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Oskarshamn site investigation

Drilling of cored borehole KSH01

Henrik Ask, H Ask Geokonsult AB

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Svensk Kärnbränslehantering AB

Henrik Stridsman, Studsvik RadWaste AB

March 2004

Svensk Kärnbränslehantering AB
Swedish Nuclear Fuel
and Waste Management Co
Box 5864
SE-102 40 Stockholm Sweden
Tel 08-459 84 00
+46 8 459 84 00
Fax 08-661 57 19
+46 8 661 57 19

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Keywords: Core drilling, Bedrock, Measurement while drilling, Flushing water monitoring, Water sampling, Wireline tests, Air-lift pumping, Telescope hole.

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

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Contents

1 Introduction

SKB, the Swedish Nuclear Fuel & Waste Management Company, performs site investigations in order to evaluate the feasibility of locating a deep repository for spent nuclear fuel /1/. The investigations are performed in two Swedish municipalities: Östhammar and Oskarshamn. The investigation area in Oskarshamn is situated close to the nuclear power plant at Simpevarp /2/, see Figure 1-1.

Drilling and investigations in boreholes are fundamental activities in order to facilitate characterisation of rock and groundwater properties at depth. Three main types of boreholes are produced: core drilled boreholes, percussion drilled boreholes in hard rock and boreholes drilled through unconsolidated soil.

The drilling of KSH01 and all related on-site operations were performed according to a specific Activity Plan (AP PS-02-004, SKB internal document).

KSH01 was the first deep cored borehole within the Oskarshamn site investigation.

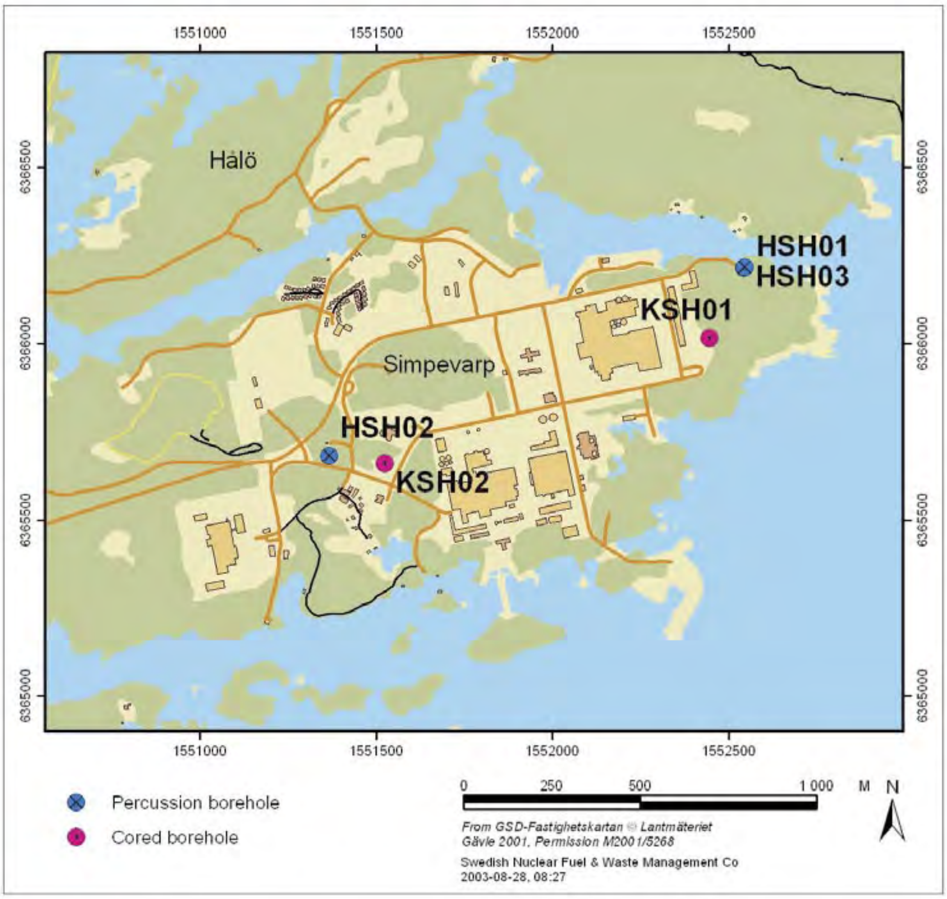


***Figure 1-1.** Locations of the first drillholes in the Simpevarp subarea. Percussion drilled holes are marked "HSH" and cored boreholes are marked "KSH". This report will be concerned with activities performed during the drilling of KSH01.*

2 Objective and scope

This report will describe the methods employed and the results achieved during the drilling of KSH01. A number of related activities, such as wireline hydraulic tests, water sampling and monitoring of drilling parameters that were performed in conjunction with drilling will also be reported here.

The main reasons for drilling borehole KSH01 was to gain geological information at depth of the eastern part of the Simpevarp peninsula and to facilitate a means for further investigation at depth.

The 1,000 m deep hole, KSH01A, was constructed as what is known in SKB parlance as a "telescope hole of chemistry type".

"Telescope" means that the hole was built with an upper 100 m percussion drilled part of wider diameter and a lower core drilled section.

"Chemistry type" means that the hole was planned to be subjected to a complete chemical characterization, which in turn put specific requirements on the cleaning level for down-hole equipment.

A separate 100 m cored hole, KSH01B, was drilled close to the telescope hole in order to obtain a complete coverage of core from surface to depth.

3 Overview of the drilling method

The drilling and all related on-site operations were performed according to a specific Activity Plan (AP PS-02-004, SKB internal document). Reference is given in the activity plan to procedures in the SKB Method Description for Percussion Drilling (SKB MD 610.003, Version 1.0), SKB Method Description for Core Drilling (SKB MD 620.003, Version 1.0) and relevant method instructions for handling of chemicals, surveying and evaluation of cuttings. Method descriptions and instructions are SKB internal documents.

3.1 The SKB telescope drilling method

In brief, the method is based on the construction of a larger diameter percussion hole (200 mm diameter) to a length of 100 m followed by a cored section to full length.

The purpose of the upper section is to allow the removal of water from the hole by air-lift pumping and minimize the introduction of foreign substances (flushing water and cuttings) to the surrounding bedrock, to enable the use of submersible pumps for tests and to facilitate the installation of multi-packer systems for ground water pressure recordings.

After percussion drilling 0–100 m, equipment for air lift pumping is installed in the borehole. The air-lift pumping will create a pressure drawdown and help remove water and cuttings while core drilling between 100 m and 1,000 m, see Figure 3-1. The effect of drawdown is dependent on the depth and capacity of major groundwater conductors.

During the core drilling phase several measurements and sampling exercises are performed through the drilling monitoring system (DMS), wireline tests for hydraulic purposes and the collecting of discrete chemical samples.

After the core drilling is completed to full length, a conical guide of stainless steel is installed between the telescope part and the deeper core drilled part, see Figure 3-2.

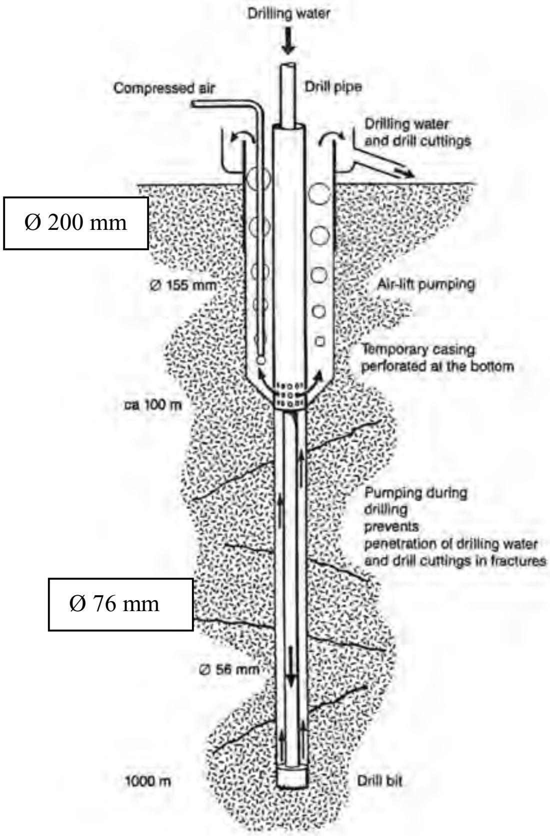


Figure 3-1. *Overview of the telescopic drilling method with air-lift pumping for retrieval of drilling water and cuttings.*

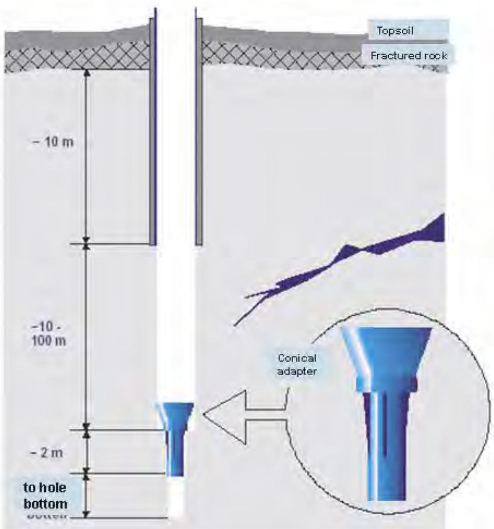


Figure 3-2. *Installation of the conical guide.*

3.2 The flushing water system

The handling of flushing water includes a source of water, tanks and pumps for introduction into the hole, air-lift pumps for raising the water from the bottom of the telescope part to surface. The return water is led to settling containers before discharge, see Figure 3-3.

Nitrogen gas is bubbled through the drilling water to remove dissolved oxygen. This is done to avoid introduction of oxygen to the formation water and thereby disturbing the virgin chemical properties.

In order to monitor possible mixing of formation and drilling water, a uranine tracer dye is added to the drilling water to a fixed concentration, see Figure 3-4.

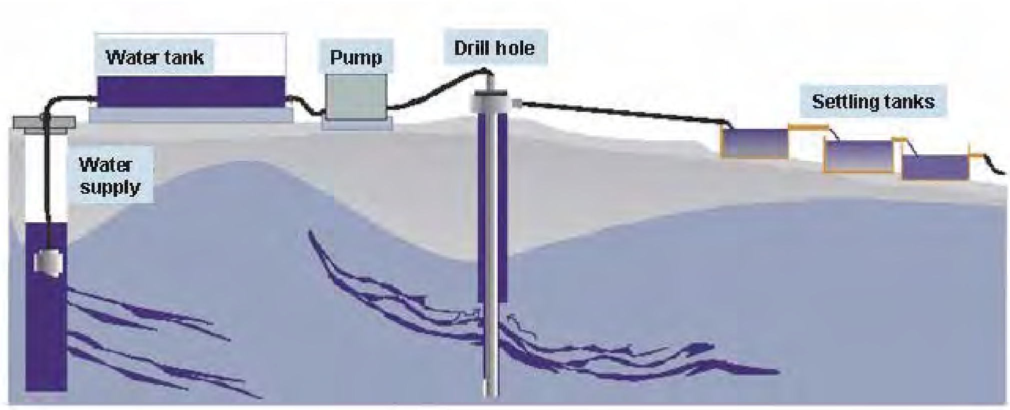


Figure 3-3. *The flushing water system from source to discharge point.*

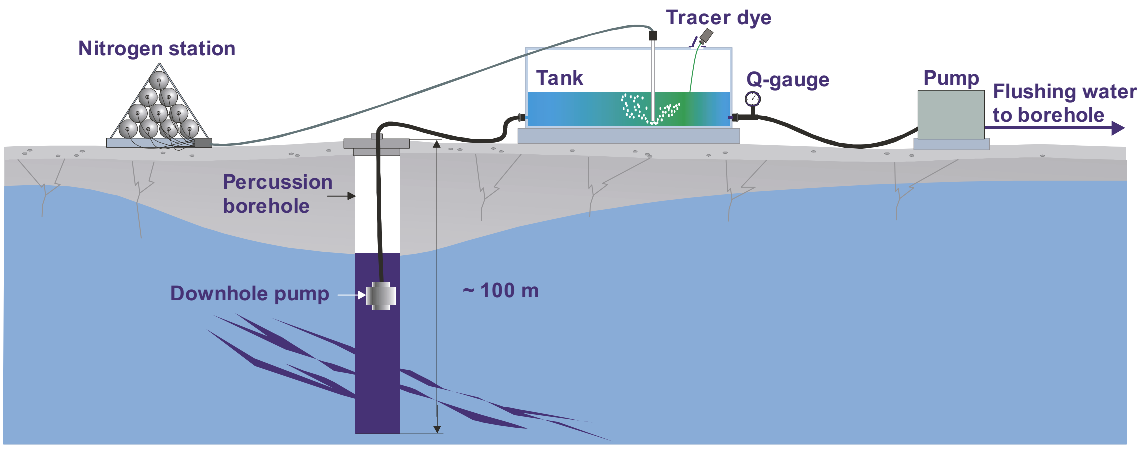


Figure 3-4. *Preparation of flushing water. Uranine is added to the water in the tank as a tracer dye. Nitrogen is bubbled through the water to remove dissolved oxygen.*

3.3 Measurements and sampling during drilling

Drilling cuttings are collected manually during percussion drilling. If water occurs in the hole, observations of changes in return water flow and colour are noted and water samples are taken. The drill penetration rate is logged manually.

At the final stage of the percussion drilling phase a recovery test is made by blowing in compressed air to remove all water in the hole. The recovery of the water table is then measured manually.

The sampling and measurements during the core drilling phase consist of:

- The drilling monitoring system.
- Wireline tests and water sampling.
- Discrete water sampling.

Drilling monitoring system (DMS)

Drilling is monitored on-line by continuous registration of drill rig parameters (logged every centimetre of bit penetration) and flushing water parameters (logged every 10 seconds). The data is compiled into a database called drilling monitoring system (DMS).

Wireline tests and water sampling

Tests for hydrogeological purposes (pumping tests and measurements of absolute pressure) and sampling for water chemistry (if possible) are performed every 100 m down the hole. The wireline tests are done in accordance with SKB Method Description MB 321.002, SKB Internal Document.

Discrete water sampling

Water samples of flushing and return water are taken at between 10 and 15 m intervals for analysis of uranine content and conductivity.

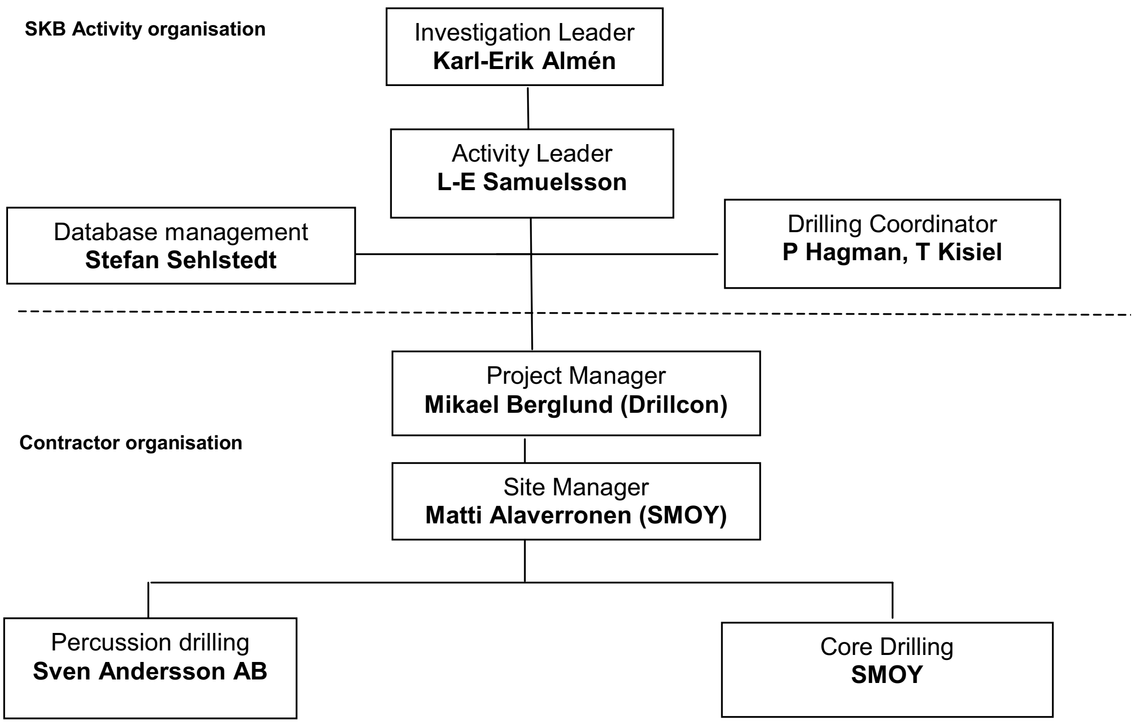
4 Contractor and equipment

4.1 Contractor

The main contractor for drilling was Drillcon Core AB, with subcontractor for core-drilling Suomen Malmi OY (SMOY), Finland and subcontractor for percussion drilling Sven Andersson AB.

An overview of the organisation for the drilling activity is given in Table 4.1.

Table 4.1. Drill activity organisation.



4.2 Percussion drilling equipment

The equipment used was a Puntel MX1000 percussion drill rig with an Atlas Copco XRVS 455 Md air compressor. The down-the-hole hammer was a Secoroc 8" or 6" and the drill rods were Driqoneq 114 mm. The casing utilized was St 37 406.5 mm (“NO-X 365”), SS 2343 208x4 mm and 273x4 mm. The casing dimensions are presented as outer diameter and thickness.

4.3 Core drilling equipment

Core drilling in KSH01A and B was made with a B 20 P Atlas Copco fully hydraulic machine fitted with a modern and environmentally adapted diesel engine. The rods were of the type Corac N3/50 NT with a 76 mm wireline triple tube core barrel system which gives a core diameter of 50.2 mm.

Figure 4-1. *Compressor and drill rig. Gas tubes for nitrogen saturation and the flushing water tank can be seen in the lower left corner.*

4.3.1 Drilling monitoring system

During the core drilling phase continual monitoring was made of several flushing water parameters (oxygen content, electrical conductivity and water flow) and measurement-while-drilling (MWD) parameters (bit feed force, rotary pressure, rotation, penetration rate, drill rig water pressure and bit position).

The data is compiled into the DMS database.

The drill rig (MWD) parameters include:

- Rotational pressure (bar).
- Bit force (kN).
- Flush water flow in (l/min).
- Water pressure at bit (kPa).
- Rotation (rpm).
- Penetration rate (cm/min).

The flushing water parameters include:

- Water level in the telescope part of the borehole (kPa).
- Oxygen level of flushing water in (mg/l).
- Flow of return flushing water (l/min).
- Electrical conductivity of flushing water in (mS/m).
- Electrical conductivity of return water (mS/m).
- Air pressure (kPa).

Data from on-line monitoring of flushing water parameters were stored on two different logging units (CR10 and CR23). A separate logging unit was used for the measurement-while-drilling (MWD) dataset. The data from the loggers was downloaded either continuously (CR10 and CR23) or by diskette or CD-ROM to the DMS database.

Figure 4-2. *The CR23 logging unit for parameters "air-pressure" and "electrical conductivity".*

4.3.2 Wireline measurements equipment

The method is developed in such a way that water sampling, pump tests and measurements of absolute pressure can be made without having to lift the drillstem. The wireline probe equipment has been especially developed by SKB.

Measurements are made with a wireline probe as specified in method description SKB MD 321.002 (SKB internal document). The principal components of the system are:

- an inflatable packer,
- a probe fitted with pressure gauges for the test section and for the packer,
- a water sampler,
- a submersible pump (placed in the upper part of the drillstem),
- a flow meter (placed at the ground surface).

The probe and packer are lowered through the drillstem into position at the drill bit. The test section is between the lower end of the packer and the bottom of the borehole, see Figure 4.3.

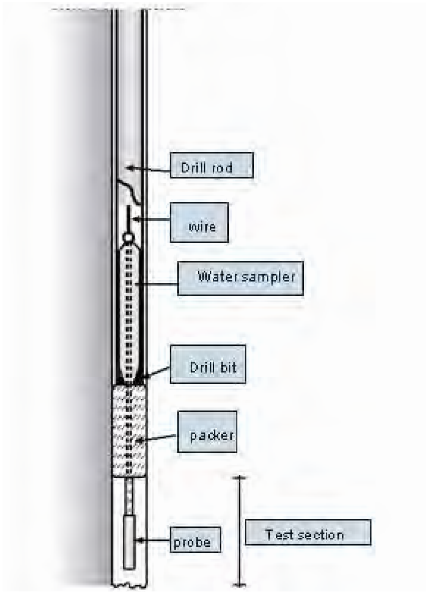


***Figure 4-3**. The wireline probe and its emplacement in the hole.*

Before the pumping tests, the measurements for absolute pressure are started and a leakage test of the drillstring, is made.

Hydraulic tests performed during drilling are generally affected to some degree by disturbances caused by the drilling operations. Transients from changes in pressure, temperature and salinity might affect the hydraulic response curves.

Pumping tests

The wireline probe is emplaced at the bottom of the drillstem. A submersible pump is lowered into the upper part of the drillstem at a length of about 40 m. The test section is hydraulically connected to the drillstem by opening a valve in the probe at a predetermined pressure. This creates a passage between the test section and the water column in the drillstem. The packer remains expanded during the entire test. Water is pumped from the drillstem and the pressure in the test section and packer are recorded in a data logger in the probe. The pumped surface flow rate is recorded to a data logger on the ground surface. The pressure transducer is situated 1.10 m below the lower end of the packer. The test consists of a pressure drawdown phase and a recovery phase. Typically the pumping time is three hours with a recovery of the same duration. However, the duration is sometimes adapted to the hydraulic situation of the tested section. The tests are normally carried out in sections of about 100 m length.

Absolute pressure measurement

The wireline probe is placed in position at the drill bit. The packer is inflated and the pressure build-up in the test section is recorded for a period of at least eight hours, typically this is done overnight. The measuring range for the pressure gauge is 0–20 MPa (± 0.05% FSD).

Water sampling

The wireline probe is placed at the bottom of the borehole. The single-packer then isolates the test section between the single-packer and the bottom of the borehole. The water volume in the section is renewed at least three times by pumping water out of the drillstem. The water at depth is replaced by formation water and a sample is collected. The wireline probe is then brought to the surface. The theoretical sample volume is 5 litres.

Pumping tests and water sampling are normally performed as an integrated activity.

4.3.3 Equipment for deviation measurements

Deviation measurements were performed in the boreholes using a Reflex **MAXIBOR™** (non-magnetic) optical equipment.

5 Execution and results

5.1 Percussion drilling

Percussion drilling, reaming and installation for air-lift pumping was made between August 22 and October 1, 2002.

5.1.1 Preparations

A cement pad for emplacement of drill rig, fuel container and compressor was built.

Cleaning of all DTH-equipment was done with a high-capacity steam cleaner.

Figure 5-1. *Drill site preparations.*

5.1.2 Construction

The construction of the upper telescope section (0–100 m) was made in steps:

- Drilling through the overburden to 2.2 m depth with NO-X 365 mm equipment. This gave a 420 mm diameter hole and a casing diameter of 406.5 mm.
- Inner supportive casing for guidance for the drill string was mounted and a pilot percussion hole of 161 mm was drilled to a depth of 12.12 m (to fresh rock). The inner casing was removed and the pilot hole was reamed in two steps to 250 mm and then to 350 mm diameter.
- The casing (273x4 mm diameter) through fractured rock was installed and gap injection with cement was made as described in Figure 5-2 and 5-3.
- A new set of inner supportive casing was installed and a new pilot hole to 100.34 m was drilled with a diameter of 161 mm. The inner guiding tubes were removed.
- The stainless steel casing of diameter 208x4 mm was installed to a depth of 12.10 m and gap injected with cement.
- The hole was reamed between 12.12 m and 100.24 m length to a diameter of 198–200 mm (at 12 m the diameter of the bit was 200 mm and at a 100 m the diameter of the drill bit was 197.8 mm).

The main steps are shown in Figure 5-2.

A detail of the gap injection method is given in Figure 5-3.

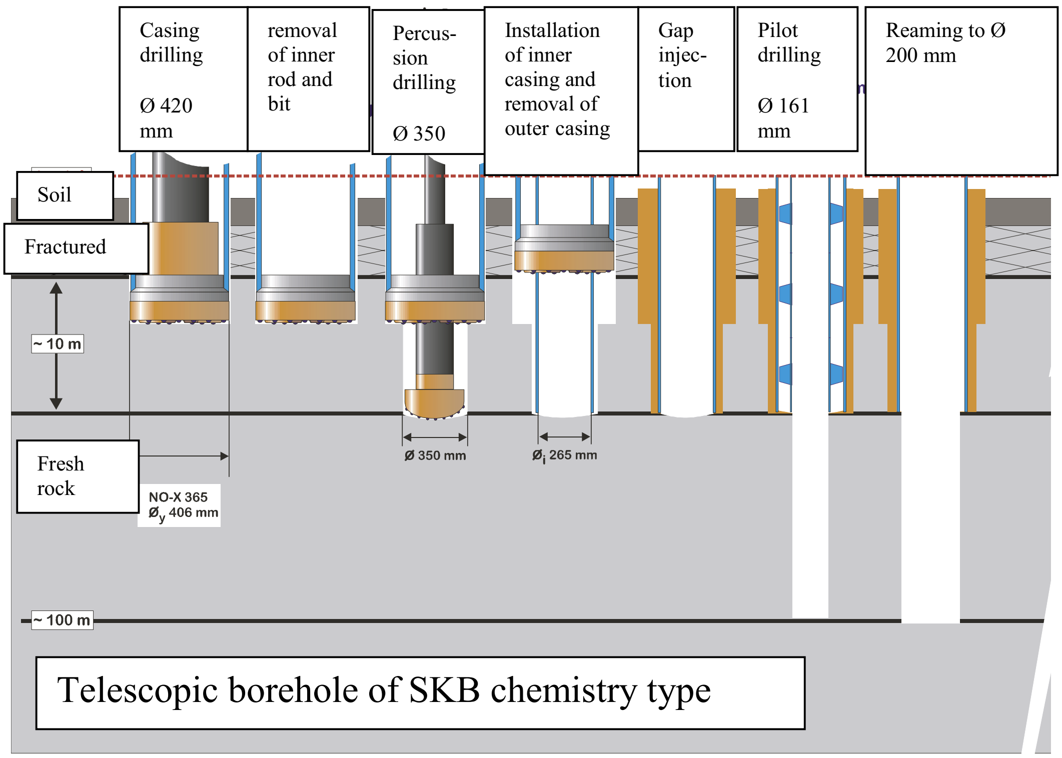


Figure 5-2. Method for drilling and installation of the first 100 m. In addition to the steps shown in the figure an extra set of casing (208 mm) was emplaced in KSH01A.

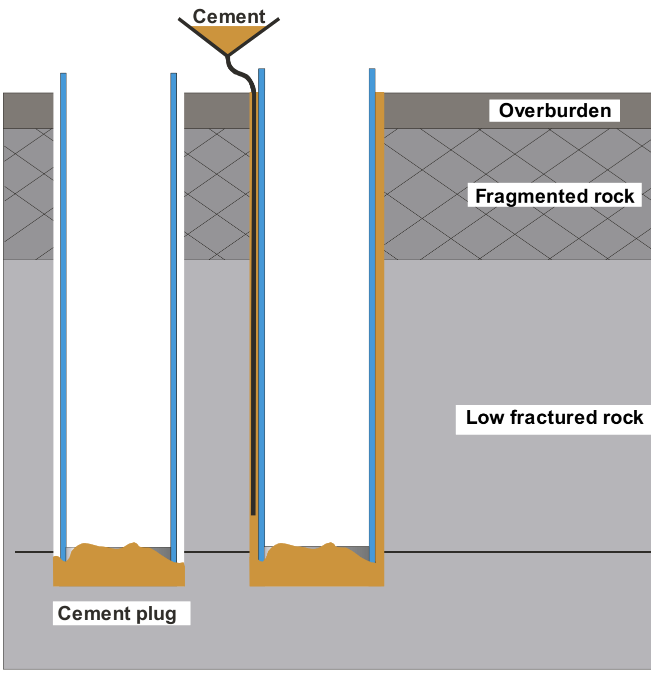


Figure 5-3. *Gap injection technique- a cement plug is emplaced at the bottom and allowed to harden. The gap filling cement is introduced between the casing and the rock wall.*

5.1.3 Sampling and measurements

Sampling and measurements done by the drill coordinators during drilling included:

- Collecting of drill cuttings was made by taking three grab samples over a length of three metres resulting in one composite sample per three metres. The samples were stored for later logging. A soil sample was collected between 0.4 and 1.4 m.
- Penetration rate (expressed as seconds per 20 cm) was manually recorded.

