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Äspö Hard Rock Laboratory

Prototype Repository

Hydrogeology – interference test campaign 2 after drill campaign 3

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September 2000

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Abstract

The Prototype Repository Test is focused on testing and demonstrating the function of the SKB deep repository system. Activities aimed at contributing to development and testing of the practical, engineering measures required to rationally perform the steps of a deposition sequence are also included in the project but are also part of other projects.

The characterisation will be made in three stages. Each stage is intended to contribute to more details useful for the determination of the localisation of the deposition holes and also the boundary and rock conditions needed for the interpretation of the experimental data.

This report describes the interference test campaign 2 made after drill campaign 3.

During interference test campaign 1 two major features, one on the south side and one on the north side of the repository, were observed and evaluated regarding geometry (strike and dip) and hydraulic parameters, such as transmissivity and storativity.

During interference test campaign 2, eight tests were made in order to confirm the features observed earlier and to try to locate the extension of these features and their possible connection to other features. The result of these efforts were in large that on the north side of the prototype repository tunnel there is a major feature, or a system of features, striking WNW, but which is not in direct connection with the earlier located major feature on the north side. On the south side the situation is rather similar with a feature, or system of features, striking WNW, but with a slightly better connection with the earlier located feature on the south side, compared with the two features to the north.

Some minor features close to the location of the deposition boreholes are also described.

Sammanfattning

Huvudsyftet med prototypförvaret är att testa och demonstrera funktionen av en del av SKB's djupförvars system. Aktiviteter som syftar till utveckling och försök av praktiska och ingenjörsmässiga lösningar, som krävs för att på ett rationellt sätt kunna stegvis utföra deponeringen av kapslar med kärnbränsle, är inkluderade i projektet för prototyp förvaret men även i andra projekt.

Karakteriseringen av bergmassan genomförs i tre steg. Varje steg syftar till att bidra med mer detaljer som skall vara användbara för att kunna lokalisera deposition hål och för att också kunna bestämma randvillkor och bergegenskaper som behövs för att kunna tolka experimentella data.

Denna rapport behandlar de interferenstester som genomförts efter att borrningsomgång 3 hade avslutats.

Två större hydrauliska strukturer, den ena på den södra sidan och den andra på den norra sidan av prototypförvaret, har tidigare observerats och utvärderats, i samband med interferenstest omgång 1, med avseende på geometri (strykning och stupning) samt hydrauliska egenskaper såsom transmissivitet och magasinskoefficient.

I samband med utvärderingen av interferenstest omgång 2 har en struktur, eller ett system av strukturer strykandes WNW, på norra sidan av prototypförvaret öster om den tidigare lokaliserade påträffats. Dessa två har inte någon direkt förbindelse med varandra utan snarare via andra spricksystem. På södra sidan är situationen snarlik med en ny lokaliserad struktur, eller ett system av strukturer, med en något bättre förbindelse med den tidigare lokaliserade strukturen på södra sidan, jämfört med norra sidan.

Ett antal mindre hydrauliska strukturer i omedelbar närhet till de planerade depositions borrhålen har även lokaliserats och utvärderats.

Executive Summary

The Prototype Repository Test is focused on testing and demonstrating the function of the SKB deep repository system. Activities aimed at contributing to development and testing of the practical, engineering measures required to rationally perform the steps of a deposition sequence are also included in the project but are also part of other projects.

The characterisation will be made in three stages. Each stage is intended to contribute to more details useful for the determination of the localisation of the deposition holes and also the boundary and rock conditions needed for the interpretation of the experimental data. The three stages are:

1. Mapping of the tunnel
2. Pilot and exploratory holes
3. Deposition holes

Stage 1 is completed and stage 2 has been divided into three drilling campaigns:

1. Drilling of pilot holes
2. Drilling of short exploratory holes
3. Drilling of long exploratory holes

This report describes the interference test campaign 2 made after drill campaign 3.

The diffusivity, η, versus the distance, r, and the timelag versus the distance, r, are shown in *Figure 1* below. Data are from all 14 interference tests performed during the two test campaigns.

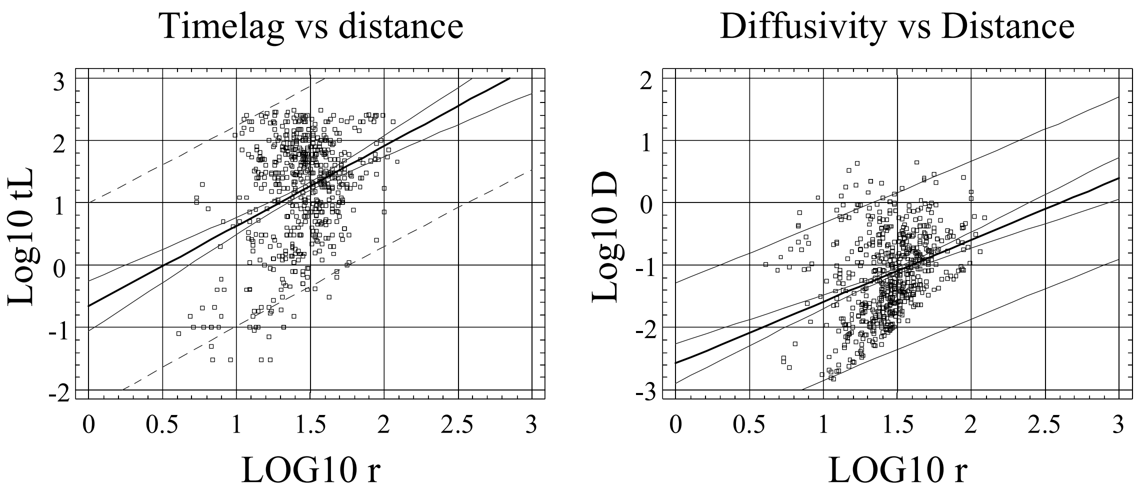

Figure 1 Linear regression plots of timelag and diffusivity versus distance

The equations of the regression lines in Figure 1 are

$$\mathrm{Log}_{10}\, t_L = 1.282 * \mathrm{Log}_{10}\, r - 0.655$$

$$\mathrm{Log}_{10}\, \eta = 0.991 * \mathrm{Log}_{10}\, r - 2.579$$

When compared with the regression analysis of the above shown parameters it is noticed that the r - t_L is more flat than earlier when only the first six tests, from the interference test campaign 1, were included. It is the other way around when comparing the two r - η relationships. When all fourteen tests are included the relationship is steeper than before.

The storativity is not always received from a hydraulic test. In order to estimate an approximate value of the parameter a relationship between the evaluated transmissivity T_{EVAL} and the evaluated storativity S is established from the fourteen evaluated interference tests 1:1-2:14. The results are shown in *Figure 2.*

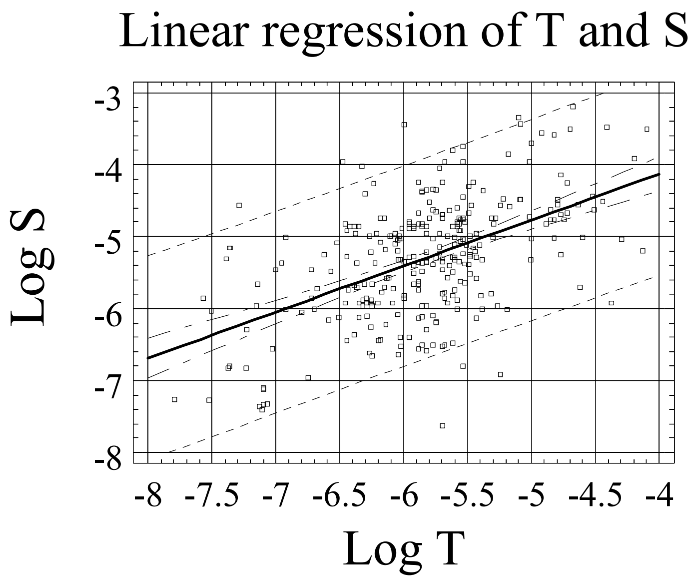

Figure 2 *Linear regression of T_{EVAL} and S.*

The equation of the regression line in *Figure 2* is

$$\mathrm{Log}_{10}\, S = 0.640 * \mathrm{Log}_{10}\, T_{EVAL} - 1.570$$

When comparing with the relationship when only the first six tests, from the interference test campaign 1, were included, this relationship is steeper now by a factor 2, when all fourteen tests are included.

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1 BACKGROUND

1.1 Äspö Hard Rock Laboratory

In order to prepare for the siting and licensing of a spent fuel repository SKB has constructed an underground research laboratory.

In the autumn of 1990, SKB began the construction of Äspö Hard Rock Laboratory (Äspö HRL), see Figure 1-1, near Oskarshamn in the south-eastern part of Sweden. A 3.6 km long tunnel was excavated in crystalline rock down to a depth of approximately 460 m.

The laboratory was completed in 1995 and research concerning the disposal of nuclear waste in crystalline rock has since then been carried out.

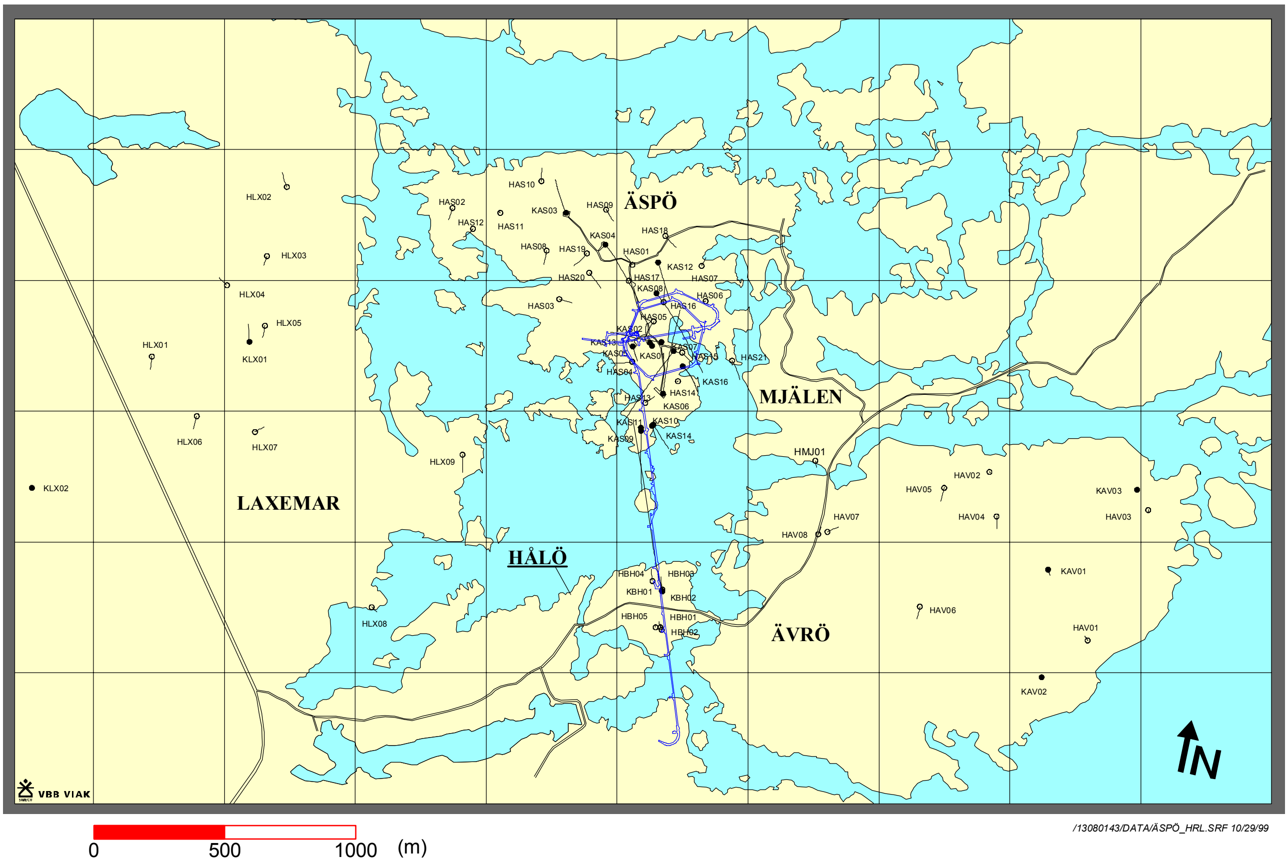

Figure 1-1 Äspö Hard Rock Laboratory

1.2 Prototype repository

The Äspö Hard Rock Laboratory is an essential part of the research, development, and demonstration work performed by SKB in preparation for construction and operation of the deep repository for spent fuel. Within the scope of the SKB program for RD&D 1995, SKB has decided to carry out a project with the designation "Prototype Repository Test". The aim of the project is to test important components in the SKB deep repository system in full scale and in a realistic environment.

The Prototype Repository Test is focused on testing and demonstrating the function of the SKB deep repository system. Activities aimed at contributing to development and testing of the practical, engineering measures required to rationally perform the steps of a deposition sequence are also included. However, efforts in this direction are limited, since these matters are addressed in the Demonstration of Repository Technology project and to some extent in the Backfill and Plug Test.

1.2.1 General objectives

The Prototype Repository should simulate as many aspects as possible a real repository, for example regarding geometry, materials, and rock environment. The Prototype Repository is a demonstration of the integrated function of the repository components. Results will be compared with models and assumptions to their validity.

The major objectives for the Prototype Repository are:

- To test and demonstrate the integrated function of the repository components under realistic conditions in full scale and to compare results with models and assumptions.
- To develop, test and demonstrate appropriate engineering standards and quality assurance methods.
- To simulate appropriate parts of the repository design and construction process.

The objectives for the characterisation program are:

- To provide a basis for determination of localisation of the deposition holes
- To provide data on boundary and rock conditions to enable interpretation of the experimental data

1.2.2 Characterisation stages

The characterisation will be made in three stages. Each stage is intended to contribute to more details useful for the determination of the localisation of the deposition holes and also the boundary and rock conditions needed for the interpretation of the experimental data. The three stages are:

1. Mapping of the tunnel
2. Pilot and exploratory holes
3. Deposition holes

Stage 1 is completed and stage 2 has been divided into three drilling campaigns:

1. Drilling of pilot holes
2. Drilling of exploratory holes - short bore holes
3. Drilling of exploratory holes - long bore holes

This report describes the results of eight interference tests carried out in seven of the long exploratory holes.

This report is to be regarded as a result report mainly. No conclusions are made in this report. A conceptual structural model of geological and hydrological features in the Prototype Repository Area will be presented in a forth-coming report. Such a report will be considered as the final report of the undertaken characterisation work done concerning the Prototype Repository.

2 OBJECTIVE

The objectives of the exploratory bore holes is to obtain data for prediction of the characteristics in the deposition holes, data for modelling and to quantify the criteria needed for validation of the suitability of the position for canister deposition. Acceptance of a canister position is based on scrutinization of characterisation data such as fracturing, permeability and stability of the bore hole wall.

The objective for the interference tests in the long exploratory holes is that they shall provide hydrogeological data useful for setting up a hydrogeological model of the rock volume around the TBM tunnel. Identification of the position and properties of larger conductive features are the main objectives. Possible minor features intersecting the deposition bore holes should also be identified.

3 SCOPE

Interference tests were performed in eight bore hole sections in seven of the long exploratory holes of the Prototype Repository tunnel. The tested intervals and basic test data are listed in *Table 3-1.* The first figure in the test number indicates the second interference test campaign number, while the second number indicate the chronological order of the interference tests.

