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Discription of background data in the SKB database GEOTAB

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Swedish Geological Co, Luleå

February 1989

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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) and 1987 (TR 87-33) is available through SKB.

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DESCRIPTION OF BACKGROUND DATA IN THE SKB DATABASE GEOTAB

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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. Here, the data is organized into six groups (subjects) as follows:

- Background data
- Geological data
- Borehole geophysical data
- Ground surface geophysical data
- Hydrogeological data
- Hydrochemical data

Except for the case of borehole and ground surface geophysical 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 BGR, 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 six groups (subjects), Figure 1.1. These are as follows:

- BGR - Background data
- GEOLOGY - Geological data
- GEOPHYS - Borehole geophysical data
- GSGPHYS - Ground surface geophysical data
- HYDRO - Hydrogeological data
- CHEMICAL - Hydrochemical data

In each subject several methods are listed and each method contains one or several tables. In Figure 1.2 the methods for the BGR subject are listed.

Figure 1.3 shows the structure of the method BGHOLE.

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

In this report, the background data subject (BGR) within the Geotab database is described. Here all methods and tables within the BGR group are described. The structure of this subject is as follows:

Subject	Method	Table
BGR	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.

Three reports dealing with different data sets stored in the Geotab database have been published to date. These are as follows:

TR86-22. Description of hydrogeological data in SKB´s database Geotab. Bengt Gentzschein.

TR88-05. Description of geophysical data in the SKB database Geotab. Stefan Sehlstedt.

TR88-06. Description of geological data in the SKB database Geotab. SGAB. Tomas Stark.

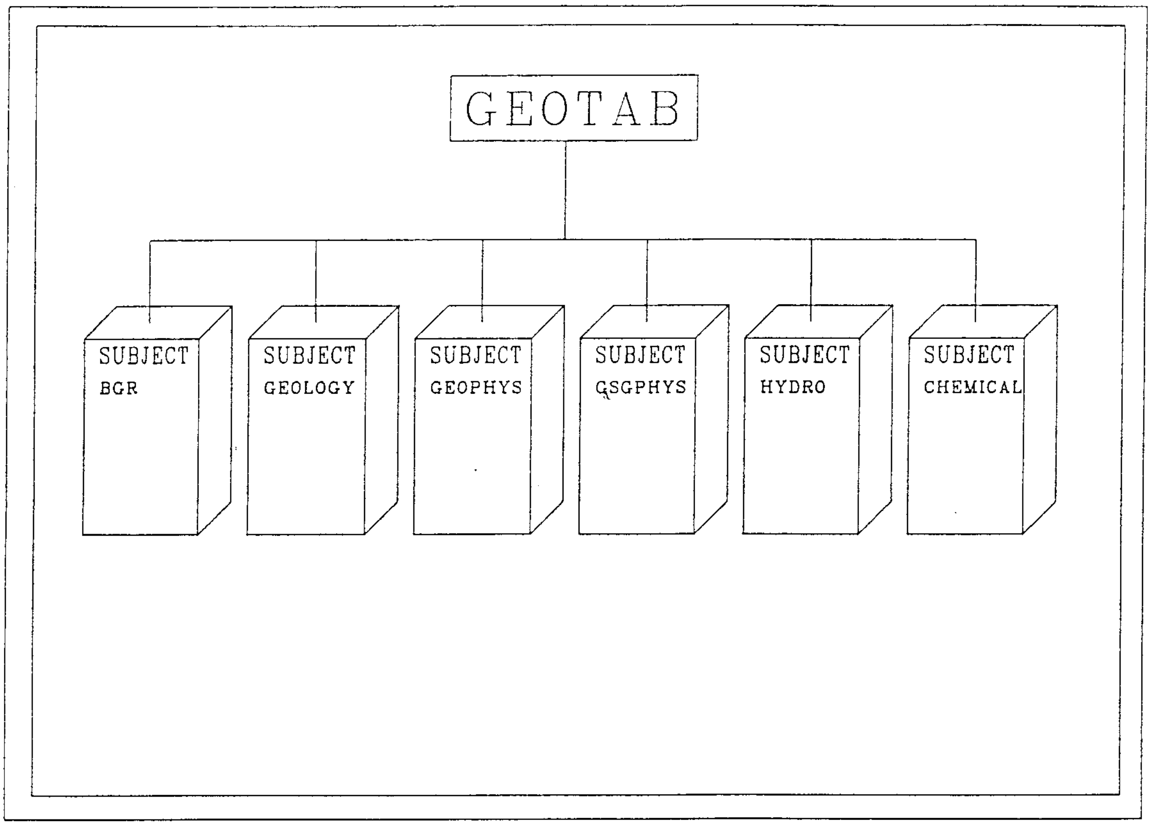


Figure 1.1 Structure of the Geotab database.