The penetration rate is presented in Figure 5-4.

No noticeable changes in water flow and colour of return water could be recorded.

A recovery test of the 160 mm hole was made when the percussion drilling was completed to full depth. The hole was rinsed from drill cuttings by blowing air with the compressor at maximum capacity for 30 minutes. The inflow of water to the borehole was calculated based on water level measurements.

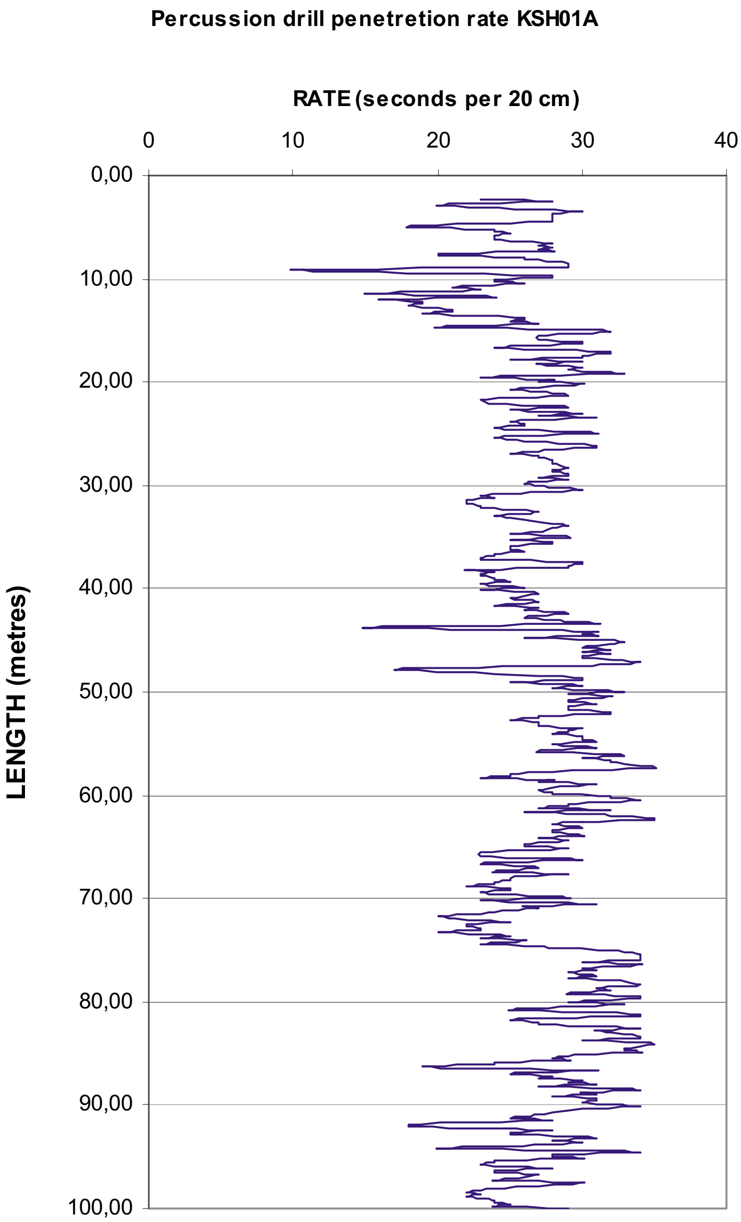


Figure 5-4. *Penetration rate for percussion drilling.*

Table 5-1. Recovery test – water level measurements in the 160 mm hole (0–100.34 m).

Date Time	Water level (metres below top of casing)	Calculated inflow (mL/min)
2002-08-30 07:30	99.64	
2002-09-03 08:30	97.43	8
2002-09-04 09:18	97.18	7
2002-09-05 09:15	96.15	9

5.2 Core drilling

Core drilling of holes KSH01A and KSH01B was conducted between September 26, 2002 and January 25, 2003.

The main work in KSH01A after pre-drilling to 100 m depth consisted of the following steps:

- preparations for core drilling,
- drilling,
- wireline tests,
- drill monitoring,
- measurements of flushing water,
- deviation measurements.

A summary of the two holes is given in Tables 5-2 (KSH01A) and 5-3 (KSH01B).

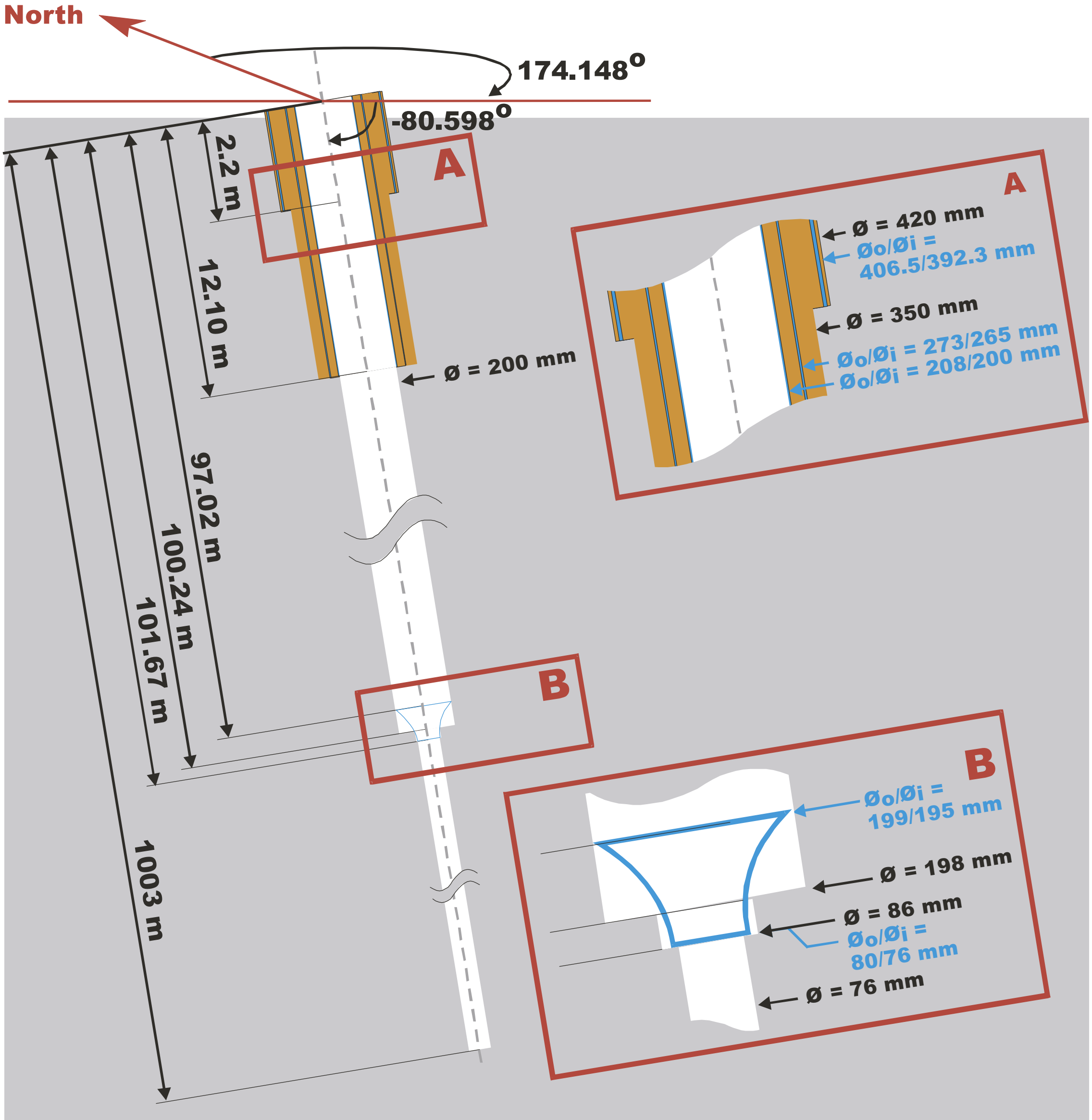
Table 5-2. KSH01A summary.

General	Technical
Name of hole: KSH01A	*Percussion drill rig* Puntel MX 1,000
Location: Simpevarp, Oskarshamn Municipality, Sweden	*Percussion drill hole diameter* 200 mm
Contractor for drilling	*Percussion hole length* 100.24 m
Drillcon AB	*Core drill rig* B 20 P Atlas Copco
Subcontractor percussion drilling	*Core drill dimension* 76 mm
Sven Andersson AB	*Cored interval* 100.24–1003 m
Subcontractor core drilling	*Average core length retrieved in one run* 2.41 m
Suomen Malmi OY (SMOY)	*Number of runs* 375
Drill start date August 22, 2002	*Diamond bits used* 7
Completion date January 17, 2003	*Average bit life* 128 m
	Position KSH01A (RT90 RH70) at top of casing: N 6366013,45 E 1552442,99 Z 5,31 (masl)
	Azimuth (0–360)/ Dip (0–90) 174,148 / –80,598
	Position KSH01A (RT90 RH70) at top of casing: N 636568,937 E 1552402,273 Z –963,699 (masl)
	Azimuth (0–360)/ Dip (0–90) 210.28 / –69.57

Technical data from borehole KSH01A is given in Figure 5-5.

Technical data

Borehole KSH01A



Drilling reference point

Northing:	**6366013.45 (m), RT90 2,5 gon V 0:-15**
Easting:	**1552442.99 (m), RT90 2,5 gon V 0:-15**
Elevation:	**5.31 (m), RHB 70**

Drilling period

Drilling start date: 2002-08-22
Drilling stop date: 2003-01-17

Figure 5-5. *Technical data from KSH01A.*

In order to retrieve a complete core from surface to full depth an additional drilling was made to 100.25 m about one metre from the percussion drill hole. The core and the borehole are called KSH01B.

Soil drilling was done with HW 114.3 mm diameter to 1.35 m depth, which corresponds with the actual soil depth. From 1.35 m to 6.04 m the hole was drilled with 76 mm diameter and reamed to 98 mm. A stainless steel casing (89/77 mm) was installed and grouted.

Drilling with 76 mm diameter was continued to 100.25 m. The geology of KSH01B is presented in Appendix 1.

The reference point for down-hole measurements was the concrete pad (the top-of-casing is 24 cm above the concrete pad).

Table 5-3. KSH01B Summary.

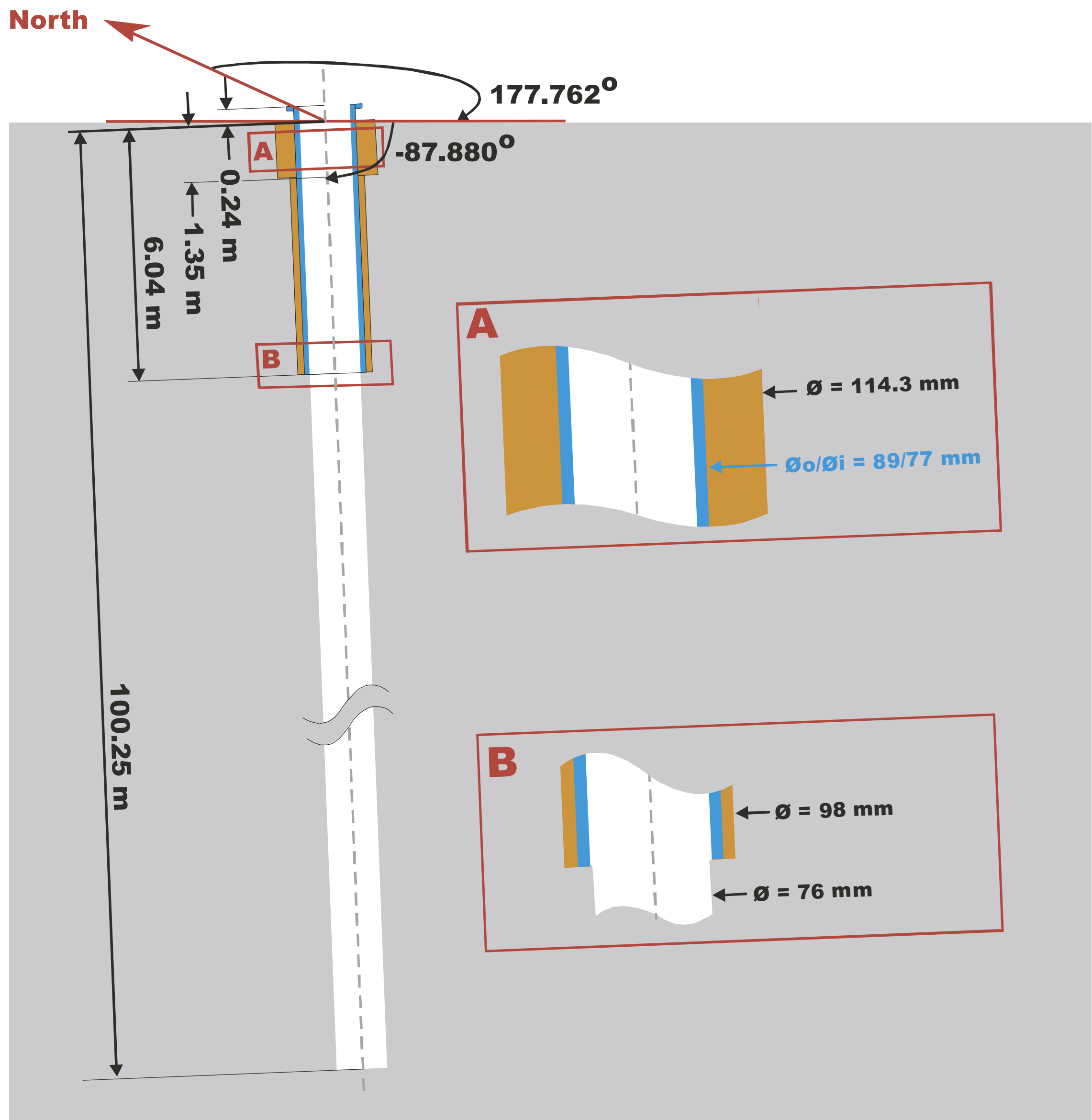
Name of hole: KSH01B	*Core drill rig* B 20 P Atlas Copco
Location: Simpevarp, Oskarshamn Municipality, Sweden	*Core drill dimension* 76 mm
Contractor for drilling	*Cored interval* 0–100.25 m
Drillcon AB	*Position KSH01B (RT90 RH70) at concrete pad:* N 6366014,039 E 1552442,890 Z 5,203 (masl)
Subcontractor core drilling	*Azimuth (0–360)/ Dip (0–90)* 177,762 / –87,880
Suomen Malmi OY (SMOY)	*Position KSH01B (RT90 RH70) at bottom of hole:** N 6366010,343 E 1552443,035 Z –94,733 (masl)
Drill start date January 17, 2003	* calculated from starting point (not measured)
Completion date January 25, 2003	

Technical data from borehole KSH01B is given in Figure 5-6.

N.B. Unless otherwise stated the rest of this report will deal with results from KSH01A.

Technical data

Borehole KSH01B



Drilling reference point

Northing: 6366014.039 (m), RT90 2,5 gon V 0:-15
Easting: 1552442.890 (m), RT90 2,5 gon V 0:-15
Elevation: 5.203 (m), RHB 70

Drilling period

Drilling start date: 2003-01-17
Drilling stop date: 2003-01-25

Figure 5-6. *Technical data from KSH01B.*

5.2.1 Preparations

The preparations for the core drilling of KSH01A consisted of installation of air-lift pumping equipment and supportive casing for alignment of the core drill rods.

The installation of supportive casing was done in two steps:

- An outer casing with a diameter of 98/89 mm, fitted with fins to a diameter of 193 mm was installed to a length of 100.28 m.
- After drilling to a length of 100.81 m with a diameter of 86 mm, an inner supportive casing with diameter 84/77 mm was installed.

The supportive casings have a perforated section between 90 and 100 m length so that water from the borehole can be evacuated to the surface through air-lift pumping. A pressure meter for monitoring of the water level was emplaced at a length of 90 m.

The discharge header was fitted to collect the return water.

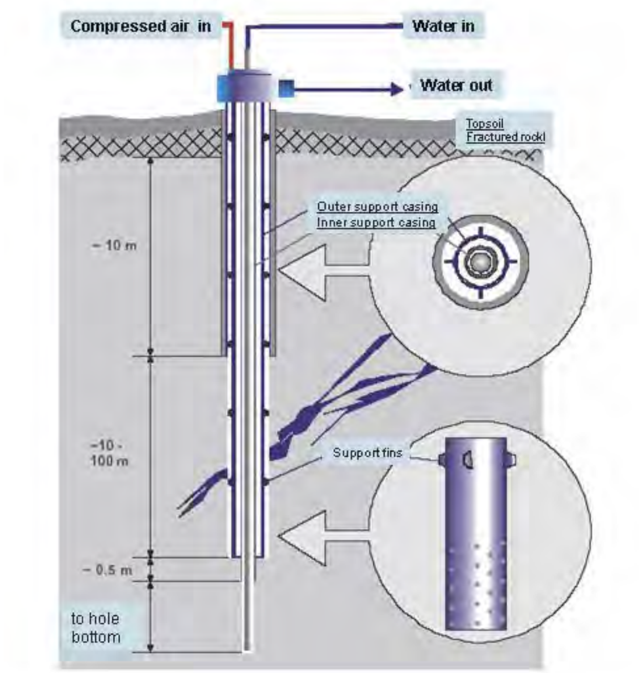


***Figure 5-7**. In the telescopic part of the drill hole a temporary installation is made with casing tubes for support and alignment and equipment for air-lift pumping. In the uppermost part the return water discharge header is mounted. The water discharge is led to the settling containers.*

Figure 5-8. *Fitting the flushing water discharge header. The supportive casing and the hoses for air-lift pumping can also be seen.*

The return water from drilling was led to a series of containers in order to collect sludge before discharge to the Baltic, see Figure 5-9.

Figure 5-9. *Aligning the flushing water discharge containers. The sludge and cuttings is allowed to settle in the containers.*

5.2.2 Drilling

Drilling was made with T-86 equipment between 100.24 m and 100.81 and produced a core of 72 mm diameter.

Core drilling with 76 mm triple-tube, wireline equipment was conducted from 100.81 m to 1,003 m which gave a core of 50.2 mm diameter.

A total of seven drill bits were used for KSH01A, see Figure 5-10.

The elasticity of the drillstem expressed as the difference in length between a hanging and a standing set of drill rods is presented in Figure 5-11. The method for conducting this test was to note the length of the drillstem standing at the bottom of the hole without any downward pressure on the string. A small, consistent rotational torque was applied to the drillstem and the rods slowly lifted. When rotation of the stem could be observed, the drill string was considered as hanging freely and the difference in length was noted.

No further analysis of the non-linear behaviour of the data in Figure 5-11 has been done.

Further results from drill monitoring in drill penetration rate and various measurements will be presented in Chapter 5.3 "Drilling monitoring results" and in Appendix 1.

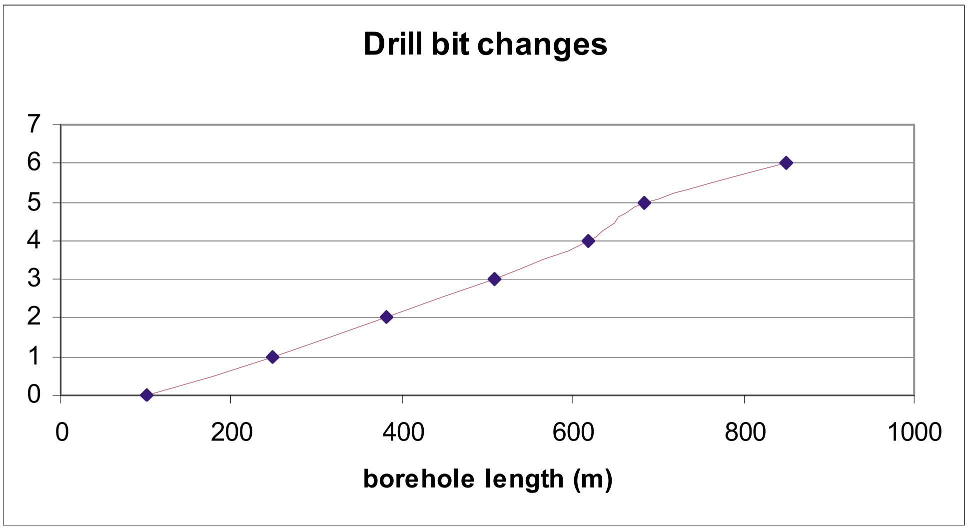


Figure 5-10. *Changes of drill bit during wireline drilling.*

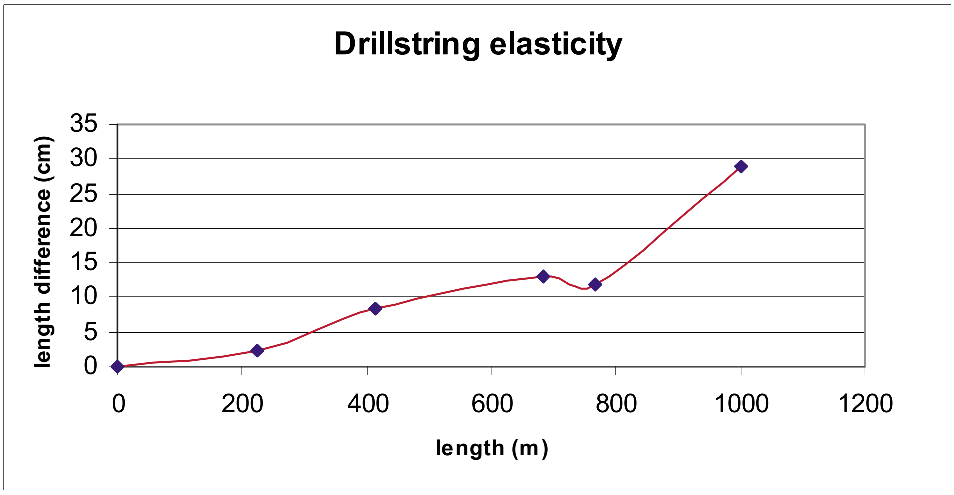


Figure 5-11. Elasticity of the drill rods expressed as the difference between the length of a hanging and a standing drillstem.

5.2.3 Wireline tests

Sampling of groundwater in borehole KSH01A was conducted with wireline tests in conjunction to core drilling. The main purpose for the sampling was to characterize the hydrochemistry as well as the hydrology in the bedrock when the conditions are less affected by hydraulic short circuiting in the borehole.

A number of wireline tests were conducted:

- Five tests for absolute pressure.
- Nine pumping tests were conducted at various intervals, only six gave useful results.

The hydrological results from wireline tests are shown in Section 5.5.

A recovery test of the hole was made after drilling to full depth. The results are given in Section 5.5.

In total, three water samples (SKB nr: 3824, 3825 and 3831) were collected with the wireline probe during pumping tests in connection with core drilling in KSH01A, the times and lengths for the samples are given in Table 5-4.

Sampling and analysis were performed according to the SKB class 3 with all options included. The parameters B_{10} and Cl_{37} were not analysed. The results are shown in Section 5.6 and Appendix 2. The methodology is described in Appendix 3.

A total of 45 samples for laboratory testing of uranine content and electrical conductivity in flushing and returning water were taken along the borehole. The results are shown in Section 5.6.

Table 5-4. Sample dates and length during core drilling in KSH01A.

SKB number	Date	Test section, length (m)	SKB Chemistry class
3824	2002-10-24	197.00–313.42	3
3825	2002-11-16	585.00–593.00	3
3831	2002-11-20	531.00–619.42	3

5.2.4 Drill monitoring system DMS

Drill hole KSH01A was the first real test for the monitoring system and some problems were encountered both with logging units and data transfer. The problems were corrected as they occurred or as they were discovered. The work with establishing routines for quality assurance of DMS data is still going on in March 2004. The results presented in this report have been checked in accordance with routines that are in preparation. Results from monitoring are presented in Section 5.3 and Appendix 1.

5.2.5 Measurements of flushing water

The amount of flushing water entering the hole is counted manually as a record of the number of 5 m^3 tanks is kept throughout the drilling process. The return water is logged via the drilling monitoring system.

As can be seen in Figure 5-12 the amount of flushing water entering and leaving the hole is very well balanced. The flushing water consumed during drilling of KSH01A amounted to 1,100 m^3, giving an average consumption of 1.22 m^3 per metre drilled.

The weight of cuttings in the settling containers could not be established with any confidence as the procedure was not fully established at the time of drilling.

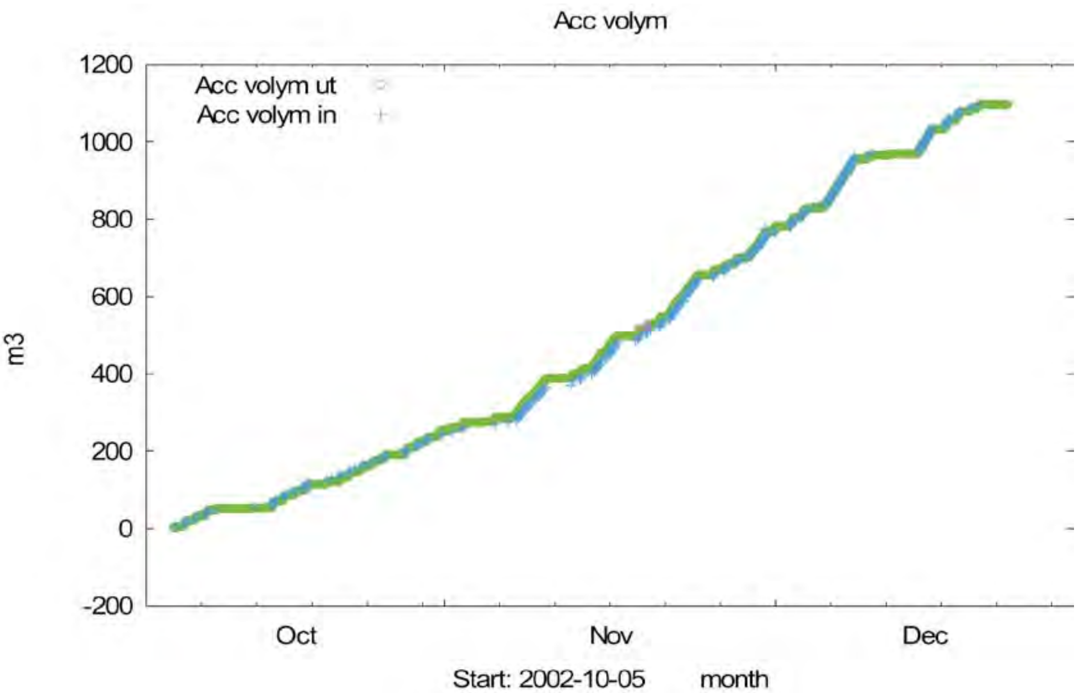


Figure 5-12. *Flushing water balance as recorded by the drilling monitoring system over time in KSH01A.*

5.2.6 Deviation measurements

Deviation measurements with the Maxibor method were made five times during drilling in KSH01A.

The results of the final run covering the entire borehole length are given in Appendix 4.

5.2.7 Borehole completion

Reaming of depth reference slots was done at intervals as shown in Table 5-5. The purpose for the depth reference slots was to be used for depth calibration of down-hole equipment for subsequent investigations in the hole.

After all core drilling activities were concluded, the air lift pumping equipment was removed and a steel conical guide was installed between 97.02 m and 101.67 m depth. The guide tapers from an inner diameter of 195 mm to 76 mm.

The borehole was secured by mounting a lockable steel cap fastened to the concrete pad. All equipment was removed, the site cleaned and a joint inspection was made by representatives from SKB and the contractor to ensure that the site had been satisfactorily restored.

Table 5-5. Depth reference slots.

Depth (m)	Depth (m)
110.000	550.000
150.000	600.000
200.000	650.000
250.000	700.000
300.000	750.000
350.000	800.000
400.000	850.000
450.000	899.000
500.000	950.000

5.3 Drilling monitoring results

The DMS database contains substantial amounts of drilling monitoring data. A selection of results primarily from the monitoring of the flushing water parameters are presented in Figures 5-13 through 5-15 below.

Selected parameters from the drill rig (MWD parameters) are presented in Appendix 1. The MWD parameters require some explanation:

- Drillability ratio- this parameter is defined as penetration rate divided by feed force.
- Flushing water ratio- this is defined as flushing water flow divided by flushing water pressure.
- Water pressure (of the water entering the drillstem).
- Flushing water flow (flow of ingoing water).

- Penetration rate (rate of drill bit penetration as measured on the surface on the drillstem).
- Hydraulic indication- this parameter is defined as penetration rate divided by flushing water flow.

