map used. In the table AREA the field RAKDEF and ZDEF is used to provide information on the resolution of the maps used and hence also the accuracy of the co-ordinate. Assuming that a borehole is correctly positioned on a map, and that the resolution on any map is 2 mm, the RAK co-ordinates will be specified to within the accuracy shown in Table 2.1.

Table 2.1 RAK co-ordinate accuracy for the grid net origin

Geotab code	Map scale	RAK co-ordinate accuracy (m)
D	1:50 000	100
E	1:20 000	40
F	1:10 000	20
G	1:8 000	16
H	1:4 000	8
I	1:2 000	4
P		0.01
O		0.01-0.1

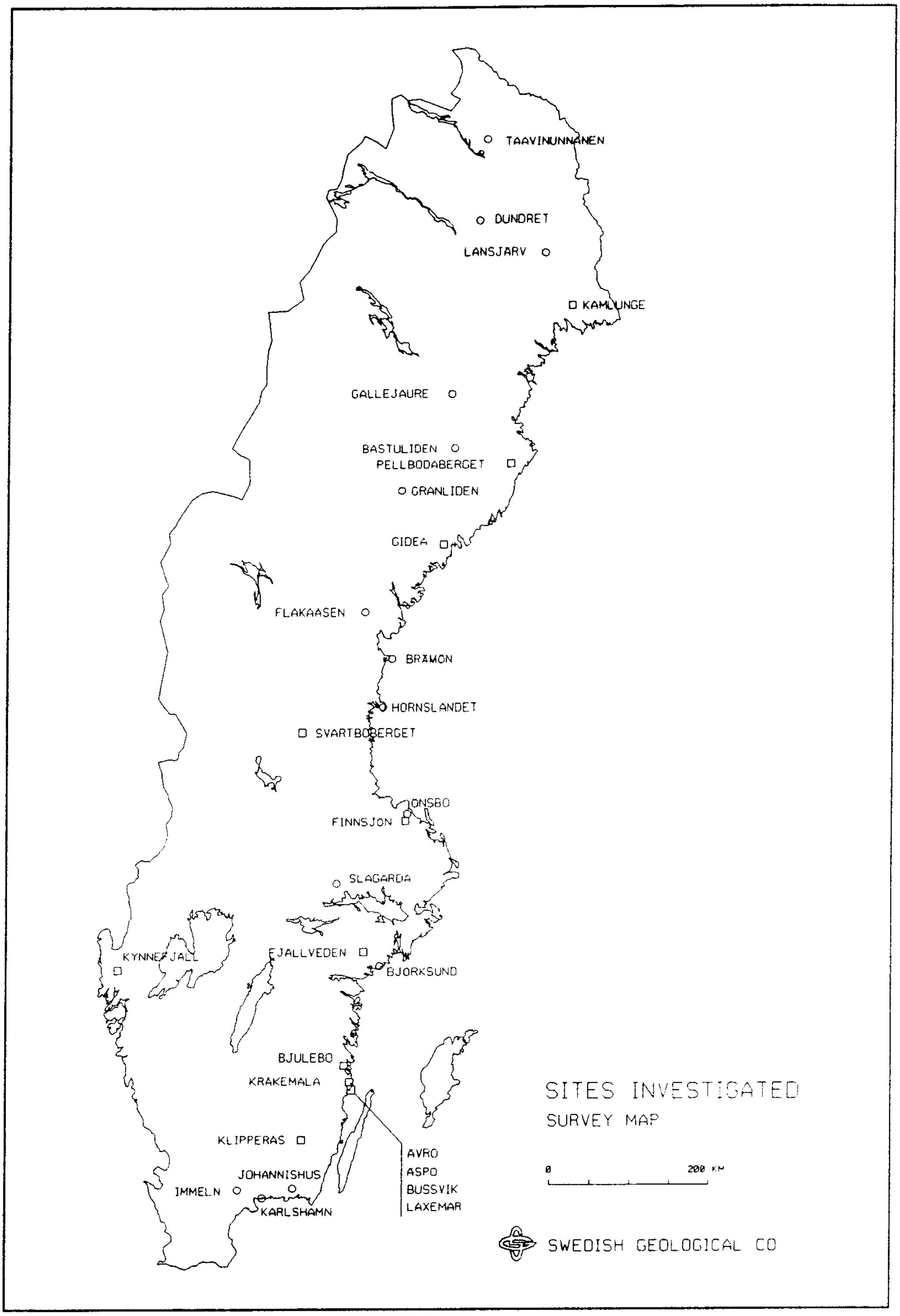

Figure 2.1 Map of areas investigated

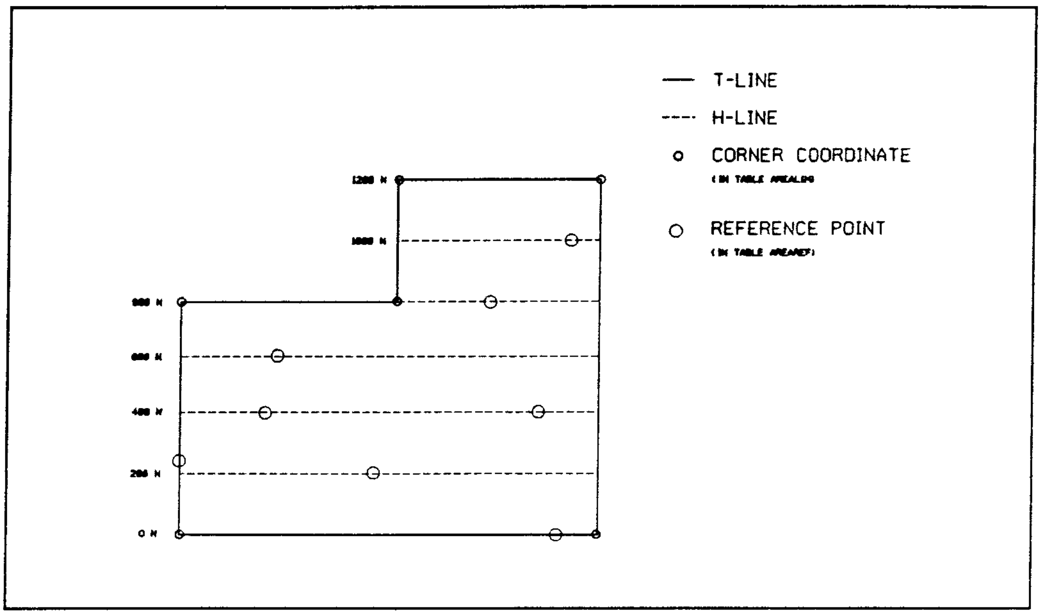

Figure 2.2 Grid net plan

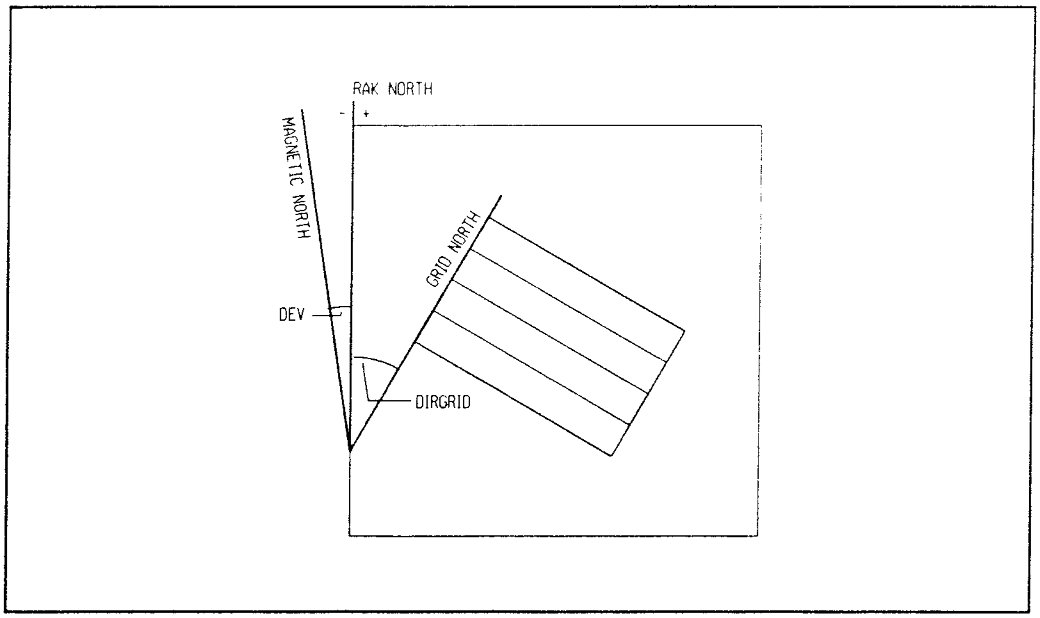

Figure 2.3 Grid net orientation

2.2 AREALIM

This table contains corner co-ordinates of the grid net. If the grid net is rectangular, four pairs of co-ordinates are needed to describe the net. The co-ordinates are given in local co-ordinates.

GEO_DB .AREALIM **Grid corner co-ordinates (see record underlined in Appendix A page 1)**

Column	Key	Text	Example
AREAC	*	area idcode	KM
XCOORD	*	x-co-ordinate local grid (m)	0
YCOORD	*	y-co-ordinate local grid (m)	2000
LDIRX		direction symbol for local x-co-ordinate	N
LDIRY		direction symbol for local y-co-ordinate	E
COM30		comments	
INDAT		data input date to geodatabase (yymmdd)	880804

AREAC	The area code is a unique two letter code from the area name.
XCOORD	the north-south co-ordinate in the local grid net. To simplify plotting and calculations, co-ordinates south of the origin are taken to be negative.
YCOORD	the east-west co-ordinate in the local grid net. To simplify plotting and calculations, co-ordinates west of the origin are taken to be negative.
LDIRX	north (N) or south (S) symbol of the x-co-ordinate.
LDIRY	east (E) or west (W) symbol of the y-co-ordinate.
COM30	additional relevant information
INDAT	date information was loaded to the database

2.3 AREAREF

The local grid net in the field degenerates rapidly. Most of this disappears after a few years. To restore the net for use in further investigations, a series of so-called area reference point are used. Small metal plates with local co-ordinates are nailed to tree stumps left along the T-lines of the grid net. The local co-ordinates of these points are collected in AREAREF.

GEO_DB .AREAREF — Area reference points (see record underlined in Appendix A page 2)

Column	Key	Text	Example
AREAC	*	area idcode	KM