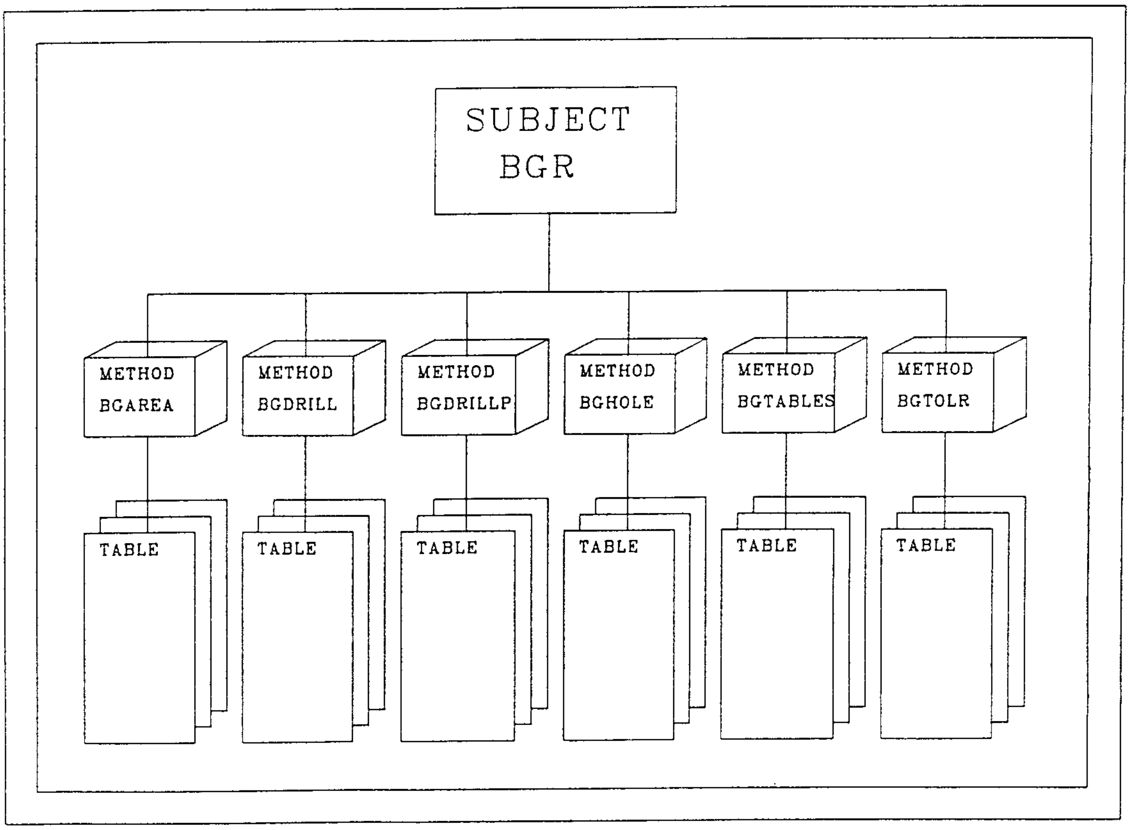


Figure 1.2 Structure of the subject BGR

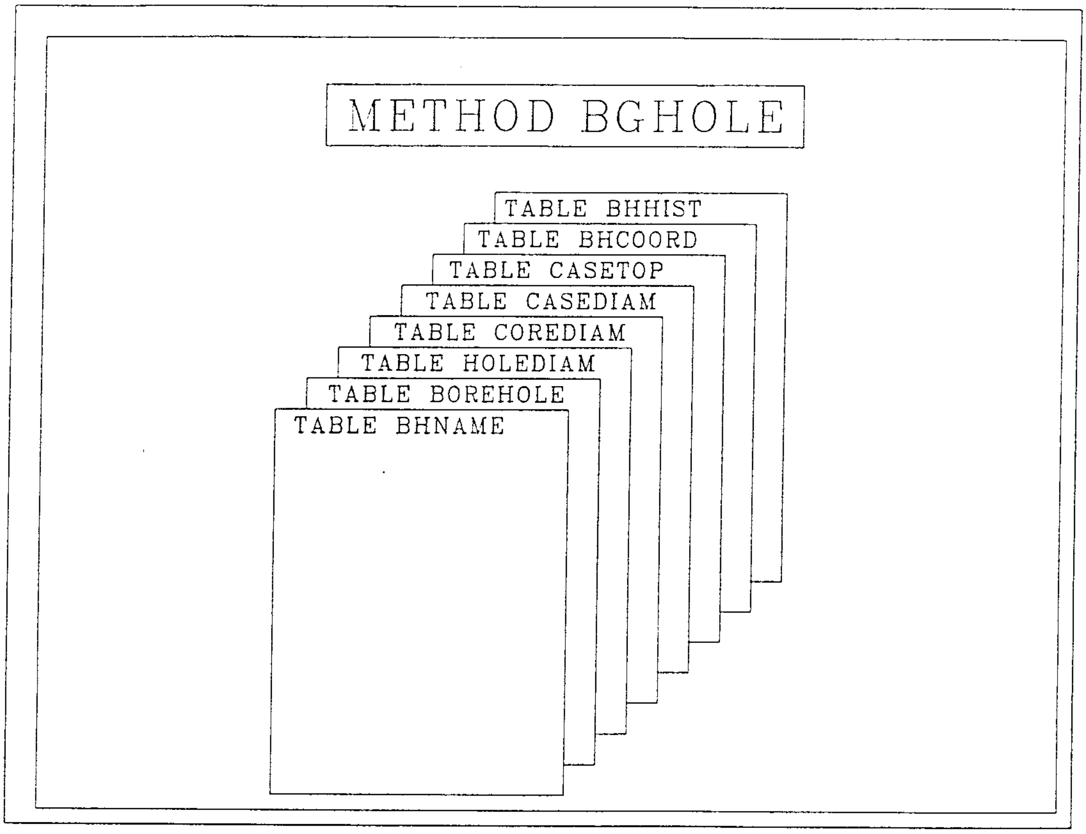
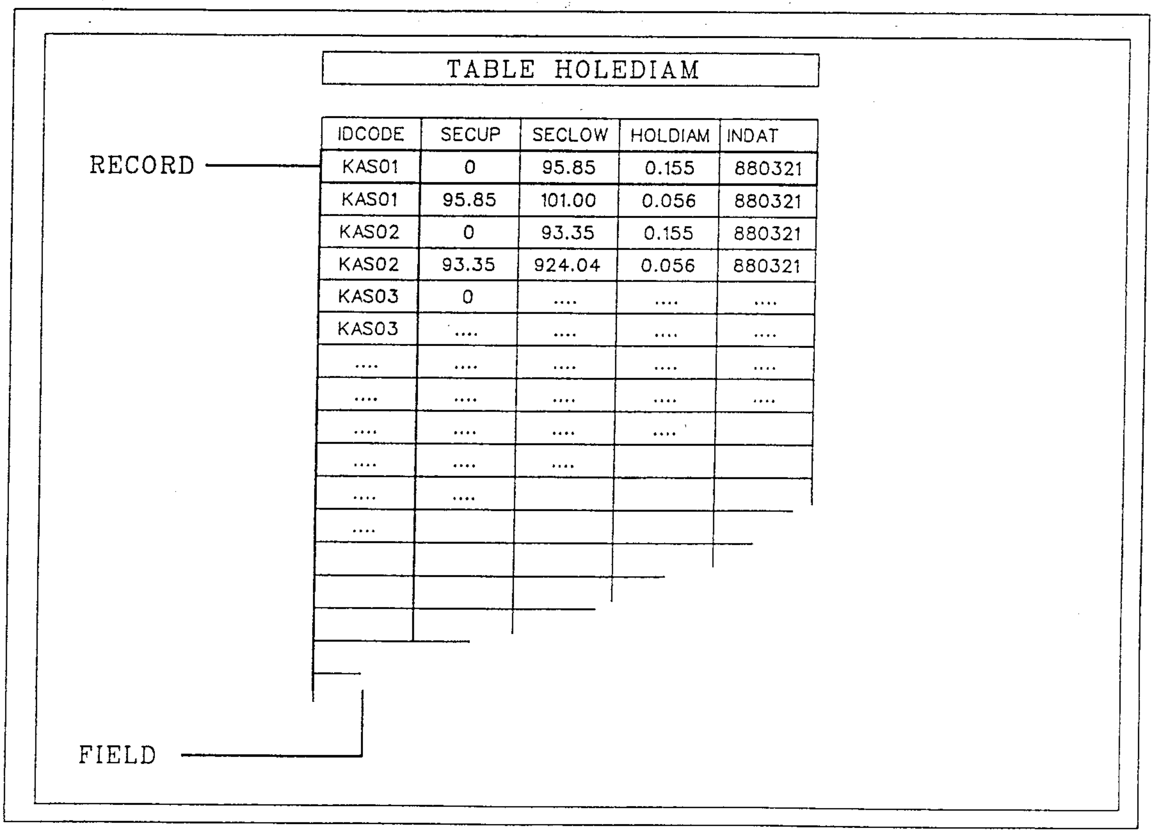


Figure 1.3 Structure of the method BGHOLE



IDCODE	SECUP	SECLOW	HOLDIAM	INDAT
KAS01	0	95.85	0.155	880321
KAS01	95.85	101.00	0.056	880321
KAS02	0	93.35	0.155	880321
KAS02	93.35	924.04	0.056	880321
KAS03	0	....	....	....
KAS03	....	....	....	....
....	....	....	....	....
....	....	....	....	....
....	....	....	....	
....	....	....		
....	....			
....				

Figure 1.4 Structure of the table HOLEDIAM

2 BGAREA -- BGR 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 may 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