In order to maintain reasonable size data files, a reduction in the number of points incorporated in the pictures has been done in Figures 5-13 through 5-15.

Figure 5-13 depicts the drill bit position (green) over time and the water level (red) in the telescope part of the drill hole. The water level, given as pressure of the overlying water column reflects the air-lift pumping activity in the hole.

Figure 5-14 shows the flushing water flow (green) entering the hole and the return water flow (red).

Figure 5-15 shows the conductivity of the ingoing flushing water (yellow). The gradual increase reflects the increasing salinity over time from the water source (HSH03). The conductivity of the return water (green) shows high peak values that should, in theory, correspond with the presence of saline formation water at depth. The oxygen content of the flushing water (red) is typically low. It should be remembered that the oxygen content is registered also during periods when there is no actual water flow.

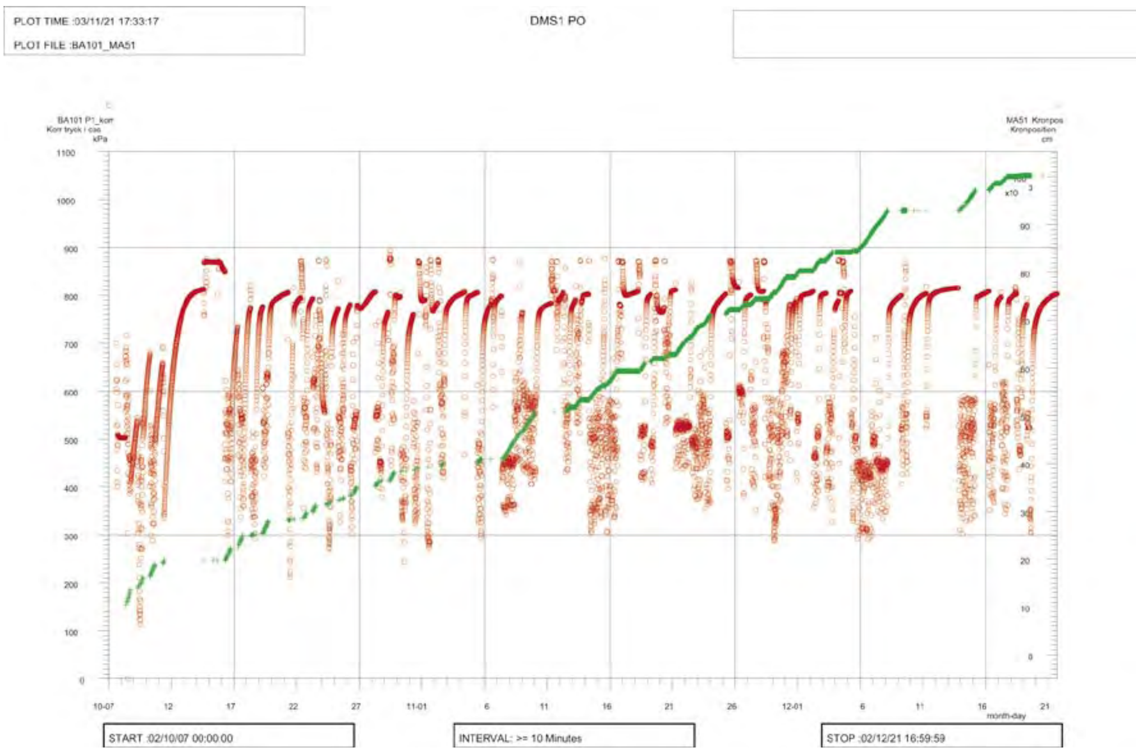


Figure 5-13. *Drill bit position (green) and water level from air-lift pumping (red). The water level is expressed as the pressure in kPa of the water column overlying the pressure gauge. The pressure is corrected for the ambient air-pressure has been subtracted. The pressure gauge is emplaced at 90.0 m borehole length. The drill bit position is given in cm x 10³.*

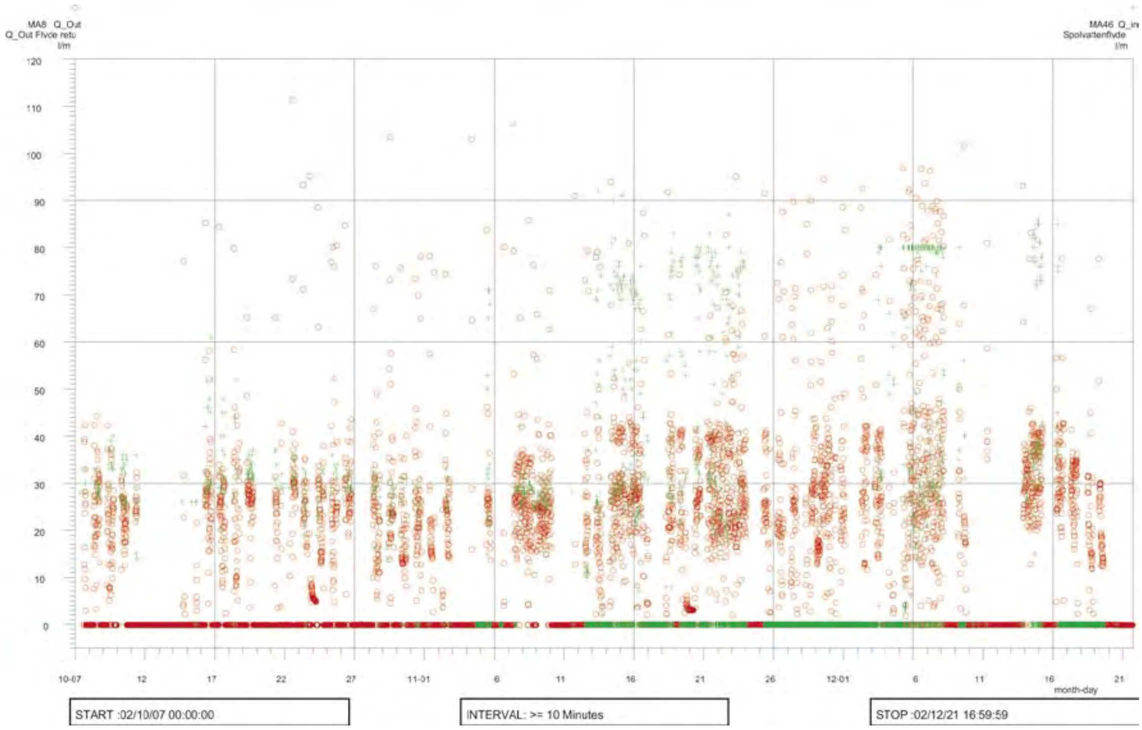


Figure 5-14. *Flushing water flow (green) and return water flow (red) in litres per minute.*

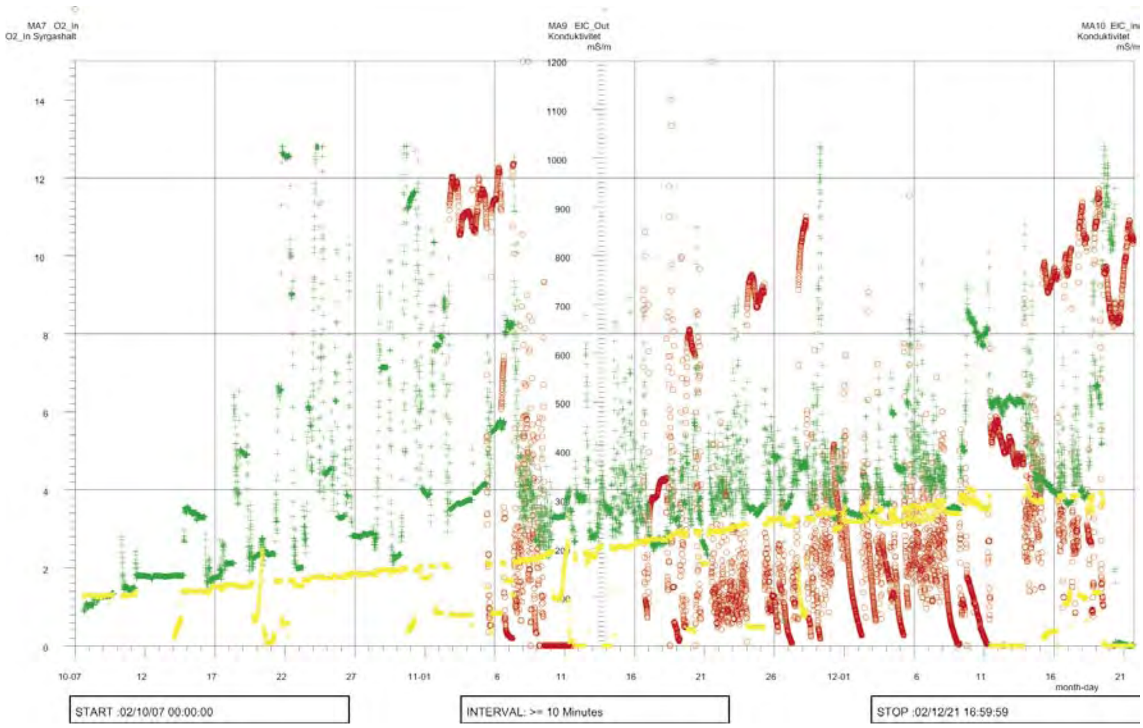


Figure 5-15. *Conductivity of flushing water in mS/m (yellow) and return water (green). The oxygen content in mg/l of the flushing water (red) is also shown.*

5.4 Geology

The geological results, based on the Boremap logging /3/, are shown in Appendix 1.

The dominant rock types are quartz monzodiorite and dioritoide with minor intercalations of mafic rock and granite. The amount of granite increases below 620 m, to dominate the core between 800 and 920 m. The upper 630 m contain oxidized sections, typically in conjunction with an increased fracture frequency.

The fracture frequency is normally less than 5 fractures per metre. Minor crushed sections do occur, notably at 570 m, 630 m, 720 m, 830 m, and 900 m. An interval with slightly higher than average fracture frequency occurs at 250 m, 430 m and between 550 m and 650 m. At depth, below 730 m, the fracture frequency is greatly reduced.

The borehole plot as can be seen in Appendix 1 has not been adjusted for the difference in reference levels between the two holes, nor is it compensated for differences in azimuth or dip.

Figure 5-16. *Unloading the core barrel.*

5.5 Hydrogeology

5.5.1 Hydraulic tests during drilling (wireline tests)

Results from pumping tests and absolute pressure measurement from borehole KSH01A are presented in Tables 5-6 and 5-7.

For the pumping tests the flow value of the end of the drawdown phase is used for calculating the specific capacity (Q/s) and transmissivity (T_M), where "Q" is the flow rate in L/min, "s" is the drawdown in kPa and "T_M" is the transmissivity according to /4/.

A total of nine pumping tests were performed but only six were good enough for calculating the transmissivity. From two of the other tested sections a rough specific capacity was calculated while one of the sections did not give any usable data.

Pumping test plots are given in Appendix 5.

Absolute pressure measurements were performed in five sections as specified in Table 5-7 and Appendix 6.

After packer inflation the pressure stabilization phase often displays different types of transient effects, both of increasing and of decreasing pressure. The reason for these transients is not known. They might be attributable to previous disturbances in the borehole caused by the drilling operations such as pressure, salinity and temperature.

Table 5-6. Pumping tests with wireline probe in KSH01A.

Tested section [m]	Comments	Q/s [m²/s]	T_{Moye} [m²/s]
273.00–284.10	Pumping is started with too high rate which generates a continuous decline in rate and pressure The pressure recovery is initially affected by backflow from the hose since no check valve is installed in the pump. Thereafter the water level is recovering in a linear fashion. A rough steady state evaluation is done on the drawdown phase.	$5.8 \cdot 10^{-7}$	$5.5 \cdot 10^{-7}$
197.00–313.42	Flow decreasing flow 7.6–4.9 L/min and pressure stabilises quickly at about 1,750 kPa! The pressure recovery is initially affected by backflow from the hose since no check valve is installed in the pump. Thereafter the water level recovers linearly. Stationary evaluation is done on the drawdown phase.	$6.9 \cdot 10^{-6}$	$9.2 \cdot 10^{-6}$
311.95–409.55	A drawdown of 575 kPa is generated in the test section but no flow data is recorded. The pressure recovery is initially affected by backflow from the hose since no check valve is installed in the pump. Thereafter the water level recovers linearly with an inflow of 0.17 L/min. A rough specific capacity may be estimated if it is assumed that this inflow is generated by the previous drawdown of 575 kPa. This would yield a Q/s= $5 \cdot 10^{-8}$m²/s. During the recovery the flow gauge registers a constant flow of 28 L/min. This suggests that the gauge was faulty.	$5 \cdot 10^{-8}$	See comments
408.00–532.64	There is a covariation of pressure in the test section, above the section and in the packer. Furthermore the pressure in the packer decreases to formation pressure at that level which causes its sealing not to perform adequately. No results were calculated		
585.00–593.10	Stable values of pressure and flow	$8.0 \cdot 10^{-7}$	$7.2 \cdot 10^{-7}$
531.00–619.42	Stable values of pressure and flow	$1.7 \cdot 10^{-6}$	$2.2 \cdot 10^{-6}$
591.31–744.51	Relatively stable values of pressure and flow	$4.1 \cdot 10^{-7}$	$5.6 \cdot 10^{-7}$
742.00–842.10	No stable conditions were reached during the tests. A linearly decreasing flow from34 L/min to16 L/min caused a corresponding decrease in pressure from 7,185 to 6,608 kPa. A very small recovery of about 1.5 kPa during 25 min was recorded. This generates an inflow to the borehole of 0.017 L/min. A rough value on the specific capacity was estimated assuming that the generated drawdown of 480 kPa was causing the flow.	$1.7 \cdot 10^{-10}$	
842.00–1,003.00	It proved impossible to obtain a stable flow or pressure. Throughout the pumping phase the flow was highly variable, fluctuating between 0 and 8 L/min approximately. The pressure decreases continuously in a stepwise manner. At the end of the pumping phase a certain degree of pressure stabilization is achieved during which Q=1 L/min and dh= 480 kPa. The pressure recovery is initially affected by backflow from the hose since no check valve is installed in the pump.	$3.5 \cdot 10^{-7}$	$4.8 \cdot 10^{-7}$

Table 5-7. Absolute pressure measurements.

Tested section [m]	Last pressure reading during build up [kPa]	Duration of pressure build-up [h]	Borehole length to pressure gauge [m]
102.00–197.00	1,017	24.3	103.10
312.10–392.78	2,997	12.6	313.20
492.00–593.00	4,773	5.6	493.10
741.00–842.10	6,689	4	742.10
842.00–1,003.00	8,436	19.1	843.10

5.5.2 Drawdown and recovery test

After drilling to full depth the borehole was flushed with water and airlift pumping tests were conducted. The drawdown and recovery of the water level was measured over a period of 24 hours. The recovery lasted about 14 hours. The inflow of water to the borehole after ceasing the flushing operation showed an inflow of 8.6 L/min at 10 min of recovery. The airlift pumping and recovery curve is shown in Figure 5-17.

From this a steady state transmissivity was calculated according to /4/, $T_M = 6.7 \cdot 10^{-6}$ m²/s and a specific capacity of $Q/s = 4.1 \cdot 10^{-6}$ m²/s.

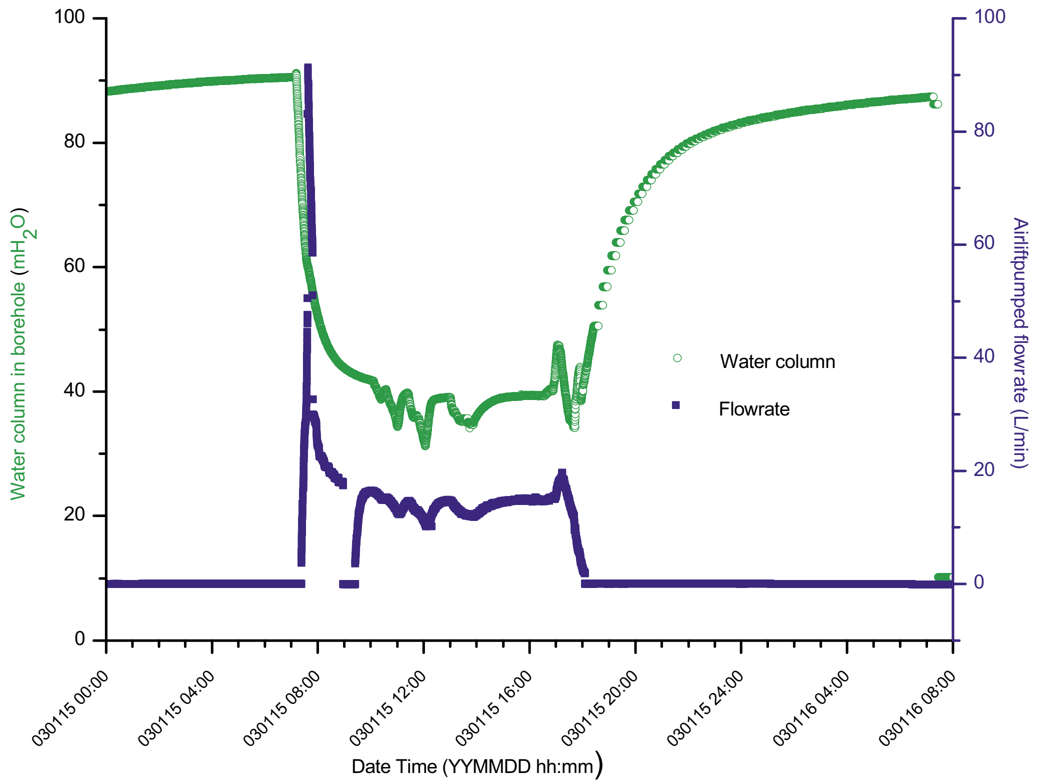


Figure 5-17. Air lift pumping in KSH01A showing flow rate and water column in borehole. The pressure transducer was positioned 90 m below top of casing, while the flowrate was measured at the surface.

5.6 Hydrochemistry

5.6.1 Results

In total, three water samples were collected from wireline tests in KSH01A during drilling. Only one of these samples (197–313 m) had a flushing water concentration less than 10%. In the other two samples the flushing water concentration was higher. The results from the samples from KSH01A are given in Appendix 2 together with results from sampling of the water source (HSH03). The concentration of Total Organic Carbon (TOC) in the samples collected in HSH03 was found to be in the range of 4.4–5 mg/L. These values were considered acceptable for the groundwater to be used as flushing water for the core drilled part of KSH01A without further filtration steps to lower the organic carbon content.

The results from sampling for control of the flushing water, uranine concentration and electric conductivity, are shown in Figure 5-18.

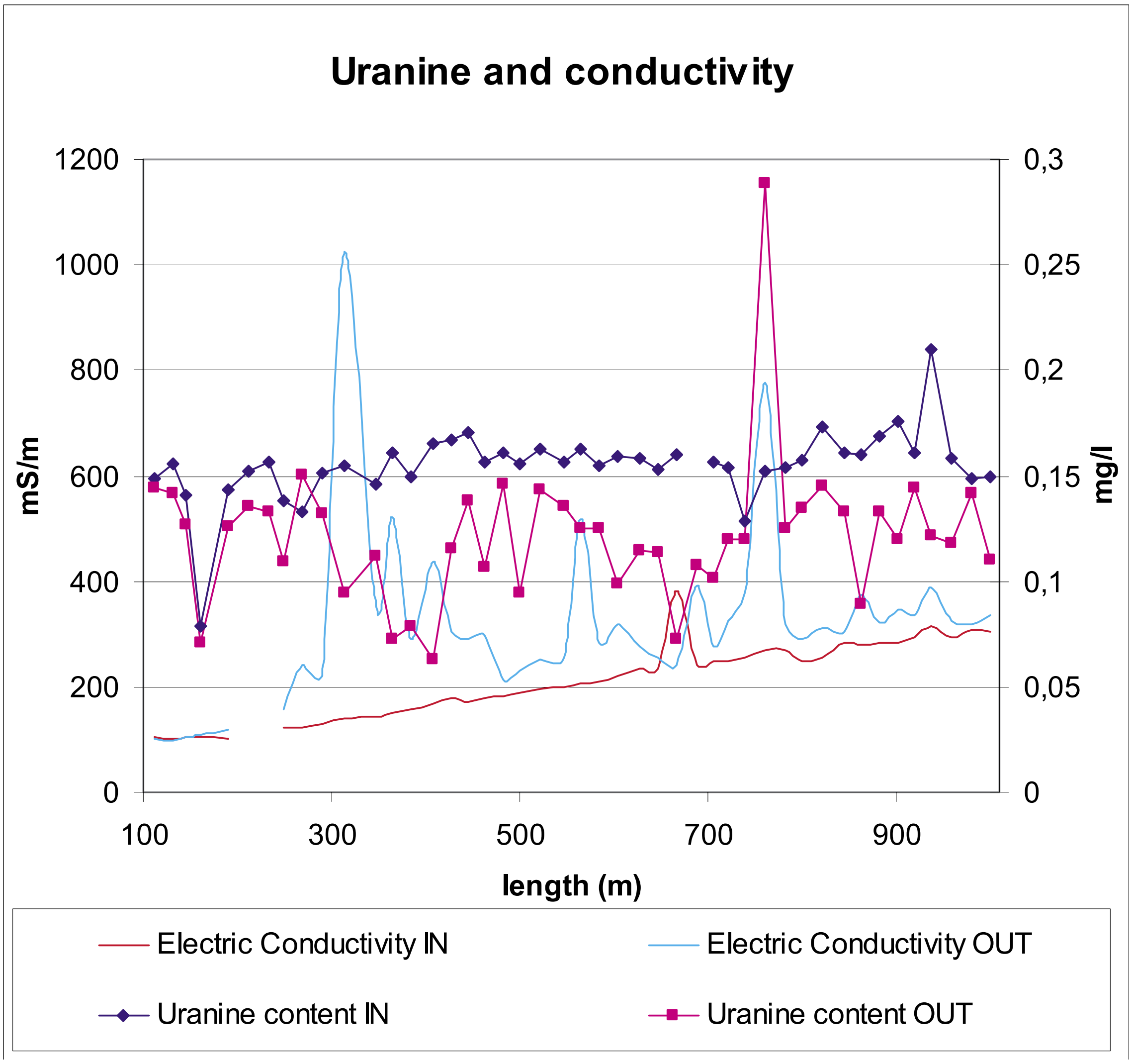


Figure 5-18. The uranine concentration and electric conductivity in KSH01A during drilling.

5.6.2 Quality of the analyses

The charge balance errors give an indication of the quality and uncertainty of the analyses of the major components. The relative charge balance errors are calculated for the selected sets of data from KSH01A, see Appendix 2. The errors do not exceed ± 5% in any of the samples (3824, 3825 and 3831) which is fully satisfactory.

Figures 5-19 and 5-20 illustrate the consistency of the analyses. The figures are based on data compilation in Appendix 2. Electric conductivity values are plotted versus chloride concentrations in Figure 5-19.

The bromide and chloride concentrations are plotted in Figure 5-20. A plot of bromide versus chloride serves as a rough quality control of the bromide analyses.

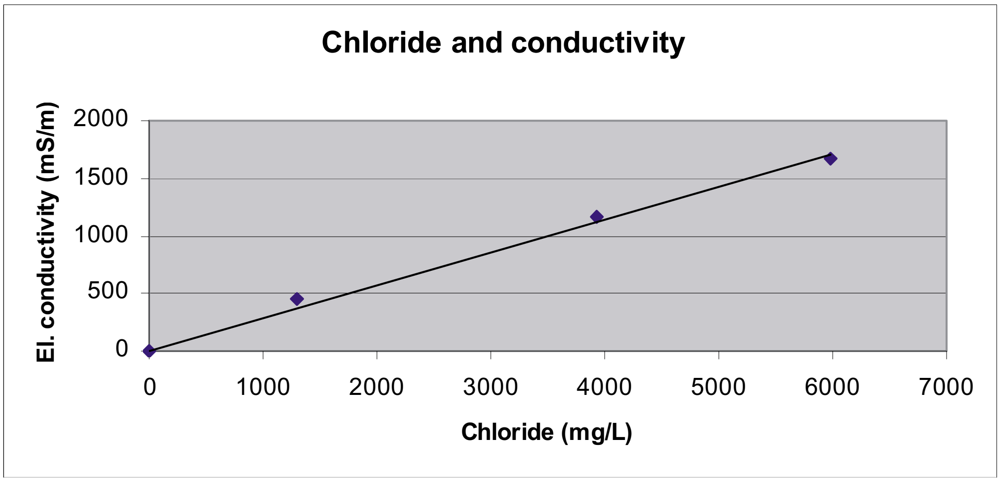


Figure 5-19. *Plot of electric conductivity versus chloride concentration.*

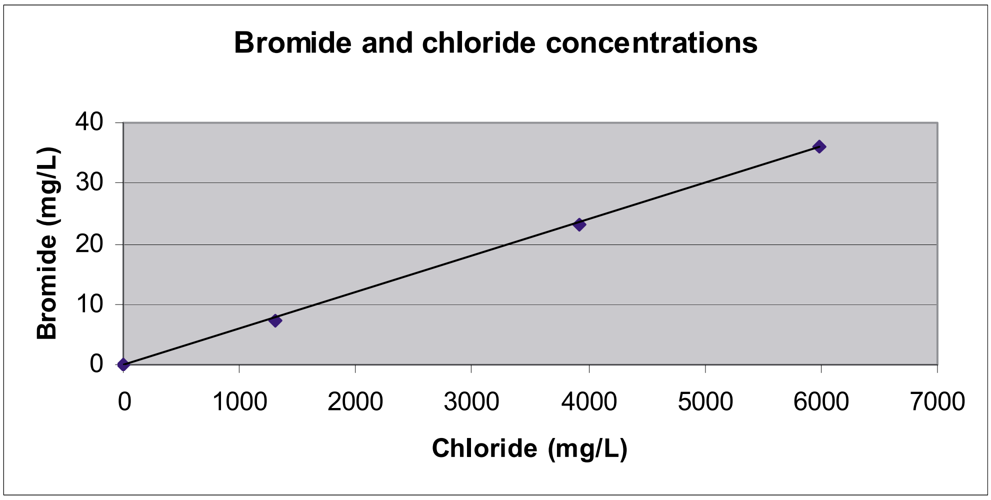


Figure 5-20. *Plot of bromide concentrations versus chloride concentrations.*

The following routines for quality control and data management are generally applied for hydrogeochemical analysis data, independent of sampling method or sampling object:

- Several components are determined by more than one method and/or laboratory. Moreover, control analyses by an independent laboratory are performed as a standard procedure on each fifth or tenth collected sample.
- All analytical results were stored in the SICADA database. The chemistry part of the database contains two types of tables, raw data tables and primary data tables (final data tables).
- Data on basic water analyses are inserted into raw data tables for further evaluation. The evaluation results in a final reduced data set for each sample. These data sets are compiled in a primary data table named "water composition". The evaluation is based on:
  - Comparison of the results from different laboratories and/or methods. The analyses are repeated if a large disparity is noted (generally more than 10%).
  - Calculation of charge balance errors. Relative errors within ± 5% are considered acceptable. For surface waters errors of ± 10%.
  - $\text{Rel. Error (\%)} = 100 \times \dfrac{(\sum \text{cations(equivalents)} - \sum \text{anions(equivalents)})}{(\sum \text{cations(equivalents)} + \sum \text{anions(equivalents)})}$
  - General expert judgement of plausibility based on earlier results and experiences.

All results from "biochemical" components and special analyses of trace metals and isotopes are inserted directly into primary data tables. In those cases where the analyses are repeated or performed by more than one laboratory, a "best choice" notation will indicate those results which are considered most reliable. The analytical methods are indicated in Appendix 3.

5.7 Data handling

Data collected by the drilling contractor and the SKB drill coordinators were reported in daily logs and other protocols and delivered to the Activity Leader. The information was entered to SICADA (SKB database) by database operators. The field note numbers for entry into SICADA are:

- KSH01A Field note Simpevarp 10.
- KSH01B Field note Simpevarp 36.

5.8 Environmental control

The SKB routine for environmental control (SDP-301, SKB internal document) was followed throughout the activity. A checklist was filled in and signed by the Activity Leader and filed in the SKB archive.

All waste generated during the establishment, drilling and completion phases have been removed and disposed of properly. Water effluent from drilling was led to the Baltic Sea in accordance with an agreement with environmental authorities.

Recovered drill cuttings were collected in steel containers. After completion of drilling, the containers were removed from the site and emptied at an approved site.

5.8.1 Consumption of oil and chemicals

No significant amounts of oil or other lubricants were consumed during the drilling.