During interference test 2:7 observations were carried out in 60 observations bore hole sections located around the flow section of each test, while during test 2:8 - 2:14 observations were carried out in 65 observations bore hole sections located around the flow section of each test.

Table 3-1 Interference tests carried out during June and August 1999

Bore hole	Section	Date of test	Test no.	Start of test	Valve opened	Valve closed	End of test
KG0048A01:1	49.00-54.69	1999-06-17	2:7	00:00	08:00.00	09:25.00	14:20 (1999-06-17)
KA3554G01:1	22.30-30.01	1999-08-18	2:8	08:00	10:00.03	16:04.05	08:55 (1999-08-19)
KA3554G02:2	10.30-21.30	1999-08-16	2:9	09:00	11:02.07	17:06.05	09:20 (1999-08-17)
KA3542G01:2	8.80-24.80	1999-08-17	2:10	09:00	11:00.03	17:05.03	09:55 (1999-08-18)
KA3542G02:3	1.30-7.80	1999-08-19	2:11	07:00	09:00.01	15:01.01	07:55 (1999-08-20)
KA3539G:2	9.80-18.30	1999-08-22	2:12	07:00	08:00.07	09:11.05	18:00 (1999-08-22)
KG0021A01:1	42.50-48.82	1999-08-21	2:13	07:00	09:00.05	15:02.10	07:55 (1999-08-22)
KG0021A01:3	25.00-34.00	1999-08-20	2:14	06:00	08:00.05	14:00.07	08:55 (1999-08-21)

In chapter 4 the results of the tests are presented.

4 RESULTS

Pressure registration was made in neighbouring bore holes during the flowing and recovery phase of every interference test. In *Table 4-1 to 4-8* the results of the tests are presented. The hydraulic centre of each bore hole section has been calculated as the weighted average point of the inflow of water to the bore hole section. The distance, r, between different bore hole sections has been calculated as the spherical distance using co-ordinates for the weighted average point of inflow. The evaluation of transmissivity $T_{EVAL,}$ and storativity S, has been made using the Theis log-log type curve method assuming radial flow. The calculation of the hydraulic diffusivity is based on radial flow:

$$\eta = T / S = r^2 / [\, 4 \cdot t_L \cdot (1 + t_L / dt) \cdot \ln(1 + dt / t_L)] \qquad (4\text{-}1)$$

The timelag t_L is defined as the time when the pressure response in an observation section is greater than 0.1 metres. The pumping time is included as dt. As can be seen in equation above the diffusivity is proportional to r^2 / t_L. S^* in the table is calculated as $S^* = T / \eta$. The values of diffusivity and storativity should be seen as approximate values as the flow dimension is not always radial. When the flow is interpreted as radial flow T_{EVAL} is shown in the table for the observation sections. The response is classified as 0 = no response (< 0.1 m), 1 = some response (0.1 m - 1.0 m) and 2 = good response (> 1.0 m). This classification is made from pressure head plots. Two columns in the tables show P_0-P_f and P_p-P_f , *see Appendix 1*, using logger data. These data are not always stable therefor for some sections where no response is noticed the value may be negative or there may exist a general pressure trend, increasing or decreasing.

Key pressure data from the interference tests are presented in *Appendix 1*.

During the drilling of KA3510A in 1996 rather large amounts of water inleakage to the borehole was encountered during the first 47 meters. The accumulated flow was at 47.32 m 62 l/min. It was then decided to grout this the first part of the borehole. This was done at five different occasions with a total injected volume of cement of 1609 litres. After the grouting and redrilling of the borehole the water inflow was 0.64 l/min. Accordingly, it is to be observed that the observation section KA3510A:3 is to its first part a grouted section.

During interference test campaign 1, two major hydrogeological features were observed. The first one is running at the north side of the repository, while the second one is located at the south side of the repository. Both seem to be almost vertical striking WNW. Both are indicated during several of the interference tests of test campaign 2.

4.1 Interference test 2:7

The test was carried out in KG0048A01, section 49.00 - 54.69 metres. The flow period was for 85 minutes with a final flow of 2.410 l/min, while the pressure build-up time was 275 minutes. In *Figure 4-1* and *Figure 4-2* the pressure drawdown recordings are shown and in Table 4-1 the interference test results are presented. Diagrams of evaluated bore hole sections are presented in *Appendix 2*.

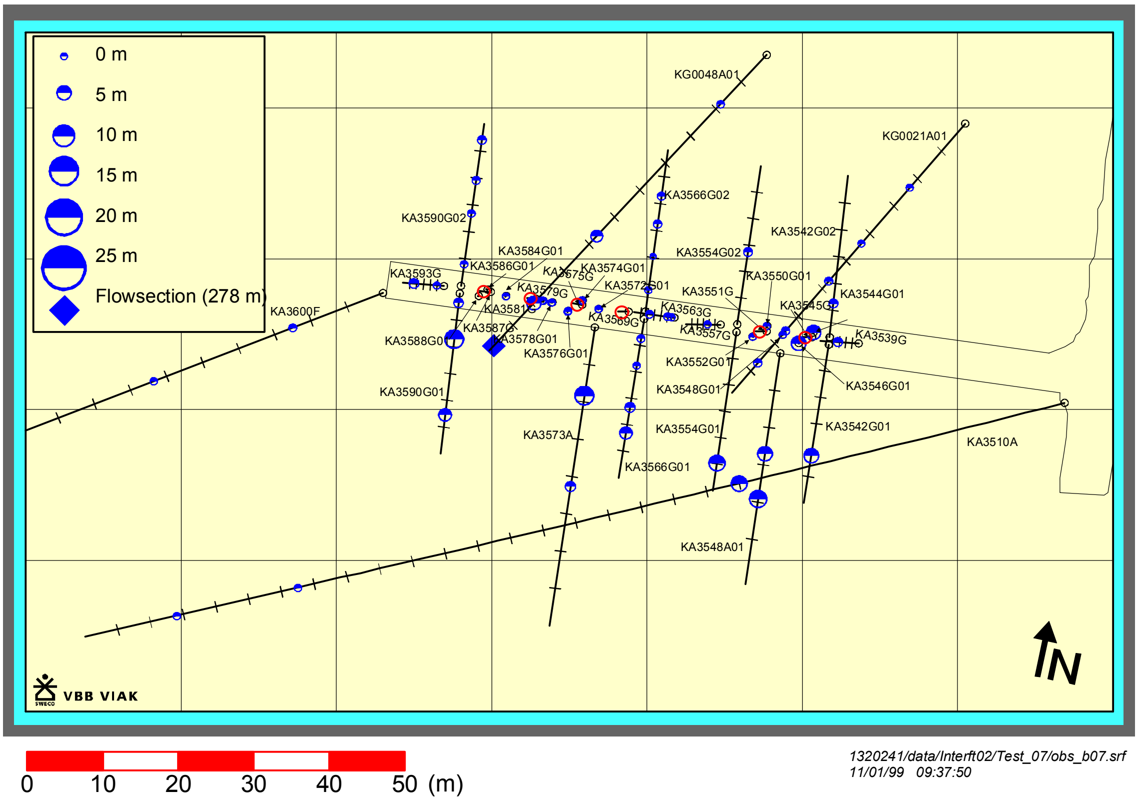

Figure 4-1 Drawdown during flowing of KG0048A01:1 (Interferencetest 2:7) - plan view

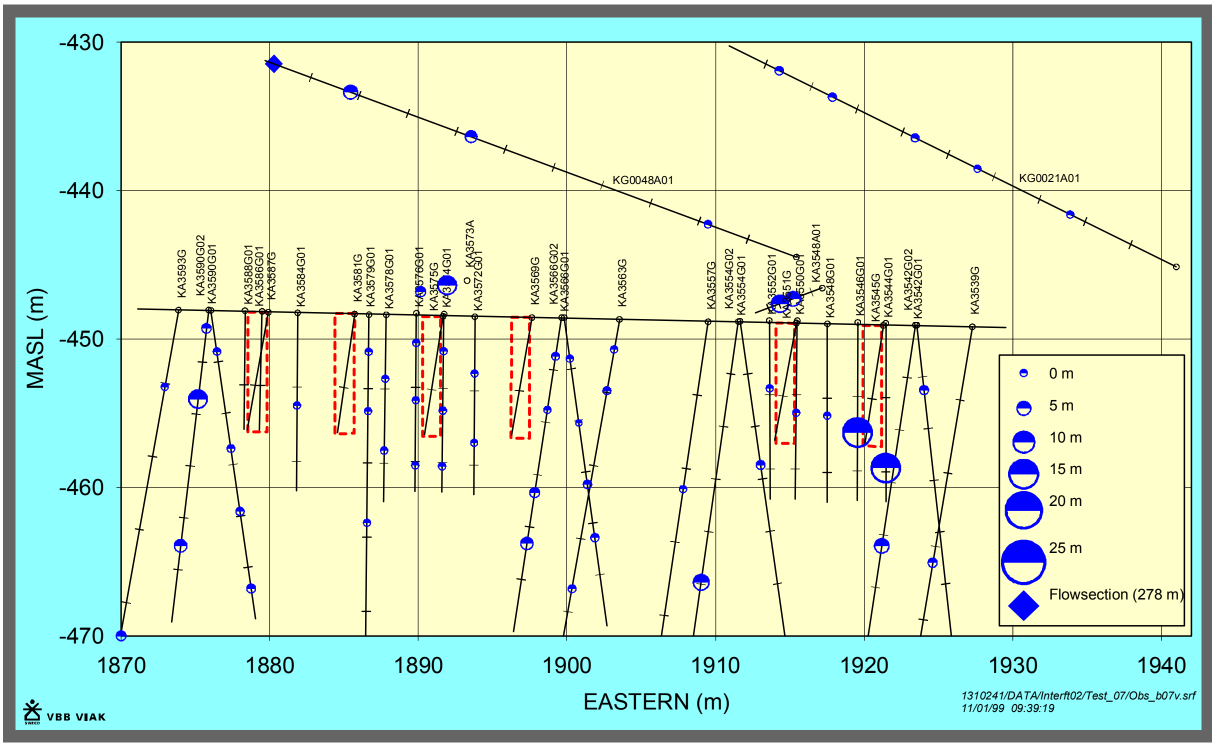

Figure 4-2 Drawdown during flowing of KG0048A01:1 (Interferencetest 2:7) - vertical view

This test shows a good connection between the flow section and KA3590G01:2, KA3573A:2, KA3554G01 (whole borehole), KA3510A:3 and finally a very quick and good response in KA3548A01:1. In comparison with the tests during the first interference test campaign, especially 1:1, 1:3 and 1:6 this test seem to activate a structure situated parallel or in the vicinity to the one activated during the earlier test. The sections, which respond during this test, do not respond at all or poorly during the earlier tests. The pressure responses of the sections in KA3566G01 are slow, while the response was fast and distinct during the earlier tests.

The transmissivity of the observation sections with response times less than 1 minute, i.e. the sections mentioned above with the exception of KA3510A:3, is within the range $9.4 \cdot 10^{-7}$ – $2.9 \cdot 10^{-6}$ m^2/s. The transmissivity of the flowing section is evaluated to be $2.5 \cdot 10^{-6}$ m^2/s with the evaluation period 1 – 3 minutes.

The structure activated during this test seem to be a more conductive than the one observed during the earlier tests. The higher flow rate and the higher evaluated values of the transmissivity indicate this.

Table 4-1 **Interference test results for KG0048A01, 49.00 - 54.69 m. (r = aprox. distance from flowing bore hole section to observation bore hole section, t_L = time lag for a pressure response of 0.1 m to be registered in an observation section, T = transmissivity, S = storage coefficient, S^* = storage coefficient from diffusivity, η) The response is classified as 0 = no response (< 0.1 m), 1 = some response (0.1 m - 1.0 m) and 2 = good response (> 1.0 m).**