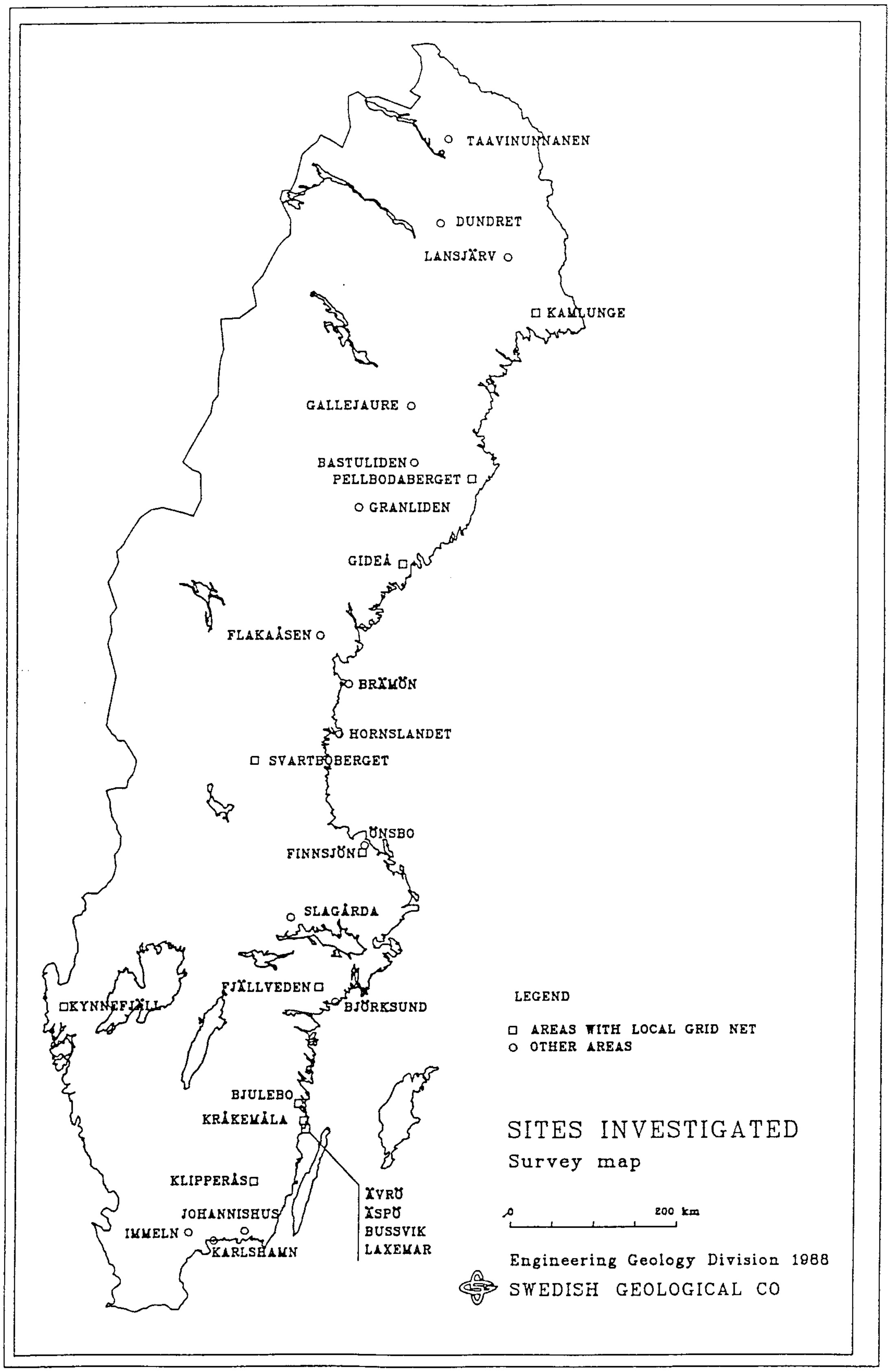
	accuracy of the co-ordinates.
ZDEF	defines the origin of the altitude above sea level.
COMMENT	additional relevant information
INDAT	date information was loaded to the database