Gap filling from the surface to 12 m was done in two steps; first between the rock wall and the 273 mm casing and secondly between the 273 mm casing and the 208 mm casing. A total of 760 litres of cement paste, with a water/cement ratio of 0.6 was used for gap filling and 75 litres for the bottom plugs.

6 References

/1/ **SKB, 2001.** Platsundersökningar. Undersökningsmetoder och generellt genomförandeprogram SKB R-01-10, Svensk Kärnbränslehantering AB.

/2/ **SKB, 2001.** Geovetenskapligt program för platsundersökning vid Simpevarp. SKB R-01-44, Svensk Kärnbränslehantering AB.

/3/ **SKB, 2004.** Boremap mapping of telescopic drilled borehole KSH01 A and B. SKB P-04-01 (in prep), Svensk Kärnbränslehantering AB.

/4/ **Moye D G, 1967.** Diamond drilling for foundation exploration. Civil Eng. Trans., Inst. Eng, Australia.

Appendix 1

Geology and MWD parameters KSH01A + KSH01B

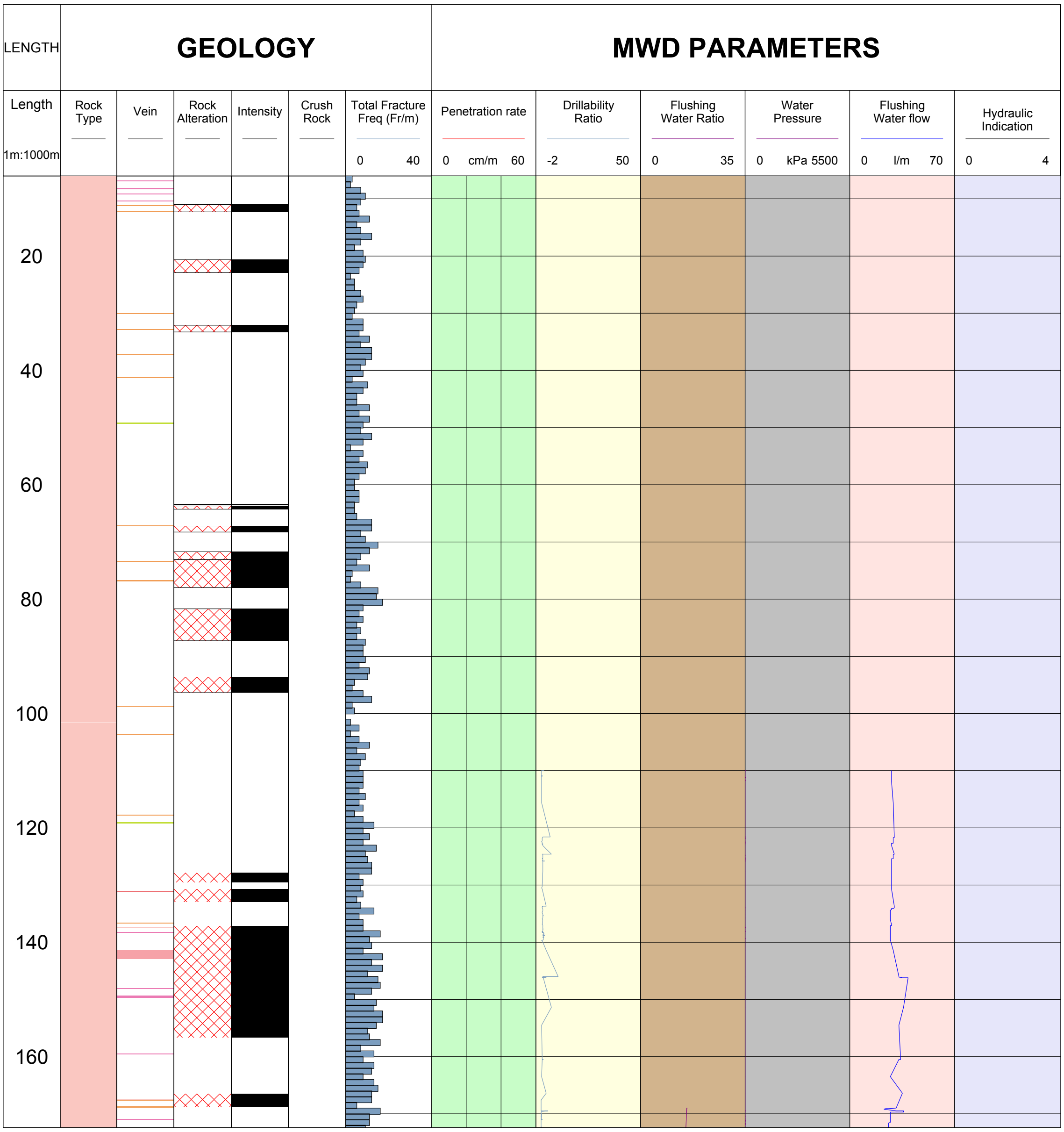
Title GEOLOGY & MWD PARAMETERS KSH01A + B **APPENDIX :1**

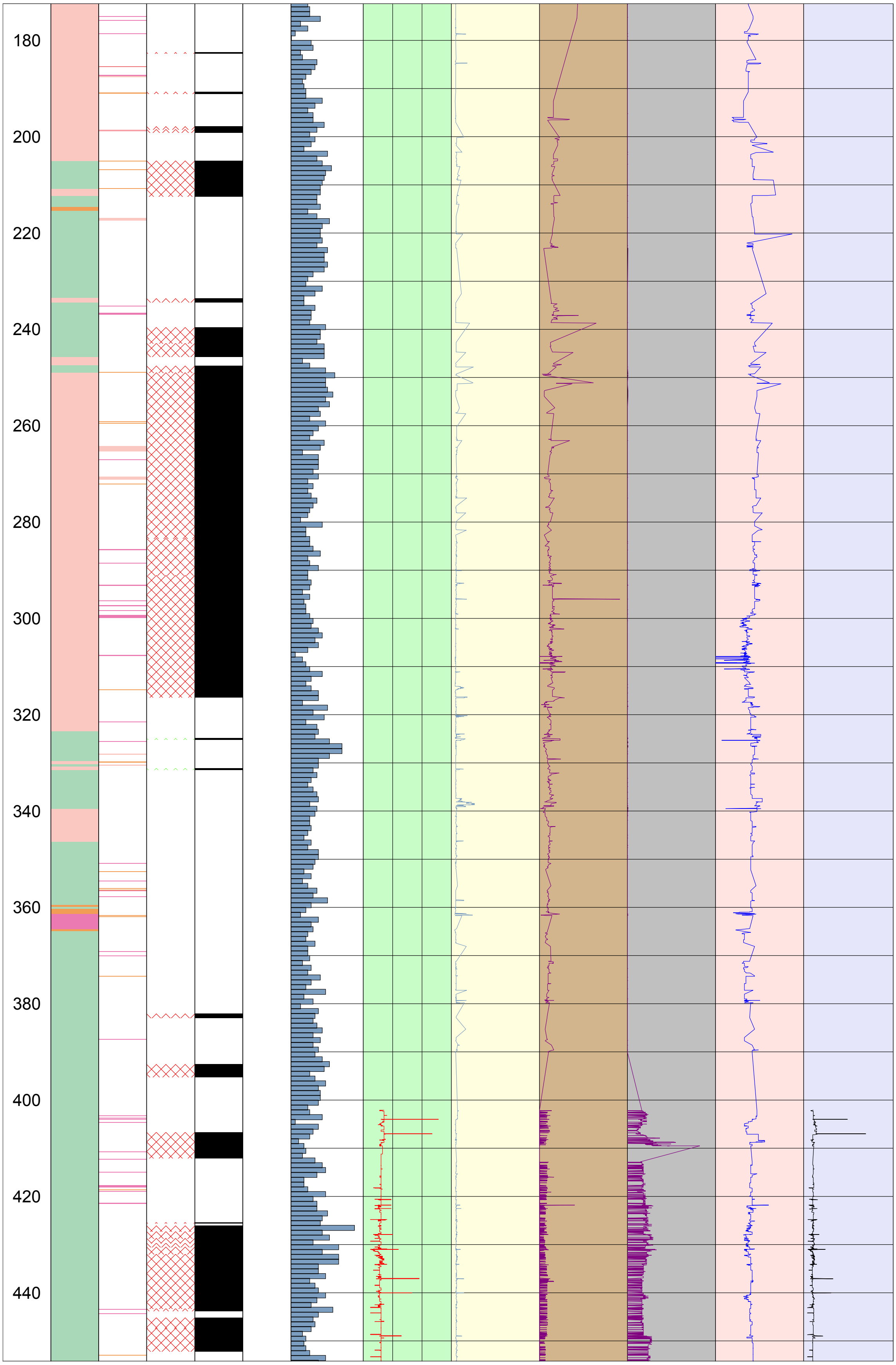
Site	SIMPEVARP	**Coordinate System**	RT90-RHB70
Borehole	KSH01A	**Northing [m]**	6366013.45
Diameter [mm]	76	**Easting [m]**	1552442.99
Length [m]	1003.000	**Elevation [m.a.s.l.]**	5.31
Bearing [°]	174.148	**Drilling Start Date**	2002-08-22 13:00:00
Inclination [°]	-80.598	**Drilling Stop Date**	2003-01-17 21:10:00
Date of mapping	2004-03-09 17:57:00	**Plot Date**	2004-03-24 21:03:42

ROCKTYPE SIMPEVARP
- Fine-grained granite
- Pegmatite
- Granite
- Ävrö granite
- Quartz monzodiorite
- Diorite / Gabbro
- Fine-grained dioritoid
- Fine-grained diorite-gabbro

ROCK ALTERATION
- Oxidized
- Epidotisized

INTENSITY
- Faint
- Weak
- Medium
- Strong

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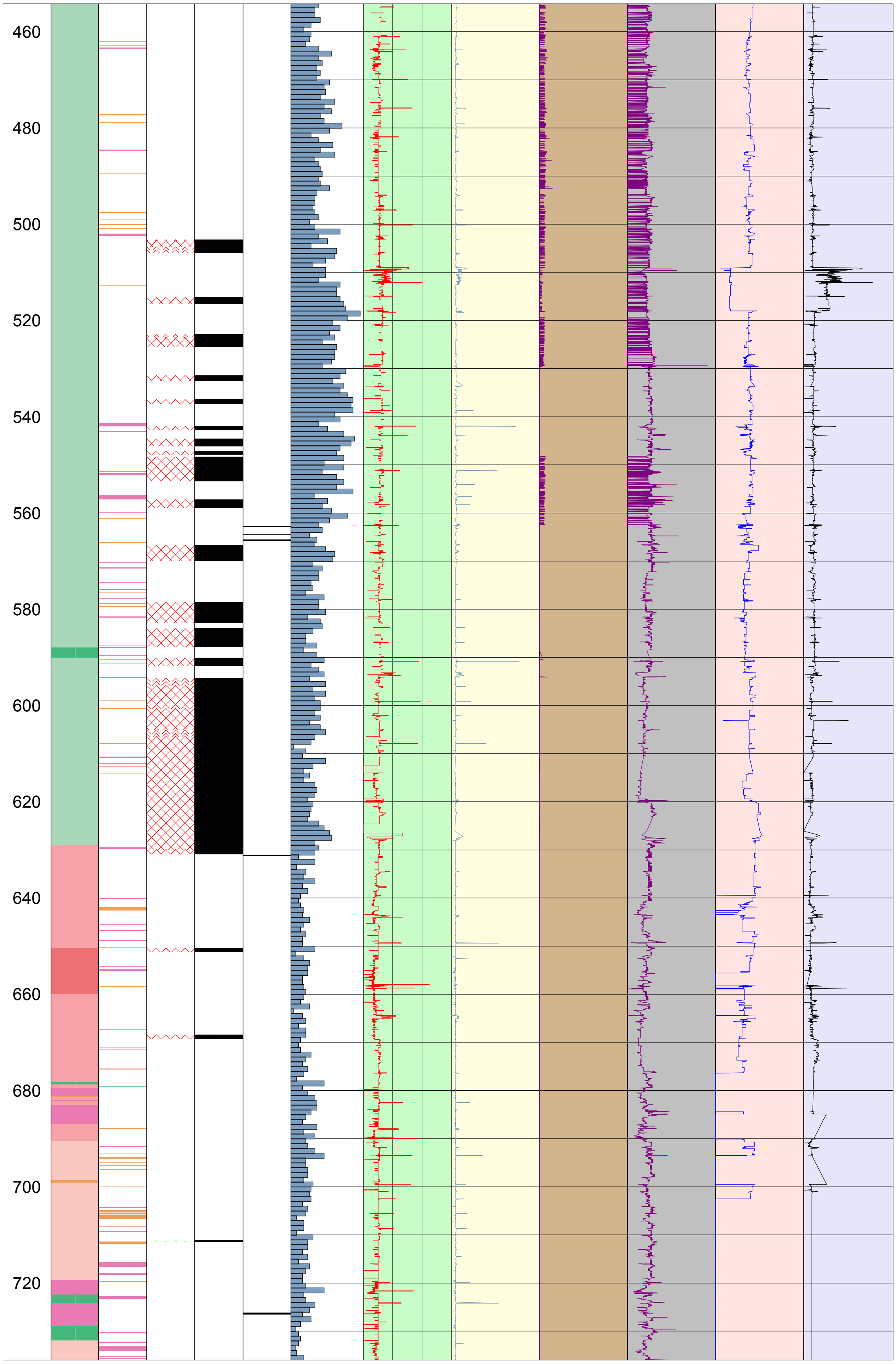

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660
680
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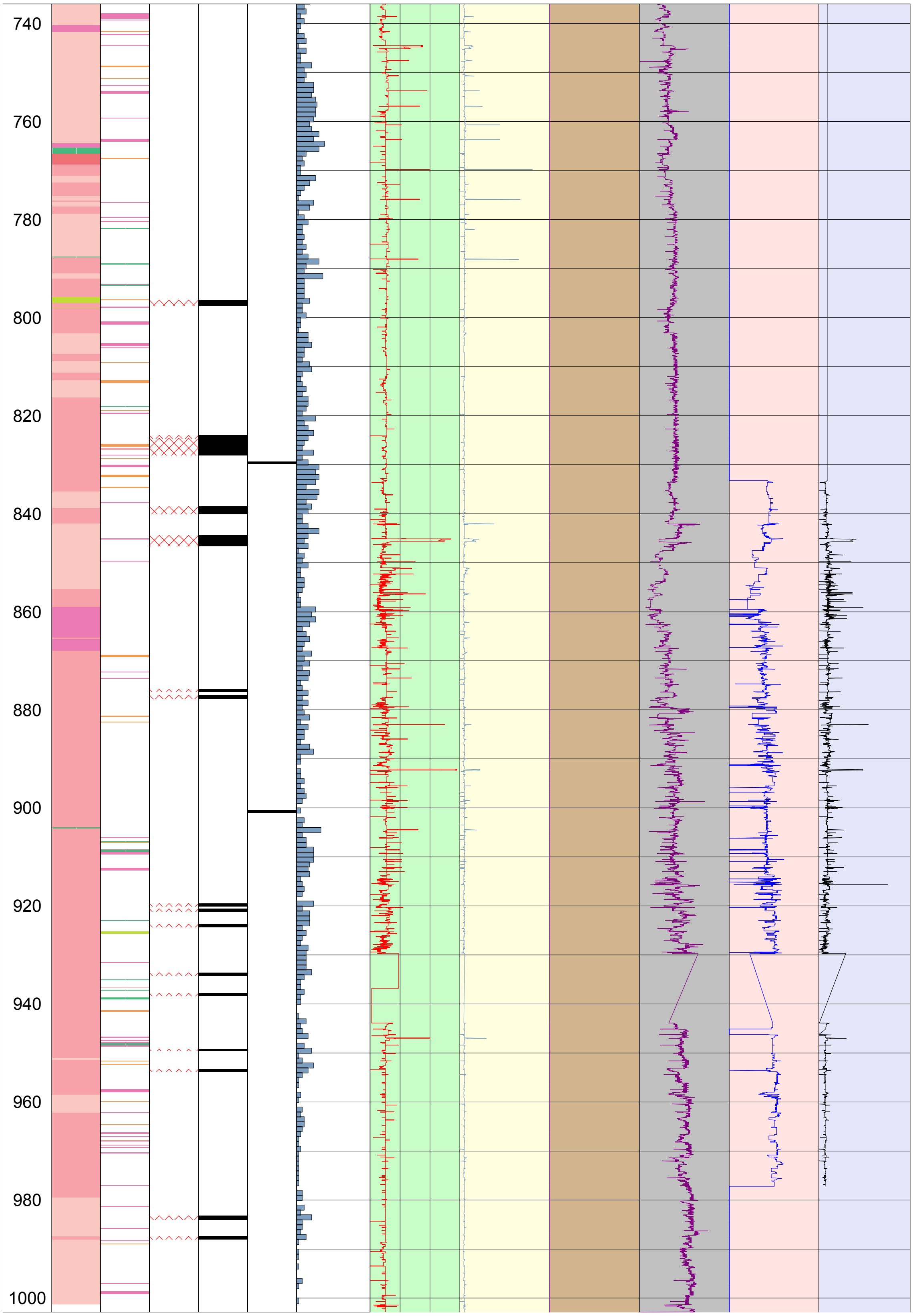

740
760
780
800
820
840
860
880
900
920
940
960
980
1000

Appendix 2

Chemical results

Borehole	Date of measurement	Upper section limit	Lower section limit	Sample_no	Groundwater Chemistry Class	pH	Conductivity mS/m	Na mg/l	K mg/l	Ca mg/l
KSH01A	2002-10-24 09:30	197,00	313,42	3824	3	7,11	1661	2440	13,1	1020
KSH01A	2002-11-16 21:40	585,00	593,00	3825	3	7,3	451	651	6,87	226
KSH01A	2002-11-20 08:30	531,00	619,42	3831	3	7,08	1160	1640	9,91	770
HSH03	2002-08-21 16:30	0,00	201,00	3759	3	8,21	76,8	152	3,31	13
HSH03	2002-08-22 18:00	0,00	103,00	3760	3	8,28	77,3	154	3,37	13,2
HSH03	2002-09-05 15:55	0,00	201,00	3761	3	8,12	111	192	3,56	21,1

Mg	HCO3	Cl	SO4	SO4_S	Br	F	Si	Fe	Mn	Li	Sr	TOC	PMC
mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	% Modern
	Alkalinity			**Total Sulphur**				**Total Iron**					**Carbon**
61,2	21	5982,3	18,5	5,43	36,16	0,56	4,4	2,76	0,53	0,335	17,3		36,35
21,1	137	1298,6	167,34	42,4	7,24	1,84	4,5	7,26	0,55	0,089	3,72		59,81
42,7	57	3922,9	96,21	35,4	23,3	1,37	3,1	5,5	0,74	0,241	12,5		57,08
3,4	255	53,1	84,29	27,1	0,36	3,07	4,2	0,044	0,03	0,016	0,19	4,5	
3,5	248	55,1	84,95	27,2	0,2	3,11	4,3	0,048	0,03	0,016	0,2	4,4	
5	233	131,8		27,2	0,36	1,57	5,3	0,396	0,05		0,32	5	

C-13	AGE_BP	D	Tr	O-18	B-10	S-34	Cl-37	Sr-87
dev PDB	Groundwater age	dev SMOW	TU	dev SMOW	B-10/B-11	dev SMOW	dev SMOC	Sr-87/Sr86
-21,4	8078	-102,5	1,1	-14,1		23,5		0,72
-16,3	4077	-77,8	6,2	-10,6		17,4		0,72
-15,7	4453	-86,1	4,2	-11,7		18,1		0,72
		-78	4,7	-10,6			0,07	
		-76,1	10	-10,7			-0,07	
		-76,6	9,4	-10,8			0,07	

Appendix 3

Chemistry – analytical method and preparation

Analysis	Sample bottle	Preparation	SKB label	Laboratory
pH, conduktivity, alkalinity	250 ml	Filtering Pallfilter	green	Äspö/field
Anions (F^-, Br^-, Cl^-, SO_4^{2-})	250 ml	Filtering Pallfilter	green	Äspö/field
Uranine	100 ml brown glass		green	Äspö/field
Main components (except Fe, Mn)	Analytica's 100 ml acid washed	1 ml HNO_3 suprapur, filtering membrane filter	red	Analytica
Archive samples	2 ea 250 ml	Filtering Pallfilter	green	
Option				
Deuterium, O-18	100 ml square		green	IFE
Tritium	1000 ml dried	Flooded at least once	green	Waterloo
Sr-87	100 ml square		green	IFE
Cl-37	*Same as for Tritium*		green	Waterloo
B-10	*Same as for main components*	Filtering membrane filter	red	Analytica
C-13, PMC	2*2 st 100 ml brown glass		green	Waterloo och Uppsala
S-34	1000 ml		green	IFE

Appendix 4

Deviation measurements

Point Seq	Northing (m)	Easting (m)	Elevation (m)	Coordinate System	Length (m)	Vertical Depth	Inclination (degrees	Bearing (degrees	Calc Date	Origin
1	6366013,92	1552442,91	8,28	RT90-RHB70	-3	-2,96	-81,17	170,47	2003-06-16 08:37	Measured
2	6366013,47	1552442,99	5,32	RT90-RHB70	0	0	-80,85	171,98	2003-06-16 08:37	Measured
3	6366012,99	1552443,05	2,35	RT90-RHB70	3	2,97	-80,75	172,64	2003-06-16 08:37	Measured
4	6366012,52	1552443,11	-0,61	RT90-RHB70	6	5,93	-80,47	174,08	2003-06-16 08:37	Measured
5	6366012,02	1552443,17	-3,57	RT90-RHB70	9	8,89	-80,3	175,17	2003-06-16 08:37	Measured
6	6366011,52	1552443,21	-6,52	RT90-RHB70	12	11,84	-80,26	175,36	2003-06-16 08:37	Measured
7	6366011,01	1552443,25	-9,48	RT90-RHB70	15	14,8	-80,3	175,28	2003-06-16 08:37	Measured
8	6366010,51	1552443,29	-12,44	RT90-RHB70	18	17,76	-80,28	175,3	2003-06-16 08:37	Measured
9	6366010	1552443,33	-15,39	RT90-RHB70	21	20,71	-80,22	175,48	2003-06-16 08:37	Measured
10	6366009,49	1552443,37	-18,35	RT90-RHB70	24	23,67	-80,15	175,58	2003-06-16 08:37	Measured
11	6366008,98	1552443,41	-21,31	RT90-RHB70	27	26,63	-80,06	175,79	2003-06-16 08:37	Measured
12	6366008,47	1552443,45	-24,26	RT90-RHB70	30	29,58	-79,94	175,81	2003-06-16 08:37	Measured
13	6366007,94	1552443,49	-27,21	RT90-RHB70	33	32,53	-79,8	175,78	2003-06-16 08:37	Measured
14	6366007,41	1552443,53	-30,17	RT90-RHB70	36	35,49	-79,65	175,57	2003-06-16 08:37	Measured
15	6366006,88	1552443,57	-33,12	RT90-RHB70	39	38,44	-79,47	175,21	2003-06-16 08:37	Measured
16	6366006,33	1552443,62	-36,07	RT90-RHB70	42	41,39	-79,32	174,79	2003-06-16 08:37	Measured
17	6366005,78	1552443,67	-39,02	RT90-RHB70	45	44,34	-79,17	174,32	2003-06-16 08:37	Measured
18	6366005,21	1552443,72	-41,96	RT90-RHB70	48	47,28	-79,02	173,85	2003-06-16 08:37	Measured
19	6366004,65	1552443,78	-44,91	RT90-RHB70	51	50,23	-78,86	173,43	2003-06-16 08:37	Measured
20	6366004,07	1552443,85	-47,85	RT90-RHB70	54	53,17	-78,71	172,98	2003-06-16 08:37	Measured
21	6366003,49	1552443,92	-50,79	RT90-RHB70	57	56,11	-78,57	172,45	2003-06-16 08:37	Measured
22	6366002,9	1552444	-53,73	RT90-RHB70	60	59,05	-78,39	171,99	2003-06-16 08:37	Measured
23	6366002,3	1552444,08	-56,67	RT90-RHB70	63	61,99	-78,23	171,48	2003-06-16 08:37	Measured
24	6366001,7	1552444,17	-59,61	RT90-RHB70	66	64,93	-78,05	171,11	2003-06-16 08:37	Measured
25	6366001,08	1552444,27	-62,54	RT90-RHB70	69	67,86	-77,91	170,64	2003-06-16 08:37	Measured
26	6366000,46	1552444,37	-65,48	RT90-RHB70	72	70,8	-77,73	170,32	2003-06-16 08:37	Measured
27	6365999,83	1552444,48	-68,41	RT90-RHB70	75	73,73	-77,6	169,78	2003-06-16 08:37	Measured
28	6365999,2	1552444,59	-71,34	RT90-RHB70	78	76,66	-77,43	169,33	2003-06-16 08:37	Measured
29	6365998,56	1552444,71	-74,27	RT90-RHB70	81	79,59	-77,29	168,83	2003-06-16 08:37	Measured
30	6365997,91	1552444,84	-77,19	RT90-RHB70	84	82,51	-77,1	168,48	2003-06-16 08:37	Measured
31	6365997,25	1552444,98	-80,12	RT90-RHB70	87	85,44	-76,95	168,16	2003-06-16 08:37	Measured
32	6365996,59	1552445,11	-83,04	RT90-RHB70	90	88,36	-76,76	167,81	2003-06-16 08:37	Measured
33	6365995,92	1552445,26	-85,96	RT90-RHB70	93	91,28	-76,6	167,51	2003-06-16 08:37	Measured
34	6365995,24	1552445,41	-88,88	RT90-RHB70	96	94,2	-76,43	167,31	2003-06-16 08:37	Measured
35	6365994,55	1552445,56	-91,8	RT90-RHB70	99	97,12	-76,25	167,13	2003-06-16 08:37	Measured
36	6365993,86	1552445,72	-94,71	RT90-RHB70	102	100,03	-76,1	167,05	2003-06-16 08:37	Measured
37	6365993,16	1552445,89	-97,62	RT90-RHB70	105	102,94	-76,02	167,06	2003-06-16 08:37	Measured
38	6365992,45	1552446,05	-100,53	RT90-RHB70	108	105,85	-76,03	167,1	2003-06-16 08:37	Measured