Flowing borehole	Hydraulic centre of borehole (m)	Flowtime dt (min)	Observation borehole	Secup (m)	Seclow (m)	Hydraulic centre of borehole (m)	r (m)	t_L (recovery) (min)	r^2/t_L (m²/s)	η (m²/s)	T_{EVAL} (m²/s)	S (-)	S^* (-)	Response (0 = no, 1 = some, 2 =good response	Po - Pp (kPa)	Pf - Pp (kPa)
KG0048A01:1	**53.81**	85	KA3510A:1	122.02	150.00	136.00	101.04	17	10.010	1.16E+00	-	-	-	1	1.9	1.3
2:07		85	KA3510A:2	114.02	121.02	117.50	86.26	50	2.481	3.93E-01	-	-	-	1	1.7	0.7
		85	KA3510A:3	4.52	113.02	50.00	55.88	1	52.049	2.89E+00	6.4E-06	9.8E-07	2.2E-06	2	59.6	60.2
		85	KA3539G:1	0.30	30.01	16.11	55.63	18	2.866	3.39E-01	7.4E-07	2.6E-06	2.2E-06	2	13.9	12.5
		85	KA3542G01:1	0.30	30.04	21.05	54.23	3.8	12.897	9.79E-01	2.0E-06	2.4E-08	2.0E-06	2	50.7	51.1
		85	KA3542G02:1	0.30	30.01	6.28	49.29	14	2.892	3.17E-01	1.1E-06	4.0E-07	3.5E-06	2	12.5	12.3
		85	KA3544G01:1	0.30	12.00	9.75	49.40	25	1.627	2.12E-01	-	-	-	2	11.8	10.8
		85	KA3546G01:1	0.30	12.00	7.42	46.48	50	0.720	1.14E-01	-	-	-	1	0.6	1.4
		85	KA3548A01:1	15.00	30.00	19.56	42.82	0.3	101.871	4.49E+00	2.9E-06	1.6E-07	6.5E-07	2	69.1	69.3
		85	KA3548A01:2	10.00	14.00	13.49	40.94	2.7	10.349	7.20E-01	1.4E-06	1.1E-06	1.9E-06	2	51.3	51.8
		85	KA3548G01:1	0.30	12.00	6.18	44.16	-	-	-	-	-	-	0	0	-0.2
		85	KA3550G01:1	0.30	12.03	6.21	42.37	-	-	-	-	-	-	1	0.4	0.2
		85	KA3552G01:1	0.30	12.01	4.56	39.91	60	0.442	7.35E-02	-	-	-	1	0.6	0.4
		85	KA3554G01:1	0.30	30.01	24.83	47.84	0.8	47.685	2.53E+00	1.7E-06	3.1E-07	6.7E-07	2	60.3	60.7
		85	KA3554G02:1	0.30	30.01	13.69	44.25	17	1.920	2.23E-01	1.2E-06	5.3E-06	5.4E-06	2	12.1	11.7
		85	KA3557G:1	0.30	30.04	11.40	39.84	-	-	-	-	-	-	0	0.2	0
		85	KA3563G01:1	9.30	30.00	18.42	40.87	32	0.870	1.22E-01	-	-	-	1	4.9	4.7
		85	KA3563G01:2	3.80	8.30	4.87	31.66	35	0.477	6.86E-02	-	-	-	1	4.9	4.7
		85	KA3563G01:3	1.30	2.80	2.05	30.15	55	0.276	4.48E-02	-	-	-	1	0.6	0.4
		85	KA3566G01:1	20.80	30.01	21.57	38.31	2.2	11.117	7.36E-01	2.4E-06	1.5E-06	3.3E-06	2	35.4	35.1
		85	KA3566G01:2	12.30	19.80	16.71	34.77	11	1.832	1.87E-01	1.1E-06	5.2E-06	5.9E-06	2	19.6	19.4
		85	KA3566G01:3	7.30	11.30	8.81	29.82	42	0.353	5.34E-02	-	-	-	1	0	4.2
		85	KA3566G01:4	1.30	6.30	3.70	27.37	40	0.312	4.66E-02	-	-	-	1	4.5	7.1
		85	KA3566G02:1	19.30	30.01	21.41	43.36	30	1.045	1.44E-01	2.7E-07	3.3E-06	1.9E-06	1	7.3	11.2
		85	KA3566G02:2	12.30	18.30	16.23	38.85	28	0.898	1.21E-01	-	-	-	2	8.4	11.1
		85	KA3566G02:3	7.80	11.30	10.25	33.88	15	1.275	1.43E-01	-	-	-	2	-5.9	13.5
		85	KA3566G02:4	1.30	6.80	3.99	29.09	60	0.235	3.90E-02	-	-	-	1	0.8	0.8
		85	KA3572G01:1	6.30	12.00	8.49	29.28	60	0.238	3.96E-02	-	-	-	1	-1	1.2
		85	KA3572G01:2	1.30	5.30	3.82	25.33	-	-	-	-	-	-	0	-0.2	0
		85	KA3573A:1	18.00	40.07	21.34	26.10	1.7	6.677	4.16E-01	3.3E-06	3.0E-06	7.9E-06	2	21.1	21.3
		85	KA3573A:2	4.50	17.00	9.16	20.06	0.19	35.300	1.44E+00	2.1E-06	3.1E-07	1.5E-06	2	79.2	79.5
		85	KA3574G01:1	8.80	12.00	10.25	29.99	60	0.250	4.15E-02	-	-	-	1	1	0.8
		85	KA3574G01:2	5.30	7.80	6.50	26.67	28	0.423	5.71E-02	-	-	-	1	1.4	-0.4
		85	KA3574G01:3	1.30	4.30	2.50	23.28	-	-	-	-	-	-	0	-0.2	-0.4
		85	KA3576G01:1	8.80	12.01	10.25	29.03	-	-	-	-	-	-	0	1	0.8
		85	KA3576G01:2	3.80	7.80	5.86	25.02	-	-	-	-	-	-	0	-0.2	0.4
		85	KA3576G01:3	1.30	2.80	2.00	21.61	-	-	-	-	-	-	0	0.4	0.8
		85	KA3578G01:1	6.80	12.58	9.14	27.69	-	-	-	-	-	-	0	0.9	0.7
		85	KA3578G01:2	1.30	5.80	4.30	23.22	-	-	-	-	-	-	0	-0.2	-0.2
		85	KA3579G01:1	9.30	22.65	14.02	32.12	60	0.287	4.76E-02	-	-	-	1	-0.6	1.4
		85	KA3579G01:2	5.30	8.30	6.50	24.97	28	0.371	5.00E-02	-	-	-	1	0	0.2
		85	KA3579G01:3	1.30	4.30	2.50	21.28	-	-	-	-	-	-	0	0.4	0.2
		85	KA3584G01:1	0.30	12.00	6.24	23.98	-	-	-	-	-	-	0	-0.2	-0.2
		85	KA3590G01:1	17.30	30.06	22.70	34.31	8	2.453	2.28E-01	4.1E-07	2.1E-06	1.8E-06	2	37.9	38.1
		85	KA3590G01:2	7.80	16.30	8.56	23.16	0.45	19.873	9.42E-01	9.4E-07	4.0E-07	1.0E-06	2	77.6	78
		85	KA3590G01:3	1.30	6.80	1.76	19.26	11	0.562	5.74E-02	1.3E-06	2.1E-05	2.3E-05	2	16.1	16.1
		85	KA3590G02:1	23.30	30.05	27.06	44.69	12	2.774	2.91E-01	1.5E-06	4.5E-06	5.2E-06	2	11.5	13.3
		85	KA3590G02:2	17.30	22.30	19.56	37.36	24	0.969	1.25E-01	8.6E-07	8.0E-06	6.9E-06	2	6.8	10.6
		85	KA3590G02:3	8.30	16.30	13.44	31.44	30	0.549	7.55E-02	-	-	-	1	3.7	4.3
		85	KA3590G02:4	1.20	7.20	4.00	22.52	-	-	-	-	-	-	0	1.8	-1.9
		85	KA3593G01:1	8.30	30.02	22.13	40.60	18	1.526	1.80E-01	-	-	-	2	17.8	18
		85	KA3593G01:2	1.30	7.30	5.24	24.32	55	0.179	2.91E-02	-	-	-	1	0.2	3.1
		85	KA3600F:1	22.00	50.10	31.78	46.55	40	0.903	1.35E-01	-	-	-	1	1.7	1.5
		85	KA3600F:2	4.50	21.00	12.51	29.76	7	2.108	1.89E-01	1.5E-05	1.7E-05	7.9E-05	1	4.8	4.8
		85	KG0021A01:1	42.50	48.82	43.53	34.09	8	2.421	2.26E-01	1.0E-06	4.5E-06	4.4E-06	2	8.4	9.9
		85	KG0021A01:2	35.00	41.50	37.70	37.71	7	3.386	3.04E-01	2.0E-06	4.9E-06	6.6E-06	2	7.8	9
		85	KG0021A01:3	25.00	34.00	28.64	44.28	7	4.669	4.19E-01	3.0E-06	4.2E-06	7.2E-06	2	6.4	7.6
		85	KG0021A01:4	17.00	24.00	21.80	49.76	22	1.876	2.36E-01	-	-	-		-0.2	12.5
		85	KG0021A01:5	4.00	16.00	11.64	58.44	30	1.897	2.61E-01	1.5E-06	6.0E-06	5.8E-06	1	1	3.3
		85	**KG0048A01:1**	**49.00**	**54.69**	**53.81**	**0.00**	**-**	**-**	**-**	**2.5E-06**	**-**	**-**	**2**	**3856.7**	**3856.7**
		85	KG0048A01:2	41.00	48.00	45.90	7.91	0.6	1.738	8.70E-02	1.9E-06	1.1E-05	2.2E-05	2	46.8	45.4
		85	KG0048A01:3	30.00	40.00	33.50	20.31	1.2	5.729	3.30E-01	2.3E-06	4.0E-06	7.0E-06	2	31.5	32.4
		85	KG0048A01:4	4.00	29.00	9.12	44.69	30	1.110	1.53E-01	1.5E-06	1.1E-05	9.8E-06	1	3	5.1

4.2 Interference test 2:8

The test was carried out in KA3554G01, section 22.30 – 30.01 metres. The flow period was for 364 minutes with a final flow of 4.47 l/min, while the pressure build-up time was 1011 minutes. In *Figure 4-3* and *Figure 4-4* the pressure drawdown recordings are shown and in *Table 4-2* the interference test results are presented. Diagrams of evaluated bore hole sections are presented in *Appendix 3.*

The two lowest sections of KA3539G show almost exactly the same pressures during this test and during the tests 2:9 – 2:14 as well. This was a consequence of a leakage between the two measurement sections.

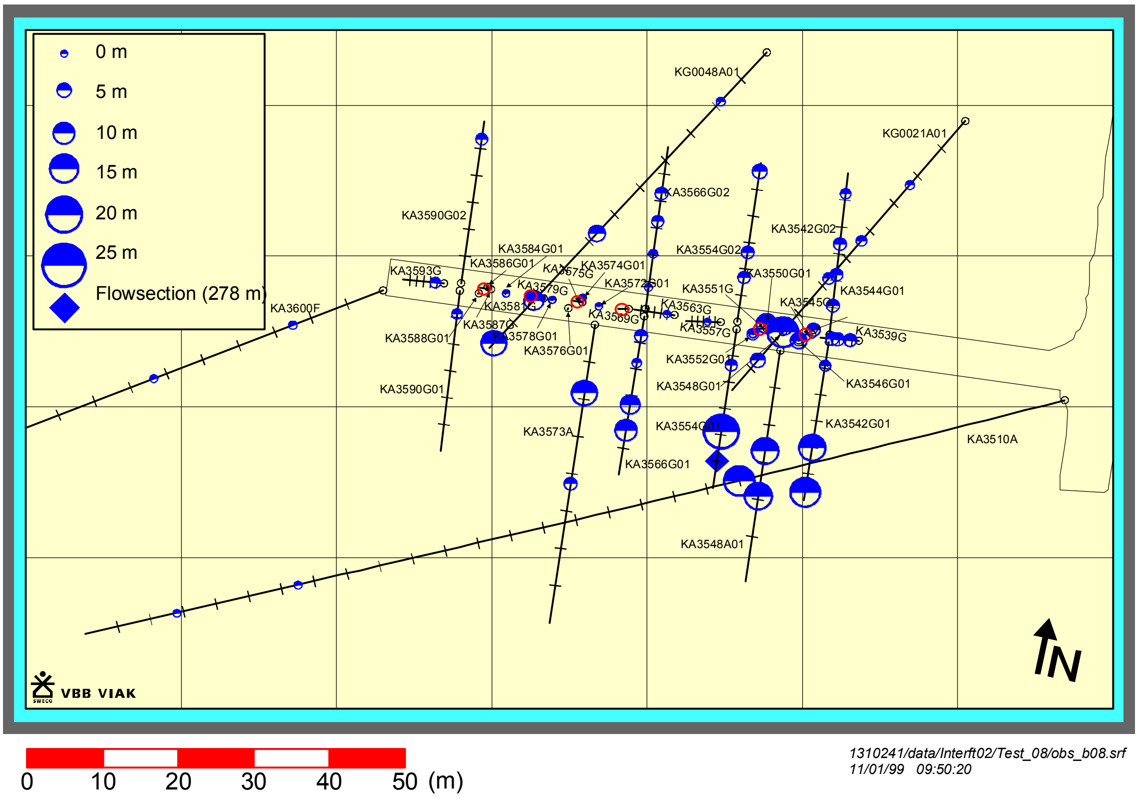

Figure 4-3 Drawdown during flowing of KA3554G01:1 (Interferencetest 2:8) - plan view

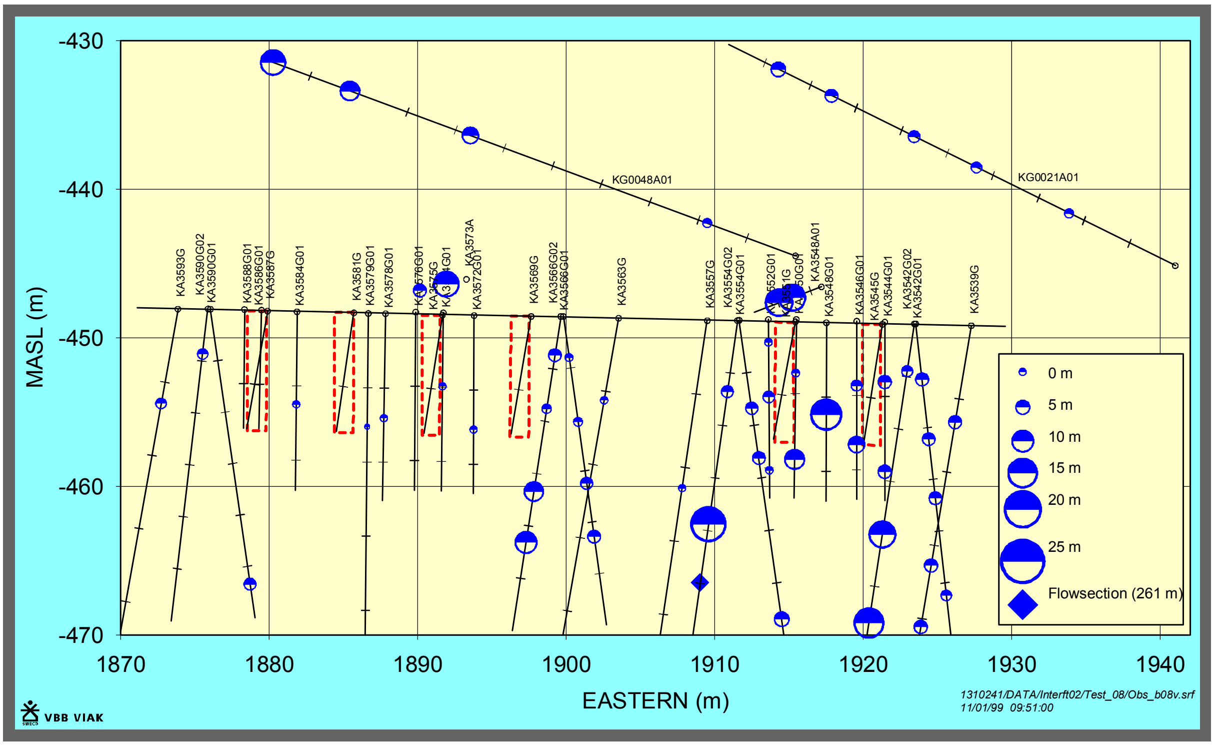

Figure 4-4 Drawdown during flowing of KA3554G01:1 (Interferencetest 2:8) - vertical view

This test show good connection, i.e. short response times, between the flow section and KA3510A:3, KA3542G01:1, KA3548A01:1, KA3573A:2 and KG0048A01:1. It is probably the same hydraulic structure that is activated during this test as during the 2:7.

The transmissivity of the observation sections with response times less than 1 minute, i.e. the sections mentioned above, is within the range $1.3 - 1.5 \cdot 10^{-6}$ m^2/s. The transmissivity of the flowing section is evaluated to be $1.7 \cdot 10^{-6}$ m^2/s with the evaluation period 2 – 6 minutes.

The same conclusion, as the one drawn from test 2:7, can be made from this test; that the structure activated from the flowing of KA3554G01:1 is more conductive than the one observed from the test series of interference test campaign 1.