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



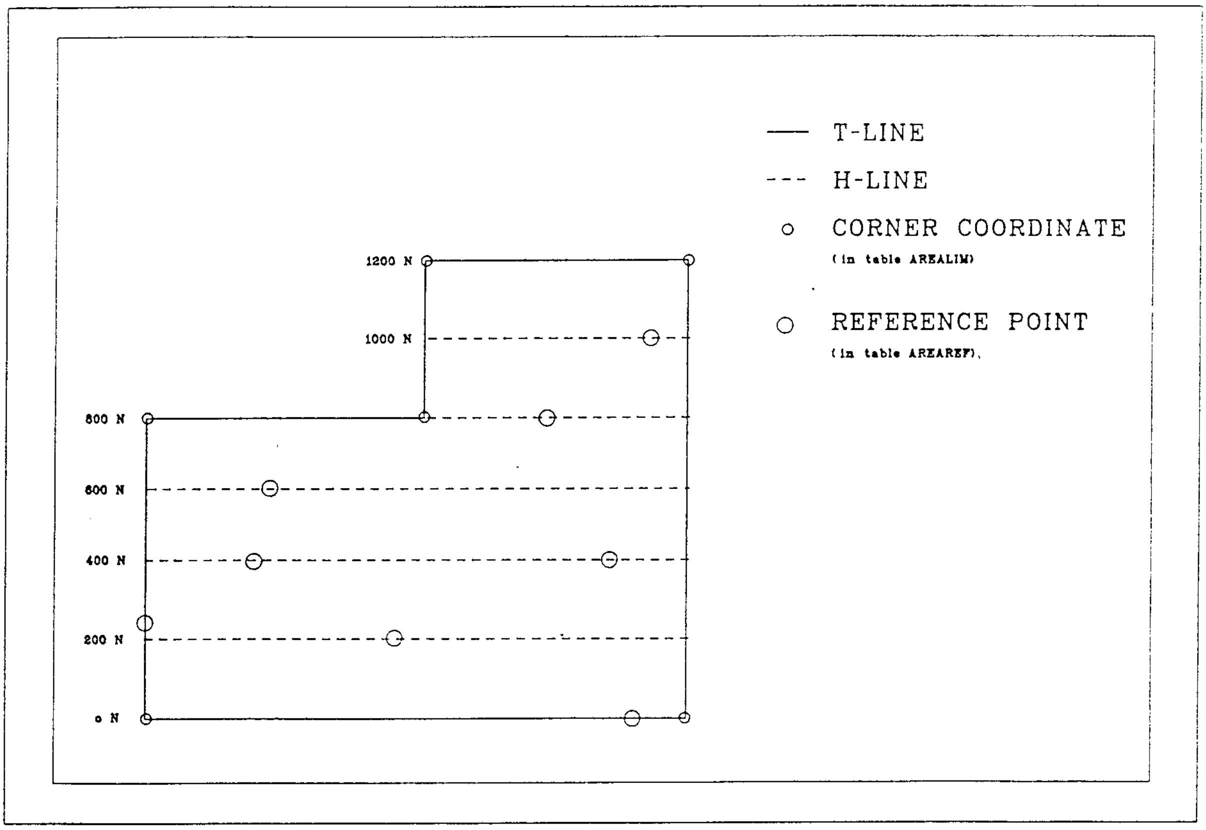


Figure 2.2 Grid net plan

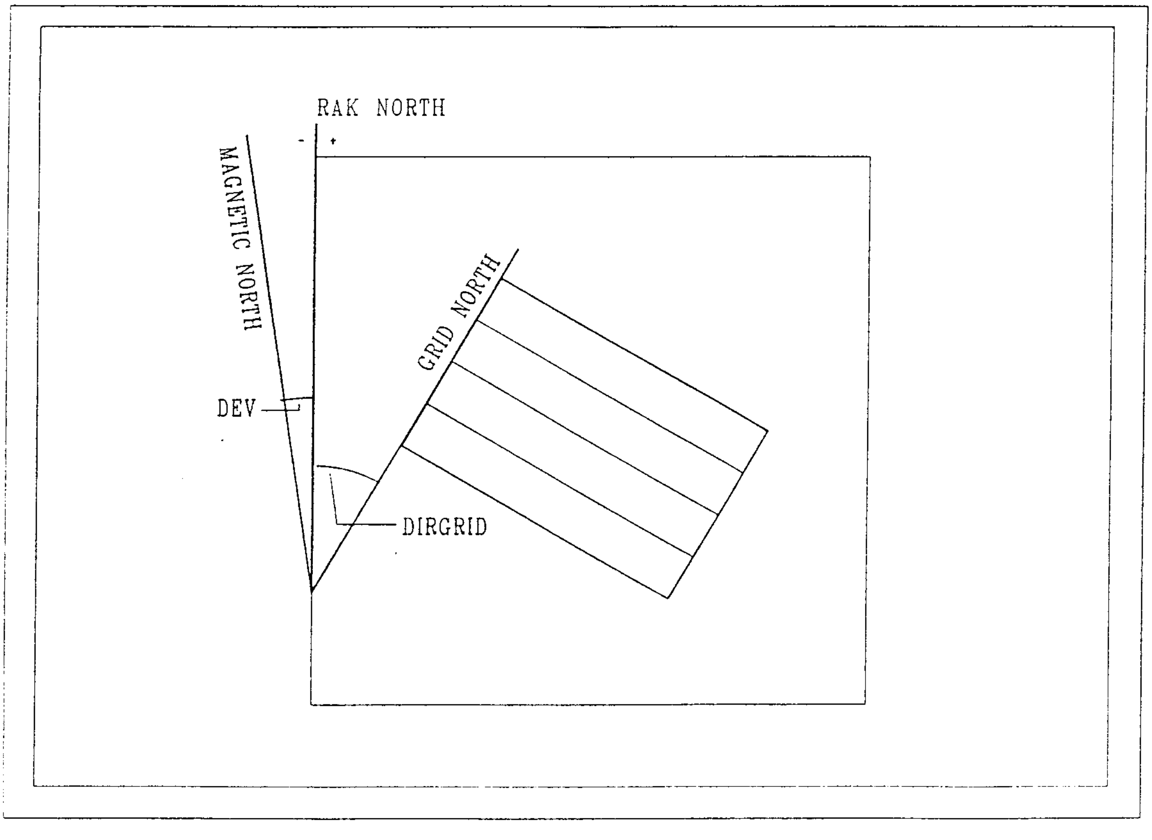


Figure 2.3 Grid net orientation

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 -- BGR 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 -- BGR 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 -- BGR 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 Casing above ground (see record underlined in Appendix D page 3)

Column Key	Text	Example
IDCODE *	borehole idcode	KLJ01
CHDATE *	date for change of length of casing above reference level (yymmdd)	871204
CASEGRN*	length of casing from reference level (m)	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)

CASEGRN — length of casing from a reference level (m), usually the ground surface or a concrete slab

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 0N / 0E	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 diffrent vertical depths in the borehole. Sign coventions are given on page 9.

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

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

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

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 -- BGR 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 -- BGR 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