39	6365991,74	1552446,21	-103,44	RT90-RHB70	111	108,76	-76,06	167,26	2003-06-16 08:37	Measured
40	6365991,04	1552446,37	-106,36	RT90-RHB70	114	111,68	-76,11	167,32	2003-06-16 08:37	Measured
41	6365990,34	1552446,53	-109,27	RT90-RHB70	117	114,59	-76,15	167,55	2003-06-16 08:37	Measured
42	6365989,64	1552446,68	-112,18	RT90-RHB70	120	117,5	-76,17	167,66	2003-06-16 08:37	Measured
43	6365988,94	1552446,83	-115,09	RT90-RHB70	123	120,41	-76,18	167,82	2003-06-16 08:37	Measured
44	6365988,24	1552446,99	-118,01	RT90-RHB70	126	123,33	-76,18	167,97	2003-06-16 08:37	Measured
45	6365987,53	1552447,14	-120,92	RT90-RHB70	129	126,24	-76,2	168,08	2003-06-16 08:37	Measured
46	6365986,83	1552447,28	-123,83	RT90-RHB70	132	129,15	-76,21	168,23	2003-06-16 08:37	Measured
47	6365986,13	1552447,43	-126,75	RT90-RHB70	135	132,07	-76,24	168,26	2003-06-16 08:37	Measured
48	6365985,44	1552447,57	-129,66	RT90-RHB70	138	134,98	-76,25	168,36	2003-06-16 08:37	Measured
49	6365984,74	1552447,72	-132,57	RT90-RHB70	141	137,89	-76,27	168,42	2003-06-16 08:37	Measured
50	6365984,04	1552447,86	-135,49	RT90-RHB70	144	140,81	-76,3	168,66	2003-06-16 08:37	Measured
51	6365983,34	1552448	-138,4	RT90-RHB70	147	143,72	-76,33	168,67	2003-06-16 08:37	Measured
52	6365982,65	1552448,14	-141,32	RT90-RHB70	150	146,64	-76,31	168,78	2003-06-16 08:37	Measured
53	6365981,95	1552448,28	-144,23	RT90-RHB70	153	149,55	-76,32	168,86	2003-06-16 08:37	Measured
54	6365981,26	1552448,41	-147,15	RT90-RHB70	156	152,47	-76,36	169,01	2003-06-16 08:37	Measured
55	6365980,56	1552448,55	-150,06	RT90-RHB70	159	155,38	-76,37	169,1	2003-06-16 08:37	Measured
56	6365979,87	1552448,68	-152,98	RT90-RHB70	162	158,3	-76,41	169,23	2003-06-16 08:37	Measured
57	6365979,17	1552448,82	-155,9	RT90-RHB70	165	161,22	-76,38	169,42	2003-06-16 08:37	Measured
58	6365978,48	1552448,94	-158,81	RT90-RHB70	168	164,13	-76,37	169,7	2003-06-16 08:37	Measured
59	6365977,78	1552449,07	-161,73	RT90-RHB70	171	167,05	-76,38	169,94	2003-06-16 08:37	Measured
60	6365977,09	1552449,19	-164,64	RT90-RHB70	174	169,96	-76,34	170,2	2003-06-16 08:37	Measured
61	6365976,39	1552449,32	-167,56	RT90-RHB70	177	172,88	-76,34	170,3	2003-06-16 08:37	Measured
62	6365975,69	1552449,43	-170,47	RT90-RHB70	180	175,79	-76,31	170,62	2003-06-16 08:37	Measured
63	6365974,99	1552449,55	-173,39	RT90-RHB70	183	178,71	-76,33	170,74	2003-06-16 08:37	Measured
64	6365974,29	1552449,66	-176,3	RT90-RHB70	186	181,62	-76,29	170,97	2003-06-16 08:37	Measured
65	6365973,59	1552449,78	-179,22	RT90-RHB70	189	184,54	-76,33	171,05	2003-06-16 08:37	Measured
66	6365972,89	1552449,89	-182,13	RT90-RHB70	192	187,45	-76,3	171,27	2003-06-16 08:37	Measured
67	6365972,19	1552449,99	-185,05	RT90-RHB70	195	190,37	-76,31	171,49	2003-06-16 08:37	Measured
68	6365971,48	1552450,1	-187,96	RT90-RHB70	198	193,28	-76,29	171,75	2003-06-16 08:37	Measured
69	6365970,78	1552450,2	-190,88	RT90-RHB70	201	196,2	-76,32	171,87	2003-06-16 08:37	Measured
70	6365970,08	1552450,3	-193,79	RT90-RHB70	204	199,11	-76,35	172,01	2003-06-16 08:37	Measured
71	6365969,38	1552450,4	-196,71	RT90-RHB70	207	202,03	-76,39	172,08	2003-06-16 08:37	Measured
72	6365968,68	1552450,5	-199,62	RT90-RHB70	210	204,94	-76,42	172,2	2003-06-16 08:37	Measured
73	6365967,98	1552450,59	-202,54	RT90-RHB70	213	207,86	-76,4	172,19	2003-06-16 08:37	Measured
74	6365967,28	1552450,69	-205,45	RT90-RHB70	216	210,77	-76,41	172,24	2003-06-16 08:37	Measured
75	6365966,58	1552450,78	-208,37	RT90-RHB70	219	213,69	-76,42	172,3	2003-06-16 08:37	Measured
76	6365965,89	1552450,88	-211,29	RT90-RHB70	222	216,61	-76,45	172,31	2003-06-16 08:37	Measured
77	6365965,19	1552450,97	-214,2	RT90-RHB70	225	219,52	-76,45	172,29	2003-06-16 08:37	Measured
78	6365964,49	1552451,07	-217,12	RT90-RHB70	228	222,44	-76,46	172,3	2003-06-16 08:37	Measured
79	6365963,8	1552451,16	-220,04	RT90-RHB70	231	225,36	-76,45	172,25	2003-06-16 08:37	Measured
80	6365963,1	1552451,26	-222,95	RT90-RHB70	234	228,27	-76,44	172,41	2003-06-16 08:37	Measured

81	6365962,4	1552451,35	-225,87	RT90-RHB70	237	231,19	-76,51	172,59	2003-06-16 08:37	Measured
82	6365961,71	1552451,44	-228,79	RT90-RHB70	240	234,11	-76,48	172,73	2003-06-16 08:37	Measured
83	6365961,01	1552451,53	-231,7	RT90-RHB70	243	237,02	-76,45	172,92	2003-06-16 08:37	Measured
84	6365960,31	1552451,61	-234,62	RT90-RHB70	246	239,94	-76,41	172,96	2003-06-16 08:37	Measured
85	6365959,61	1552451,7	-237,53	RT90-RHB70	249	242,85	-76,38	173	2003-06-16 08:37	Measured
86	6365958,91	1552451,79	-240,45	RT90-RHB70	252	245,77	-76,38	172,95	2003-06-16 08:37	Measured
87	6365958,21	1552451,87	-243,37	RT90-RHB70	255	248,69	-76,35	172,9	2003-06-16 08:37	Measured
88	6365957,51	1552451,96	-246,28	RT90-RHB70	258	251,6	-76,36	172,87	2003-06-16 08:37	Measured
89	6365956,81	1552452,05	-249,2	RT90-RHB70	261	254,52	-76,37	172,88	2003-06-16 08:37	Measured
90	6365956,11	1552452,14	-252,11	RT90-RHB70	264	257,43	-76,39	172,89	2003-06-16 08:37	Measured
91	6365955,41	1552452,22	-255,03	RT90-RHB70	267	260,35	-76,39	172,77	2003-06-16 08:37	Measured
92	6365954,71	1552452,31	-257,94	RT90-RHB70	270	263,26	-76,38	172,64	2003-06-16 08:37	Measured
93	6365954	1552452,4	-260,86	RT90-RHB70	273	266,18	-76,39	172,96	2003-06-16 08:37	Measured
94	6365953,3	1552452,49	-263,78	RT90-RHB70	276	269,1	-76,41	173,08	2003-06-16 08:37	Measured
95	6365952,6	1552452,57	-266,69	RT90-RHB70	279	272,01	-76,41	172,91	2003-06-16 08:37	Measured
96	6365951,9	1552452,66	-269,61	RT90-RHB70	282	274,93	-76,41	173,06	2003-06-16 08:37	Measured
97	6365951,21	1552452,75	-272,52	RT90-RHB70	285	277,84	-76,37	173,07	2003-06-16 08:37	Measured
98	6365950,5	1552452,83	-275,44	RT90-RHB70	288	280,76	-76,36	173,17	2003-06-16 08:37	Measured
99	6365949,8	1552452,92	-278,35	RT90-RHB70	291	283,67	-76,37	173,61	2003-06-16 08:37	Measured
100	6365949,1	1552452,99	-281,27	RT90-RHB70	294	286,59	-76,31	173,86	2003-06-16 08:37	Measured
101	6365948,39	1552453,07	-284,18	RT90-RHB70	297	289,5	-76,29	173,9	2003-06-16 08:37	Measured
102	6365947,69	1552453,15	-287,1	RT90-RHB70	300	292,42	-76,25	174,09	2003-06-16 08:37	Measured
103	6365946,98	1552453,22	-290,01	RT90-RHB70	303	295,33	-76,23	174,22	2003-06-16 08:37	Measured
104	6365946,27	1552453,29	-292,93	RT90-RHB70	306	298,25	-76,22	174,46	2003-06-16 08:37	Measured
105	6365945,55	1552453,36	-295,84	RT90-RHB70	309	301,16	-76,19	174,58	2003-06-16 08:37	Measured
106	6365944,84	1552453,43	-298,75	RT90-RHB70	312	304,07	-76,18	174,83	2003-06-16 08:37	Measured
107	6365944,13	1552453,49	-301,67	RT90-RHB70	315	306,99	-76,19	174,93	2003-06-16 08:37	Measured
108	6365943,42	1552453,56	-304,58	RT90-RHB70	318	309,9	-76,22	175,05	2003-06-16 08:37	Measured
109	6365942,7	1552453,62	-307,49	RT90-RHB70	321	312,81	-76,24	175,15	2003-06-16 08:37	Measured
110	6365941,99	1552453,68	-310,41	RT90-RHB70	324	315,73	-76,28	175,39	2003-06-16 08:37	Measured
111	6365941,28	1552453,74	-313,32	RT90-RHB70	327	318,64	-76,27	175,67	2003-06-16 08:37	Measured
112	6365940,57	1552453,79	-316,24	RT90-RHB70	330	321,56	-76,27	175,83	2003-06-16 08:37	Measured
113	6365939,86	1552453,84	-319,15	RT90-RHB70	333	324,47	-76,26	176,27	2003-06-16 08:37	Measured
114	6365939,15	1552453,89	-322,06	RT90-RHB70	336	327,38	-76,28	176,6	2003-06-16 08:37	Measured
115	6365938,44	1552453,93	-324,98	RT90-RHB70	339	330,3	-76,26	176,96	2003-06-16 08:37	Measured
116	6365937,73	1552453,97	-327,89	RT90-RHB70	342	333,21	-76,27	177,19	2003-06-16 08:37	Measured
117	6365937,02	1552454	-330,81	RT90-RHB70	345	336,13	-76,24	177,49	2003-06-16 08:37	Measured
118	6365936,31	1552454,03	-333,72	RT90-RHB70	348	339,04	-76,22	177,82	2003-06-16 08:37	Measured
119	6365935,59	1552454,06	-336,64	RT90-RHB70	351	341,96	-76,2	178,04	2003-06-16 08:37	Measured
120	6365934,88	1552454,08	-339,55	RT90-RHB70	354	344,87	-76,17	178,25	2003-06-16 08:37	Measured
121	6365934,16	1552454,11	-342,46	RT90-RHB70	357	347,78	-76,14	178,49	2003-06-16 08:37	Measured
122	6365933,44	1552454,13	-345,37	RT90-RHB70	360	350,69	-76,08	178,79	2003-06-16 08:37	Measured

123	6365932,72	1552454,14	-348,29	RT90-RHB70	363	353,61	-76,07	178,87	2003-06-16 08:37	Measured
124	6365932	1552454,16	-351,2	RT90-RHB70	366	356,52	-76	178,78	2003-06-16 08:37	Measured
125	6365931,27	1552454,17	-354,11	RT90-RHB70	369	359,43	-75,96	179,07	2003-06-16 08:37	Measured
126	6365930,54	1552454,18	-357,02	RT90-RHB70	372	362,34	-75,91	179,14	2003-06-16 08:37	Measured
127	6365929,81	1552454,19	-359,93	RT90-RHB70	375	365,25	-75,86	179,23	2003-06-16 08:37	Measured
128	6365929,08	1552454,2	-362,84	RT90-RHB70	378	368,16	-75,83	179,58	2003-06-16 08:37	Measured
129	6365928,35	1552454,21	-365,75	RT90-RHB70	381	371,07	-75,85	179,88	2003-06-16 08:37	Measured
130	6365927,61	1552454,21	-368,66	RT90-RHB70	384	373,98	-75,81	179,96	2003-06-16 08:37	Measured
131	6365926,88	1552454,21	-371,56	RT90-RHB70	387	376,88	-75,75	180,17	2003-06-16 08:37	Measured
132	6365926,14	1552454,21	-374,47	RT90-RHB70	390	379,79	-75,74	180,33	2003-06-16 08:37	Measured
133	6365925,4	1552454,2	-377,38	RT90-RHB70	393	382,7	-75,72	180,75	2003-06-16 08:37	Measured
134	6365924,66	1552454,19	-380,29	RT90-RHB70	396	385,61	-75,67	180,97	2003-06-16 08:37	Measured
135	6365923,92	1552454,18	-383,19	RT90-RHB70	399	388,51	-75,68	181,31	2003-06-16 08:37	Measured
136	6365923,18	1552454,16	-386,1	RT90-RHB70	402	391,42	-75,63	181,46	2003-06-16 08:37	Measured
137	6365922,43	1552454,15	-389,01	RT90-RHB70	405	394,33	-75,63	181,58	2003-06-16 08:37	Measured
138	6365921,69	1552454,13	-391,91	RT90-RHB70	408	397,23	-75,63	181,67	2003-06-16 08:37	Measured
139	6365920,94	1552454,1	-394,82	RT90-RHB70	411	400,14	-75,66	181,77	2003-06-16 08:37	Measured
140	6365920,2	1552454,08	-397,73	RT90-RHB70	414	403,05	-75,68	181,97	2003-06-16 08:37	Measured
141	6365919,46	1552454,06	-400,63	RT90-RHB70	417	405,95	-75,68	182,15	2003-06-16 08:37	Measured
142	6365918,72	1552454,03	-403,54	RT90-RHB70	420	408,86	-75,67	182,26	2003-06-16 08:37	Measured
143	6365917,98	1552454	-406,45	RT90-RHB70	423	411,77	-75,68	182,32	2003-06-16 08:37	Measured
144	6365917,24	1552453,97	-409,35	RT90-RHB70	426	414,67	-75,69	182,3	2003-06-16 08:37	Measured
145	6365916,49	1552453,94	-412,26	RT90-RHB70	429	417,58	-75,72	182,37	2003-06-16 08:37	Measured
146	6365915,76	1552453,91	-415,17	RT90-RHB70	432	420,49	-75,73	182,58	2003-06-16 08:37	Measured
147	6365915,02	1552453,87	-418,07	RT90-RHB70	435	423,39	-75,74	182,8	2003-06-16 08:37	Measured
148	6365914,28	1552453,84	-420,98	RT90-RHB70	438	426,3	-75,73	183,03	2003-06-16 08:37	Measured
149	6365913,54	1552453,8	-423,89	RT90-RHB70	441	429,21	-75,74	183,28	2003-06-16 08:37	Measured
150	6365912,8	1552453,76	-426,8	RT90-RHB70	444	432,12	-75,73	183,42	2003-06-16 08:37	Measured
151	6365912,06	1552453,71	-429,7	RT90-RHB70	447	435,02	-75,69	183,61	2003-06-16 08:37	Measured
152	6365911,32	1552453,67	-432,61	RT90-RHB70	450	437,93	-75,7	183,88	2003-06-16 08:37	Measured
153	6365910,58	1552453,62	-435,52	RT90-RHB70	453	440,84	-75,72	183,98	2003-06-16 08:37	Measured
154	6365909,85	1552453,56	-438,43	RT90-RHB70	456	443,75	-75,7	184,24	2003-06-16 08:37	Measured
155	6365909,11	1552453,51	-441,33	RT90-RHB70	459	446,65	-75,64	184,35	2003-06-16 08:37	Measured
156	6365908,37	1552453,45	-444,24	RT90-RHB70	462	449,56	-75,57	184,53	2003-06-16 08:37	Measured
157	6365907,62	1552453,39	-447,14	RT90-RHB70	465	452,46	-75,54	184,84	2003-06-16 08:37	Measured
158	6365906,87	1552453,33	-450,05	RT90-RHB70	468	455,37	-75,53	185,14	2003-06-16 08:37	Measured
159	6365906,13	1552453,26	-452,95	RT90-RHB70	471	458,27	-75,54	185,52	2003-06-16 08:37	Measured
160	6365905,38	1552453,19	-455,86	RT90-RHB70	474	461,18	-75,59	185,81	2003-06-16 08:37	Measured
161	6365904,64	1552453,12	-458,76	RT90-RHB70	477	464,08	-75,61	186,2	2003-06-16 08:37	Measured
162	6365903,9	1552453,04	-461,67	RT90-RHB70	480	466,99	-75,66	186,43	2003-06-16 08:37	Measured
163	6365903,16	1552452,95	-464,58	RT90-RHB70	483	469,9	-75,66	186,61	2003-06-16 08:37	Measured
164	6365902,42	1552452,87	-467,48	RT90-RHB70	486	472,8	-75,69	186,98	2003-06-16 08:37	Measured

165	6365901,68	1552452,78	-470,39	RT90-RHB70	489	475,71	-75,71	187,13	2003-06-16 08:37	Measured
166	6365900,95	1552452,69	-473,3	RT90-RHB70	492	478,62	-75,73	187,36	2003-06-16 08:37	Measured
167	6365900,22	1552452,59	-476,2	RT90-RHB70	495	481,52	-75,73	187,63	2003-06-16 08:37	Measured
168	6365899,48	1552452,49	-479,11	RT90-RHB70	498	484,43	-75,72	187,89	2003-06-16 08:37	Measured
169	6365898,75	1552452,39	-482,02	RT90-RHB70	501	487,34	-75,73	187,94	2003-06-16 08:37	Measured
170	6365898,02	1552452,29	-484,93	RT90-RHB70	504	490,25	-75,71	188,17	2003-06-16 08:37	Measured
171	6365897,28	1552452,18	-487,83	RT90-RHB70	507	493,15	-75,74	188,18	2003-06-16 08:37	Measured
172	6365896,55	1552452,08	-490,74	RT90-RHB70	510	496,06	-75,74	188,42	2003-06-16 08:37	Measured
173	6365895,82	1552451,97	-493,65	RT90-RHB70	513	498,97	-75,75	188,59	2003-06-16 08:37	Measured
174	6365895,09	1552451,86	-496,56	RT90-RHB70	516	501,88	-75,75	188,65	2003-06-16 08:37	Measured
175	6365894,36	1552451,75	-499,46	RT90-RHB70	519	504,78	-75,77	188,68	2003-06-16 08:37	Measured
176	6365893,63	1552451,64	-502,37	RT90-RHB70	522	507,69	-75,78	188,89	2003-06-16 08:37	Measured
177	6365892,91	1552451,52	-505,28	RT90-RHB70	525	510,6	-75,83	188,87	2003-06-16 08:37	Measured
178	6365892,18	1552451,41	-508,19	RT90-RHB70	528	513,51	-75,82	189,05	2003-06-16 08:37	Measured
179	6365891,45	1552451,29	-511,1	RT90-RHB70	531	516,42	-75,85	189,25	2003-06-16 08:37	Measured
180	6365890,73	1552451,18	-514,01	RT90-RHB70	534	519,33	-75,87	189,36	2003-06-16 08:37	Measured
181	6365890,01	1552451,06	-516,92	RT90-RHB70	537	522,24	-75,88	189,55	2003-06-16 08:37	Measured
182	6365889,29	1552450,94	-519,83	RT90-RHB70	540	525,15	-75,87	189,72	2003-06-16 08:37	Measured
183	6365888,56	1552450,81	-522,73	RT90-RHB70	543	528,05	-75,88	189,95	2003-06-16 08:37	Measured
184	6365887,84	1552450,69	-525,64	RT90-RHB70	546	530,96	-75,91	190,03	2003-06-16 08:37	Measured
185	6365887,12	1552450,56	-528,55	RT90-RHB70	549	533,87	-75,88	190,29	2003-06-16 08:37	Measured
186	6365886,4	1552450,43	-531,46	RT90-RHB70	552	536,78	-75,88	190,44	2003-06-16 08:37	Measured
187	6365885,68	1552450,3	-534,37	RT90-RHB70	555	539,69	-75,89	190,64	2003-06-16 08:37	Measured
188	6365884,97	1552450,16	-537,28	RT90-RHB70	558	542,6	-75,91	190,92	2003-06-16 08:37	Measured
189	6365884,25	1552450,02	-540,19	RT90-RHB70	561	545,51	-75,91	191,2	2003-06-16 08:37	Measured
190	6365883,53	1552449,88	-543,1	RT90-RHB70	564	548,42	-75,89	191,23	2003-06-16 08:37	Measured
191	6365882,81	1552449,74	-546,01	RT90-RHB70	567	551,33	-75,87	191,25	2003-06-16 08:37	Measured
192	6365882,1	1552449,59	-548,92	RT90-RHB70	570	554,24	-75,84	191,24	2003-06-16 08:37	Measured
193	6365881,38	1552449,45	-551,83	RT90-RHB70	573	557,15	-75,78	191,2	2003-06-16 08:37	Measured
194	6365880,65	1552449,31	-554,74	RT90-RHB70	576	560,06	-75,79	191,41	2003-06-16 08:37	Measured
195	6365879,93	1552449,16	-557,65	RT90-RHB70	579	562,97	-75,76	191,53	2003-06-16 08:37	Measured
196	6365879,21	1552449,02	-560,55	RT90-RHB70	582	565,87	-75,74	191,61	2003-06-16 08:37	Measured
197	6365878,48	1552448,87	-563,46	RT90-RHB70	585	568,78	-75,75	191,92	2003-06-16 08:37	Measured
198	6365877,76	1552448,71	-566,37	RT90-RHB70	588	571,69	-75,85	192,27	2003-06-16 08:37	Measured
199	6365877,05	1552448,56	-569,28	RT90-RHB70	591	574,6	-75,89	192,5	2003-06-16 08:37	Measured
200	6365876,33	1552448,4	-572,19	RT90-RHB70	594	577,51	-75,85	192,58	2003-06-16 08:37	Measured
201	6365875,62	1552448,24	-575,1	RT90-RHB70	597	580,42	-75,79	192,62	2003-06-16 08:37	Measured
202	6365874,9	1552448,08	-578	RT90-RHB70	600	583,32	-75,76	192,75	2003-06-16 08:37	Measured
203	6365874,18	1552447,92	-580,91	RT90-RHB70	603	586,23	-75,76	193	2003-06-16 08:37	Measured
204	6365873,46	1552447,75	-583,82	RT90-RHB70	606	589,14	-75,74	193,19	2003-06-16 08:37	Measured
205	6365872,74	1552447,58	-586,73	RT90-RHB70	609	592,05	-75,73	193,41	2003-06-16 08:37	Measured
206	6365872,02	1552447,41	-589,63	RT90-RHB70	612	594,95	-75,73	193,81	2003-06-16 08:37	Measured

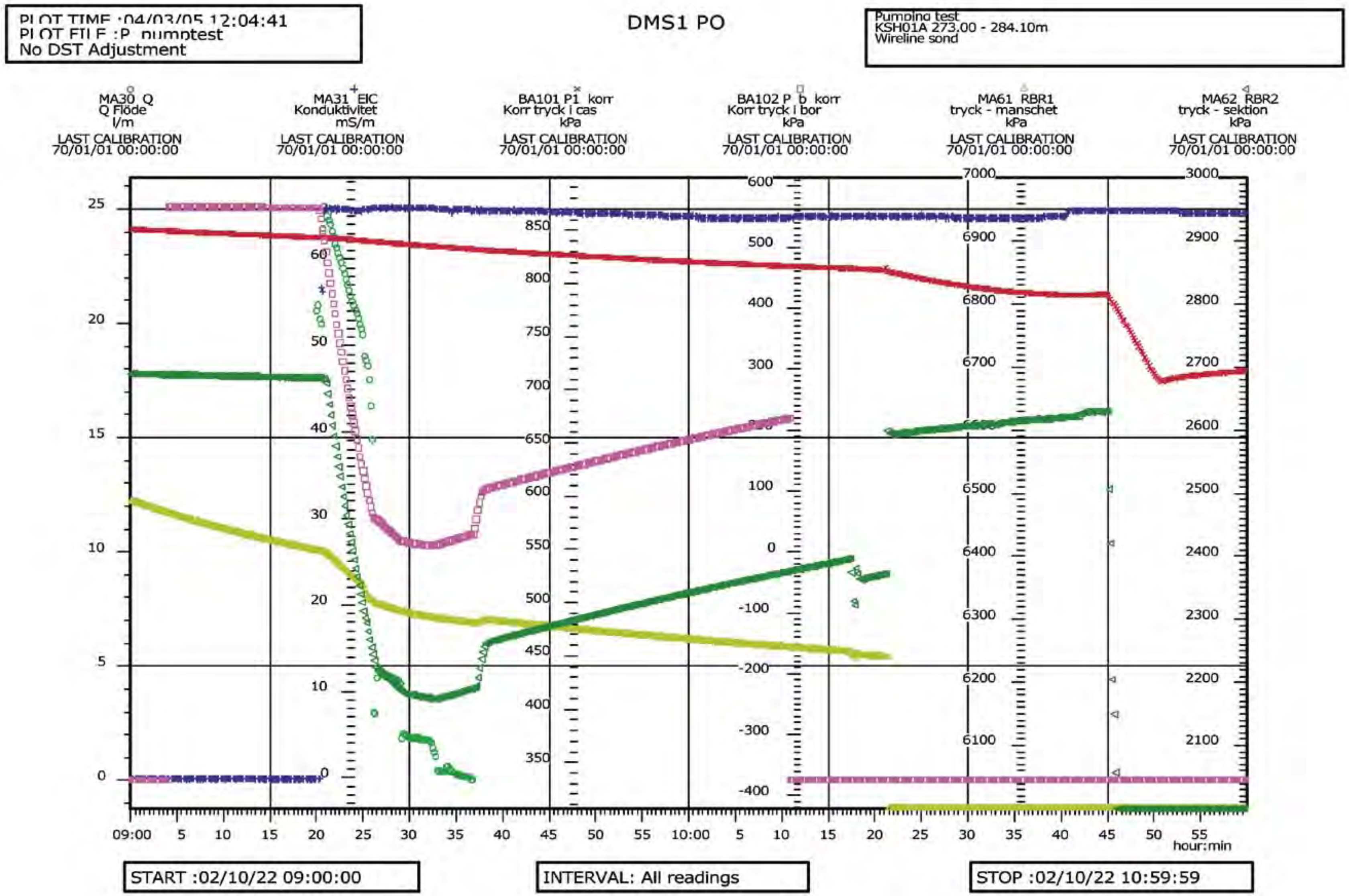
207	6365871,3	1552447,23	-592,54	RT90-RHB70	615	597,86	-75,7	193,95	2003-06-16 08:37	Measured
208	6365870,58	1552447,06	-595,45	RT90-RHB70	618	600,77	-75,73	194,01	2003-06-16 08:37	Measured
209	6365869,86	1552446,88	-598,36	RT90-RHB70	621	603,68	-75,73	194,37	2003-06-16 08:37	Measured
210	6365869,15	1552446,69	-601,26	RT90-RHB70	624	606,58	-75,74	194,45	2003-06-16 08:37	Measured
211	6365868,43	1552446,51	-604,17	RT90-RHB70	627	609,49	-75,74	194,85	2003-06-16 08:37	Measured
212	6365867,72	1552446,32	-607,08	RT90-RHB70	630	612,4	-75,75	194,93	2003-06-16 08:37	Measured
213	6365867	1552446,13	-609,99	RT90-RHB70	633	615,31	-75,75	195,11	2003-06-16 08:37	Measured
214	6365866,29	1552445,94	-612,89	RT90-RHB70	636	618,21	-75,77	195,3	2003-06-16 08:37	Measured
215	6365865,58	1552445,74	-615,8	RT90-RHB70	639	621,12	-75,78	195,48	2003-06-16 08:37	Measured
216	6365864,87	1552445,54	-618,71	RT90-RHB70	642	624,03	-75,79	195,77	2003-06-16 08:37	Measured
217	6365864,16	1552445,34	-621,62	RT90-RHB70	645	626,94	-75,79	195,8	2003-06-16 08:37	Measured
218	6365863,45	1552445,14	-624,53	RT90-RHB70	648	629,85	-75,78	195,97	2003-06-16 08:37	Measured
219	6365862,74	1552444,94	-627,43	RT90-RHB70	651	632,75	-75,75	196,17	2003-06-16 08:37	Measured
220	6365862,04	1552444,74	-630,34	RT90-RHB70	654	635,66	-75,75	196,22	2003-06-16 08:37	Measured
221	6365861,33	1552444,53	-633,25	RT90-RHB70	657	638,57	-75,72	196,5	2003-06-16 08:37	Measured
222	6365860,62	1552444,32	-636,16	RT90-RHB70	660	641,48	-75,69	196,7	2003-06-16 08:37	Measured
223	6365859,91	1552444,11	-639,06	RT90-RHB70	663	644,38	-75,66	196,85	2003-06-16 08:37	Measured
224	6365859,2	1552443,89	-641,97	RT90-RHB70	666	647,29	-75,64	197,04	2003-06-16 08:37	Measured
225	6365858,48	1552443,67	-644,88	RT90-RHB70	669	650,2	-75,6	197,16	2003-06-16 08:37	Measured
226	6365857,77	1552443,45	-647,78	RT90-RHB70	672	653,1	-75,54	197,23	2003-06-16 08:37	Measured
227	6365857,06	1552443,23	-650,69	RT90-RHB70	675	656,01	-75,49	197,44	2003-06-16 08:37	Measured
228	6365856,34	1552443,01	-653,59	RT90-RHB70	678	658,91	-75,46	197,61	2003-06-16 08:37	Measured
229	6365855,62	1552442,78	-656,5	RT90-RHB70	681	661,82	-75,39	197,74	2003-06-16 08:37	Measured
230	6365854,9	1552442,55	-659,4	RT90-RHB70	684	664,72	-75,34	197,86	2003-06-16 08:37	Measured
231	6365854,18	1552442,31	-662,3	RT90-RHB70	687	667,62	-75,29	197,98	2003-06-16 08:37	Measured
232	6365853,45	1552442,08	-665,2	RT90-RHB70	690	670,52	-75,26	198,06	2003-06-16 08:37	Measured
233	6365852,73	1552441,84	-668,1	RT90-RHB70	693	673,42	-75,2	198,15	2003-06-16 08:37	Measured
234	6365852	1552441,6	-671,01	RT90-RHB70	696	676,33	-75,16	198,4	2003-06-16 08:37	Measured
235	6365851,27	1552441,36	-673,9	RT90-RHB70	699	679,22	-75,11	198,56	2003-06-16 08:37	Measured
236	6365850,54	1552441,12	-676,8	RT90-RHB70	702	682,12	-75,04	198,67	2003-06-16 08:37	Measured
237	6365849,81	1552440,87	-679,7	RT90-RHB70	705	685,02	-75	198,98	2003-06-16 08:37	Measured
238	6365849,07	1552440,62	-682,6	RT90-RHB70	708	687,92	-74,97	199,08	2003-06-16 08:37	Measured
239	6365848,34	1552440,36	-685,5	RT90-RHB70	711	690,82	-74,94	199,45	2003-06-16 08:37	Measured
240	6365847,6	1552440,1	-688,39	RT90-RHB70	714	693,71	-74,89	199,78	2003-06-16 08:37	Measured
241	6365846,86	1552439,84	-691,29	RT90-RHB70	717	696,61	-74,84	200,01	2003-06-16 08:37	Measured
242	6365846,13	1552439,57	-694,19	RT90-RHB70	720	699,51	-74,82	199,95	2003-06-16 08:37	Measured
243	6365845,39	1552439,3	-697,08	RT90-RHB70	723	702,4	-74,83	199,93	2003-06-16 08:37	Measured
244	6365844,65	1552439,03	-699,98	RT90-RHB70	726	705,3	-74,79	199,99	2003-06-16 08:37	Measured
245	6365843,91	1552438,76	-702,87	RT90-RHB70	729	708,19	-74,77	199,97	2003-06-16 08:37	Measured
246	6365843,17	1552438,49	-705,77	RT90-RHB70	732	711,09	-74,71	200,14	2003-06-16 08:37	Measured
247	6365842,43	1552438,22	-708,66	RT90-RHB70	735	713,98	-74,66	200,2	2003-06-16 08:37	Measured
248	6365841,68	1552437,95	-711,55	RT90-RHB70	738	716,87	-74,62	200,21	2003-06-16 08:37	Measured