Table 4-2 **Interference test results for KA3554G01, 22.30 - 30.01 m. (r = aprox. distance from flowing bore hole section to observation bore hole section, t_L = time lag for a pressure response of 0.1 m to be registered in an observation section, T = transmissivity, S = storage coefficient, S^* = storage coefficient from diffusivity, η) The response is classified as 0 = no response (< 0.1 m), 1 = some response (0.1 m - 1.0 m) and 2 = good response (> 1.0 m).**

Flowing borehole	Hydraulic centre of borehole (m)	Flowtime dt (min)	Observation borehole	Secup (m)	Seclow (m)	Hydraulic centre of borehole (m)	r (m)	t_L (recovery) (min)	r^2 / t_L (m²/s)	η (m²/s)	T_{EVAL} (m²/s)	S (-)	S^* (-)	Response (0 = no, 1 = some, 2 =good response	Po - Pp (kPa)	Pf - Pp (kPa)
KA3554G01:1		364	KA3510A:1	122.02	150.00	136.00	88.13	2.5	51.781	2.58E+00	4.2E-05	1.2E-06	1.6E-05	1	4.7	4.3
2:08		364	KA3510A:2	114.02	121.02	117.50	69.73	25	3.242	2.76E-01	1.8E-05	1.7E-05	6.5E-05	1	6.1	5.9
		364	KA3510A:3	4.52	113.02	50.00	8.27	0.4	2.847	1.04E-01	1.5E-06	4.4E-05	1.4E-05	2	158.5	155.9
		364	KA3539G:1	19.30	30.01	20.56	22.17	6	1.366	8.15E-02	-	-	-	2	41.7	38.4
		364	KA3539G:2	9.80	18.30	16.37	22.44	6	1.399	8.35E-02	-	-	-	2	41.7	38.4
		364	KA3539G:3	1.30	8.80	6.59	25.84	6	1.855	1.11E-01	-	-	-	2	40.5	36.4
		364	KA3542G01:1	25.80	30.04	28.50	12.40	0.4	6.407	2.35E-01	1.3E-06	2.4E-06	5.5E-06	2	154.4	151.5
		364	KA3542G01:2	8.80	24.80	20.06	12.81	1.7	1.608	7.45E-02	8.0E-07	1.0E-05	1.1E-05	2	133.2	130.9
		364	KA3542G01:3	1.30	7.80	4.50	23.59	3.5	2.649	1.41E-01	3.1E-05	2.4E-05	2.2E-04	1	26.3	5.7
		364	KA3542G02:1	22.30	30.01	26.21	39.14	70	0.365	4.19E-02	-	-	-	2	23.5	21.9
		364	KA3542G02:2	13.80	21.30	16.83	33.33	14	1.322	9.66E-02	1.6E-06	1.8E-05	1.7E-05	2	38.2	36.6
		364	KA3542G02:3	8.80	12.80	11.13	30.67	12	1.306	9.18E-02	2.0E-06	2.0E-05	2.2E-05	2	37.8	35.5
		364	KA3542G02:4	1.30	7.80	5.36	28.89	6	2.318	1.38E-01	2.4E-06	1.4E-05	1.7E-05	2	40.5	36.4
		364	KA3544G01:1	6.30	12.00	10.07	22.65	10	0.855	5.74E-02	1.7E-06	2.4E-05	3.0E-05	2	41.7	36.6
		364	KA3544G01:2	1.30	5.30	4.03	25.29	17	0.627	4.82E-02	1.6E-06	3.0E-05	3.3E-05	2	41.9	35.2
		364	KA3546G01:1	6.80	12.00	8.30	21.26	200	0.038	5.86E-03	-	-	-	1	62.6	-0.2
		364	KA3546G01:2	1.30	5.80	4.33	23.28	-	-	-	-	-	-	0	25.3	-10.2
		364	KA3548A01:1	15.00	30.00	19.56	20.13	0.4	16.891	6.19E-01	1.5E-06	2.6E-07	2.4E-06	2	137.5	134.8
		364	KA3548A01:2	10.00	14.00	13.49	20.20	1.4	4.856	2.17E-01	2.0E-06	3.5E-06	9.2E-06	2	133.8	130.9
		364	KA3548G01:1	0.30	12.01	6.18	22.17	-	-	-	-	-	-	0	161.3	-
		364	KA3550G01:1	6.30	12.03	9.42	21.00	-	-	-	-	-	-	0	87.29	-0.21
		364	KA3550G01:2	1.30	5.30	3.61	23.94	-	-	-	-	-	-	0	3.9	-24.6
		364	KA3552G01:1	8.80	12.01	10.15	19.00	-	-	-	-	-	-	0	2.5	-2.6
		364	KA3552G01:2	4.05	7.80	5.22	21.46	120	0.064	8.62E-03	-	-	-	1	30.6	1
		364	KA3552G01:3	1.30	3.05	1.53	23.81	-	-	-	-	-	-	0	2.8	-6.2
		364	**KA3554G01:1**	**22.30**	**30.01**	**24.95**	**0.00**	**-**	**-**	**-**	**1.7E-06**	**-**	**-**	2	2611.3	2606.8
		364	KA3554G01:2	12.30	21.30	19.39	5.56	-	-	-	-	-	-	2	188.3	187.2
		364	KA3554G01:3	1.30	11.30	6.78	18.17	-	-	-	-	-	-	2	32.7	31
		364	KA3554G02:1	22.30	30.01	28.47	38.88	23	1.095	9.12E-02	9.2E-07	1.0E-05	1.0E-05	2	51.6	49.3
		364	KA3554G02:2	10.30	21.01	13.13	29.18	10	1.419	9.54E-02	2.0E-06	2.0E-05	2.1E-05	2	38.1	35.8
		364	KA3554G02:3	1.30	9.30	8.39	27.26	24	0.516	4.35E-02	7.1E-07	1.8E-05	1.6E-05	2	35.6	33.5
		364	KA3557G:1	0.30	30.04	11.40	19.57	-	-	-	-	-	-	0	-0.2	-1.1
		364	KA3563G01:1	0.30	30.00	5.60	23.94	38	0.251	2.41E-02	1.0E-05	2.0E-04	4.1E-04	1	1.9	6.4
		364	KA3566G01:1	20.80	30.01	21.57	12.70	2.6	1.033	5.18E-02	1.2E-06	1.3E-05	2.3E-05	2	99.5	97.6
		364	KA3566G01:2	12.30	19.80	16.71	14.79	2.4	1.519	7.50E-02	2.6E-06	1.4E-05	3.5E-05	2	83.2	83.2
		364	KA3566G01:3	7.30	11.30	8.81	20.33	80	0.086	1.03E-02	-	-	-	2	15.3	13.1
		364	KA3566G01:4	1.30	6.30	3.70	24.60	29	0.348	3.09E-02	1.4E-06	4.2E-05	4.5E-05	2	38.1	37.6
		364	KA3566G02:1	19.30	30.01	21.41	36.33	22	1.000	8.23E-02	1.4E-06	1.4E-05	1.7E-05	2	38.7	37.2
		364	KA3566G02:2	12.30	18.30	16.23	33.36	18	1.031	8.04E-02	1.5E-06	1.4E-05	1.9E-05	2	33.5	32.9
		364	KA3566G02:3	7.80	11.30	10.25	30.68	150	0.105	1.50E-02	-	-	-	2	11.8	10
		364	KA3566G02:4	1.30	6.80	3.99	28.95	120	0.116	1.57E-02	8.3E-06	3.7E-04	5.3E-04	1	5.1	1.9
		364	KA3572G01:1	0.30	12.00	7.67	27.55	250	0.051	8.35E-03	-	-	-	1	0	1.1
		364	KA3573A:1	18.00	40.07	21.34	27.42	3	4.177	2.15E-01	2.4E-06	5.1E-06	1.1E-05	2	38.9	37.5
		364	KA3573A:2	4.50	17.00	9.16	27.87	0.7	18.498	7.38E-01	1.4E-06	7.7E-07	1.9E-06	1	124.9	122.4
		364	KA3574G01:1	0.30	12.00	4.93	30.74	-	-	-	-	-	-	0	0	-0.2
		364	KA3576G01:1	0.30	12.01	5.99	30.43	-	-	-	-	-	-	0	-	-
		364	KA3578G01:1	0.30	12.58	7.03	32.13	-	-	-	-	-	-	0	-0.2	0
		364	KA3579G01:1	0.30	22.65	7.62	32.87	-	-	-	-	-	-	0	-14.7	27
		364	KA3584G01:1	0.30	12.00	6.24	23.98	-	-	-	-	-	-	0	-0.4	-0.8
		364	KA3590G01:1	0.30	30.06	4.33	41.70	2.7	10.736	5.42E-01	9.9E-06	4.8E-06	1.8E-05	2	22.7	26.2
		364	KA3590G02:1	0.30	30.05	26.73	52.35	11	4.152	2.86E-01	2.5E-06	4.8E-06	8.8E-06	2	32.5	32.3
		364	KA3593G01:1	0.30	30.02	6.45	44.97	25	1.348	1.15E-01	2.7E-06	1.8E-05	2.3E-05	2	23.8	24.8
		364	KA3600F:1	22.00	50.10	31.78	76.03	30	3.211	2.88E-01	-	-	-	1	6.2	6
		364	KA3600F:2	4.50	21.00	12.51	61.08	7.5	8.289	5.20E-01	1.7E-05	5.7E-06	3.3E-05	2	9.7	11.3
		364	KG0021A01:1	42.50	48.82	43.53	37.41	4.6	5.072	2.86E-01	1.7E-06	4.1E-06	6.0E-06	2	51.2	50.8
		364	KG0021A01:2	35.00	41.50	37.70	38.24	4.8	5.079	2.89E-01	2.5E-06	5.1E-06	8.7E-06	2	39.6	39.8
		364	KG0021A01:3	25.00	34.00	28.64	41.17	5.4	5.232	3.05E-01	3.3E-06	5.6E-06	1.1E-05	2	31.5	33
		364	KG0021A01:4	17.00	24.00	21.80	44.49	18	1.833	1.43E-01	-	-	-	2	24.7	23.9
		364	KG0021A01:5	4.00	16.00	11.64	50.74	20	2.146	1.72E-01	5.2E-06	1.8E-05	3.0E-05	2	13.4	12.6
		364	KG0048A01:1	49.00	54.69	53.81	47.92	0.65	58.891	2.32E+00	1.3E-06	2.8E-07	5.6E-07	2	123.3	120.8
		364	KG0048A01:2	41.00	48.00	45.90	45.88	1.5	23.391	1.06E+00	1.5E-06	5.1E-07	1.4E-06	2	84.7	82.8
		364	KG0048A01:3	30.00	40.00	33.50	45.35	2	17.139	8.18E-01	2.2E-06	1.2E-06	2.7E-06	2	64.3	63.3
		364	KG0048A01:4	4.00	29.00	9.12	53.46	25	1.905	1.62E-01	4.9E-06	1.8E-05	3.0E-05	2	12.7	11.7

4.3 Interference test 2:9

The test was carried out in KA3554G02, section 10.30 - 21.80 meters. The flow period was for 364 minutes with a final flow of 0.482 l/min, while the pressure build-up time was 974 minutes. In *Figure 4-5* and *Figure 4-6* the pressure drawdown recordings are shown and in *Table 4-3* the interference test results are presented. Diagrams of evaluated bore hole sections are presented in *Appendix 4.*

The two lowest sections of KA3539G show almost exactly the same pressures during this test. This was a consequence of a leakage between the two measurement sections.

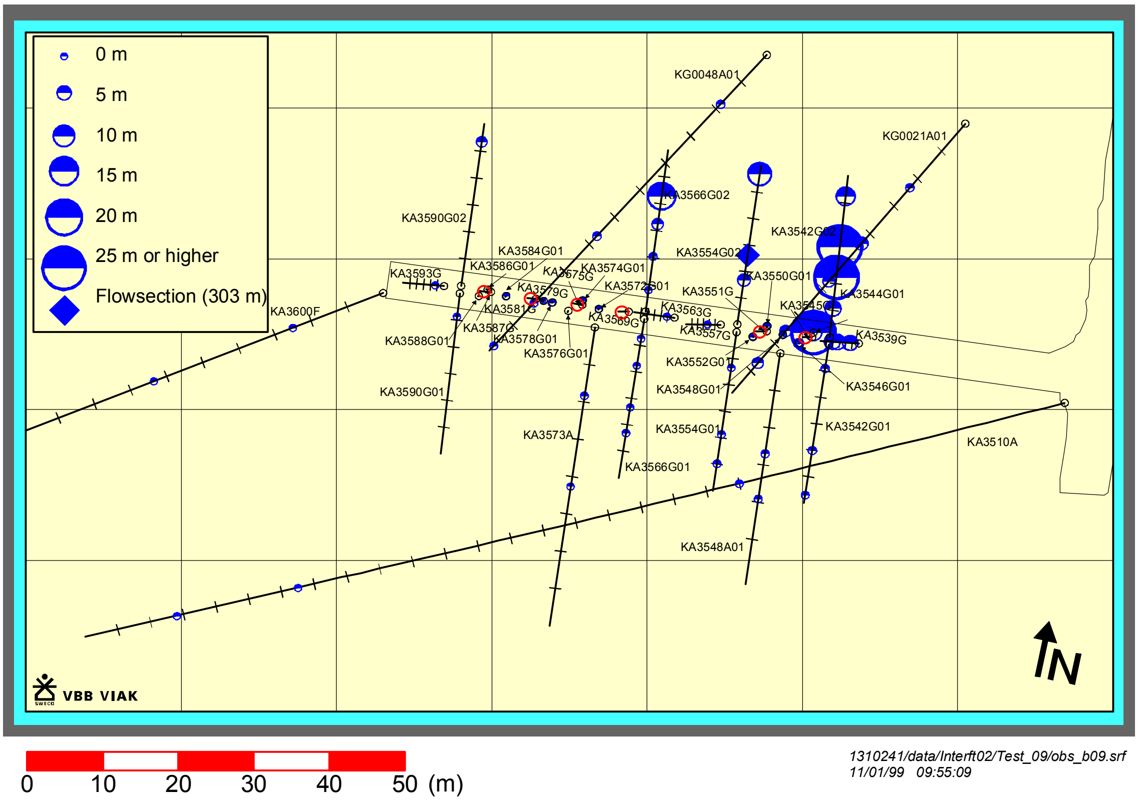

Figure 4-5 Drawdown during flowing of KA3554G02:2 (Interferencetest 2:9) - plan view

This test coincided with a major earthquake in Turkey the night between 1999-08-16 and 1999-08-17. Several of the observation sections responded to this event, which is clearly visible in the plots in *Appendix 4.*

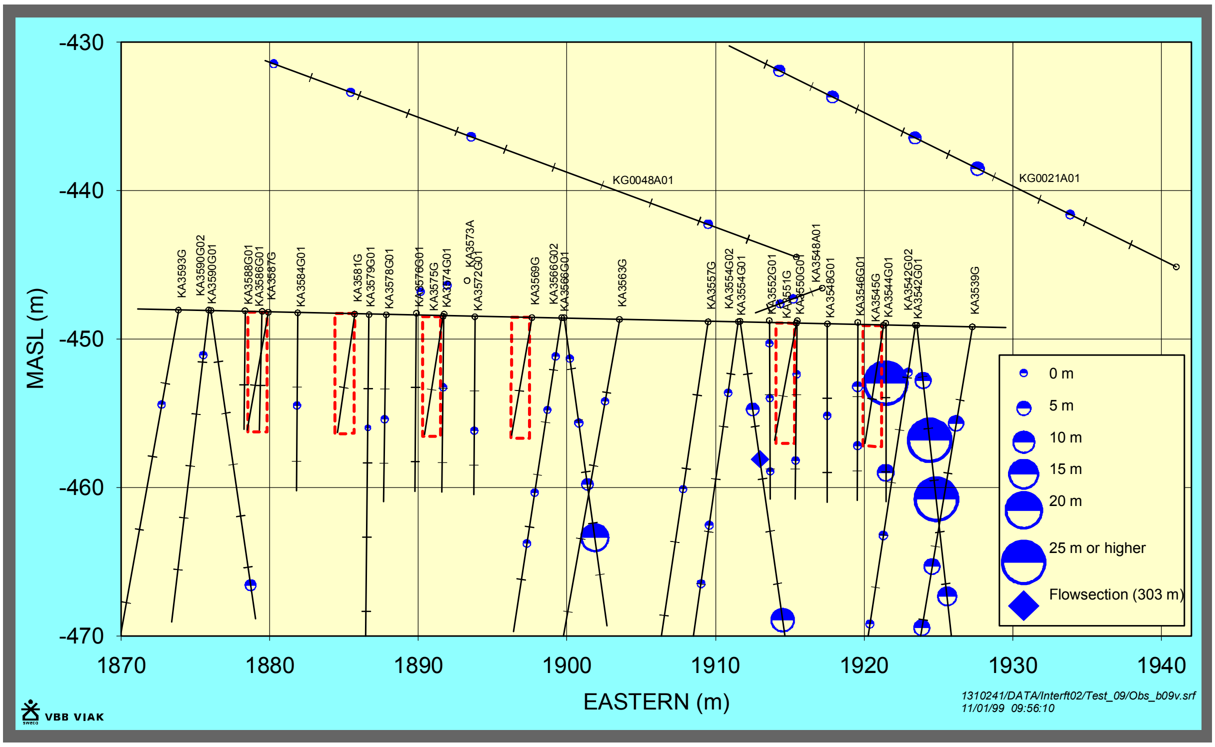

Figure 4-6 Drawdown during flowing of KA3554G02:2 (Interferencetest 2:9) - vertical view

Three of the observation boreholes respond rather well, with relatively short response times, during this test. The best connection exist between the flow section and the observation sections KA3566G02:1, KA3542G02:3 and the sections of KA3539G which all show similar responses. Altogether, this is evidence of probably several hydraulic structures on the north side of the tunnel. It may be in close contact with the structure activated during test 1:2 and 1:5.