XCOORD	*	x-co-ordinate in local grid	200.000
YCOORD	*	y-co-ordinate in local grid	2000.00
LDIRX		direction symbol for local x-co-ordinate	N
LDIRY		direction symbol for local y-co-ordinate	E
COM30		comments	
INDAT		data input date in geodatabase (yymmdd)	880804

AREAC the area code is a unique two letter code from the area name.

XCOORD the north-south co-ordinate in the local grid net. To simplify plotting and calculations, co-ordinates south of the origin are taken to be negative.

YCOORD the east-west co-ordinate in the local grid net. To simplify plotting and calculations, co-ordinates west of the origin are taken to be negative.

LDIRX north (N) or south (S) symbol for the x-co-ordinate.

LDIRY east (E) or west (W) symbol for the y-co-ordinate.

COM30 additional relevant information

INDAT date information was loaded to the database

2.4 AREAFIXP

If true RAK fixpoints or fixpoints measured from a RAK fixpoint are used to locate boreholes or the origin of the grid net itself in the RAK system, these fixpoints are collected in AREAFIXP.

An RAK fixpoint is a geodetically well determined fixpoint which is part of a system of triangular points attached to the National Co-ordinate System (RAK) of Sweden. In the terrain, these points are marked with bolts in the bedrock or in concrete constructions and are also presented on maps published by Lantmäteriverket (LMV).

No local z-co-ordinates are usually used during the field work in an area.

GEO_DB .AREAFIXP Area fixpoints (see record underlined in Appendix A page 2)

Column	Key	Text	Exemple
AREAC	*	area idcode	AS
XCOORD	*	x-co-ordinate in local grid (m)	6848.146
YCOORD	*	y-co-ordinate in local grid (m)	2079.353
LDIRX		direction symbol for local x-co-ordinate	N
LDIRY		direction symbol for local y-co-ordinate	E
FIXNAME		code or number of fixpoint	
X		RAK x-co-ordinate for fixpoint	67380.746
Y		RAK y-co-ordinate for fixpoint	51460.546
Z		z-co-ordinate (m.a.s.l)	2.37
RAKDEF		co-ordinate method RAK definition	
		P=definition towards RAK fixpoint	P
		O=true RAK fixpoint	
ZDEF		Altitude definition	
		P=definition towards RAK fixpoint	P
		O= true RAK fixpoint	
		D= definition on topographic map 1:50000	
		E= definition on topographic map 1:20000	
		F= definition on topographic map 1:10000	
		G= definition on topographic map 1:8000	
		H= definition on topographic map 1:4000	
		I= definition on topographic map 1:2000	
COM30		comments	
INDAT		data input date into geodatabase	880805

AREAC The area code is a unique two letter code from the area name.