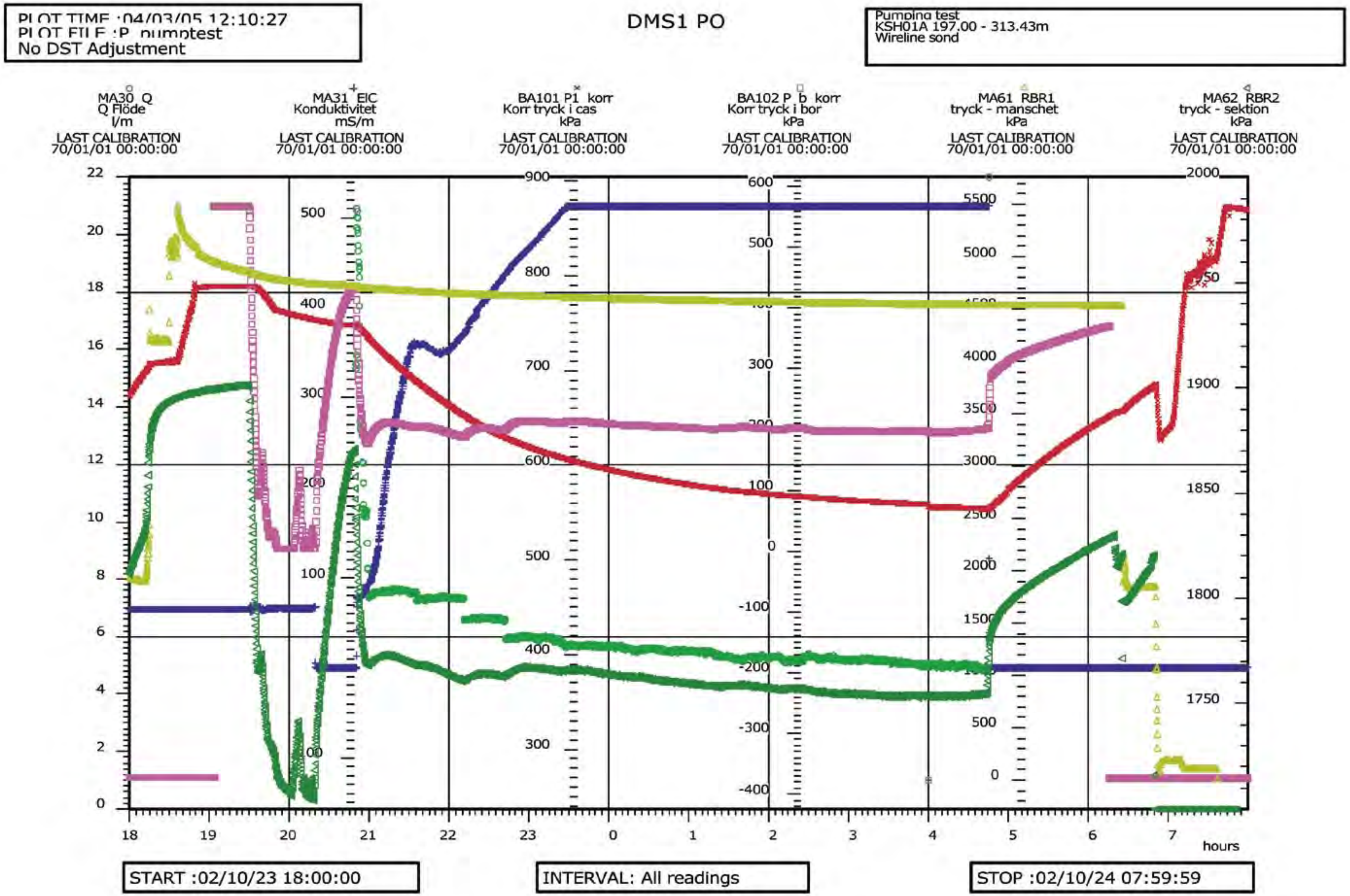
249	6365840,94	1552437,67	-714,45	RT90-RHB70	741	719,77	-74,6	200,38	2003-06-16 08:37	Measured
250	6365840,19	1552437,4	-717,34	RT90-RHB70	744	722,66	-74,57	200,27	2003-06-16 08:37	Measured
251	6365839,44	1552437,12	-720,23	RT90-RHB70	747	725,55	-74,5	200,3	2003-06-16 08:37	Measured
252	6365838,69	1552436,84	-723,12	RT90-RHB70	750	728,44	-74,42	200,64	2003-06-16 08:37	Measured
253	6365837,94	1552436,56	-726,01	RT90-RHB70	753	731,33	-74,37	200,62	2003-06-16 08:37	Measured
254	6365837,18	1552436,27	-728,9	RT90-RHB70	756	734,22	-74,33	200,79	2003-06-16 08:37	Measured
255	6365836,42	1552435,98	-731,79	RT90-RHB70	759	737,11	-74,33	200,86	2003-06-16 08:37	Measured
256	6365835,66	1552435,7	-734,68	RT90-RHB70	762	740	-74,3	200,91	2003-06-16 08:37	Measured
257	6365834,91	1552435,41	-737,57	RT90-RHB70	765	742,89	-74,24	201,01	2003-06-16 08:37	Measured
258	6365834,14	1552435,11	-740,45	RT90-RHB70	768	745,77	-74,24	201,05	2003-06-16 08:37	Measured
259	6365833,38	1552434,82	-743,34	RT90-RHB70	771	748,66	-74,14	201,21	2003-06-16 08:37	Measured
260	6365832,62	1552434,53	-746,23	RT90-RHB70	774	751,55	-74,11	201,31	2003-06-16 08:37	Measured
261	6365831,85	1552434,23	-749,11	RT90-RHB70	777	754,43	-74,09	201,4	2003-06-16 08:37	Measured
262	6365831,09	1552433,93	-752	RT90-RHB70	780	757,32	-74,1	201,6	2003-06-16 08:37	Measured
263	6365830,32	1552433,62	-754,88	RT90-RHB70	783	760,2	-74,11	201,76	2003-06-16 08:37	Measured
264	6365829,56	1552433,32	-757,77	RT90-RHB70	786	763,09	-74,1	202,04	2003-06-16 08:37	Measured
265	6365828,8	1552433,01	-760,65	RT90-RHB70	789	765,97	-74,06	202,29	2003-06-16 08:37	Measured
266	6365828,04	1552432,7	-763,54	RT90-RHB70	792	768,86	-74,05	202,67	2003-06-16 08:37	Measured
267	6365827,28	1552432,38	-766,42	RT90-RHB70	795	771,74	-73,97	202,88	2003-06-16 08:37	Measured
268	6365826,51	1552432,06	-769,3	RT90-RHB70	798	774,62	-73,9	203,3	2003-06-16 08:37	Measured
269	6365825,75	1552431,73	-772,19	RT90-RHB70	801	777,51	-73,82	203,49	2003-06-16 08:37	Measured
270	6365824,98	1552431,4	-775,07	RT90-RHB70	804	780,39	-73,81	203,66	2003-06-16 08:37	Measured
271	6365824,22	1552431,06	-777,95	RT90-RHB70	807	783,27	-73,74	203,89	2003-06-16 08:37	Measured
272	6365823,45	1552430,72	-780,83	RT90-RHB70	810	786,15	-73,67	204,12	2003-06-16 08:37	Measured
273	6365822,68	1552430,38	-783,71	RT90-RHB70	813	789,03	-73,63	204,28	2003-06-16 08:37	Measured
274	6365821,91	1552430,03	-786,59	RT90-RHB70	816	791,91	-73,6	204,32	2003-06-16 08:37	Measured
275	6365821,14	1552429,68	-789,46	RT90-RHB70	819	794,78	-73,52	204,56	2003-06-16 08:37	Measured
276	6365820,36	1552429,33	-792,34	RT90-RHB70	822	797,66	-73,42	204,63	2003-06-16 08:37	Measured
277	6365819,58	1552428,97	-795,22	RT90-RHB70	825	800,54	-73,32	204,63	2003-06-16 08:37	Measured
278	6365818,8	1552428,61	-798,09	RT90-RHB70	828	803,41	-73,25	204,62	2003-06-16 08:37	Measured
279	6365818,02	1552428,25	-800,96	RT90-RHB70	831	806,28	-73,21	204,61	2003-06-16 08:37	Measured
280	6365817,23	1552427,89	-803,83	RT90-RHB70	834	809,15	-73,15	204,66	2003-06-16 08:37	Measured
281	6365816,44	1552427,53	-806,71	RT90-RHB70	837	812,03	-73,11	204,8	2003-06-16 08:37	Measured
282	6365815,65	1552427,16	-809,58	RT90-RHB70	840	814,9	-73,06	205,02	2003-06-16 08:37	Measured
283	6365814,85	1552426,79	-812,45	RT90-RHB70	843	817,77	-73	205,33	2003-06-16 08:37	Measured
284	6365814,06	1552426,42	-815,32	RT90-RHB70	846	820,64	-72,93	205,38	2003-06-16 08:37	Measured
285	6365813,27	1552426,04	-818,18	RT90-RHB70	849	823,5	-72,83	205,48	2003-06-16 08:37	Measured
286	6365812,47	1552425,66	-821,05	RT90-RHB70	852	826,37	-72,77	205,32	2003-06-16 08:37	Measured
287	6365811,66	1552425,28	-823,91	RT90-RHB70	855	829,23	-72,69	205,33	2003-06-16 08:37	Measured
288	6365810,86	1552424,9	-826,78	RT90-RHB70	858	832,1	-72,64	205,35	2003-06-16 08:37	Measured
289	6365810,05	1552424,51	-829,64	RT90-RHB70	861	834,96	-72,59	205,51	2003-06-16 08:37	Measured
290	6365809,24	1552424,13	-832,51	RT90-RHB70	864	837,83	-72,53	205,71	2003-06-16 08:37	Measured

291	6365808,43	1552423,74	-835,37	RT90-RHB70	867	840,69	-72,44	205,97	2003-06-16 08:37	Measured
292	6365807,61	1552423,34	-838,23	RT90-RHB70	870	843,55	-72,34	206,14	2003-06-16 08:37	Measured
293	6365806,8	1552422,94	-841,09	RT90-RHB70	873	846,41	-72,27	206,29	2003-06-16 08:37	Measured
294	6365805,98	1552422,53	-843,94	RT90-RHB70	876	849,26	-72,19	206,45	2003-06-16 08:37	Measured
295	6365805,16	1552422,13	-846,8	RT90-RHB70	879	852,12	-72,13	206,51	2003-06-16 08:37	Measured
296	6365804,33	1552421,71	-849,65	RT90-RHB70	882	854,97	-72,05	206,57	2003-06-16 08:37	Measured
297	6365803,5	1552421,3	-852,51	RT90-RHB70	885	857,83	-71,96	206,8	2003-06-16 08:37	Measured
298	6365802,68	1552420,88	-855,36	RT90-RHB70	888	860,68	-71,88	206,94	2003-06-16 08:37	Measured
299	6365801,84	1552420,46	-858,21	RT90-RHB70	891	863,53	-71,8	207,13	2003-06-16 08:37	Measured
300	6365801,01	1552420,03	-861,06	RT90-RHB70	894	866,38	-71,7	207,37	2003-06-16 08:37	Measured
301	6365800,17	1552419,6	-863,91	RT90-RHB70	897	869,23	-71,56	207,67	2003-06-16 08:37	Measured
302	6365799,33	1552419,16	-866,76	RT90-RHB70	900	872,08	-71,47	207,84	2003-06-16 08:37	Measured
303	6365798,49	1552418,71	-869,6	RT90-RHB70	903	874,92	-71,37	207,98	2003-06-16 08:37	Measured
304	6365797,64	1552418,26	-872,44	RT90-RHB70	906	877,76	-71,28	208,04	2003-06-16 08:37	Measured
305	6365796,79	1552417,81	-875,29	RT90-RHB70	909	880,61	-71,19	208,04	2003-06-16 08:37	Measured
306	6365795,94	1552417,36	-878,12	RT90-RHB70	912	883,44	-71,1	208,02	2003-06-16 08:37	Measured
307	6365795,08	1552416,9	-880,96	RT90-RHB70	915	886,28	-71,01	208,04	2003-06-16 08:37	Measured
308	6365794,22	1552416,44	-883,8	RT90-RHB70	918	889,12	-70,91	208,1	2003-06-16 08:37	Measured
309	6365793,36	1552415,98	-886,63	RT90-RHB70	921	891,95	-70,82	208,24	2003-06-16 08:37	Measured
310	6365792,49	1552415,51	-889,47	RT90-RHB70	924	894,79	-70,73	208,38	2003-06-16 08:37	Measured
311	6365791,62	1552415,04	-892,3	RT90-RHB70	927	897,62	-70,62	208,56	2003-06-16 08:37	Measured
312	6365790,74	1552414,57	-895,13	RT90-RHB70	930	900,45	-70,55	208,69	2003-06-16 08:37	Measured
313	6365789,87	1552414,09	-897,96	RT90-RHB70	933	903,28	-70,47	208,77	2003-06-16 08:37	Measured
314	6365788,99	1552413,6	-900,79	RT90-RHB70	936	906,11	-70,38	208,8	2003-06-16 08:37	Measured
315	6365788,1	1552413,12	-903,61	RT90-RHB70	939	908,93	-70,35	208,83	2003-06-16 08:37	Measured
316	6365787,22	1552412,63	-906,44	RT90-RHB70	942	911,76	-70,32	208,75	2003-06-16 08:37	Measured
317	6365786,33	1552412,15	-909,26	RT90-RHB70	945	914,58	-70,27	208,88	2003-06-16 08:37	Measured
318	6365785,45	1552411,66	-912,09	RT90-RHB70	948	917,41	-70,23	208,91	2003-06-16 08:37	Measured
319	6365784,56	1552411,17	-914,91	RT90-RHB70	951	920,23	-70,16	209,01	2003-06-16 08:37	Measured
320	6365783,67	1552410,67	-917,73	RT90-RHB70	954	923,05	-70,1	208,98	2003-06-16 08:37	Measured
321	6365782,78	1552410,18	-920,55	RT90-RHB70	957	925,87	-70,05	208,94	2003-06-16 08:37	Measured
322	6365781,88	1552409,68	-923,37	RT90-RHB70	960	928,69	-70	209	2003-06-16 08:37	Measured
323	6365780,98	1552409,18	-926,19	RT90-RHB70	963	931,51	-69,97	208,96	2003-06-16 08:37	Measured
324	6365780,08	1552408,69	-929,01	RT90-RHB70	966	934,33	-69,9	209,06	2003-06-16 08:37	Measured
325	6365779,18	1552408,19	-931,83	RT90-RHB70	969	937,15	-69,84	209,17	2003-06-16 08:37	Measured
326	6365778,28	1552407,68	-934,64	RT90-RHB70	972	939,96	-69,79	209,34	2003-06-16 08:37	Measured
327	6365777,38	1552407,17	-937,46	RT90-RHB70	975	942,78	-69,75	209,58	2003-06-16 08:37	Measured
328	6365776,47	1552406,66	-940,27	RT90-RHB70	978	945,59	-69,71	209,74	2003-06-16 08:37	Measured
329	6365775,57	1552406,15	-943,09	RT90-RHB70	981	948,41	-69,67	209,89	2003-06-16 08:37	Measured
330	6365774,67	1552405,63	-945,9	RT90-RHB70	984	951,22	-69,63	210,05	2003-06-16 08:37	Measured
331	6365772,86	1552404,57	-951,52	RT90-RHB70	990	956,84	-69,57	210,28	2003-06-16 08:37	Measured
332	6365768,937	1552402,273	-963,699	RT90-RHB70	1003	969,019	-69,57	210,28	2003-06-16 08:37	Measured