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

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

Stark, T., 1988.TR88-06. 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	SVARTBOBERGET	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 .IDCODE,CHDATE,CASEGRN,COM30,INDAT
from CASETOP
where IDCODE   LIKE '*KL*' ;
```

IDCODE	CHDATE (yymmdd)	CASEGRN (m)	COM30	INDAT
HKL01	830609	0.94		870403
HKL02	840409	0.63		870403
HKL03	840410	0.56		870403
HKL04	840411	0.63		870403
HKL05	840416	0.66		870403
HKL06	840530	0.62		870403
HKL07	840522	0.64		870403
HKL08	840520	0.60		870403
HKL09	840529	0.63		870403
HKL10	840526	0.59	CORE SAMPLES TAKEN FROM DOLERI	870403
HKL11	840607	0.60		870403
HKL12	840605	0.60		870403
HKL13	840601	0.59		870403
HKL14	840603	0.61		870403
KKL01	830608	0.66		870403
KKL02	840427	0.60		870403
KKL03	840701	0.32		870403
KKL04	840710	0.20		870403
KKL05	840721	0.40		870403
KKL06	840802	0.50	DRILLED TO 266 M (840810). NEW	870515
KKL06	850222	0.50		870403
KKL07	840814	0.40		870403
KKL08	841025	0.22		870403
KKL09	841005	0.14		870403
KKL10	850105	0.34		870518
KKL11	850115	0.34		870403
KKL12	850124	0.33		870403
KKL13	850221	0.36		870403
KKL14	850319	0.18		870403
KLJ01	871204	0.46	0.00 AT TOP OF 140 MM CASING	880802
KLX01	880224	0.90	+0.5 m CASING	880303

```
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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Engineering Division

FORM 1, AREA
Registration of background data from investigation area

AREANAME

Areaname: ______________________________ Areacode: __

Map reference where local co-ordinate are 0,0

Mapsheet: ______________________________ Square of map: __

GRIDNET
RAK co-ordinate where local co-ordinate are 0,0

RAK X: _______.___ RAK Y: _______.___ Z (M.A.S.L): _____.__
RAKdef: _ Zdef: _

Angle in degrees between RAK north and north in local grid : ___.__
Angle in degrees between RAK north and magnetic north : __.__

Comments: ______________________________

Please complete the form and return it to the person responsible for storing background data in the database. The data will be stored in the table AREA in SKBs database GEOTAB.
If you do not have complete information, please keep a copy of the form. Fill in the missing information later and then send it in.

Signed : ______________________________
Date: ____-__-__
Is the form complete [ ] Yes [ ] No, will be completed later.

HOW TO COMPLETE THE FORM

AREA
Areaname:____________________ (ex: KLIPPERÅS)
The name of the area.

Areacode:__ (ex: KL)
The two letter code for the area.

Mapsheet:____________________ (ex: 12I ÖSTHAMMER)
The name of the topographical map where 0,0 for the local gridnet is located.

Square of map:__ (ex: 6A)
The identification of the square of the map where 0,0 for the local gridnet is located.

GRIDNET
RAK X:_______.___ (ex: 6368074.100)
The RAK north co-ordinate where local gridnet co-ordinates are 0,0.

RAK Y:_______.___ (ex: 1551297.000)
The RAK east co-ordinate where local gridnet co-ordinates are 0,0.

Z(M.A.S.L):___.___ (ex: 134.234)
The altitude from sea level where local gridnet co-ordinates are 0,0.

RAKdef:_ (ex: I)
A code giving information on how the RAK co-ordinates for the Xzero and Yzero are established. The codes are as follows
P = towards RAK fixpoint
D = on map in scale 1:50 000   G = on map in scale 1:8 000
E = on map in scale 1:20 000   H = on map in scale 1:4 000
F = on map in scale 1:10 000   I = on map in scale 1:2 000

Zdef:_ (ex: P)
A code giving information on how the M.A.S.L. is established for the point where the local gridnet co-ordinates are 0,0. The codes are the same as for RAKdef.

Angle in degrees between RAK north and north in local grid:___.__ (ex:123.23)
The angle between RAK north and north in the local gridnet. The angle is taken to be negative towards west and positive towards east.

Angle in degrees between RAK north and magnetic north:_._ (ex: 1.5)
The angle between RAK north and magnetic north. This angle is taken to be negative towards west and positive towards east.

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FORM 2, AREA
Registration of background data from investigation area

Areacode:__

FIX LOCATED IN OR NEARBY AREA

X-coord	Sx	Y-coord	Sy	Fixname	RAK X	RAK Y	RAKdef	M.A.S.L	Zdef
_____.____	_	_____.____	_	_________	_________.____	_________.____	_	_____.___	_
_____.____	_	_____.____	_	_________	_________.____	_________.____	_	_____.___	_
_____.____	_	_____.____	_	_________	_________.____	_________.____	_	_____.___	_
_____.____	_	_____.____	_	_________	_________.____	_________.____	_	_____.___	_
_____.____	_	_____.____	_	_________	_________.____	_________.____	_	_____.___	_
_____.____	_	_____.____	_	_________	_________.____	_________.____	_	_____.___	_
_____.____	_	_____.____	_	_________	_________.____	_________.____	_	_____.___	_
_____.____	_	_____.____	_	_________	_________.____	_________.____	_	_____.___	_
_____.____	_	_____.____	_	_________	_________.____	_________.____	_	_____.___	_
_____.____	_	_____.____	_	_________	_________.____	_________.____	_	_____.___	_
_____.____	_	_____.____	_	_________	_________.____	_________.____	_	_____.___	_
_____.____	_	_____.____	_	_________	_________.____	_________.____	_	_____.___	_

Comments:______________________________________

Please complete the form and return it to the person responsible for storing background data in the database. The data will be stored in the table AREAFIXP in SKBs database GEOTAB.
If you do not have complete information, please keep a copy of the form. Fill in the missing information later and then send it in.

Signed :____
Date:_____-__-__
Is the form complete [ ] Yes [ ] No, will be completed later.