XCOORD the north-south co-ordinate in the local grid net. To simplify plotting and calculations, co-ordinates south of the origin are taken to be negative.

YCOORD the east-west co-ordinate in the local grid net. To simplify plotting and calculations, co-ordinates west of the origin are taken to be negative.

LDIRX north (N) or south (S) symbol of the x-co-ordinate.

LDIRY east (E) or west (W) symbol of the y-co-ordinate.

X north-south RAK co-ordinate for the fixpoint

Y east-west RAK co-ordinate for the fixpoint

Z	altitude above the sea level (m)
RAKDEF	defines the origin of the x- and y- co-ordinates. Indirectly, this gives the accuracy of the co-ordinates. O is a permanent RAK fixpoint with high accuracy, P might not have the same accuracy and may also disappear.
ZDEF	Defines the origin of the altitude above sea level.
COMMENT	additional relevant information
INDAT	date information was loaded to the database

3 BGDRILL -- BACKGROUND DRILLING INFORMATION

General information from drilling events are collected in the method BGDRILL. The method consists only of one table.

DRILL drilling information

A list from this table is found in Appendix B.

3.1 DRILL

The DRILL table contains information on the type of drill rigg used and the drilling company. Drilling periods and the borehole length are also included.

GEO_DB .DRILL Drilling information (see record underlined in Appendix B page 1)

Column	Key	Text	Example
IDCODE	*	borehole idcode	KLJ01
SECUP	*	length to section upper limit (m)	0.00
SECLOW	*	length to section lower limit (m)	500.60
START		drill start date (yymmdd)	870817
END		drill end date (yymmdd)	871127
COMP		drilling company	LKAB
RIGG		type of drill rigg	DIAMEC 260
COMMENT		comments	
INDAT		data input date to geodatabase	880804

IDCODE a borehole code where each position gives the following information
- 1 code for type of drilling
- 2-3 area code
- 4-5 borehole number

SECUP drilling started at this borehole length
SECLOW drilling stopped at this borehole length
START drilling started at this date
END drilling stopped at this date
COMP company performing drilling
RIGG drill rigg type
COMMENT additional relevant information
INDAT date information was loaded to the database

4 BGDRILLP -- BACKGROUND DRILLING PENETRATION

The method BGDRILLP contains information concerning the measurement and data from drill penetration during percussion drilling. This method contains two tables:

DRILLPF	Drillhole penetration - Flyleaf page 1
DRILLPD	Drill penetration log - Data

4.1 DRILLPF

This table is a flyleaf table to the data table DRILLP. A flyleaf table contains information on the drilling company and drill crew involved. To date no information is stored in this table.

GEO_DB .DRILLPF Drillhole penetration - Flyleaf page 1.

Column	Key	Text	Example
IDCODE	*	borehole idcode	
DATE	*	date of measurement (yymmdd)	
COMP		drilling company	
CREW		drill crew	
RESP		person evaluating measurements	
REPORT		reference to report	
ARCHIVE		reference to archive	
DATASTO		data storage	
COMMENT		comments	
SIGN		signature of person responsible for input of data	
INDAT		data input date to geodatabase (yymmdd)	

IDCODE	a borehole code where each position gives the following information 1 code for type of drilling 2-3 area code 4-5 borehole number
DATE	date of measurement
COMP	drilling company
CREW	drill crew
RESP	person evaluating data
REPORT	evaluation report reference
ARCHIVE	archive where files are stored
DATASTO	data storage reference
COMMENT	additional relevant information
SIGN	signature of person responsible for input into database
INDAT	date information was loaded to the data base

4.2 DRILLPD

Drill penetration data from percussion drilling is stored in this table.

GEO_DB .DRILLPD Drill Penetration Log - Data (see record underlined in Appendix C page 1)

Column	Key	Text	Example
IDCODE	*	borehole idcode	HAS01
SECUP	*	length along borehole (m)	1.40
SECLEN		section length (m)	0.2
PTIME		penetration time (s)	43
INDAT		data input date to geodatabase (yymmdd)	870915

IDCODE	a borehole code where each position gives the following information 1 code for type of drilling 2-3 area code 4-5 borehole number
SECUP	borehole length from top of casing pipe to upper section limit
SECLEN	section length
PTIME	penetration time, seconds
INDAT	date information was loaded to the database

5 BGHOLE -- BACKGROUND BOREHOLE INFORMATION

During the investigation of an area, a series of cored boreholes are drilled. A number of percussion boreholes are also drilled, sometimes as many as 50 in one area. Different types of measurements were performed in the boreholes. The results from these measurements are stored in other tables in other subjects within the database.

The method BGHOLE contains different types of information concerning the boreholes. The method consists of the following tables:

BHNAME	Connection between Area code and borehole idcode. Check table for borehole idcode in other tables
BOREHOLE	Borehole information
HOLEDIAM	Borehole diameter
COREDIAM	Borehole core diameter
CASEDIAM	Borehole casing diameter
CASETOP	Casing above ground
BHCOORD	Co-ordinates along borehole
BHHIST	Events occurred in borehole

A list from each table is found in Appendix D.

5.1 BHNAME

This table describes the connection between borehole type, area code and borehole idcode. The table is used as a check table, to prevent data storage under an illegal idcode. To store data from a new borehole into any table within the database, the new borehole idcode must first be loaded into the table BHNAME.

GEO_DB .BHNAME Connection between borehole idcode, area code and borehole type (see record underlined in Appendix D page 1)

Column	Key	Text	Example
IDCODE	*	idcode for borehole	KAS02
AREAC	*	area idcode	AS
BHTYPE		borehole-type	K
OIDCODE		old idcode	
COM30		comment	
INDAT		data input date to geodatabase	880208

IDCODE a borehole code where each position gives the following information
1 code for type of drilling
2-3 area code
4-5 borehole number

AREAC The area code is a unique two letter code from the area name.