The transmissivity of the flowing section is evaluated to be $1.8 \cdot 10^{-7}$ m^2/s with the evaluation period 0.6 – 2 minutes. The transmissivity of KA3566G02:1 and KA3542G02:3 is $1.2 \cdot 10^{-7}$ m^2/s and $1.8 \cdot 10^{-7}$ m^2/s respectively. This is within the same order of magnitude as the structure observed during the earlier tests at the north side of the prototype repository.

Table 4-3 **Interference test results for KA3554G02, 10.30 - 21.80 m. (r = aprox. distance from flowing bore hole section to observation bore hole section, t_L = time lag for a pressure response of 0.1 m to be registered in an observation section, T = transmissivity, S = storage coefficient, S^* = storage coefficient from diffusivity, $\tilde{\eta}$) The response is classified as 0 = no response (< 0.1 m), 1 = some response (0.1 m - 1.0 m) and 2 = good response (> 1.0 m).**

Flowing borehole	Hydraulic centre of borehole (m)	Flowtime dt (min)	Observation borehole	Secup (m)	Seclow (m)	Hydraulic centre of borehole (m)	r (m)	t_L (recovery) (min)	r^2/t_L (m²/s)	η (m²/s)	T_{EVAL} (m²/s)	S (-)	S^* (-)	Response (0 = no, 1 = some, 2 =good response	Po - Pp (kPa)	Pf - Pp (kPa)
KA3554G02:2		364	KA3510A:1	122.02	150.00	136.00	105.49	-	-	-	-	-	-	0	0.2	0.6
2:09		364	KA3510A:2	114.02	121.02	117.50	87.98	240	0.538	8.77E-02	-	-	-	1	0.4	1.4
		364	KA3510A:3	4.52	113.02	50.00	34.15	50	0.389	4.04E-02	3.0E-06	1.6E-05	7.4E-05	1	5	2.3
		364	KA3539G:1	19.30	30.01	20.56	19.48	1.4	4.518	2.02E-01	2.1E-06	1.4E-06	1.0E-05	2	58.7	46.4
		364	KA3539G:2	9.80	18.30	16.37	17.87	1.3	4.095	1.81E-01	2.1E-06	1.7E-06	1.2E-05	2	58.4	46.4
		364	KA3539G:3	1.30	8.80	6.59	17.77	1.3	4.048	1.79E-01	2.0E-06	1.6E-06	1.1E-05	2	55.6	43.5
		364	KA3542G01:1	25.80	30.04	28.50	34.51	45	0.441	4.45E-02	2.9E-06	1.7E-05	6.5E-05	1	4.9	2.1
		364	KA3542G01:2	8.80	24.80	20.06	27.70	31	0.413	3.74E-02	1.2E-06	1.3E-05	3.2E-05	1	8.3	5.3
		364	KA3542G01:3	1.30	7.80	4.50	18.97	30	0.200	1.79E-02	2.9E-06	3.5E-05	1.6E-04	1	7.7	6.9
		364	KA3542G02:1	22.30	30.01	26.21	17.47	15	0.339	2.52E-02	-	-	-	2	79.6	77.5
		364	KA3542G02:2	13.80	21.30	16.83	12.23	1.1	2.267	9.73E-02	4.1E-07	4.3E-07	4.2E-06	2	421.4	432.8
		364	KA3542G02:3	8.80	12.80	11.13	11.88	0.4	5.881	2.15E-01	1.8E-07	1.1E-07	8.4E-07	2	492.2	487.7
		364	KA3542G02:4	1.30	7.80	5.36	14.10	-	-	-	-	-	-	-	60.1	50.3
		364	KA3544G01:1	6.30	12.00	10.07	13.35	3.1	0.958	4.97E-02	9.4E-07	4.8E-06	1.9E-05	2	64.2	44.4
		364	KA3544G01:2	1.30	5.30	4.03	14.27	5.2	0.652	3.77E-02	1.7E-06	9.5E-06	4.5E-05	2	662.3	28.8
		364	KA3546G01:1	6.80	12.00	8.30	13.46	20	0.151	1.21E-02	3.5E-06	5.7E-05	2.9E-04	1	5.7	4
		364	KA3546G01:2	1.30	5.80	4.33	14.28	50	0.068	7.07E-03	5.8E-07	5.5E-05	8.2E-05	1	18.6	6.3
		364	KA3548A01:1	15.00	30.00	19.56	34.03	60	0.322	3.53E-02	2.0E-06	1.8E-05	5.7E-05	1	4.5	1.8
		364	KA3548A01:2	10.00	14.00	13.49	28.56	37	0.368	3.50E-02	1.3E-06	1.5E-05	3.7E-05	1	7.6	4.7
		364	KA3548G01:1	0.30	12.01	6.18	11.89	60	0.039	4.31E-03	-	-	-	1	1.3	2.1
		364	KA3550G01:1	6.30	12.03	9.42	9.76	120	0.013	1.78E-03	-	-	-	1	1.4	2.4
		364	KA3550G01:2	1.30	5.30	3.61	11.30	220	0.010	1.55E-03	-	-	-	1	0.4	1.8
		364	KA3552G01:1	8.80	12.01	10.15	10.93	130	0.015	2.11E-03	-	-	-	1	-1	3.1
		364	KA3552G01:2	4.05	7.80	5.22	11.62	250	0.009	1.49E-03	-	-	-	1	-0.4	1.1
		364	KA3552G01:3	1.30	3.05	1.53	13.36	-	-	-	-	-	-	0	0.2	0.4
		364	KA3554G01:1	22.30	30.01	24.95	29.18	50	0.284	2.95E-02	2.6E-06	2.5E-05	8.8E-05	1	4.9	1.9
		364	KA3554G01:2	12.30	21.30	19.39	24.43	-	-	-	-	-	-	0	5.1	2
		364	KA3554G01:3	1.30	11.30	6.78	15.76	40	0.103	1.01E-02	-	-	-	1	1.7	1.4
		364	KA3554G02:1	22.30	30.01	28.47	15.34	-	-	-	-	-	-	2	110	114.3
		364	**KA3554G02:2**	**10.30**	**21.01**	**13.13**	**0.00**	-	-	-	**1.8E-07**	-	-	2	3034.8	3029.3
		364	KA3554G02:3	1.30	9.30	8.39	4.74	-	-	-	-	-	-	2	37.2	54.8
		364	KA3557G:1	0.30	30.04	11.40	10.75	-	-	-	-	-	-	0	-0.4	1
		364	KA3563G01:1	0.30	30.00	5.60	13.79	-	-	-	-	-	-	0	0	-0.7
		364	KA3566G01:1	20.80	30.01	21.57	28.89	200	0.070	1.08E-02	-	-	-	1	2.8	0.4
		364	KA3566G01:2	12.30	19.80	16.71	25.35	200	0.054	8.33E-03	-	-	-	1	1.3	3.1
		364	KA3566G01:3	7.30	11.30	8.81	20.74	70	0.102	1.18E-02	-	-	-	1	-1.3	6.3
		364	KA3566G01:4	1.30	6.30	3.70	18.96	100	0.060	7.66E-03	2.9E-06	1.1E-04	3.8E-04	1	1.4	2.6
		364	KA3566G02:1	19.30	30.01	21.41	14.56	1.2	2.945	1.28E-01	1.2E-07	9.7E-07	9.3E-07	2	140.2	133.9
		364	KA3566G02:2	12.30	18.30	16.23	12.42	7	0.367	2.27E-02	3.8E-07	1.4E-05	1.7E-05	2	29.1	27
		364	KA3566G02:3	7.80	11.30	10.25	12.42	200	0.013	2.00E-03	-	-	-	1	6.6	5.2
		364	KA3566G02:4	1.30	6.80	3.99	15.19	200	0.019	2.99E-03	-	-	-	1	0.4	1.2
		364	KA3572G01:1	0.30	12.00	7.67	20.60	-	-	-	-	-	-	0	-0.2	1.8
		364	KA3573A:1	18.00	40.07	21.34	39.88	100	0.265	3.39E-02	-	-	-	1	1.4	1.6
		364	KA3573A:2	4.50	17.00	9.16	30.46	45	0.344	3.46E-02	3.2E-06	2.1E-05	9.2E-05	1	4.5	2
		364	KA3574G01:1	0.30	12.00	4.93	22.66	-	-	-	-	-	-	0	0	0
		364	KA3576G01:1	0.30	12.01	5.99	24.62	-	-	-	-	-	-	0		
		364	KA3578G01:1	0.30	12.58	7.03	26.16	-	-	-	-	-	-	0	1.2	0.2
		364	KA3579G01:1	0.30	22.65	7.62	27.13	-	-	-	-	-	-	0	-10.8	30.9
		364	KA3584G01:1	0.30	12.00	6.24	31.83	-	-	-	-	-	-	0	-0.2	0.6
		364	KA3590G01:1	0.30	30.06	4.33	38.96	-	-	-	-	-	-	0	0.4	-0.6
		364	KA3590G02:1	0.30	30.05	26.73	38.36	9	2.724	1.78E-01	5.1E-07	1.4E-06	2.9E-06	2	25	23.1
		364	KA3593G01:1	0.30	30.02	6.45	40.61	100	0.275	3.51E-02	-	-	-	1	1.1	4.3
		364	KA3600F:1	22.00	50.10	31.78	79.16	260	0.402	6.69E-02	-	-	-	1	0.5	1.3
		364	KA3600F:2	4.50	21.00	12.51	60.60	230	0.266	4.30E-02	-	-	-	1	0.9	1.9
		364	KG0021A01:1	42.50	48.82	43.53	29.85	5	2.970	1.70E-01	5.6E-07	1.3E-06	3.3E-06	2	27.4	24.3
		364	KG0021A01:2	35.00	41.50	37.70	26.83	3	4.000	2.06E-01	5.5E-07	1.2E-06	2.7E-06	2	30.7	27.9
		364	KG0021A01:3	25.00	34.00	28.64	24.28	1.1	8.930	3.83E-01	5.7E-07	1.1E-06	1.5E-06	2	33.2	30.5
		364	KG0021A01:4	17.00	24.00	21.80	24.49	22	0.454	3.74E-02	1.0E-07	3.5E-06	2.7E-06	2	42.4	40.1
		364	KG0021A01:5	4.00	16.00	11.64	28.06	22	0.596	4.91E-02	8.9E-07	8.9E-06	1.8E-05	1	9.8	8.8
		364	KG0048A01:1	49.00	54.69	53.81	43.86	50	0.641	6.67E-02	-	-	-	1	4.5	2.3
		364	KG0048A01:2	41.00	48.00	45.90	37.55	30	0.783	7.02E-02	2.5E-06	7.8E-06	3.6E-05	1	5.3	4.1
		364	KG0048A01:3	30.00	40.00	33.50	29.25	11	1.296	8.91E-02	1.4E-06	4.3E-06	1.6E-05	1	10.6	9.4
		364	KG0048A01:4	4.00	29.00	9.12	25.73	28	0.394	3.47E-02	8.6E-07	1.1E-05	2.5E-05	1	9.2	8.6

4.4 Interference test 2:10

The test was carried out in KA3542G01, section 8.80 - 24.80 meters. The flow period was for 365 minutes with a final flow of 2.556 l/min, while the pressure build-up time was 365 minutes. In *Figure 4-7* and *Figure 4-8* the pressure drawdown recordings are shown and in Table 4-4 the interference test results are presented. Diagrams of evaluated bore hole sections are presented in Appendix 5.

The two lowest sections of KA3539G show almost exactly the same pressures during this test. This was a consequence of a leakage between the two measurement sections.

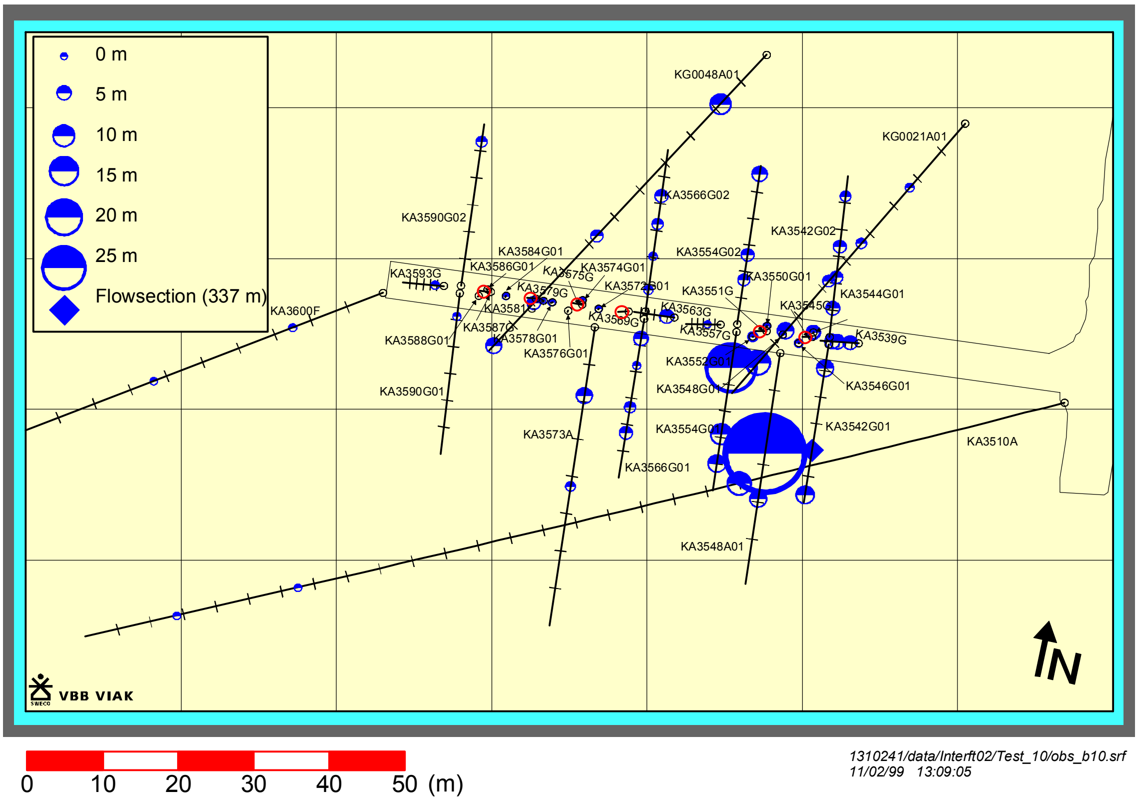

Figure 4-7 Drawdown during flowing of KA3542G01:2 (Interferencetest 2:10) - plan view