HOW TO COMPLETE THE FORM

Areacode:__ (ex: KL)
The two letter code for the area. The codes are stored in the table AREA in SKBs database GEOTAB.

AREA FIXPOINTS
Xcoord:____.__ (ex: 75.120)
The local x-co-ordinate for fixpoint location.

Ldirx:_ (ex: S)
The direction symbol for the x-co-ordinate in the local gridnet.

Ycoord:____.___ (ex: 150.000)
The local y-co-ordinate for fixpoint location.

Ldiry:_ (ex: E)
The direction symbol for the y-co-ordinate in the local gridnet.

Fixname:______ (ex: P23)
The name of the fixpoint.

XRAK:_______.___ (ex: 6512121.123)
The RAK x-co-ordinate for the fixpoint.

YRAK:_______.___ (ex: 1412000.000)
The RAK y-co-ordinate for the fixpoint.

M.A.S.L:____.__ (ex: 12.23)
The altitude for the fixpoint.

Rakdef:_ (ex: H)
A code giving information on how the RAK co-ordinates for the Xzero and Yzero are established. The codes are as follows

O = True RAK fix
P = towards RAK fixpoint
D = on map in scale 1:50 000   G = on map in scale 1:8 000
E = on map in scale 1:20 000   H = on map in scale 1:4 000
F = on map in scale 1:10 000   I = on map in scale 1:2 000

Zdef:_ (ex: P)
A code giving information on how the M.A.S.L. is established for the point where the local gridnet co-ordinates are 0,0. The codes are the same as for Rakdef.

O = True RAK fix
P = towards RAK fixpoint
D = on map in scale 1:50 000   G = on map in scale 1:8 000
E = on map in scale 1:20 000   H = on map in scale 1:4 000
F = on map in scale 1:10 000   I = on map in scale 1:2 000

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Engineering Division

v2.0 1988-10-28

FORM 3, AREA
Registration of background data from investigation area

Areacode:__

GRID CORNER COORDINATES

Local x-co-ordinate	Sx	Local y-co-ordinate	Sy
_____.____	_	_____.____	_
_____.____	_	_____.____	_
_____.____	_	_____.____	_
_____.____	_	_____.____	_
_____.____	_	_____.____	_
_____.____	_	_____.____	_
_____.____	_	_____.____	_
_____.____	_	_____.____	_
_____.____	_	_____.____	_
_____.____	_	_____.____	_
_____.____	_	_____.____	_

GRID REFERENCE POINT

Local x-co-ordinate	Sx	Local y-co-ordinate	Sy
_____.____	_	_____.____	_
_____.____	_	_____.____	_
_____.____	_	_____.____	_
_____.____	_	_____.____	_
_____.____	_	_____.____	_
_____.____	_	_____.____	_
_____.____	_	_____.____	_
_____.____	_	_____.____	_
_____.____	_	_____.____	_
_____.____	_	_____.____	_
_____.____	_	_____.____	_

Comments:______________________________

Please complete the form and return it to the person responsible for storing background data in the database. The data will be stored in the table AREALIM and AREAREF in SKBs database GEOTAB.
If you do not have complete information, please keep a copy of the form. Fill in the missing information later and then send it in.

Signed :____
Date:____-__-__
Is the form complete [ ] Yes [ ] No, will be completed later.

HOW TO COMPLETE THE FORM

Areacode:__ (ex: KL)

The two letter code for the area. The codes are stored in the table AREA in SKBs database GEOTAB.

GRIDNET CORNER CO-ORDINATES

Xcoord:____.___ (ex: 1212.400)

The local x-co-ordinate for a corner of the gridnet.

Ldirx:_ (ex: N)

The direction symbol for the x-co-ordinate in the local gridnet.

Ycoord:____.___ (ex: 1005.000)

The local y-co-ordinate for a corner of the gridnet.

Ldiry:_ (ex: Y)

The direction symbol for the y-co-ordinate in the loal gridnet.

GRIDNET REFERENCE POINTS

Xcoord:____.___ (ex:1023.000)

The local x-co-ordinate where the preservation mark is placed.

Ldirx:_ (ex: N)

The direction symbol for the x-co-ordinate in the local gridnet.

Ycoord:____.___ (ex: 534.100)

The local y-co-ordinate where the preservation mark is placed.

Ldiry:_ (ex: W)

The direction symbol for the y-co-ordinate in the loal gridnet.

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Engineering Division

FORM, BOREHOLE
Registration of background data from investigation area

BOREHOLE INFORMATION
Areacode:__
Borehole idcode:_____ Old idcode:_____
Borehole type:_
Borehole local x-co-ordinate:____.___ x-co-ordinate axis symbol:_
Borehole local y-co-ordinate:____.___ y-co-ordinate axis symbol:_
Borehole RAK x-co-ordinate:______.___ Borehole RAK y-co-ordinate:______.___
Borehole altitude above sea level(M.A.S.L):____.__
RAK definition method:_ M.A.S.L definition method:_
Borehole length from top of casing:____.__
Original length of casing above surface:____.__
Length of quaternary layers along borehole:____.__
Borehole preliminary declination:___._
Borehole preliminary inclination:__._

BOREHOLE DIAMETER

Length to upper limits:	Length to lower limits:	Borehole diameter:
____.__	____.__	_.___
____.__	____.__	_.___
____.__	____.__	_.___
____.__	____.__	_.___

CORE DIAMETER

Length to upper limits:	Length to lower limits:	Core diameter:
____.__	____.__	_.___
____.__	____.__	_.___
____.__	____.__	_.___
____.__	____.__	_.___

CASING DIAMETER

Length to upper limits:	Length to lower limits:	Casing diameter: inside	outside
____.__	____.__	_.___	_.___
____.__	____.__	_.___	_.___
____.__	____.__	_.___	_.___
____.__	____.__	_.___	_.___

Comments:____
____

Please complete the form and return it to the person responsible for storing background data in the database. The data will be stored in the table BOREHOLE in SKBs database GEOTAB.
If you do not have complete information, please keep a copy of the form. Fill in the missing information later and then send it in.