BHTYPE the first letter in the idcode states the type of borehole.
B Booster borehole
H percussion borehole (well)
K cored borehole (drill hole)

OIDCODE if for any reason the idcode has been changed, the old idcode is saved in this field

COM30 additional relevant information

INDAT date information was loaded to the database

5.2 BOREHOLE

General borehole information is collected in this table. This includes the borehole code, local and RAK co-ordinates, altitude, borehole length and intended orientation.

No local z-co-ordinate is usually used during the field work.

GEO_DB .BOREHOLE Borehole information (see record underlined in Appendix D page 1)

Column	Key	Text	Example
IDCODE	*	idcode for borehole	KAS02
XCOORD		x-co-ordinate (local net) (m)	7261.986
LDIRX		direction for local x - co-ordinate	N
YCOORD		y-co-ordinate (local net) (m)	2125.224
LDIRY		direction for local y - co-ordinate	E
X		RAK x-co-ordinate for borehole (on surface)	
Y		RAK y-co-ordinate for borehole (on surface)	
Z		altitude above sea level (m)	7.68
RAKDEF		RAK co-ordinate method definition	
		P=definition towards RAK fixpoint	P
		O=true RAK fixpoint	
		D=definition on topographic map 1:50000	
		E=definition on topographic map 1:20000	
		F=definition on topographic map 1:10000	
		G=definition on topographic map 1:8000	
		H=definition on topographic map 1:4000	
		I=definition on topographic map 1:2000	
ZDEF		RAK co-ordinate method definition	
		P= definition towards RAK fixpoint	P
		O=true RAK fixpoint	
		D=definition on topographic map 1:50000	
		E=definition on topographic map 1:20000	
		F=definition on topographic map 1:10000	
		G=definition on topographic map 1:8000	
		H=definition on topographic map 1:4000	
		I=definition on topographic map 1:2000	
BHLEN		borehole length (m)	924.04
CASEGRN		length of casing above ground (m)	0.69
SOILLEN		length along borehole of Quaternary layers (Quaternary layers = soil)	0.00
PREDEC		preliminary angle to RAK north (degree)	330.0
PREINC		preliminary angle from horizontal plane (degree)	85.0
COM50		comments	
INDAT		data input date to geodatabase	880208

IDCODE a borehole code where each position gives the following information
- 1 code for type of drilling
- 2-3 area code
- 4-5 borehole number

XCOORD the north-south co-ordinate in the local grid net. To simplify plotting and calculations co-ordinates south of the origin are taken to be negative.

YCOORD the east-west co-ordinate in the local grid net. To simplify plotting and calculations

	co-ordinates west of the origin are taken to be negative.
LDIRX	north (N) or south (S) symbol of the x-co-ordinate.
LDIRY	east (E) or west (W) symbol of the y-co-ordinate.
X	north-south RAK co-ordinate of the fixpoint
Y	east-west RAK co-ordinate of the fixpoint
Z	altitude above the sea level (m)
RAKDEF	defines the origin of the x- and y- co-ordinates. Indirectly, this gives the accuracy of the co-ordinates. O is a permanent RAK fixpoint with high accuracy, P might not have the same accuracy and may also disappear.
ZDEF	defines the altitude of the origin above sea level.
BHLEN	borehole length (m)
CASEGRN	length of casing above ground (m)
SOILLEN	length along borehole of Quaternary layers (Quaternary layers = soil)
PREDEC	intended drill direction in a 360 degree clockwise system (degree)
PREINC	intended angle from horizontal plane, vertical being 90 degrees
COM50	additional relevant information
INDAT	date information was loaded to the database

Normally the boreholes are determined geodetically towards the origin of the grid net (0 N / 0 E). Inside a local grid net the accuracy of the local borehole co-ordinates is estimated to be within 5 m.

Borehole RAK co-ordinates may be determined geodetically. In general, they are determined either directly from a map, or calculated from the RAK co-ordinate for the origin of the grid net, the local borehole co-ordinates and the orientation of the grid net. The accuracy of determination of the co-ordinates in either case depends on the scale of the map used, Table 5.1.

Table 5.1 Accuracy of the RAK co-ordinate for the boreholes

Geotab code	Map scale	RAK co-ordinate accuracy (m)
D	1:50 000	100
E	1:20 000	40
F	1:10 000	20
G	1:8 000	16
H	1:4 000	8
I	1:2 000	4
P		0.01
O		0.01-0.1

5.3 HOLEDIAM

In this table, the diameter for a given section in a borehole is given. Normally the diameter is constant along the entire borehole length, but it may vary in some boreholes.

GEO_DB .HOLEDIAM Borehole diameter (see record underlined in Appendix D page 2)

Column	Key	Text	Example
IDCODE	*	borehole idcode	KAS02
SECUP	*	length to upper limit (m)	0.00
SECLOW	*	length to lower limit (m)	93.35
HOLDIAM		borehole diameter (m)	0.155
INDAT		data input date to geodatabase (yymmdd)	880229

IDCODE a borehole code where each position gives the following information
- 1 code for type of drilling
- 2-3 area code
- 4-5 borehole number

SECUP borehole length from top of casing to upper section limit (m)

SECLOW borehole length from top of casing to lower section limit (m)

HOLDIAM borehole diameter (m)

INDAT date information was loaded to the database

5.4 COREDIAM

This table contains information on drill core diameter.

GEO_DB .COREDIAM Drill core diameter (see record underlined in Appendix D page 2)

Column	Key	Text	Example
IDCODE	*	borehole idcode	KAS02
SECUP	*	length to upper limit (m)	0.00
SECLOW	*	length to lower limit (m)	924.04
COREDIAM		drill core diameter (m)	0.042
COM30		comments	
INDAT		data input date to geodatabase (yymmdd)	880229

IDCODE	a borehole code where each position gives the following information 1 code for type of drilling 2-3 area code 4-5 borehole number
SECUP	borehole length from top of casing to upper section limit (m)
SECLOW	borehole length from top of casing to lower section limit (m)
COREDIAM	drill core diameter for this section (m)
COM30	additional relevant information
INDAT	date information was loaded to the database

5.5 CASEDIAM

To prevent borehole collapse in the soil layer, an iron casing pipe is inserted into the bedrock during the drilling. In general, only one diameter is used in a borehole, but in some cases several diameters were used.

In the CASEDIAM table, the diameter of the casing pipe is noted.