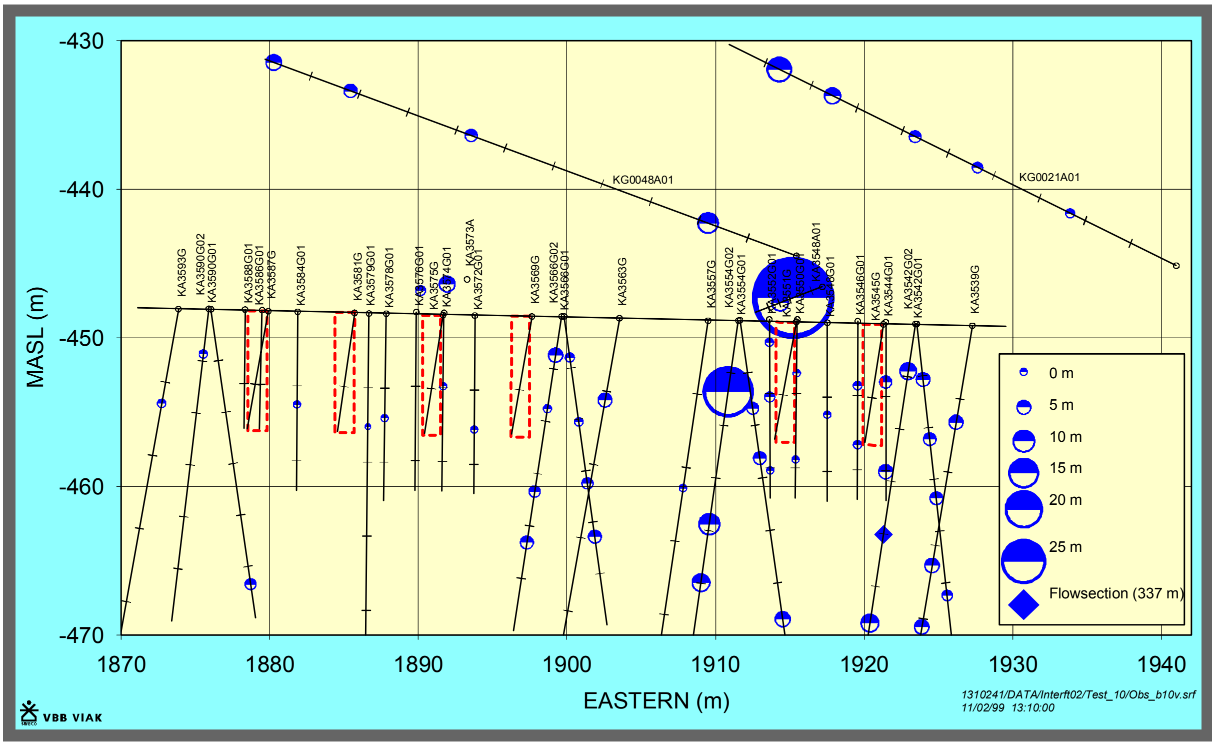

Figure 4-8 Drawdown during flowing of KA3542G01:2 (Interferencetest 2:10) - vertical view

The pressure responses of this test show only a few with short response times, i.e. less than 1 minute. Good connection exists between the flow section and KA3510A:3 and KA3548A01:2.

During this test no radial flow occurred into the flow section until late in test period ($T = 6.5 \cdot 10^{-6}$ m^2/s with the evaluation time 200 – 250 minutes). Therefor the evaluated transmissivity of the flowing borehole section is estimated to include several hydraulic structures and not a single one. The observed pressure response in KA3548A01:2, however, is a good one and evaluated to be $5.4 \cdot 10^{-7}$ m^2/s while the storativity is $2.4 \cdot 10^{-7}$.

Table 4-4 Interference test results for KA3542G01, 8.80 - 24.80 m. (r = aprox. distance from flowing bore hole section to observation bore hole section, t_L = time lag for a pressure response of 0.1 m to be registered in an observation section, T = transmissivity, S = storage coefficient, S^* = storage coefficient from diffusivity, η) The response is classified as 0 = no response (< 0.1 m), 1 = some response (0.1 m - 1.0 m) and 2 = good response (> 1.0 m).

Flowing borehole	Hydraulic centre of borehole (m)	Flowtime dt (min)	Observation borehole	Secup (m)	Seclow (m)	Hydraulic centre of borehole (m)	r (m)	t_L (recovery) (min)	r^2/t_L (m²/s)	η (m²/s)	T_{EVAL} (m²/s)	S (-)	S^* (-)	Response (0 = no, 1 = some, 2 =good response	Po - Pp (kPa)	Pf - Pp (kPa)
KA3542G01:2	**20.06**	365	KA3510A:1	122.02	150.00	136.00	100.17	7	23.890	1.48E+00	2.4E-05	2.0E-06	1.6E-05	1	3.5	3.5
2:10		365	KA3510A:2	114.02	121.02	117.50	81.69	47	2.367	2.41E-01	1.3E-05	1.5E-05	5.4E-05	1	3.5	4.1
		365	KA3510A:3	4.52	113.02	50.00	14.78	0.21	17.339	5.81E-01	2.6E-06	1.0E-06	4.5E-06	2	111.6	111.6
		365	KA3539G:1	19.30	30.01	20.56	15.94	3	1.411	7.28E-02	-	-	-	2	50.9	45.8
		365	KA3539G:2	9.80	18.30	16.37	14.91	3	1.235	6.37E-02	-	-	-	2	50.9	45.8
		365	KA3539G:3	1.30	8.80	6.59	16.88	2	2.374	1.13E-01	-	-	-	2	47.6	44
		365	KA3542G01:1	25.80	30.04	28.50	8.44	-	-	-	-	-	-	2	73.6	73
		365	**KA3542G01:2**	**8.80**	**24.80**	**20.06**	**0.00**	**-**	**-**	**-**	**6.5E-06**	**-**	**-**	**2**	**3370.9**	**3369.7**
		365	KA3542G01:3	1.30	7.80	4.50	15.56	-	-	-	-	-	-	2	66.6	67.6
		365	KA3542G02:1	22.30	30.01	26.21	34.22	80	0.244	2.92E-02	-	-	-	2	23.3	22.5
		365	KA3542G02:2	13.80	21.30	16.83	27.36	3	4.160	2.14E-01	-	-	-	2	38.7	37.2
		365	KA3542G02:3	8.80	12.80	11.13	24.04	2	4.817	2.30E-01	-	-	-	2	38.2	35.8
		365	KA3542G02:4	1.30	7.80	5.36	21.71	3	2.619	1.35E-01	-	-	-	2	45.8	41.9
		365	KA3544G01:1	6.30	12.00	10.07	16.21	8	0.547	3.49E-02	4.2E-06	4.3E-05	1.2E-04	2	48.7	43.2
		365	KA3544G01:2	1.30	5.30	4.03	18.72	20	0.292	2.34E-02	-	-	-	2	33.9	29.8
		365	KA3546G01:1	6.80	12.00	8.30	15.54	20	0.201	1.61E-02	6.6E-06	1.4E-04	4.1E-04	1	8.2	8.4
		365	KA3546G01:2	1.30	5.80	4.33	17.49	30	0.170	1.52E-02	2.9E-06	1.8E-04	1.9E-04	1	10	7.3
		365	KA3548A01:1	15.00	30.00	19.56	18.26	2.5	2.222	1.11E-01	-	-	-	2	65.2	64.4
		365	KA3548A01:2	10.00	14.00	13.49	17.06	0.17	28.537	9.29E-01	5.4E-07	2.4E-07	5.8E-07	2	495.8	496.2
		365	KA3548G01:1	0.30	12.01	6.18	17.73	80	0.066	7.83E-03	2.1E-05	6.4E-04	2.7E-03	1	1.2	1.8
		365	KA3550G01:1	6.30	12.03	9.42	18.21	-	-	-	-	-	-	0	-0.2	1
		365	KA3550G01:2	1.30	5.30	3.61	20.60	-	-	-	-	-	-	0	1.3	-4
		365	KA3552G01:1	8.80	12.01	10.15	17.40	-	-	-	-	-	-	0	0.8	-0.2
		365	KA3552G01:2	4.05	7.80	5.22	19.27	23	0.269	2.24E-02	1.4E-06	4.1E-05	6.3E-05	2	20	20.8
		365	KA3552G01:3	1.30	3.05	1.53	21.31	60	0.126	1.38E-02	-	-	-	1	7.7	6.5
		365	KA3554G01:1	22.30	30.01	24.95	12.81	2.1	1.302	6.27E-02	7.9E-07	1.0E-05	1.3E-05	2	72.7	71.9
		365	KA3554G01:2	12.30	21.30	19.39	11.92	3.3	0.718	3.77E-02	5.4E-07	1.0E-05	1.4E-05	2	95.5	94.1
		365	KA3554G01:3	1.30	11.30	6.78	17.93	2.8	1.914	9.73E-02	1.9E-07	1.4E-06	2.0E-06	2	288.9	295.5
		365	KA3554G02:1	22.30	30.01	28.47	37.71	24	0.988	8.32E-02	3.6E-07	5.3E-06	4.3E-06	2	55.1	53.3
		365	KA3554G02:2	10.30	21.01	13.13	27.70	1.5	8.528	3.86E-01	1.1E-06	1.3E-05	2.8E-06	2	38.5	36.3
		365	KA3554G02:3	1.30	9.30	8.39	25.70	31	0.355	3.21E-02	3.6E-07	1.2E-05	1.1E-05	2	32.5	28.2
		365	KA3557G:1	0.30	30.04	11.40	21.70	120	0.065	8.81E-03	7.9E-06	4.5E-04	9.0E-04	1	1.4	2.3
		365	KA3563G01:1	0.30	30.00	5.60	27.35	12	1.039	7.29E-02	5.5E-07	6.0E-06	7.5E-06	2	47	48.7
		365	KA3566G01:1	20.80	30.01	21.57	24.10	9	1.076	7.04E-02	9.3E-07	9.3E-06	1.3E-05	2	40.1	40.3
		365	KA3566G01:2	12.30	19.80	16.71	24.32	14	0.704	5.14E-02	1.1E-06	1.5E-05	2.1E-05	2	28.7	31.3
		365	KA3566G01:3	7.30	11.30	8.81	26.63	150	0.079	1.13E-02	-	-	-	1	6.1	7.5
		365	KA3566G01:4	1.30	6.30	3.70	29.19	50	0.284	2.95E-02	4.1E-07	1.4E-05	1.4E-05	2	50.1	46.3
		365	KA3566G02:1	19.30	30.01	21.41	38.92	22	1.147	9.44E-02	7.2E-07	6.6E-06	7.6E-06	2	40.3	38.8
		365	KA3566G02:2	12.30	18.30	16.23	36.19	26	0.840	7.23E-02	6.5E-07	8.4E-06	9.0E-06	2	28.2	27.6
		365	KA3566G02:3	7.80	11.30	10.25	33.77	180	0.106	1.60E-02	-	-	-	1	8.8	8
		365	KA3566G02:4	1.30	6.80	3.99	32.24	44	0.394	3.94E-02	6.5E-07	1.8E-05	1.6E-05	2	13.9	14.8
		365	KA3572G01:1	0.30	12.00	7.67	34.04	-	-	-	-	-	-	0	-0.2	1.4
		365	KA3573A:1	18.00	40.07	21.34	35.52	10.5	2.003	1.36E-01	1.9E-06	7.2E-06	1.4E-05	2	18.4	19
		365	KA3573A:2	4.50	17.00	9.16	34.61	3.5	5.705	3.03E-01	8.3E-07	1.9E-06	2.7E-06	2	59.6	59.2
		365	KA3574G01:1	0.30	12.00	4.93	37.06	-	-	-	-	-	-	0	0.4	0.4
		365	KA3576G01:1	0.30	12.01	5.99	37.56	-	-	-	-	-	-	0		
		365	KA3578G01:1	0.30	12.58	7.03	39.65	-	-	-	-	-	-	0	0	-0.2
		365	KA3579G01:1	0.30	22.65	7.62	40.63	-	-	-	-	-	-	0	-10.2	28.9
		365	KA3584G01:1	0.30	12.00	6.24	45.29	-	-	-	-	-	-	0	0	0
		365	KA3590G01:1	0.30	30.06	4.33	50.56	18	2.367	1.84E-01	5.0E-06	9.8E-06	2.7E-05	1	7.6	8.8
		365	KA3590G02:1	0.30	30.05	26.73	59.15	17	3.431	2.63E-01	1.4E-06	3.3E-06	5.3E-06	2	26	26
		365	KA3593G01:1	0.30	30.02	6.45	54.00	65	0.748	8.40E-02	1.4E-06	1.5E-05	1.7E-05	2	9	10.2
		365	KA3600F:1	22.00	50.10	31.78	86.92	60	2.099	2.30E-01	1.4E-05	1.7E-05	6.1E-05	1	3.7	4.1
		365	KA3600F:2	4.50	21.00	12.51	70.98	25	3.359	2.86E-01	1.0E-05	9.3E-06	3.5E-05	1	6.1	6.7
		365	KG0021A01:1	42.50	48.82	43.53	34.12	1.6	12.125	5.55E-01	5.5E-07	5.5E-07	9.9E-07	2	119.5	124
		365	KG0021A01:2	35.00	41.50	37.70	33.70	3	6.309	3.25E-01	1.0E-06	1.5E-06	3.1E-06	2	63	64.5
		365	KG0021A01:3	25.00	34.00	28.64	35.02	6.3	3.245	1.96E-01	1.8E-06	5.0E-06	9.2E-06	2	31.9	31.9
		365	KG0021A01:4	17.00	24.00	21.80	37.47	10	2.340	1.57E-01	1.1E-06	1.6E-05	7.0E-06	2	22.9	22.7
		365	KG0021A01:5	4.00	16.00	11.64	42.90	28	1.095	9.63E-02	2.9E-06	1.8E-05	3.0E-05	2	12.5	11.2
		365	KG0048A01:1	49.00	54.69	53.81	53.71	3.8	12.651	6.84E-01	8.9E-07	8.3E-07	1.3E-06	2	58.6	58.2
		365	KG0048A01:2	41.00	48.00	45.90	50.58	6	7.107	4.24E-01	1.0E-06	1.4E-06	2.4E-06	2	41.8	41.8
		365	KG0048A01:3	30.00	40.00	33.50	47.95	7.2	5.323	3.31E-01	1.3E-06	2.2E-06	3.9E-06	2	35.2	35.2
		365	KG0048A01:4	4.00	29.00	9.12	51.83	3	14.926	7.70E-01	2.7E-06	1.2E-05	3.5E-06	2	91.9	90.9

4.5 Interference test 2:11

The test was carried out in KA3542G02, section 1.30 - 7.80 m. The flow period was for 361 minutes with a final flow of 3.37 l/min, while the pressure build-up time was 1014 minutes. In *Figure 4-9* and *Figure 4-10* the pressure drawdown recordings are shown and in *Table 4-5* the interference test results are presented. Diagrams of evaluated bore hole sections are presented in *Appendix 6*.

The two lowest sections of KA3539G show almost exactly the same pressures during this test. This was a consequence of a leakage between the two measurement sections.