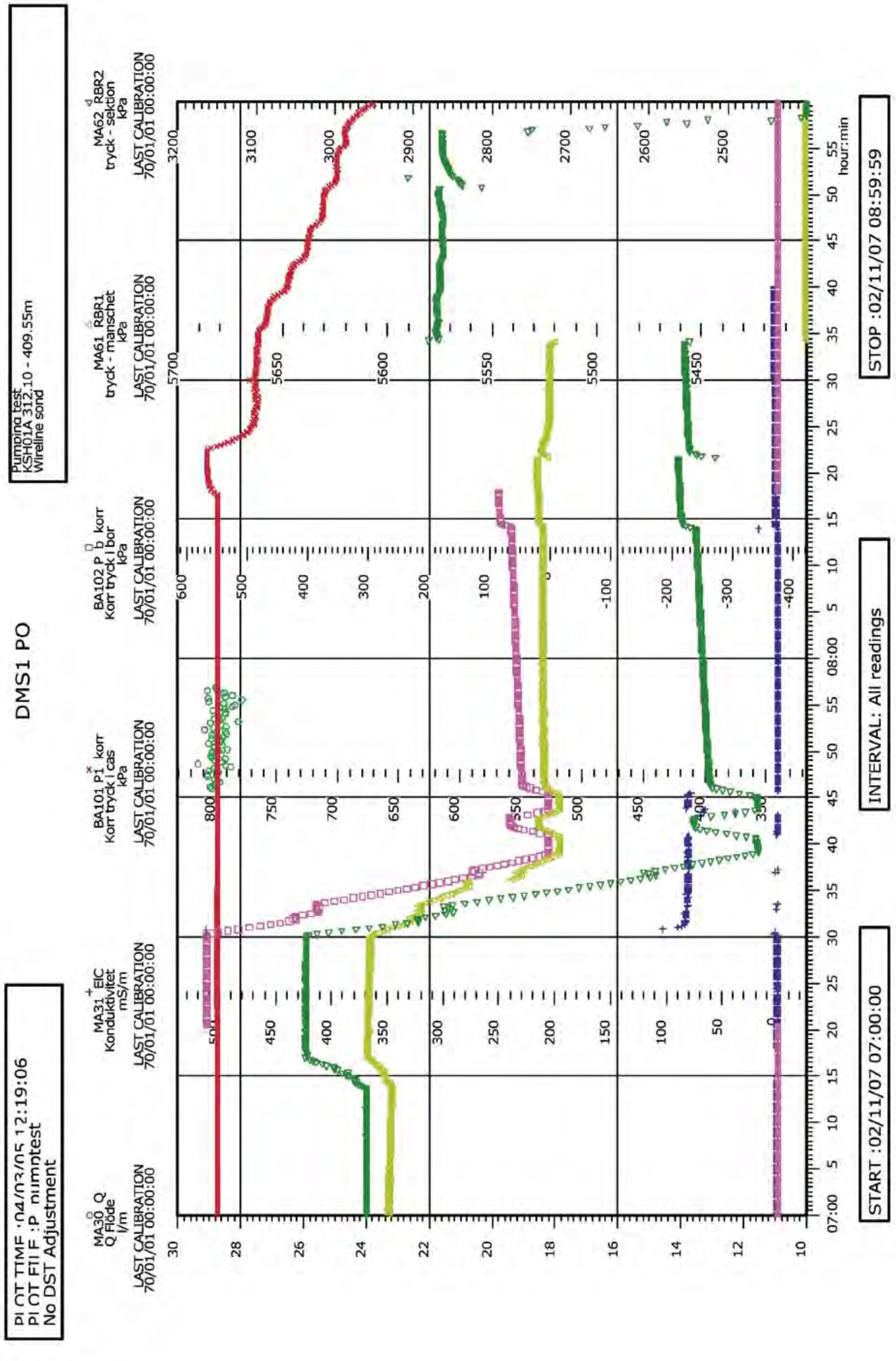
Appendix 5

Wireline pumping tests

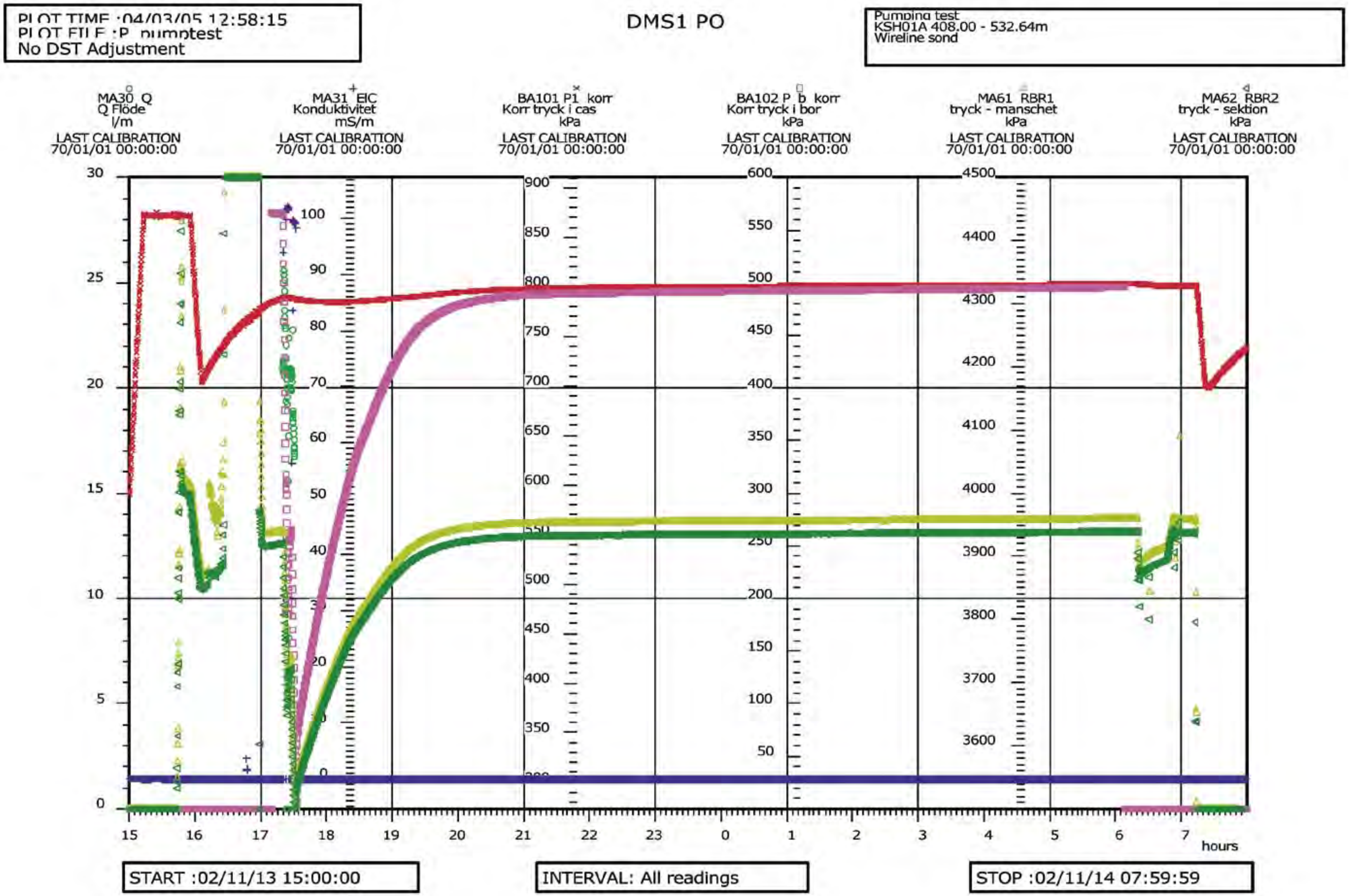


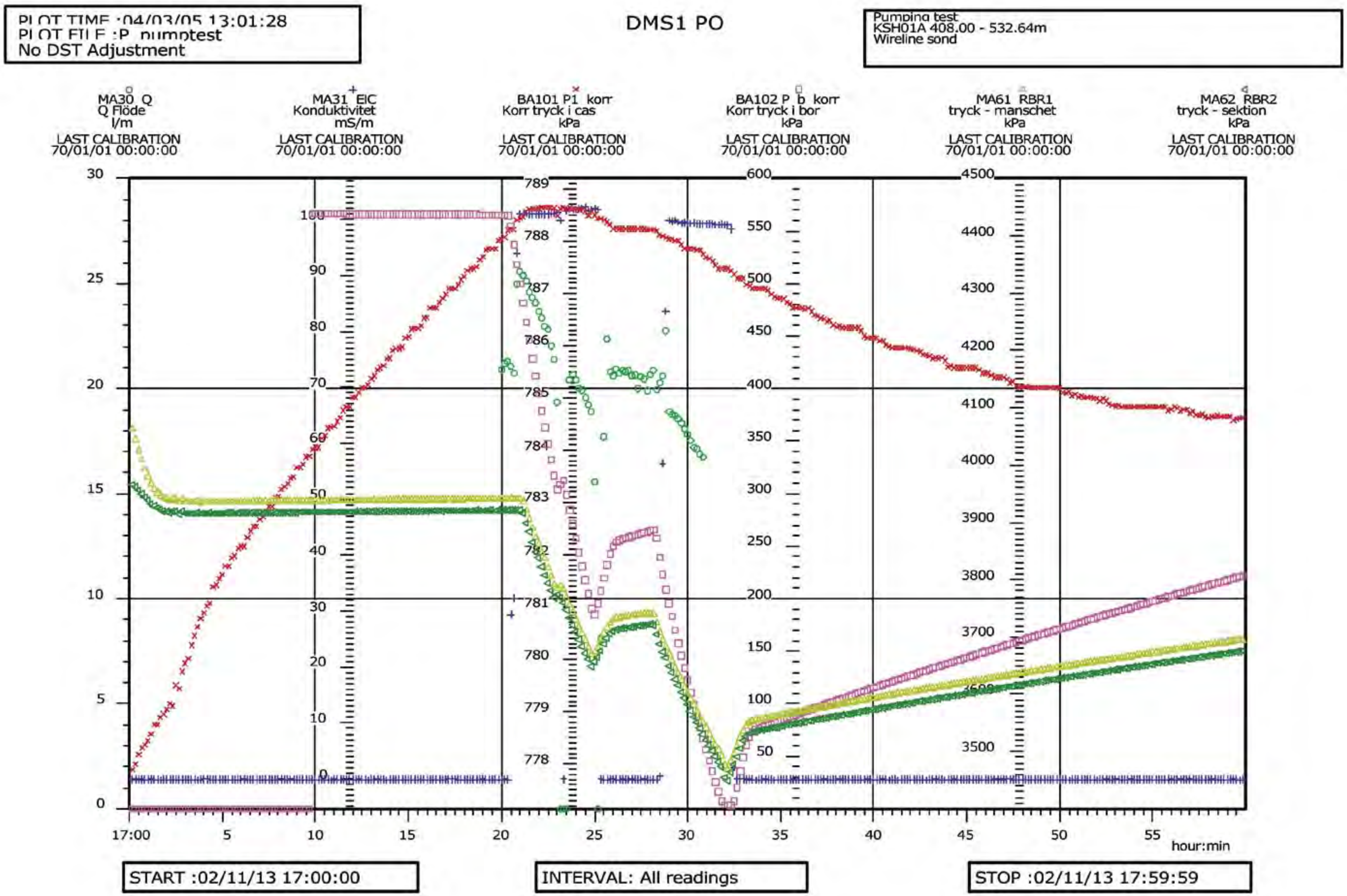


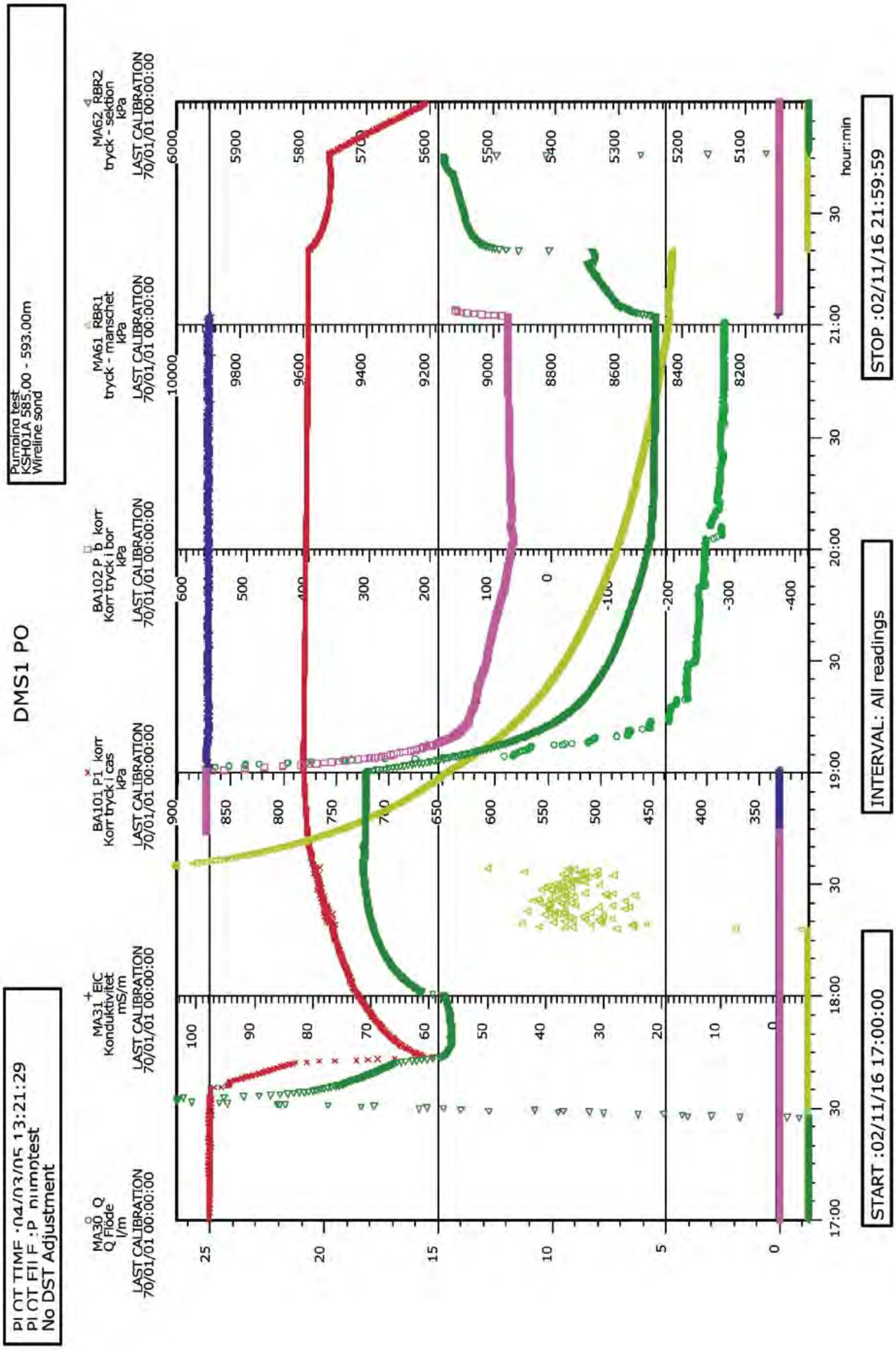
PLOT TIME :04/03/05 12:10:27
PLOT FILE :P_pumptest
No DST Adjustment
DMS1 PO
Pumping test
KSH01A 197.00 - 313.43m
Wireline sond
MA30 Q
Q Flöde
l/m
LAST CALIBRATION
70/01/01 00:00:00
MA31 EIC
Konduktivitet
mS/m
LAST CALIBRATION
70/01/01 00:00:00
BA101 P1 korr
Korr tryck i cas
kPa
LAST CALIBRATION
70/01/01 00:00:00
BA102 P b korr
Korr tryck i bor
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA61 RBR1
tryck - manschet
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA62 RBR2
tryck - sektion
kPa
LAST CALIBRATION
70/01/01 00:00:00
hours
START :02/10/23 18:00:00
INTERVAL: All readings
STOP :02/10/24 07:59:59

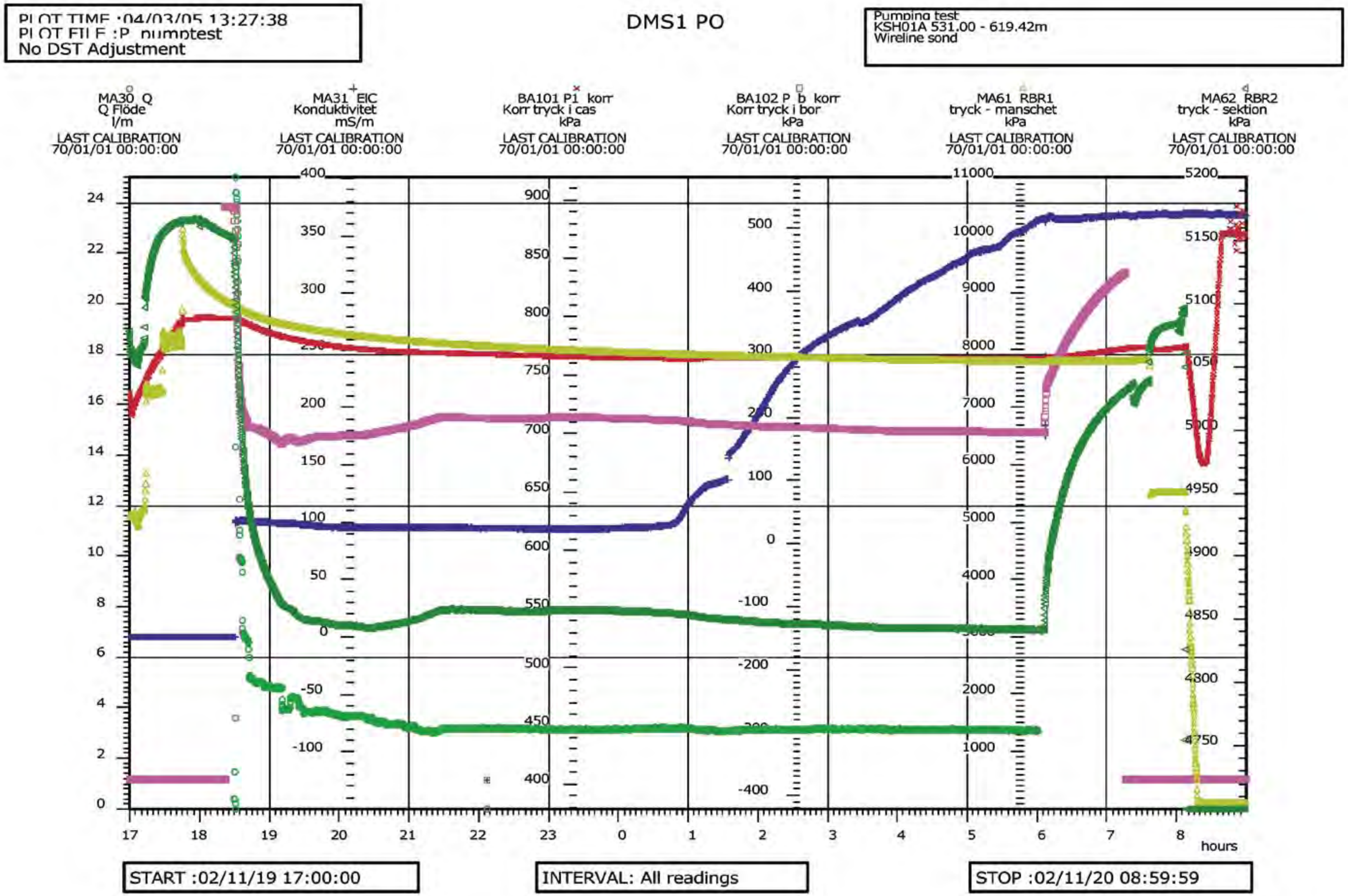


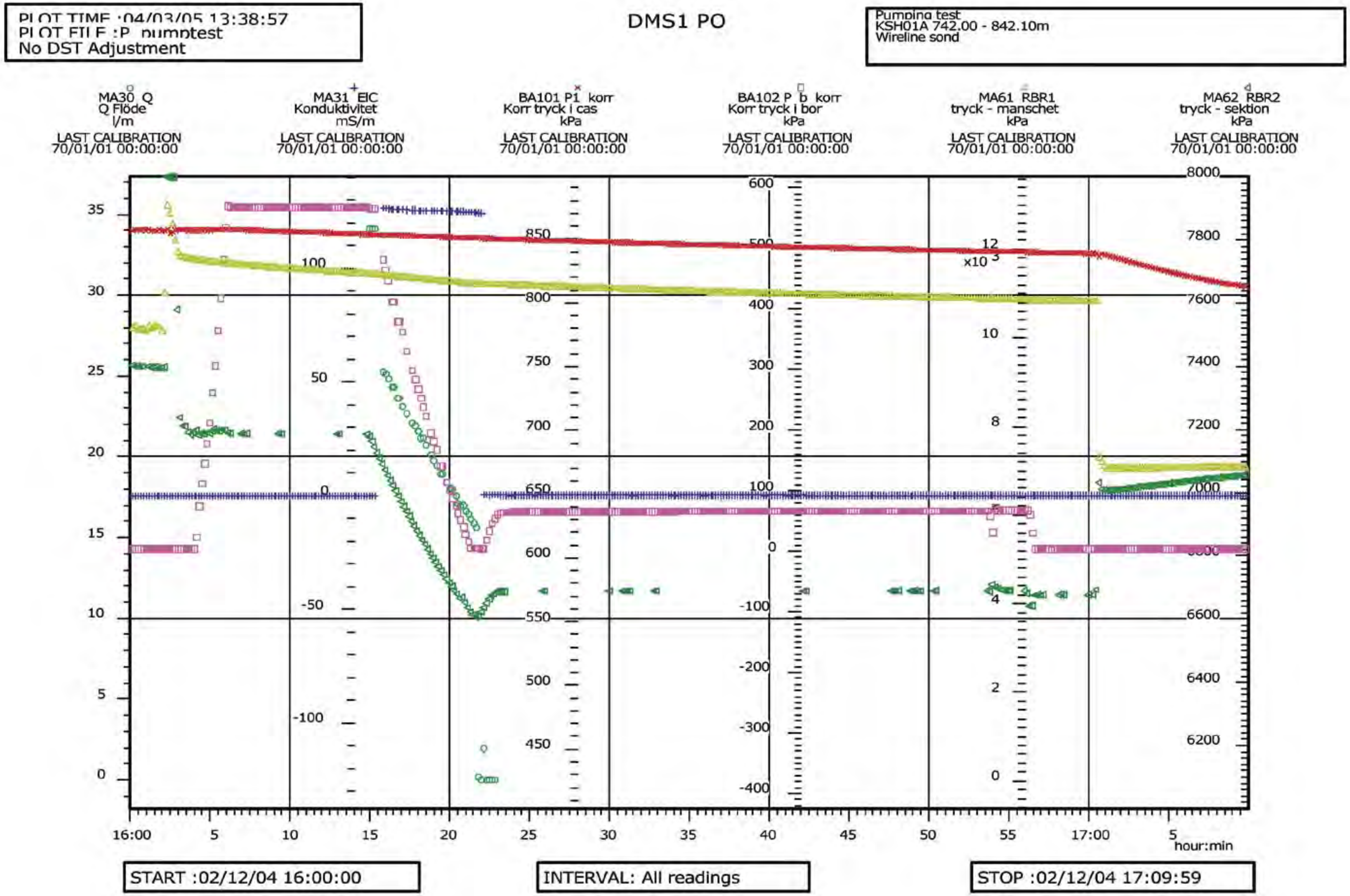
DMS1 PO
PLOT TIME :04/03/05 12:19:06
PLOT FILE :P_pumptest
No DST Adjustment
Pumping test
KSH01A 312.10 - 409.55m
Wireline sond
MA30 Q
Q Flöde
l/m
LAST CALIBRATION
70/01/01 00:00:00
MA31 EIC
Konduktivitet
mS/m
LAST CALIBRATION
70/01/01 00:00:00
BA101 P1_korr
Korr tryck i cas
kPa
LAST CALIBRATION
70/01/01 00:00:00
BA102 P_b_korr
Korr tryck i bor
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA61 RBR1
tryck - manschet
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA62 RBR2
tryck - sektion
kPa
LAST CALIBRATION
70/01/01 00:00:00
hour:min
START :02/11/07 07:00:00
INTERVAL: All readings
STOP :02/11/07 08:59:59

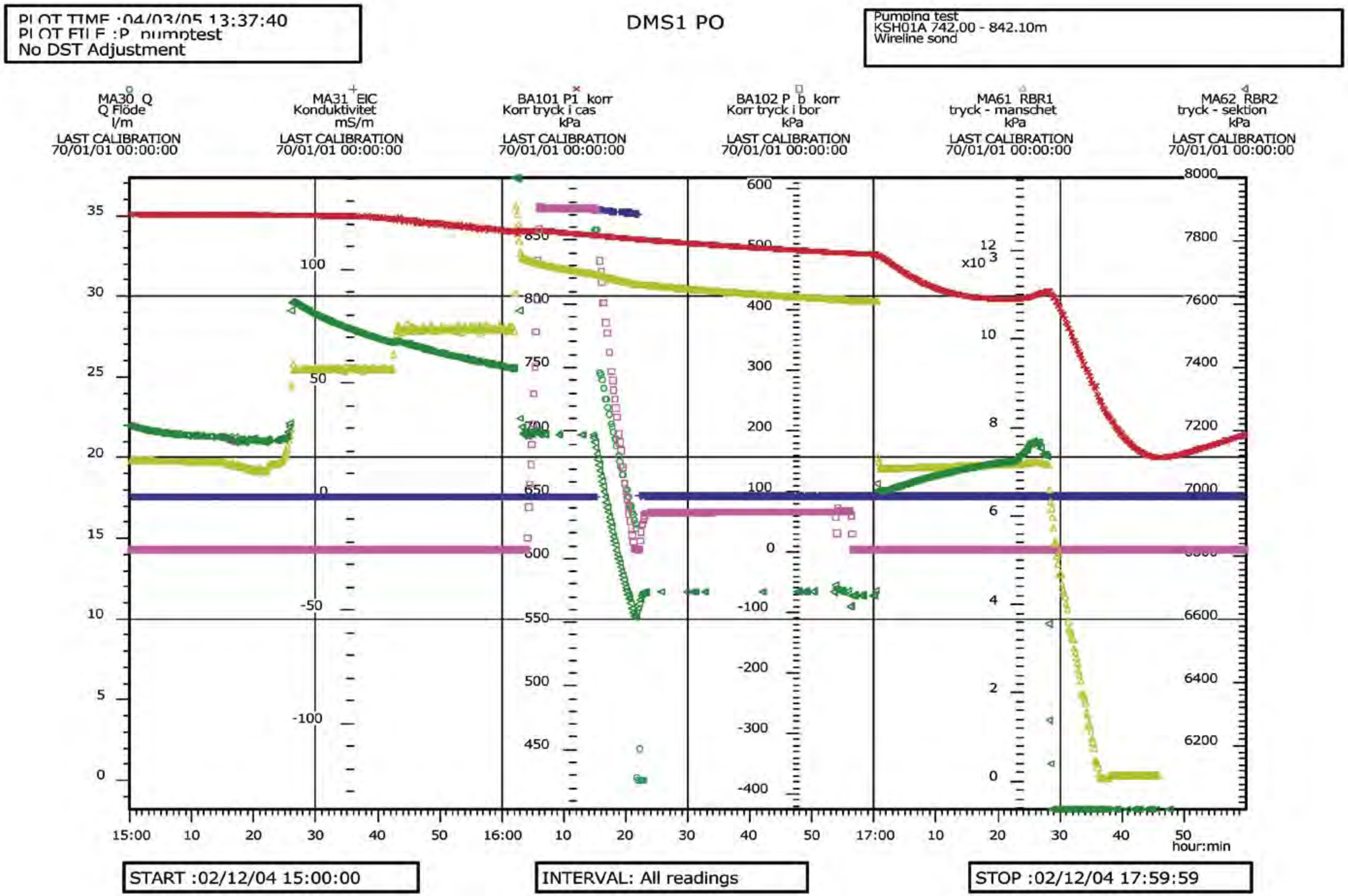

PLOT TIME :04/03/05 12:58:15
PLOT FILE :P_pumptest
No DST Adjustment
DMS1 PO
Pumping test
KSH01A 408.00 - 532.64m
Wireline sond
MA30_Q
Q Flöde
l/m
LAST CALIBRATION
70/01/01 00:00:00
MA31_EIC
Konduktivitet
mS/m
LAST CALIBRATION
70/01/01 00:00:00
BA101_P1_korr
Korr tryck i cas
kPa
LAST CALIBRATION
70/01/01 00:00:00
BA102_P_b_korr
Korr tryck i bor
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA61_RBR1
tryck - manschet
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA62_RBR2
tryck - sektion
kPa
LAST CALIBRATION
70/01/01 00:00:00
hours
START :02/11/13 15:00:00
INTERVAL: All readings
STOP :02/11/14 07:59:59

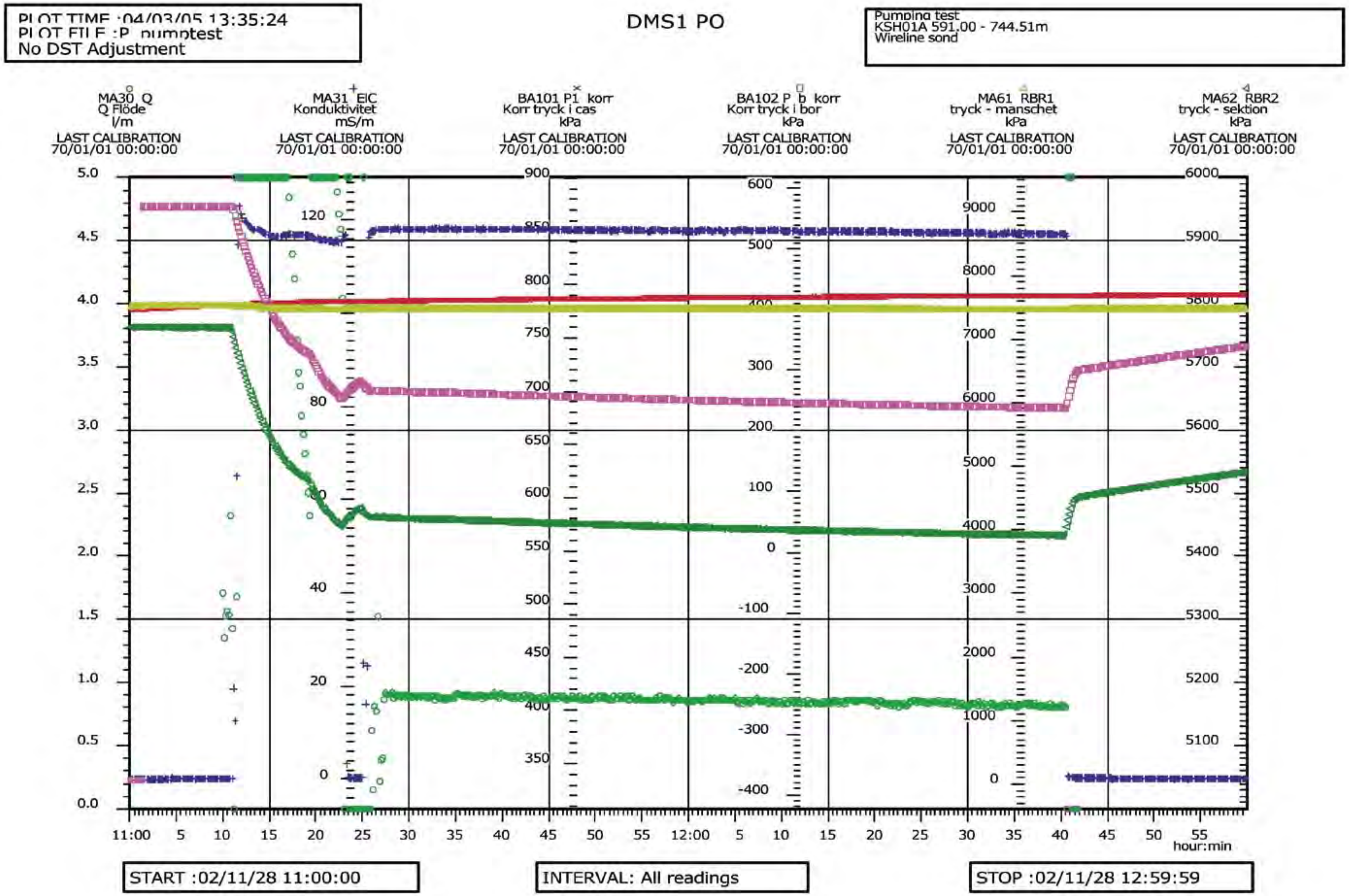

PLOT TIME :04/03/05 13:01:28
PLOT FILE :P_pumptest
No DST Adjustment
DMS1 PO
Pumping test
KSH01A 408.00 - 532.64m
Wireline sond
MA30_Q
Q Flöde
l/m
LAST CALIBRATION
70/01/01 00:00:00
MA31_EIC
Konduktivitet
mS/m
LAST CALIBRATION
70/01/01 00:00:00
BA101_P1_korr
Korr tryck i cas
kPa
LAST CALIBRATION
70/01/01 00:00:00
BA102_P_b_korr
Korr tryck i bor
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA61_RBR1
tryck - manschet
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA62_RBR2
tryck - sektion
kPa
LAST CALIBRATION
70/01/01 00:00:00
hour:min
START :02/11/13 17:00:00
INTERVAL: All readings
STOP :02/11/13 17:59:59

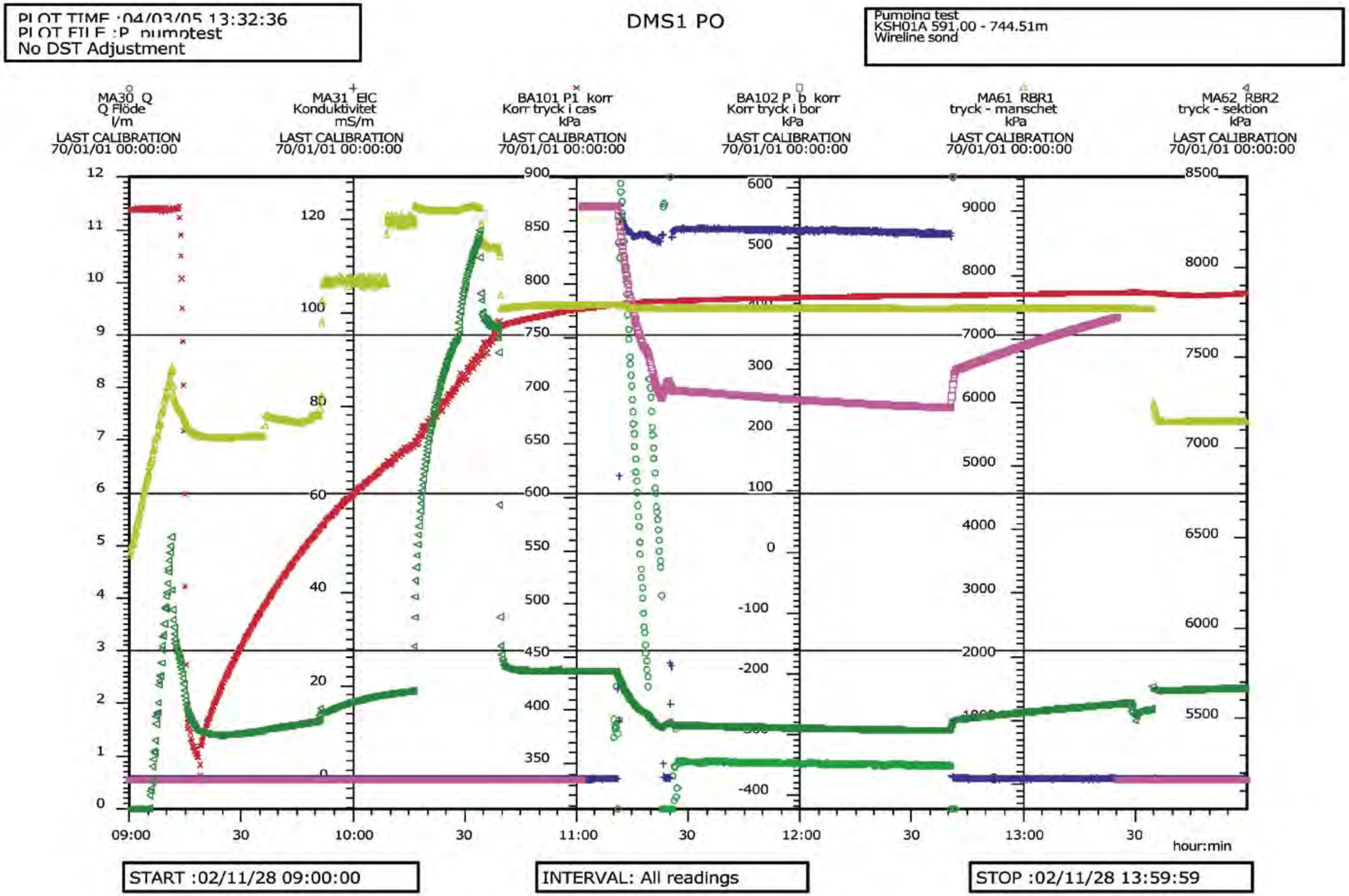

DMS1 PO
PLOT TIME :04/03/05 13:21:29
PLOT FILE :P_pumptest
No DST Adjustment
Pumping test
KSH01A 585.00 - 593.00m
Wireline sond
MA30 Q
Q Flöde
l/m
LAST CALIBRATION
70/01/01 00:00:00
MA31 EIC
Konduktivitet
mS/m
LAST CALIBRATION
70/01/01 00:00:00
BA101 P1 korr
Korr tryck i cas
kPa
LAST CALIBRATION
70/01/01 00:00:00
BA102 P b korr
Korr tryck i bor
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA61 RBR1
tryck - manschet
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA62 RBR2
tryck - sektion
kPa
LAST CALIBRATION
70/01/01 00:00:00
hour:min
START :02/11/16 17:00:00
INTERVAL: All readings
STOP :02/11/16 21:59:59