GEO_DB .CASEDIAM Borehole casing diameter (see record underlined in Appendix D page 2)

Column	Key	Text	Example
IDCODE	*	borehole idcode	KAS02
SECUP	*	length to upper limit (m)	0.00
SECLOW	*	length to lower limit (m)	1.05
CASEIN		casing inner diameter (m)	0.173
CASEOUT		casing outside diameter (m)	0.197
COM30		comments	
INDAT		data input date to geodatabase (yymmdd)	880303

IDCODE	a borehole code where each position gives the following information 1 code for type of drilling 2-3 area code 4-5 borehole number
SECUP	borehole length from top of casing to upper section limit (m)
SECLOW	borehole length from top of casing to lower section limit (m)
CASEIN	casing inner diameter (m)
CASEOUT	casing outer diameter (m)
COM30	additional relevant information
INDAT	date information was loaded to the database

5.6 CASETOP

This table contains information on casing length above a reference level. This information is of interest when measuring methods are used, which must later be compared with each other and with the geological core mapping and then length corrected. Since the casing pipe is used to attach different types of equipment, its length is sometimes reduced or increased. It is then important to have a fixed reference level and to measure CASEGRN at every measuring event.

GEO_DB .CASETOP Difference from original casetop level

Column	Key	Text	Example
IDCODE	*	borehole idcode	KLJ01
CHDATE	*	date for change of length of casing above reference level (yymmdd)	871204
ZERODIFF	*	difference from zero level (m), which equals column Z in table BOREHOLE	0.46
COM30		comments	
INDAT		data input date to geodatabase (yymmdd)	880802

IDCODE	a borehole code where each position gives the following information 1 code for type of drilling 2-3 area code 4-5 borehole number
CHDATE	date of change of casing length above reference level (yymmdd)
ZERODIFF	difference from zero level (m), which equals column Z in table BOREHOLE
COM30	additional relevant information
INDAT	date information was loaded to the database

5.7 BHCOORD

This table contains calculated local co-ordinates, vertical depths from the top of a casing and meters above sea level (MASL) for different lengths along the borehole. These values are generated and loaded into the table by a program, using information from the table DEVANGLE (DECLIN and INCLIN) and the table AREA (DIRGRID and DEV). This program is run automatically every night. The accuracy of the values calculated are presented in Table 5.2.

Table 5.2 Estimated accuracy for co-ordinates along the borehole

X- and Y-co-ordinate reference point	Accuracy
top of casing	1% of borehole length
local grid ON / OE	5 m + 1% of borehole length
RAK system	M + 5 m + 1% of borehole length

M = map dependent, see Table 2.1

When the borehole deviation log is measured, the borehole direction in the vertical plane, inclination, is monitored by a pendulum, while the direction in the horizontal plane is registered by a compass needle. The inclination is given in a 90 degree system, where 0 degrees is horizontal and 90 degrees is vertical. The direction is given in a 360 degree clockwise system.

The deviation log measurements are stored in a table called DEVANGLE. The inclination is in the column INCLIN, while the direction is in the column DECLIN.

Since the direction is measured with a compass needle and the RAK system is not oriented exactly in the magnetic north direction, corrections must be applied in the calculation of co-ordinates from the measurements. The topographic map indicates the following:

RAK angle = compass angle + M - C
where M = compass deviation (magnetic north direction - geographic north direction)
and C = meridian convergence (RAK north direction - geographic north direction)

From this a new parameter, DEV, is defined:

DEV = M - C (magnetic north direction - RAK north direction)

Using the data in the columns DEV and DIRGRID from the table AREA and INCLIN and DECLIN from the table DEVANGLE, it is now possible to calculate the local co-ordinates at different vertical depths in the borehole.

Sign conventions are given on page 8.

$X_i = X_{i-1} + (BHLEN_{i-1} - BHLEN_i) * COS(DECLIN-DEV+DIRGRID) * COS(INCLIN)$

$Y_i = Y_{i-1} + (BHLEN_{i-1} - BHLENi) * SIN(DECLIN-DEV+DIRGRID) * COS(INCLIN)$

$Z_i = Z_{i-1} + (BHLEN_{i-1} - BHLEN_i) * SIN(INCLIN)$

The same formulae can be used to calculate the RAK co-ordinates if DIRGRID is excluded.

GEO_DB .BHCOORD — Co-ordinates Along Borehole (see record underlined in Appendix D page 3)

Column	Key	Text	Example
IDCODE	*	borehole idcode	KKM02
BHLEN	*	length along hole	10.00
XCOORD		x-co-ordinate (local net)	250.371
YCOORD		y-co-ordinate (local net)	362.679
ZCOORD		vertical depth (m)	8.69
MASL		meters above sea level (m.a.s.l.)	
INDAT		data input date to geodatabase (yymmdd)	880525

IDCODE — a borehole code where each position gives the following information
- 1 — code for type of drilling
- 2-3 — area code
- 4-5 — borehole number

BHLEN — length along borehole from top of casing

XCOORD — the north-south co-ordinate in the local grid net calculated from the borehole deviation measurements.

YCOORD — the calculated east-west co-ordinate in the local grid net calculated from the borehole deviation measurements.

ZCOORD — calculated vertical depth for XCOORD/YCOORD, if zero at top of casing, positive downwards

MASL — borehole level above sea level - ZCOORD (positive above and negative below sea level)

INDAT — date information was loaded to the database

5.8 BHHIST

Events such as the loss of equipment in borehole, blocked borehole etc, can be recorded in this table. So far (September 1988) no data has been loaded into this table.

GEO_DB .BHHIST Events Occurred In Boreholes

Column	Key	Text
IDCODE	*	borehole idcode
DATE	*	date (year,month,day)
TIME	*	time of day
LINENO	*	line number
EVENT		event
INDAT		data input date to geodatabase

IDCODE	a borehole code where each position gives the following information	
	1	code for type of drilling
	2-3	area code
	4-5	borehole number
DATE	date of event	
TIME	time of event	
LINENO	line number of the text describing an event	
EVENT	borehole historical event	
INDAT	date information was loaded to the database	

6 BGTABLES -- BACKGROUND NUMBER OF ROWS IN TABLE

This method was created to gather information concerning what data is present in the database. The method consists of one table only. Example of list from this table is found in Appendix E.

6.1 ROWTAB

In this table, information on the number of rows (records) in each database table is found. This table must be updated manually and it is seldom up to date.