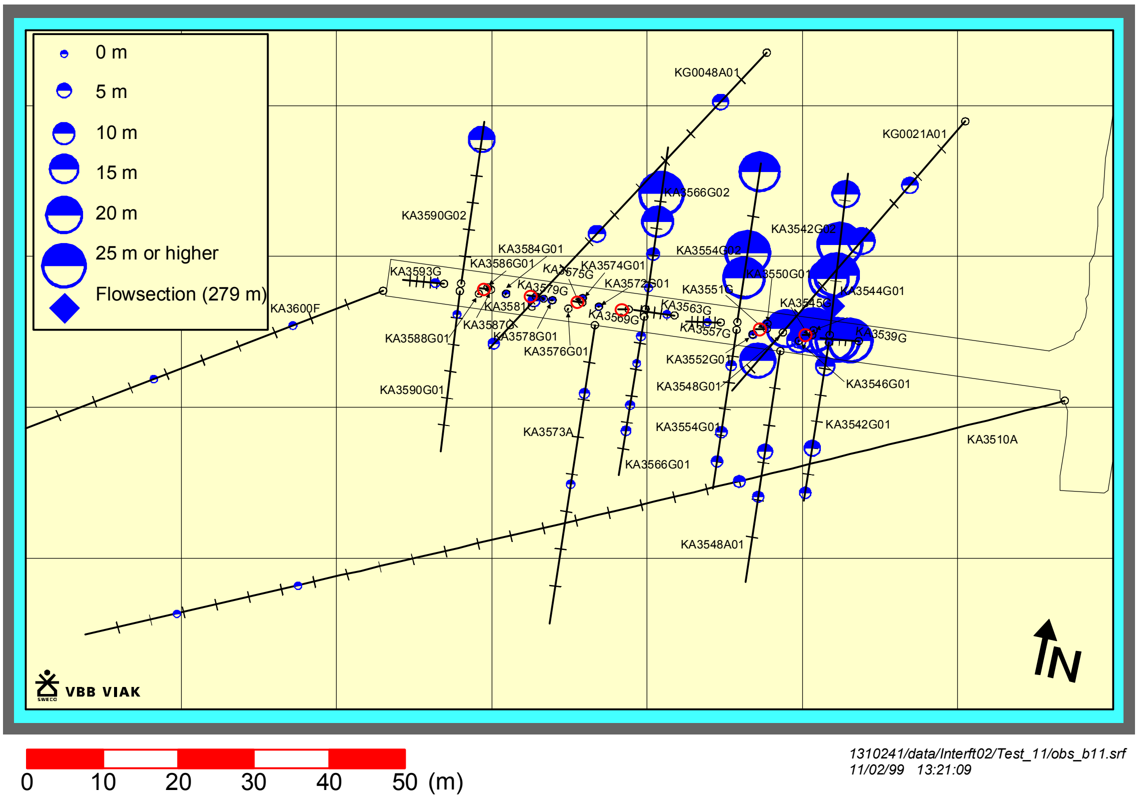

Figure 4-9 Drawdown during flowing of KA3542G02:4 (Interferencetest 2:11) - plan view

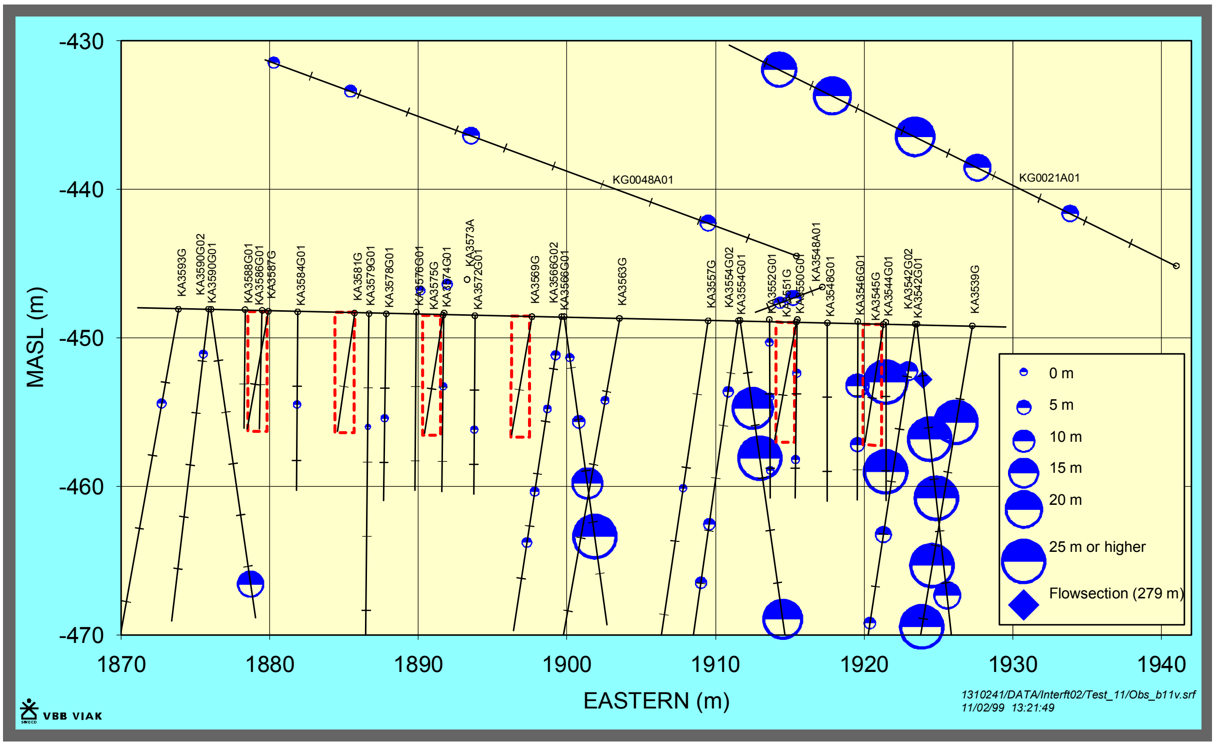

Figure 4-10 Drawdown during flowing of KA3542G02:4 (Interferencetest 2:11) - vertical view

The closest observation section, KA3544G01:2, to the flow section is located with a distance of approximately 4 meters to it. The response time is very short, less than 5 seconds. The hydraulic properties of this hydraulic connection is evaluated to be $T = 9.7 \cdot 10^{-6}$ m^2/s and $S = 1.1 \cdot 10^{-4}$. This may be the result of a feature being rather horizontal. The value of storativity is high and may indicate of the involvement of several hydraulic features. The lower section of KA3544G01 responds rather fast as well, indicating a connection with the dominating hydraulic feature at the north side of the prototype tunnel.

This is consistent with the results of the rest of the observation sections with rather short response times. The flow section has good connection with KG0021A01:3, KA3554G02:2 and the sections of KA3539G. The transmissivity of these sections is within the range $4 \cdot 10^{-7}$ and $2 \cdot 10^{-6}$ m^2/s with a storativity range of $2 - 7 \cdot 10^{-7}$. The evaluated transmissivity of the flow section is $T = 6.1 \cdot 10^{-7}$ m^2/s with the evaluation period 0.7 – 3 minutes.

Table 4-5 **Interference test results for KA3542G02, 1.30 – 7.80 m. (r = aprox. distance from flowing bore hole section to observation bore hole section, t_L = time lag for a pressure response of 0.1 m to be registered in an observation section, T = transmissivity, S = storage coefficient, S^* = storage coefficient from diffusivity, $\tilde{\eta}$) The response is classified as 0 = no response (< 0.1 m), 1 = some response (0.1 m - 1.0 m) and 2 = good response (> 1.0 m).**

Flowing borehole	Hydraulic centre of borehole (m)	Flowtime dt (min)	Observation borehole	Secup (m)	Seclow (m)	Hydraulic centre of borehole (m)	r (m)	t_L (recovery) (min)	r^2/t_L (m²/s)	η (m²/s)	T_{EVAL} (m²/s)	S (-)	S^* (-)	Response (0 = no, 1 = some, 2 =good response	Po - Pp (kPa)	Pf - Pp (kPa)
KA3542G02:4	**5.36**	361	KA3510A:1	122.02	150.00	136.00	113.52	200	1.074	1.67E-01	-	-	-	1	0.6	0.8
2:11		361	KA3510A:2	114.02	121.02	117.50	95.44	100	1.518	1.94E-01	3.0E-05	3.6E-05	1.5E-04	1	1.8	2
		361	KA3510A:3	4.52	113.02	50.00	33.55	5	3.752	2.15E-01	2.5E-06	9.9E-06	1.2E-05	2	31.9	28.4
		361	KA3539G:1	19.30	30.01	20.56	17.23	0.18	27.491	9.03E-01	5.7E-07	2.2E-07	6.3E-07	2	678.9	688.7
		361	KA3539G:2	9.80	18.30	16.37	13.31	0.18	16.400	5.39E-01	6.5E-07	3.7E-07	1.2E-06	2	678.9	688.7
		361	KA3539G:3	1.30	8.80	6.59	5.84	0.205	2.774	9.27E-02	4.3E-07	2.0E-06	4.6E-06	2	659.5	668.5
		361	KA3542G01:1	25.80	30.04	28.50	29.91	8	1.863	1.19E-01	2.6E-06	1.5E-05	2.2E-05	2	28.6	25.2
		361	KA3542G01:2	8.80	24.80	20.06	21.71	3	2.619	1.35E-01	9.7E-07	1.3E-05	7.2E-06	2	59.5	55.6
		361	KA3542G01:3	1.30	7.80	4.50	8.05	5	0.216	1.24E-02	4.7E-07	9.6E-05	3.8E-05	2	79.3	91.9
		361	KA3542G02:1	22.30	30.01	26.21	20.85	-	-	-	-	-	-	2	133.7	127.8
		361	KA3542G02:2	13.80	21.30	16.83	11.47	-	-	-	-	-	-	2	308.9	309.3
		361	KA3542G02:3	8.80	12.80	11.13	5.77	-	-	-	-	-	-	2	331.4	331.2
		361	**KA3542G02:4**	**1.30**	**7.80**	**5.36**	**0.00**	**-**	**-**	**-**	**6.1E-07**	**-**	**-**	**2**	**2784.8**	**2797.5**
		361	KA3544G01:1	6.30	12.00	10.07	7.43	0.4	2.299	8.43E-02	9.1E-07	4.8E-06	1.1E-05	2	656.6	670.1
		361	KA3544G01:2	1.30	5.30	4.03	4.07	0.08	3.454	1.03E-01	9.7E-06	1.1E-04	9.5E-05	2	542.4	556.3
		361	KA3546G01:1	6.80	12.00	8.30	7.76	2	0.502	2.40E-02	2.0E-06	5.7E-05	8.3E-05	2	46.2	76
		361	KA3546G01:2	1.30	5.80	4.33	6.40	8	0.085	5.45E-03	3.3E-07	1.1E-04	6.1E-05	2	108.6	114.7
		361	KA3548A01:1	15.00	30.00	19.56	27.54	8	1.580	1.01E-01	2.8E-06	1.7E-05	2.8E-05	2	26.9	23.9
		361	KA3548A01:2	10.00	14.00	13.49	21.87	4	1.993	1.09E-01	1.2E-06	1.4E-05	1.1E-05	2	52	48.1
		361	KA3548G01:1	0.30	12.01	6.18	7.72	-	-	-	-	-	-	-	-	-
		361	KA3550G01:1	6.30	12.03	9.42	10.40	12	0.150	1.06E-02	3.9E-05	3.3E-04	3.7E-03	1	5.5	4.9
		361	KA3550G01:2	1.30	5.30	3.61	8.83	-	-	-	-	-	-	0	7.3	-9.4
		361	KA3552G01:1	8.80	12.01	10.15	12.55	150	0.018	2.52E-03	-	-	-	1	2.3	2.9
		361	KA3552G01:2	4.05	7.80	5.22	11.05	70	0.029	3.35E-03	1.0E-06	3.6E-04	3.0E-04	1	5.3	31.2
		361	KA3552G01:3	1.30	3.05	1.53	11.28	160	0.013	1.95E-03	-	-	-	1	2.6	4.9
		361	KA3554G01:1	22.30	30.01	24.95	28.89	9	1.545	1.01E-01	2.6E-06	1.6E-05	2.6E-05	2	28.3	25.2
		361	KA3554G01:2	12.30	21.30	19.39	24.10	7	1.383	8.56E-02	2.3E-06	2.3E-05	2.7E-05	2	29.2	25.8
		361	KA3554G01:3	1.30	11.30	6.78	15.32	1	3.913	1.66E-01	2.1E-06	1.1E-04	1.3E-05	2	21	20.6
		361	KA3554G02:1	22.30	30.01	28.47	25.83	9	1.235	8.11E-02	1.9E-07	3.5E-06	2.3E-06	2	219.4	215.9
		361	KA3554G02:2	10.30	21.01	13.13	14.10	0.18	18.401	6.05E-01	1.4E-06	3.1E-07	2.3E-06	2	401.7	408.5
		361	KA3554G02:3	1.30	9.30	8.39	12.22	0.41	6.067	2.23E-01	3.0E-07	8.1E-06	1.3E-06	2	230.5	227.1
		361	KA3557G:1	0.30	30.04	11.40	17.86	200	0.027	4.14E-03	-	-	-	1	0.2	1.7
		361	KA3563G01:1	0.30	30.00	5.60	21.47	75	0.102	1.20E-02	8.1E-06	3.3E-05	6.7E-04	1	3.9	5.1
		361	KA3566G01:1	20.80	30.01	21.57	33.23	18	1.022	7.99E-02	3.4E-06	2.7E-05	4.3E-05	2	16.6	14.6
		361	KA3566G01:2	12.30	19.80	16.71	30.20	33	0.461	4.25E-02	3.2E-06	5.0E-05	7.5E-05	1	12	9.6
		361	KA3566G01:3	7.30	11.30	8.81	26.46	60	0.195	2.14E-02	-	-	-	1	3.1	7.2
		361	KA3566G01:4	1.30	6.30	3.70	25.10	55	0.191	2.05E-02	1.9E-06	8.9E-05	9.3E-05	2	12.2	12
		361	KA3566G02:1	19.30	30.01	21.41	28.65	1.5	9.122	4.14E-01	3.1E-07	7.5E-07	7.5E-07	2	251.2	346.9
		361	KA3566G02:2	12.30	18.30	16.23	26.15	4	2.849	1.56E-01	1.2E-06	4.0E-06	7.7E-06	2	160.8	158.8
		361	KA3566G02:3	7.80	11.30	10.25	24.33	140	0.070	9.96E-03	-	-	-	2	37.2	30.7
		361	KA3566G02:4	1.30	6.80	3.99	23.94	12	0.796	5.60E-02	-	-	-	1	5.3	7.1
		361	KA3572G01:1	0.30	12.00	7.67	30.38	250	0.062	1.02E-02	-	-	-	1	0	1
		361	KA3573A:1	18.00	40.07	21.34	41.67	20	1.447	1.16E-01	6.8E-06	2.6E-05	5.8E-05	1	9.4	8.8
		361	KA3573A:2	4.50	17.00	9.16	34.65	9	2.223	1.46E-01	2.8E-06	1.2E-05	1.9E-05	2	20	23.2
		361	KA3574G01:1	0.30	12.00	4.93	32.31	-	-	-	-	-	-	0	0.2	0.4
		361	KA3576G01:1	0.30	12.01	5.99	34.17	-	-	-	-	-	-	-		
		361	KA3578G01:1	0.30	12.58	7.03	36.33	-	-	-	-	-	-	0	0	0.2
		361	KA3579G01:1	0.30	22.65	7.62	37.50	20	1.172	9.42E-02	-	-	-	1	-15.3	-32.1
		361	KA3584G01:1	0.30	12.00	6.24	42.19	-	-	-	-	-	-	0	0.2	0.4
		361	KA3590G01:1	0.30	30.06	4.33	48.47	50	0.783	8.16E-02	1.7E-05	7.2E-05	2.1E-04	1	4.1	2.9
		361	KA3590G02:1	0.30	30.05	26.73	52.20	2.6	17.467	8.78E-01	1.3E-06	7.4E-07	1.5E-06	2	127.4	122.1
		361	KA3593G01:1	0.30	30.02	6.45	51.35	60	0.732	8.06E-02	1.8E-06	2.2E-05	2.2E-05	2	11.5	11.3
		361	KA3600F:1	22.00	50.10	31.78	88.24	90	1.442	1.79E-01	1.6E-05	3.3E-05	8.9E-05	1	3.1	3.1
		361	KA3600F:2	4.50	21.00	12.51	69.95	50	1.631	1.70E-01	1.6E-05	2.8E-05	9.4E-05	1	4.3	4.5
		361	KG0021A01:1	42.50	48.82	43.53	24.11	1.4	6.921	3.10E-01	1.3E-06	1.8E-06	4.2E-06	2	187.5	178.5
		361	KG0021A01:2	35.00	41.50	37.70	20.27	0.6	11.410	4.45E-01	1.4E-06	1.1E-06	3.1E-06	2	206.5	198.3
		361	KG0021A01:3	25.00	34.00	28.64	16.75	0.21	22.264	7.47E-01	1.8E-06	6.4E-07	2.4E-06	2	217.5	209.1
		361	KG0021A01:4	17.00	24.00	21.80	17.06	0.9	5.388	2.24E-01	1.5E-05	9.7E-06	6.7E-05	2	133.1	127.4
		361	KG0021A01:5	4.00	16.00	11.64	21.89	6	1.331	7.96E-02	-	-	-	2	62.2	60.8
		361	KG0048A01:1	49.00	54.69	53.81	48.87	9	4.423	2.90E-01	2.9E-06	5.8E-06	1.0E-05	2	26	23.2
		361	KG0048A01:2	41.00	48.00	45.90	43.14	5	6.204	3.56E-01	4.1E-06	4.8E-06	1.2E-05	2	32.7	30.5
		361	KG0048A01:3	30.00	40.00	33.50	35.86	2.4	8.933	4.42E-01	3.7E-06	2.6E-06	8.4E-06	2	64.9	61.6
		361	KG0048A01:4	4.00	29.00	9.12	32.44	7	2.506	1.55E-01	-	-	-	2	57.6	56.4