Signed :____
Date:____-__-__
Is the form complete [ ] Yes [ ] No, will be completed later.

INFORMATION ABOUT HOW TO FILL IN THE FORM

AREA
Areaname:____________________ (ex: KLIPPERÅS)
The name of the area.

Borehole idcode:_____ (ex: KKL02)
The borehole idcode.

Old idcode:_____ (ex: KKL1b)
Old idcode for borehole if such exist.

Borehole local x-co-ordinate:____.___ (ex: 1234.12)
Axis symbol:_ (ex: N)
Borehole local y-co-ordinate:____.___ (ex: 1200.00)
Axis symbol:_
Borehole RAK x-co-ordinate:_______.___
Borehole RAK y-co-ordinate:_______.___
Borehole altitude above sealevel (M.A.S.L):____.__

RAK definition:_ (ex: I)
A code giving information on how the RAK co-ordinates for the borehole are established. The codes are as follows
P = towards RAK fixpoint
D = on map in scale 1:50 000 G = on map in scale 1:8 000
E = on map in scale 1:20 000 H = on map in scale 1:4 000
F = on map in scale 1:10 000 I = on map in scale 1:2 000

M.A.S.L definition:_ (ex: P)
A code giving information on how the M.A.S.L. is established for the borehole. The codes are the same as above.

Borehole length from top of casing:____.__
Original length of casing above ground:____.__
Length of auaternary layers along borehole:____.__
Borehole preliminary declination:___._
Borehole preliminary inclination:__._

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FORM, TOP OF CASING
Registration of background data from investigation area

CASING ABOVE GROUND

Borehole idcode:_____

Date for change of length of casing above ground (yymmdd):______

New length of casing above ground (m):____.__

Comments:____
____

Please complete the form and return it to the person responsible for storing background data in the database. The data will be stored in the CASETOP in SKBs database GEOTAB.
If you do not have complete information, please keep a copy of the form. Fill in the missing information later and then send it in.

Signed :____
Date:____-__-__

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FORM, DRILLING
Registration of background data from investigation area

DRILLING INFORMATION

Borehole idcode:_____

Length to upper limit (m) :____.__
Length to lower limit (m) :____.__

Start of drilling (yymmdd):______
End of drilling (yymmdd) :______

Company performing drilling:______________________________
Type of drillrigg:______________________________

Comments:____

Please complete the form and return it to the person responsible for storing background data in the database. The data will be stored in the table DRILL in SKBs database GEOTAB.
If you do not have complete information, please keep a copy of the form. Fill in the missing information later and then send it in.

Signed :____
Date:____-__-__
Is the form complete [ ] Yes [ ] No, will be completed later.

List of SKB reports

Annual Reports

1977–78
TR 121
KBS Technical Reports 1 – 120.
Summaries. Stockholm, May 1979.

1979
TR 79–28
The KBS Annual Report 1979.
KBS Technical Reports 79-01 – 79-27.
Summaries. Stockholm, March 1980.

1980
TR 80–26
The KBS Annual Report 1980.
KBS Technical Reports 80-01 – 80-25.
Summaries. Stockholm, March 1981.

1981
TR 81–17
The KBS Annual Report 1981.
KBS Technical Reports 81-01 – 81-16.
Summaries. Stockholm, April 1982.

1982
TR 82–28
The KBS Annual Report 1982.
KBS Technical Reports 82-01 – 82-27.
Summaries. Stockholm, July 1983.

1983
TR 83–77
The KBS Annual Report 1983.
KBS Technical Reports 83-01 – 83-76
Summaries. Stockholm, June 1984.

1984
TR 85–01
Annual Research and Development Report 1984
Including Summaries of Technical Reports Issued during 1984. (Technical Reports 84-01 – 84-19)
Stockholm June 1985.

1985
TR 85-20
Annual Research and Development Report 1985
Including Summaries of Technical Reports Issued during 1985. (Technical Reports 85-01-85-19)
Stockholm May 1986.

1986
TR 86-31
SKB Annual Report 1986
Including Summaries of Technical Reports Issued during 1986
Stockholm, May 1987

1987
TR 87-33
SKB Annual Report 1987
Including Summaries of Technical Reports Issued during 1987
Stockholm, May 1988

1988
TR 88-31
SKB Annual Report 1988
Including Summaries of Technical Reports Issued during 1988
Stockholm, May 1989

Technical Reports

1989
TR 89-01
Near-distance seismological monitoring of the Lansjärv neotectonic fault region Part II: 1988
Rutger Wahlström, Sven-Olof Linder,
Conny Holmqvist, Hans-Edy Mårtensson
Seismological Department, Uppsala University, Uppsala
January 1989