GEO_DB .ROWTAB Description Of Tables - Number Of Rows In Tables (see record underlined in Appendix F page 1)

Column	Key	Text	Example
TABLE	*	table name	AREA
DATE	*	date of notice	871124
NUMROW		number of rows	39
RECLEN		record length	
COM50		comment	
INDAT		inputdate of data to geodatabase yymmdd)	871125

TABLE	table name
DATE	date when this table was updated
NUMROW	number of rows (records) in a table
RECLEN	maximum record length in the table
COM50	additional relevant information
INDAT	date information was loaded to the database

7 BGTOLR -- BACKGROUND DATA TOLERANCE BACKGROUND TABLE

In a database table the accuracy of the data might depend on how each parameter was measured. The same type of measurement might be made with different instruments or the equipment might have been modified to give higher resolution. Nevertheless, all data in a specific table is stored in the same format. This might give a false picture of the accuracy or sensitivity of different measurements.

The method BGTOLR consists of only one table. A list from this table is found in Appendix F.

7.1 TOLR

The measuring sensitivity or accuracy for different data are stored in this table.

GEO_DB .TOLR Tolerances in different columns (see record underlined in Appendix G page 1)

Column	Key	Text	Example
TNAME	*	table name	BOREHOLE
COLNAME	*	columnname	BHLEN
START	*	start date for valid tolerance and/or sensitivity	
END		end date for valid tolerance and/or sensitivity	
ACCURACY		accuracy	1.00E-01
DIMACC		accuracy dimension	%
SENS		sensitivity	
DIMSENS		sensitivity dimension	
COMMENT		comment	
INDAT		data input date to geodatabase	880412

TNAME	table name in the database
COLNAME	column name in this table
START	accuracy/sensitivity valid from this date
END	accuracy/sensitivity no longer valid from this date
ACCURACY	accuracy of the measuring method stored in this table
DIMACC	dimension or unit for accuracy
SENS	sensitivity of the measuring method stored in this table
DIMSENS	dimension or unit for sensitivity
COMMENT	additional relevant information
INDAT	date information was loaded to the database

8 REFERENCES

Eriksson, E., and Sehlstedt, S., 1989. Description of background data in the SKB database Geotab. SKB TR89-02

Gentzschein, B., 1986. Description of hydrogeological data in SKB's database Geotab. SKB TR86-22.

Sehlstedt, S., 1988. Description of geophysical data in the SKB database Geotab. SKB TR88-05.

Stark, T., 1988. Description of geological data in the SKB database Geotab. SKB TR88-06.

APPENDIX A:BGAREA

```
select AREA    .AREAC,AREAN,MAPNAME,PMAP,XZERO,YZERO,ZZERO,DIRGRID,DEV,RAKDEF,
ZDEF
from AREA;
```

AREAC	AREAN	MAPNAME	PMAP	XZERO	YZERO	ZZERO	DIRGRID	DEV	RAKDEF ZDEF
AO	ÄVRÖ	6H KRÅKELUND	3A	6366800.000	1552250.000		10.00	-0.8	F
AR	ÄVRÖ	6H KRÅKELUND	3A	6367257.000	1553084.000		-42.20	-0.8	F
AS	ÄSPÖ	6H KRÅKELUND	3A	6360253.000	1550813.000		-11.77	-0.8	I
AV	ÄVRÖ	6H KRÅKELUND	3A	6360253.000	1550813.000		-11.77	-0.8	I
BA	BASTULIDEN	22J KALVTRÄSK	2F						
BJ	BJULEBO	6G VIMMERBY	8I	6390640.000	1541450.000		42.30	-0.6	F
BM	BRÄMÖN	17H SUNDSVALL	0J						
BS	BJÖRKSUND	9H NYKÖPING	3H						
BU	BUSSVIK	6H KRÅKELUND							
DU	DUNDRET	28K GÄLLIVARE	0B						
DY	LOVISA								
FI	FINNSJÖN	12I ÖSTHAMMAR	9D					-1.0	
FJ	FJÄLLVEDEN	9H NYKÖPING	6C	6532940.000	1564830.000		-35.20	-1.6	F
FL	FLAKAÅSEN	18H GRANINGE	1C						
FO	FORSMARK	13I ÖSTERLÖVSTA	0G						
FR	SFR FORSMARK								
FS	FINNSJÖN	12I ÖSTHAMMAR	9D	6696490.000	1616500.000		-21.80	-1.0	F
GA	GALLEJAURE	23J NORSJÖ	6E						
GB	GÅVASTBO	12I ÖSTHAMMAR							
GI	GIDEÅ	19J HUSUM	8C	7044290.000	1662790.000		-3.00	-1.2	F
GR	GRANLIDEN	21I FREDRIKA	2B						
HO	HORNSLANDET	15H HUDIKSVALL							
IM	IMMELN	3E KARLSHAMN							
JH	JOHANNISHUS	3F KARLSKRONA	7F						
KA	KARLSHAMN	3E KARLSHAMN	5I						
KL	KLIPPERÅS	4F LESSEBO	9H	6297000.000	1488500.000		0.00	0.2	F
KM	KAMLUNGE	25M KALIX	9E	7345320.000	1821340.000		-6.50	1.7	F
KR	KRÅKEMÅLA	6G VIMMERBY	4J	6370000.000	1548000.000		0.00	-0.7	F
KY	KYNNEFJÄLL	9B DALS-ED	1B	6509810.000	1257080.000		23.50	1.1	F
LA	LAVIA								
LJ	LANSJÄRV								
LX	LAXEMAR	6H KRÅKELUND	3A	6360252.000	1550821.000				
ON	ÖNSBO	13I ÖSTERLÖVSTA	1D	6705410.000	1618890.000		-6.00	-0.9	F
PE	PELLBODABERGET	21K ROBERTSFORS	9J	7145980.000	1745975.000		0.00	-2.2	F
SL	SLAGÅRDA	11G VÄSTERÅS	3G						
ST	SALTSJÖTUNNELN								
SU	STUDSVIK								
SV	SVARTBOBGT	15F VOXNA	1H	6808160.000	1487280.000		-25.50	-0.3	F
TA	TAAVINUNNANEN	30K							
YD	OLKILOUTTO								

```
select AREALIM .AREAC,XCOORD,LDIRX,YCOORD,LDIRY,COM30,INDAT
from AREALIM
where AREAC    = 'KM' ;
```

AREAC	XCOORD	LDIRX	YCOORD	LDIRY	COM30	INDAT
KM	0.000	N	0.000	E		880804
KM	0.000	N	2000.000	E		880804
KM	2000.000	N	0.000	E		880804
KM	2000.000	N	2000.000	E		880804

```
select AREAREF .AREAC,XCOORD,LDIRX,YCOORD,LDIRY,COM30,INDAT
from AREAREF
where AREAC    = 'KM' ;
```