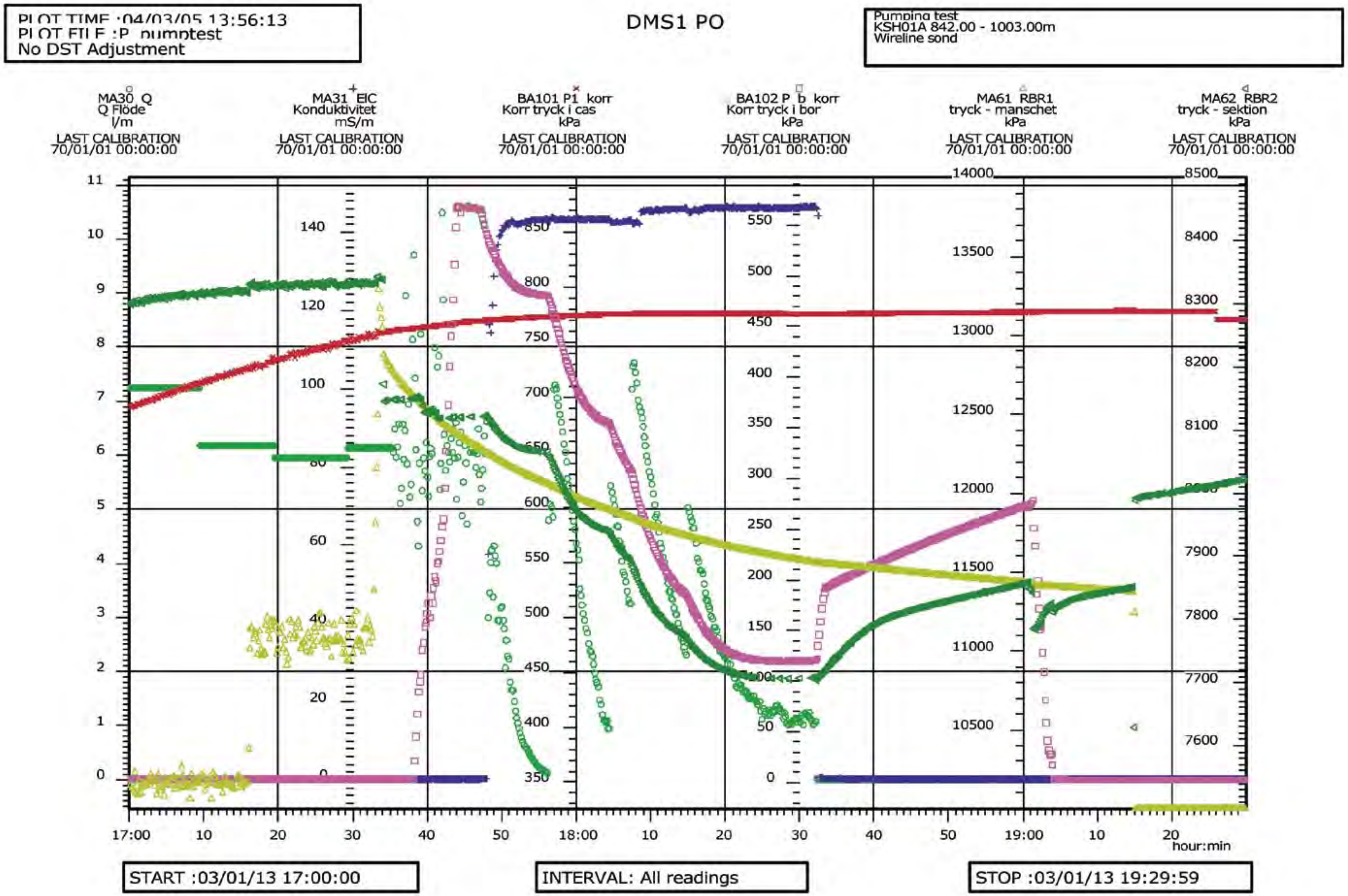

PLOT TIME :04/03/05 13:27:38
PLOT FILE :P_pumptest
No DST Adjustment
DMS1 PO
Pumping test
KSH01A 531.00 - 619.42m
Wireline sond
MA30_Q
Q Flöde
l/m
LAST CALIBRATION
70/01/01 00:00:00
MA31_EIC
Konduktivitet
mS/m
LAST CALIBRATION
70/01/01 00:00:00
BA101 P1_korr
Korr tryck i cas
kPa
LAST CALIBRATION
70/01/01 00:00:00
BA102 P_b_korr
Korr tryck i bor
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA61_RBR1
tryck - manschet
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA62_RBR2
tryck - sektion
kPa
LAST CALIBRATION
70/01/01 00:00:00
hours
START :02/11/19 17:00:00
INTERVAL: All readings
STOP :02/11/20 08:59:59


PLOT TIME :04/03/05 13:38:57
PLOT FILE :P_pumptest
No DST Adjustment
DMS1 PO
Pumping test
KSH01A 742.00 - 842.10m
Wireline sond
MA30 Q
Q Flöde
l/m
LAST CALIBRATION
70/01/01 00:00:00
MA31 EIC
Konduktivitet
mS/m
LAST CALIBRATION
70/01/01 00:00:00
BA101 P1 korr
Korr tryck i cas
kPa
LAST CALIBRATION
70/01/01 00:00:00
BA102 P b korr
Korr tryck i bor
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA61 RBR1
tryck - manschet
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA62 RBR2
tryck - sektion
kPa
LAST CALIBRATION
70/01/01 00:00:00
x10 3
hour:min
START :02/12/04 16:00:00
INTERVAL: All readings
STOP :02/12/04 17:09:59


PLOT TIME :04/03/05 13:37:40
PLOT FILE :P_pumptest
No DST Adjustment
DMS1 PO
Pumping test
KSH01A 742.00 - 842.10m
Wireline sond
MA30 Q
Q Flöde
l/m
LAST CALIBRATION
70/01/01 00:00:00
MA31 EIC
Konduktivitet
mS/m
LAST CALIBRATION
70/01/01 00:00:00
BA101 P1 korr
Korr tryck i cas
kPa
LAST CALIBRATION
70/01/01 00:00:00
BA102 P b korr
Korr tryck i bor
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA61 RBR1
tryck - manschet
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA62 RBR2
tryck - sektion
kPa
LAST CALIBRATION
70/01/01 00:00:00
x10 3
hour:min
START :02/12/04 15:00:00
INTERVAL: All readings
STOP :02/12/04 17:59:59

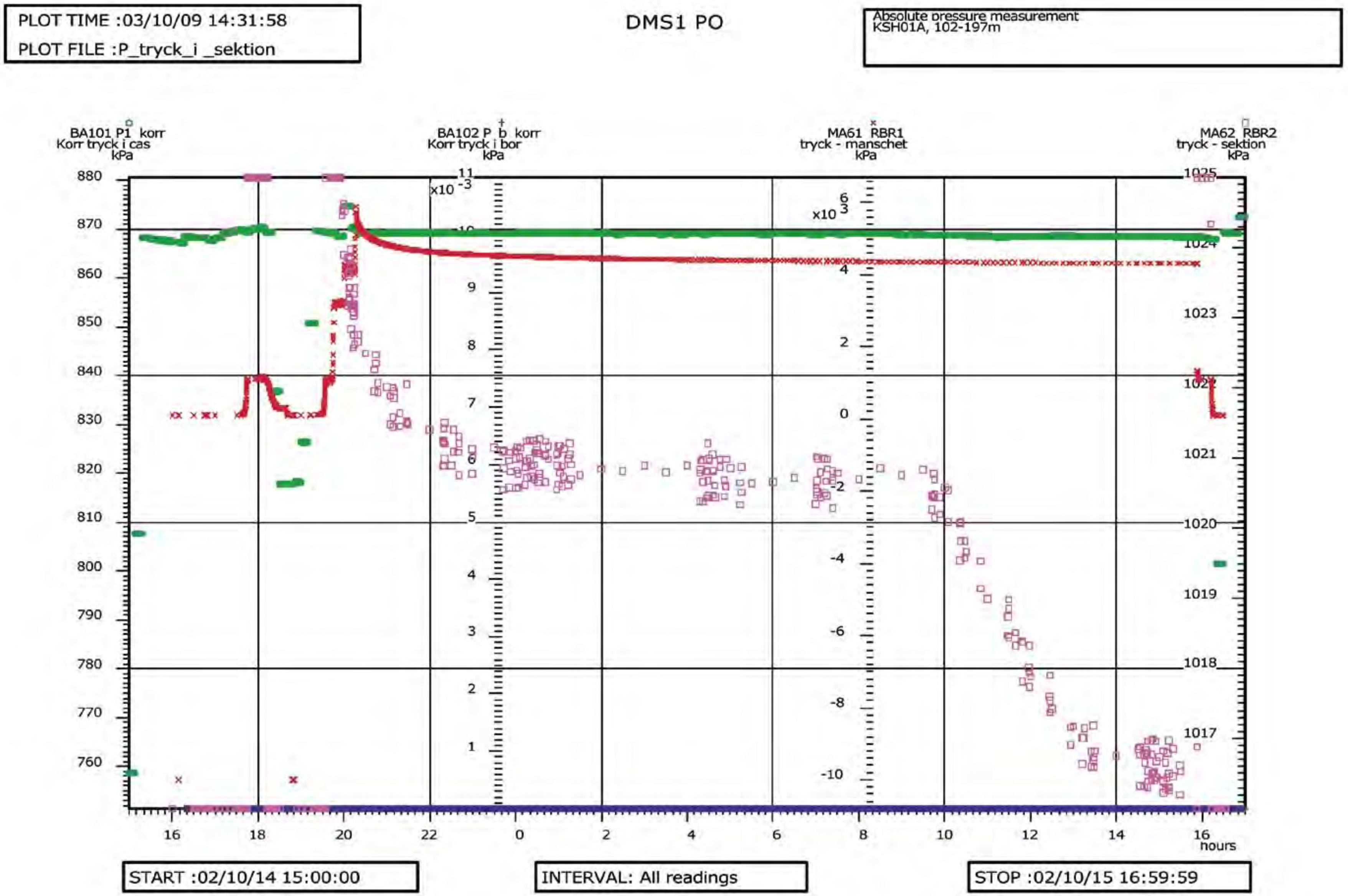

PLOT TIME :04/03/05 13:35:24
PLOT FILE :P_pumptest
No DST Adjustment
DMS1 PO
Pumping test
KSH01A 591.00 - 744.51m
Wireline sond
MA30 Q
Q Flöde
l/m
LAST CALIBRATION
70/01/01 00:00:00
MA31 EC
Konduktivitet
mS/m
LAST CALIBRATION
70/01/01 00:00:00
BA101 P1 korr
Korr tryck i cas
kPa
LAST CALIBRATION
70/01/01 00:00:00
BA102 P b korr
Korr tryck i bor
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA61 RBR1
tryck - manschet
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA62 RBR2
tryck - sektion
kPa
LAST CALIBRATION
70/01/01 00:00:00
hour:min
START :02/11/28 11:00:00
INTERVAL: All readings
STOP :02/11/28 12:59:59

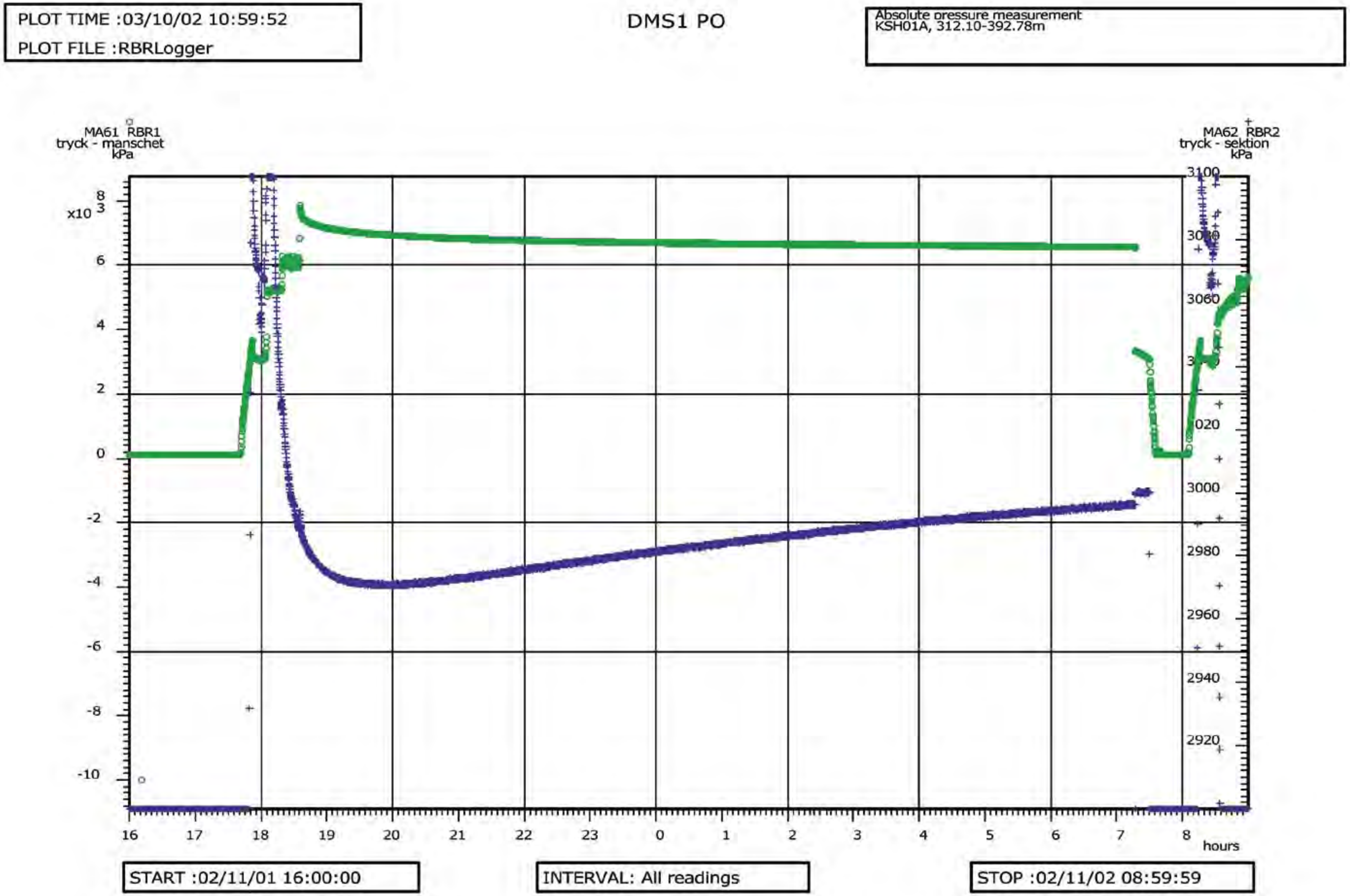

PLOT TIME :04/03/05 13:32:36
PLOT FILE :P_pumptest
No DST Adjustment
DMS1 PO
Pumping test
KSH01A 591.00 - 744.51m
Wireline sond
MA30 Q
Q Flöde
l/m
LAST CALIBRATION
70/01/01 00:00:00
MA31 EIC
Konduktivitet
mS/m
LAST CALIBRATION
70/01/01 00:00:00
BA101 P1 korr
Korr tryck i cas
kPa
LAST CALIBRATION
70/01/01 00:00:00
BA102 P_b korr
Korr tryck i bor
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA61 RBR1
tryck - manschet
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA62 RBR2
tryck - sektion
kPa
LAST CALIBRATION
70/01/01 00:00:00
09:00
30
10:00
30
11:00
30
12:00
30
13:00
30
hour:min
START :02/11/28 09:00:00
INTERVAL: All readings
STOP :02/11/28 13:59:59

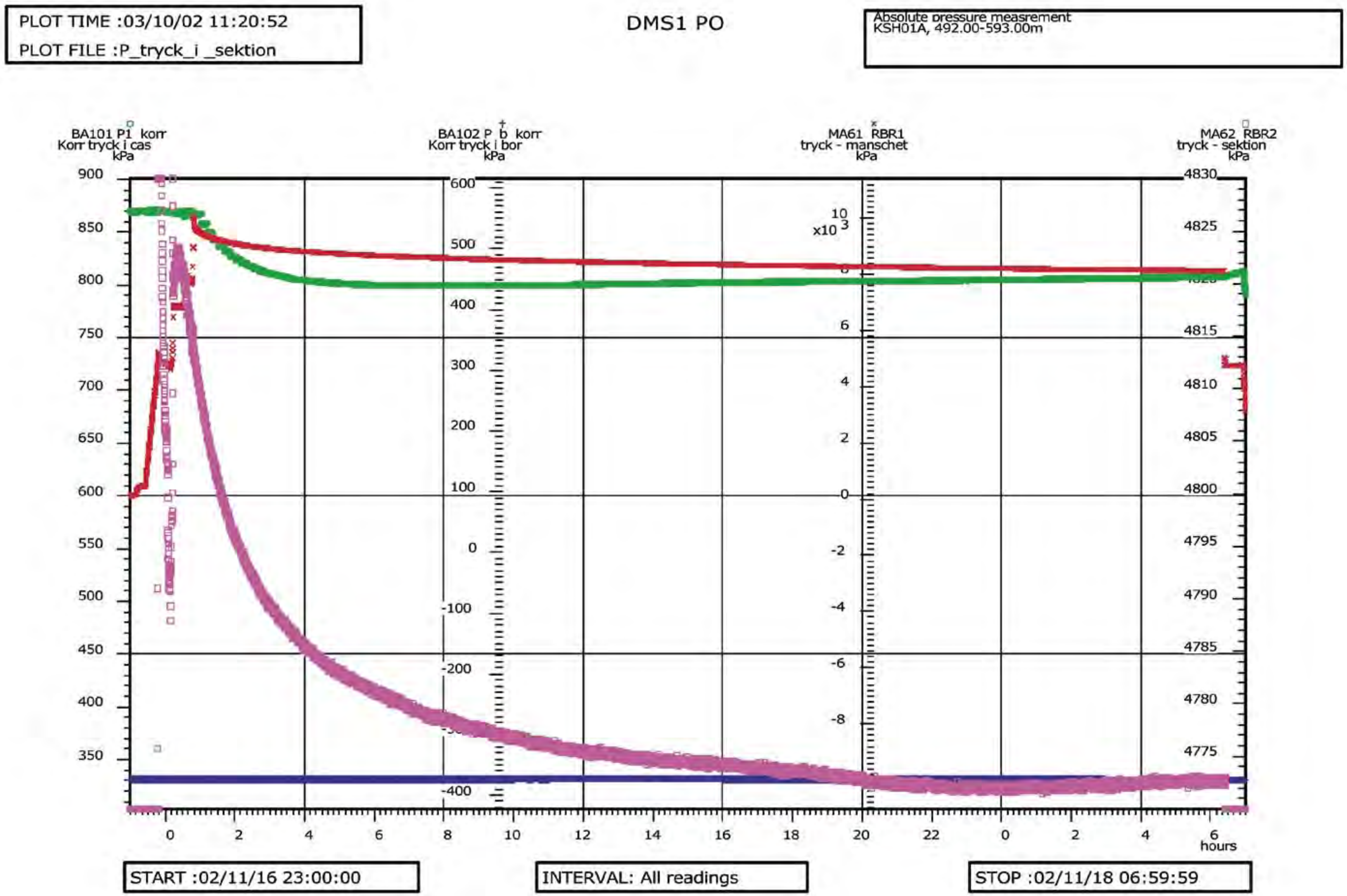

PLOT TIME :04/03/05 13:56:13
PLOT FILE :P_pumptest
No DST Adjustment
DMS1 PO
Pumping test
KSH01A 842.00 - 1003.00m
Wireline sond
MA30 Q
Q Flöde
l/m
LAST CALIBRATION
70/01/01 00:00:00
MA31 EIC
Konduktivitet
mS/m
LAST CALIBRATION
70/01/01 00:00:00
BA101 P1 korr
Korr tryck i cas
kPa
LAST CALIBRATION
70/01/01 00:00:00
BA102 P b korr
Korr tryck i bor
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA61 RBR1
tryck - manschet
kPa
LAST CALIBRATION
70/01/01 00:00:00
MA62 RBR2
tryck - sektion
kPa
LAST CALIBRATION
70/01/01 00:00:00
hour:min
START :03/01/13 17:00:00
INTERVAL: All readings
STOP :03/01/13 19:29:59

Appendix 6

Time series of absolute pressure measurements in borehole KSH01A




PLOT TIME :03/10/02 10:59:52
PLOT FILE :RBRLogger
DMS1 PO
Absolute pressure measurement
KSH01A, 312.10-392.78m
MA61 RBR1
tryck - manschet
kPa
x10 3
8
6
4
2
0
-2
-4
-6
-8
-10
MA62 RBR2
tryck - sektion
kPa
3100
3060
3000
2980
2960
2940
2920
16
17
18
19
20
21
22
23
0
1
2
3
4
5
6
7
8
hours
START :02/11/01 16:00:00
INTERVAL: All readings
STOP :02/11/02 08:59:59

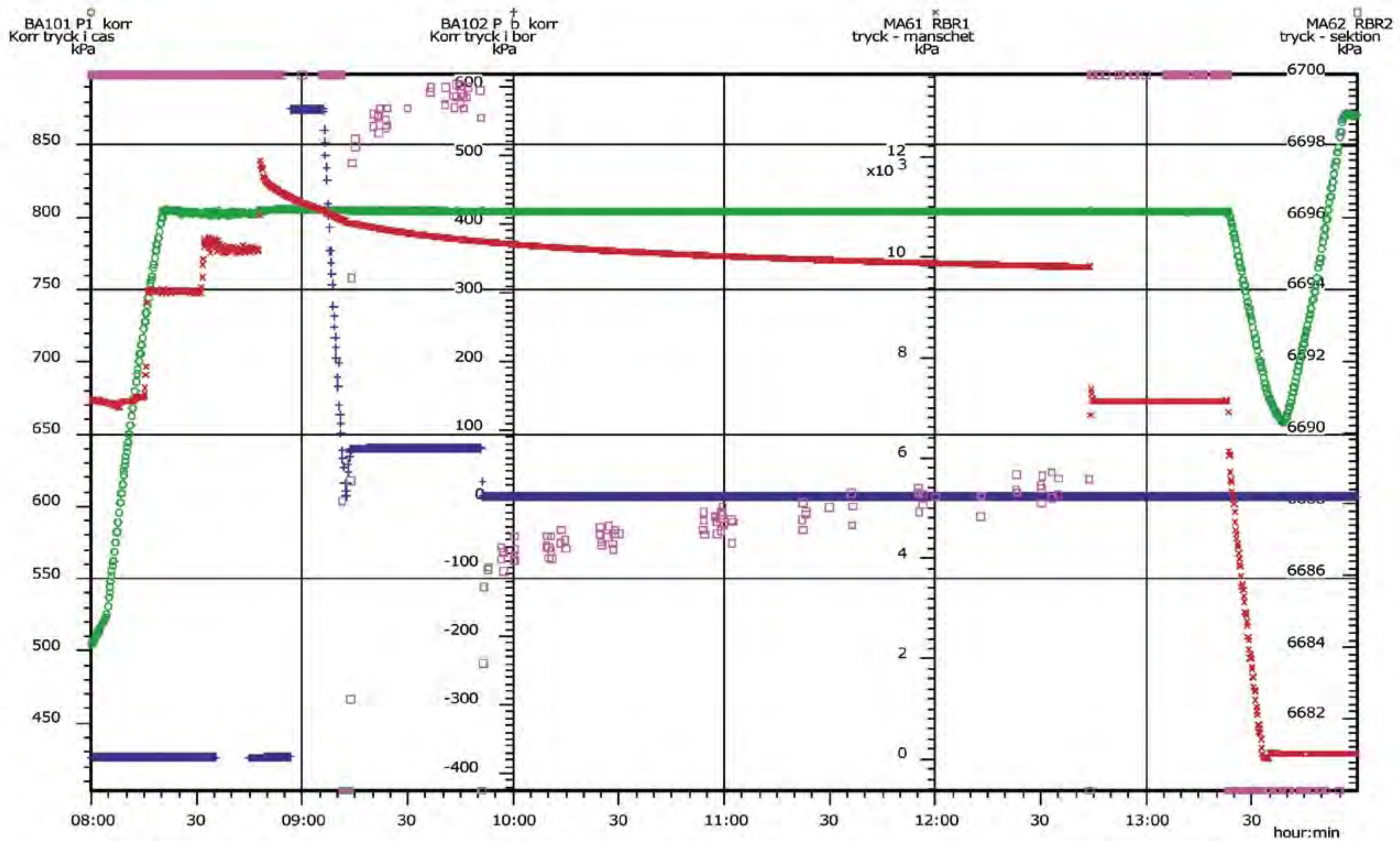


PLOT TIME :03/10/02 11:20:52
PLOT FILE :P_tryck_i _sektion
DMS1 PO
Absolute pressure measrement
KSH01A, 492.00-593.00m
BA101 P1 korr
Korr tryck i cas
kPa
BA102 P b korr
Korr tryck i bor
kPa
MA61 RBR1
tryck - manschet
kPa
x10 3
MA62 RBR2
tryck - sektion
kPa
900
850
800
750
700
650
600
550
500
450
400
350
600
500
400
300
200
100
0
-100
-200
-400
10
6
4
2
0
-2
-4
-6
-8
4830
4825
4815
4810
4805
4800
4795
4790
4785
4780
4775
0 2 4 6 8 10 12 14 16 18 20 22 0 2 4 6
hours
START :02/11/16 23:00:00
INTERVAL: All readings
STOP :02/11/18 06:59:59

PLOT TIME :03/10/02 11:28:49
PLOT FILE :P_tryck_i _sektion

DMS1 PO

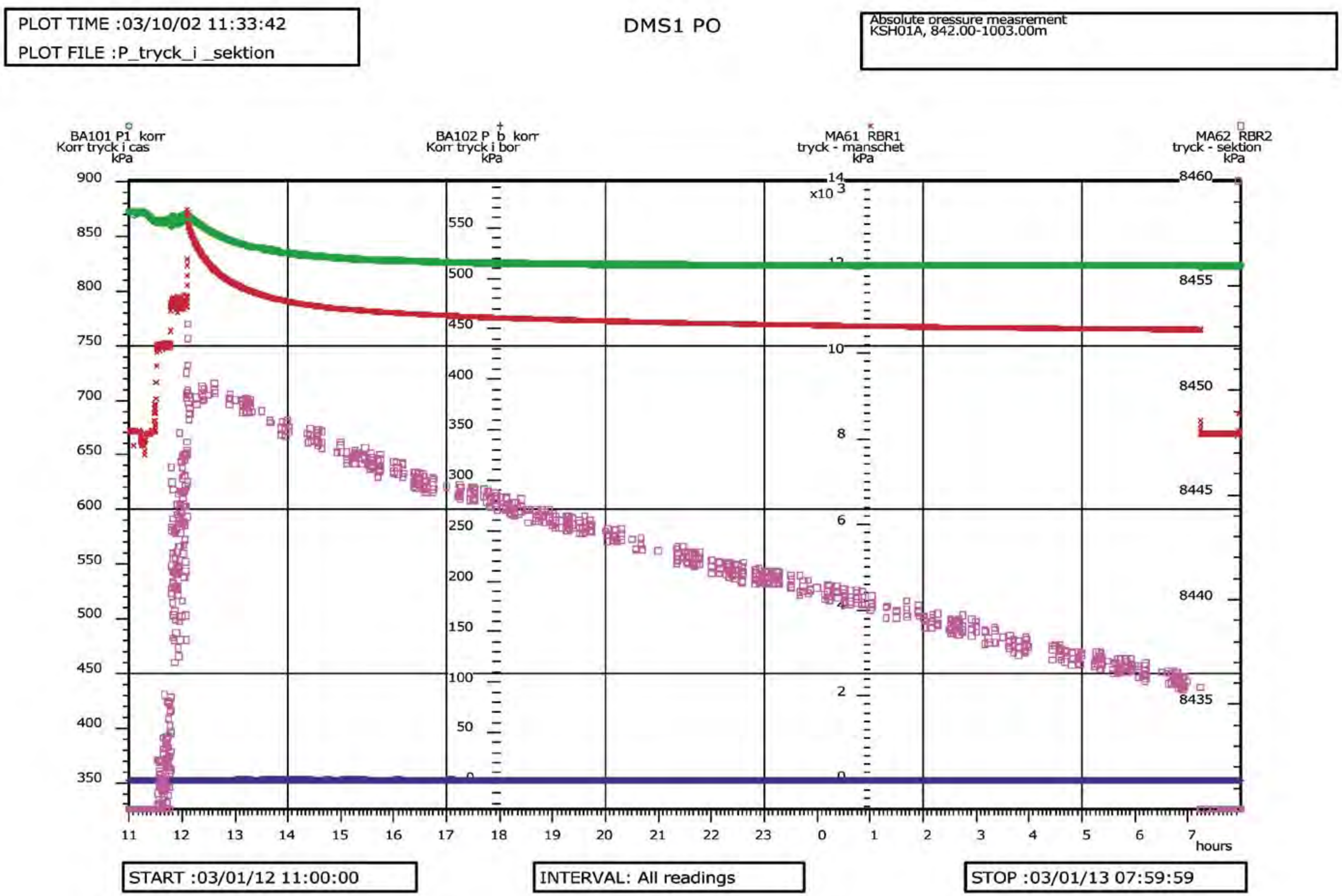
Absolute pressure measrement
KSH01A, 741.00-842.10m



START :02/12/04 08:00:00

INTERVAL: All readings

STOP :02/12/04 13:59:59



PLOT TIME :03/10/02 11:33:42
PLOT FILE :P_tryck_i _sektion
DMS1 PO
Absolute pressure measrement
KSH01A, 842.00-1003.00m
BA101 P1 korr
Korr tryck i cas
kPa
BA102 P b korr
Korr tryck i bor
kPa
MA61 RBR1
tryck - manschet
kPa
MA62 RBR2
tryck - sektion
kPa
x10 3
hours
START :03/01/12 11:00:00
INTERVAL: All readings
STOP :03/01/13 07:59:59