AREAC	XCOORD	LDIRX	YCOORD	LDIRY	COM30	INDAT
KM	0.000	N	0.000	E		880804
KM	0.000	N	200.000	E		880804
KM	0.000	N	400.000	E		880804
KM	0.000	N	600.000	E		880804
KM	0.000	N	800.000	E		880804
KM	0.000	N	1000.000	E		880804
KM	0.000	N	1174.600	E		880804
KM	0.000	N	1400.000	E		880804
KM	0.000	N	1642.400	E		880804
KM	0.000	N	1800.000	E		880804
KM	0.000	N	2000.000	E		880804
KM	200.000	N	0.000	E		880804
KM	200.000	N	1000.000	E		880804
KM	200.000	N	2000.000	E		880804
KM	400.000	N	1000.000	E		880804
KM	400.000	N	2000.000	E		880804
KM	476.800	N	0.000	E		880804
KM	600.000	N	2000.000	E		880804
KM	606.000	N	1000.000	E		880804
KM	648.200	N	0.000	E		880804
KM	800.000	N	0.000	E		880804
KM	800.000	N	1000.000	E		880804
KM	800.000	N	2000.000	E		880804
KM	1000.000	N	0.000	E		880804

```
select AREAFIXP.AREAC,XCOORD,LDIRX,YCOORD,LDIRY,X,Y,Z,RAKDEF,ZDEF,INDAT
from AREAFIXP
where AREAC    = 'AS' ;
```

AREAC	XCOORD (m)	LDIRX	YCOORD (m)	LDIRY	X	Y	Z m.a.s.l.	RAKDEF	ZDEF	INDAT (yymmdd)
AS	6848.146	N	2079.353	E	67380.746	51460.546	2.37	P	P	880805
AS	7048.812	N	1194.981	E	68135.991	50398.977	0.58	P	P	880805
AS	7119.214	N	2505.381	E	67733.327	51822.021	2.13	P	P	880805
AS	7799.968	N	2595.705	E	68418.148	51770.997	14.14	P	P	880805
AS	8113.079	N	2008.557	E	68604.360	51132.165	0.90	P	P	880805

APPENDIX B:BGDRILL

```
select DRILL   .IDCODE,SECUP,SECLOW,START,END,COMP,RIGG
from DRILL
where IDCODE   LIKE '*LJ*' ;
```

IDCODE	SECUP (m)	SECLOW (m)	START (yymmdd)	END (yymmdd)	COMP	RIGG
HLJ01	0.00	75.00	870811	870814	TGB	
HLJ02	0.00	83.60	870824	870908	TGB	
HLJ03	0.00	92.00	880117	880120	TGB	
KLJ01	0.00	500.60	870817	871127	LKAB	DIAMEC 260

APPENDIX C:DRILLP

```
select DRILLPF
0 rows found


select DRILLPD .IDCODE,BHLEN,PTIME,INDAT
from DRILLPD
where IDCODE   = 'HAS01' ;
```

IDCODE	BHLEN (m)	PTIME (s)	INDAT (yymmdd)
HAS01	1.40	43	870915
HAS01	1.60	42	870915
HAS01	1.80	43	870915
HAS01	2.00	40	870915
HAS01	2.20	45	870915
HAS01	2.40	47	870915
HAS01	2.60	48	870915
HAS01	2.80	48	870915
HAS01	3.00	49	870915
HAS01	3.20	43	870915
HAS01	3.40	40	870915
HAS01	3.60	42	870915
HAS01	3.80	36	870915
HAS01	4.00	35	870915
HAS01	4.20	38	870915
HAS01	4.40	40	870915
HAS01	4.60	32	870915
HAS01	4.80	31	870915
HAS01	5.00	30	870915
HAS01	5.20	30	870915
HAS01	5.40	36	870915
HAS01	5.60	28	870915
HAS01	5.80	30	870915
HAS01	6.00	33	870915
HAS01	6.20	32	870915
HAS01	6.40	34	870915
HAS01	6.60	36	870915
HAS01	6.80	38	870915
HAS01	7.00	40	870915
HAS01	7.20	38	870915
HAS01	7.40	43	870915
HAS01	7.60	39	870915
HAS01	7.80	37	870915
HAS01	8.00	44	870915
HAS01	8.20	33	870915

etc

APPENDIX D:BGHOLE

```
select BHNAME  .IDCODE,AREAC,BHTYPE,OIDCODE,COM30,INDAT
from BHNAME
where IDCODE   LIKE '*AS*' ;
```

IDCODE	AREAC	BHTYPE	OIDCODE	COM30	INDAT
HAS01	AS	H			870909
HAS02	AS	H			870909
HAS03	AS	H			870909
HAS04	AS	H			870909
HAS05	AS	H			870909
HAS06	AS	H			870909
HAS07	AS	H			870909
HAS08	AS	H			880411
HAS09	AS	H			880411
HAS10	AS	H			880411
HAS11	AS	H			880411
HAS12	AS	H			880411
KAS01	AS	K			880208
KAS02	AS	K			880229
KAS03	AS	K			880208
KAS04	AS	K			880208

```
select BOREHOLE.IDCODE,XCOORD,LDIRX,YCOORD,LDIRY,X,Y,Z,RAKDEF,ZDEF,BHLEN,
CASEGRN,SOILLEN,PREDEC,PREINC
from BOREHOLE
where IDCODE   LIKE '*AS*' ;
```

IDCODE	XCOORD	LDIRX	YCOORD	LDIRY	X	Y	Z	RAKDEF	ZDEF	BHLEN	CASEGRN	SOILLEN	PREDEC	PREINC
HAS01	7559.557	X	2058.460	Y	6368074.000	1551297.000	5.85	P	P	100.00			310.0	60.0
HAS02	7776.932	X	1371.199	Y	6368145.000	1550577.000	1.63	P	P	93.00			180.0	60.0
HAS03	7428.483	X	1778.998	Y	6367887.000	1551050.000	1.72	P	P	100.00			90.0	60.0
HAS04	7189.523	X	2057.348	Y	6367709.000	1551369.000	5.75	P	P	100.00			180.0	60.0
HAS05	7343.335	X	2139.569	Y	6367877.000	1551419.000	5.92	P	P	100.00			180.0	60.0
HAS06	7420.610	X	2337.806	Y	6367993.000	1551594.000	4.73	P	P	100.00				90.0
HAS07	7555.081	X	2322.802	Y	6368122.000	1551554.000	3.61	P	P	100.00			0.0	60.0
HAS08	7613.713	X	1731.070	Y			6.21	P	P	125.00	0.30	0.50		
HAS09	7770.423	X	1958.065	Y			7.03	P	P	125.00	0.30	0.10		
HAS10	7879.144	X	1711.000	Y			5.91	P	P	125.00	0.40	0.10		
HAS11	7758.157	X	1553.960	Y			5.10	P	P	125.00		0.00		
HAS12	7697.364	X	1449.506	Y			2.48	P	P	125.00				
KAS01	7250.110	X	2132.786	Y			8.18	P	P	101.00		0.00	330.0	85.0
KAS02	7261.986	X	2125.224	Y			7.68	P	P	924.04	0.69	0.00	330.0	85.0
KAS03	7758.228	X	1805.205	Y			8.79	P	P	1002.06				85.0
KAS04	7636.826	X	1955.060	Y			11.45	P	P				135.0	60.0

```
select HOLEDIAM.IDCODE,SECUP,SECLOW,HOLDIAM,INDAT
from HOLEDIAM
where IDCODE   LIKE '*AS*' ;
```

IDCODE	SECUP	SECLOW	HOLDIAM	INDAT
HAS01	0.00	100.00	0.115	870909
HAS02	0.00	93.00	0.115	870909
HAS03	0.00	100.00	0.115	870909
HAS04	0.00	100.00	0.115	870909
HAS05	0.00	100.00	0.115	870909
HAS06	0.00	100.00	0.115	870909
HAS07	0.00	100.00	0.115	870909
HAS08	0.00	125.00	0.115	880411
KAS01	0.00	95.85	0.155	880303
KAS01	95.85	101.00	0.056	880303
KAS02	0.00	93.35	0.155	880229
KAS02	93.35	924.04	0.056	880229

```
select COREDIAM.IDCODE,SECUP,SECLOW,COREDIAM,COM30,INDAT from COREDIAM
where IDCODE   LIKE '*AS*' ;
```

IDCODE	SECUP (m)	SECLOW (m)	COREDIAM (m)	COM30	INDAT
HAS01	0.00	100.00			870909
HAS02	0.00	93.00			870909
HAS03	0.00	100.00			870909
HAS04	0.00	100.00			870909
HAS05	0.00	100.00			870909
HAS06	0.00	100.00			870909
HAS07	0.00	100.00			870909
KAS01	0.00	101.00	0.042		880826
KAS02	0.00	924.04	0.042		880229
KAS03			0.042		880826
KAS04			0.042		880826

```
select CASEDIAM.IDCODE,SECUP,SECLOW,CASEIN,CASEOUT,COM30,INDAT from CASEDIAM
where IDCODE   LIKE '*AS*' ;
```

IDCODE	SECUP (m)	SECLOW (m)	CASEIN (m)	CASEOUT (m)	COM30	INDAT
HAS01	0.00	1.40	0.140			870909
HAS02	0.00	1.60	0.140			870909
HAS03	0.00	1.60	0.140			870909
HAS04	0.00	1.40	0.140			870909
HAS05	0.00	1.40	0.140			870909
HAS06	0.00	1.00	0.140			870909
HAS07	0.00	2.00	0.140			870909
KAS01	0.00	1.00	0.173	0.197		880303
KAS02	0.00	1.05	0.173	0.197		880303
KAS04	0.00	100.80	0.128	0.140		880506

```
select CASETOP
0 rows found


select BHCOORD .IDCODE,BHLEN,XCOORD,ECOORD,ZCOORD,INDAT
from BHCOORD
where IDCODE   = 'KKM02' ;
```

IDCODE	BHLEN (m)	XCOORD (m)	ECOORD (m)	ZCOORD (m)	INDAT (yymmdd)
KKM02	10.00	250.371	362.679	8.69	880525
KKM02	20.00	248.741	367.358	17.37	880525
KKM02	30.00	247.010	372.065	26.02	880525
KKM02	40.00	245.109	376.722	34.67	880525
KKM02	50.00	243.372	381.443	43.31	880525
KKM02	60.00	241.619	386.206	51.93	880525
KKM02	70.00	239.851	391.012	60.52	880525
KKM02	80.00	238.163	395.861	69.10	880525
KKM02	90.00	236.394	400.667	77.69	880525
KKM02	100.00	234.626	405.472	86.28	880525
KKM02	110.00	232.923	410.364	94.83	880525

etc

```
select BHHIST
0 rows found
```

APPENDIX E:BGTABLE

```
select ROWTAB  .TABLE,DATE,NUMROW,RECLEN,COM50,INDAT
from ROWTAB
where TABLE    = 'AREA' ;
```

TABLE	DATE (yymmdd)	NUMROW	RECLEN	COM50	INDAT (yymmdd)
AREA	870701		27		870706
AREA	870817		27		870817
AREA	871028		39		871029
AREA	871124		39		871125

APPENDIX F:BGTOLR

```
select TOLR    .TNAME,COLNAME,START,END,ACCURACY,DIMACC,SENS,DIMSENS,COMMENT, INDAT
from TOLR
where TNAME    = 'BOREHOLE' ;
------------------------------------------------------------------------------------------
--------------
TNAME    COLNAME  START (yymmdd) END (yymmdd)  ACCURACY DIMACC    SENS DIMSENS COMMENT
INDAT (yymmdd)
------------------------------------------------------------------------------------------
--------------
BOREHOLE BHLEN                                 1.00E-01 %
880412
BOREHOLE CASDIAM                               0.00E+00 M
880412
BOREHOLE CASEGRN                               1.00E-01 M
880412
BOREHOLE CORDIAM                               0.00E+00 M
880412
BOREHOLE HOLDIAM                               0.00E+00 M
880412
BOREHOLE LCAS                                  1.00E-01 M
880412
BOREHOLE SOILLEN                               1.00E-01 M
880412
BOREHOLE X                                     1.00E+02 M
880412
BOREHOLE XCOORD                                1.00E+01 M
880412
BOREHOLE Y                                     1.00E+02 M
880412
BOREHOLE YCOORD                                1.00E+01 M
880412
BOREHOLE Z                                     0.00E+00 M
880412
```

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[1]Enviromental Services, Studsvik Nuclear, Nyköping, Sweden
[2]MBT Tecnologia Ambiental, CENT, Cerdanyola, Spain
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