4.6 Interference test 2:12

The test was planned to be carried out in KA3539G, section 9.80 - 18.30 m. Since there was a leak between the two lowest sections this test in fact included sections 9.80 – 18.30 meters plus 19.30 – 30.01 meters. The flow period was for 61 minutes with a final flow rate of 4.278 l/min, while the pressure build-up time was 529 minutes. In *Figure 4-11* and *Figure 4-12* the pressure drawdown recordings are shown and in *Table 4-6* the interference test results are presented. Diagrams of evaluated bore hole sections are presented in *Appendix 7.*

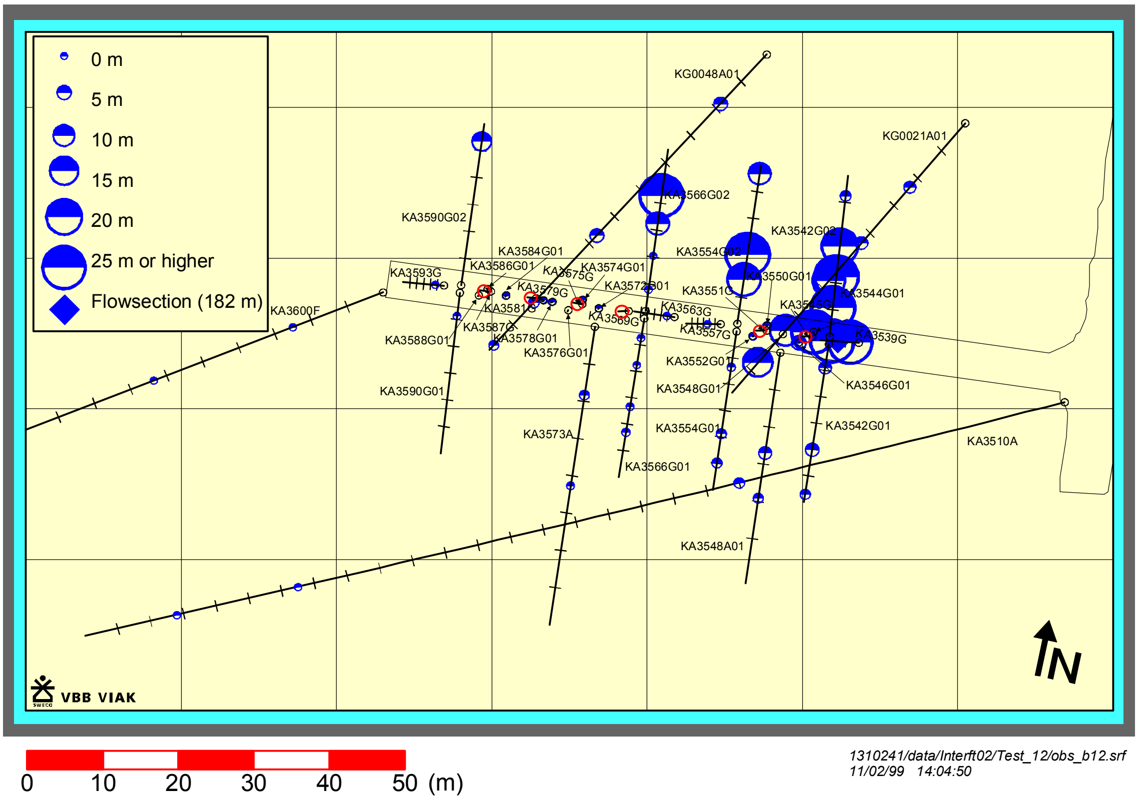

Figure 4-11 Drawdown during flowing of KA3539G:2 (Interferencetest 2:12) - plan view

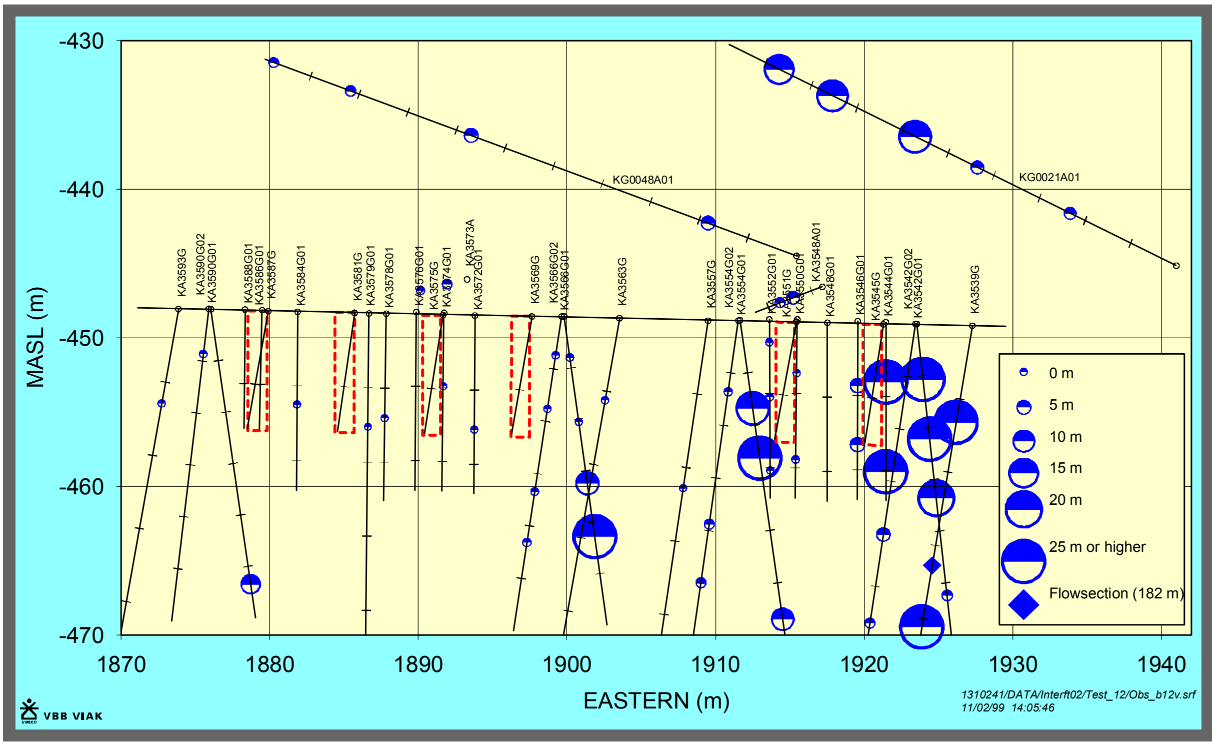

Figure 4-12 Drawdown during flowing of KA3539G:2 (Interferencetest 2:12) - vertical view

This test shows good connection, with short response times, between the flow section and KA3542G02:4, KA3544G01:1, KA3554G02:2 and KG0021A01:3. The transmissivity of these sections is within the range $9 \cdot 10^{-7}$ and $3 \cdot 10^{-6}$ m^2/s while the storativity is between $3 \cdot 10^{-7}$ and $3 \cdot 10^{-6}$. The evaluated transmissivity of the flow section is $5.3 \cdot 10^{-7}$ m^2/s with the evaluation period 0.4 – 2 minutes.

Considering the short response times and the magnitude of the evaluated hydraulic properties is seem plausible that the same structure, or system of hydraulic features, is activated in all of these borehole sections.

Table 4-6 Interference test results for KA3539G, 9.80 - 18.30 m. (r = aprox. distance from flowing bore hole section to observation bore hole section, t_L = time lag for a pressure response of 0.1 m to be registered in an observation section, T = transmissivity, S = storage coefficient, S^* = storage coefficient from diffusivity, η) The response is classified as 1 = no response (< 0.1 m), 2 = some response (0.1 m - 1.0 m) and 3 = good response (> 1.0 m).

Flowing borehole	Hydraulic centre of borehole (m)	Flowtime dt (min)	Observation borehole	Secup (m)	Seclow (m)	Hydraulic centre of borehole (m)	r (m)	t_L (recovery) (min)	r^2/t_L (m²/s)	η (m²/s)	T_{EVAL} (m²/s)	S (-)	S^* (-)	Response (0 = no, 1 = some, 2 =good response	Po - Pp (kPa)	Pf - Pp (kPa)
KA3539G:2	**16.37**	61	KA3510A:1	122.02	150.00	136.00	105.84	55	3.394	5.98E-01	-	-	-	1	1	1.2
2:12		61	KA3510A:2	114.02	121.02	117.50	87.58	50	2.557	4.40E-01	-	-	-	1	0.6	1.4
		61	KA3510A:3	4.52	113.02	50.00	24.19	9	1.083	1.15E-01	-	-	-	2	24.1	22.9
		61	KA3539G:1	19.30	30.01	20.56	4.19	-	-	-	-	-	-	2	1816	1818.7
		61	**KA3539G:2**	**9.80**	**18.30**	**16.37**	**0.00**	**-**	**-**	**-**	**5.3E-07**	**-**	**-**	**2**	**1815.8**	**1818.5**
		61	KA3539G:3	1.30	8.80	6.59	9.78	-	-	-	-	-	-	2	912.6	885.8
		61	KA3542G01:1	25.80	30.04	28.50	21.08	17	0.436	5.59E-02	4.5E-07	1.4E-05	8.0E-06	2	20.5	19.2
		61	KA3542G01:2	8.80	24.80	20.06	14.91	17	0.218	2.80E-02	1.2E-07	9.9E-06	4.3E-06	2	43.8	41.3
		61	KA3542G01:3	1.30	7.80	4.50	13.64	35	0.089	1.39E-02	-	-	-	2	36.6	36
		61	KA3542G02:1	22.30	30.01	26.21	19.44	48	0.131	2.24E-02	-	-	-	2	24	20.1
		61	KA3542G02:2	13.80	21.30	16.83	13.42	7.8	0.385	3.92E-02	1.1E-07	4.3E-06	2.8E-06	2	199.2	213.9
		61	KA3542G02:3	8.80	12.80	11.13	12.07	2.7	0.899	6.81E-02	-	-	-	2	256.2	257.1
		61	KA3542G02:4	1.30	7.80	5.36	13.31	0.09	32.800	1.26E+00	9.6E-07	3.0E-07	7.6E-07	2	760.6	765.7
		61	KA3544G01:1	6.30	12.00	10.07	7.15	0.21	4.057	1.78E-01	1.2E-06	3.1E-06	6.7E-06	2	948.4	967.9
		61	KA3544G01:2	1.30	5.30	4.03	12.80	2.4	1.138	8.36E-02	3.6E-07	3.6E-07	4.3E-06	2	497.8	505.7
		61	KA3546G01:1	6.80	12.00	8.30	9.56	4.2	0.363	3.09E-02	1.7E-06	4.5E-05	5.5E-05	2	49.3	50.1
		61	KA3546G01:2	1.30	5.80	4.33	13.11	32	0.089	1.38E-02	-	-	-	2	49.5	51.7
		61	KA3548A01:1	15.00	30.00	19.56	29.18	18	0.788	1.03E-01	4.5E-07	7.6E-07	4.4E-06	2	19.2	17.9
		61	KA3548A01:2	10.00	14.00	13.49	25.14	16	0.658	8.30E-02	1.8E-06	4.4E-05	2.2E-05	2	38.5	36.4
		61	KA3548G01:1	0.30	12.01	6.18	12.40	-	-	-	-	-	-	-	-	-
		61	KA3550G01:1	6.30	12.03	9.42	11.82	12	0.194	2.24E-02	1.2E-05	2.8E-04	5.3E-04	1	2.8	6.3
		61	KA3550G01:2	1.30	5.30	3.61	15.97	-	-	-	-	-	-	0	0.4	-0.4
		61	KA3552G01:1	8.80	12.01	10.15	12.65	54	0.049	8.66E-03	-	-	-	1	1	1
		61	KA3552G01:2	4.05	7.80	5.22	15.76	31	0.134	2.03E-02	2.4E-06	1.6E-04	1.2E-04	1	3.1	3.1
		61	KA3552G01:3	1.30	3.05	1.53	18.61	20	0.289	3.88E-02	-	-	-	1	1.4	2
		61	KA3554G01:1	22.30	30.01	24.95	22.44	17	0.494	6.33E-02	4.2E-07	1.1E-05	6.6E-06	2	20.3	19.3
		61	KA3554G01:2	12.30	21.30	19.39	19.55	20	0.319	4.29E-02	3.5E-07	1.5E-05	8.2E-06	2	19.8	18.4
		61	KA3554G01:3	1.30	11.30	6.78	18.35	40	0.140	2.29E-02	-	-	-	1	8.4	7
		61	KA3554G02:1	22.30	30.01	28.47	24.69	70	0.145	2.70E-02	-	-	-	2	104.4	98.9
		61	KA3554G02:2	10.30	21.01	13.13	17.87	0.27	19.718	9.05E-01	1.7E-06	8.0E-07	1.9E-06	2	379	386.3
		61	KA3554G02:3	1.30	9.30	8.39	18.03	10.5	0.516	5.73E-02	7.2E-08	2.2E-06	1.3E-06	2	179.3	179.1
		61	KA3557G:1	0.30	30.04	11.40	17.70	-	-	-	-	-	-	0	0	0.4
		61	KA3563G01:1	0.30	30.00	5.60	24.88	54	0.191	3.35E-02	-	-	-	1	1.4	1
		61	KA3566G01:1	20.80	30.01	21.57	29.85	31	0.479	7.30E-02	-	-	-	1	8.6	8.4
		61	KA3566G01:2	12.30	19.80	16.71	28.54	40	0.339	5.53E-02	-	-	-	1	4.9	5.1
		61	KA3566G01:3	7.30	11.30	8.81	28.12	50	0.264	4.54E-02	-	-	-	1	1.1	1.9
		61	KA3566G01:4	1.30	6.30	3.70	29.02	52	0.270	4.69E-02	-	-	-	1	2.5	1.6
		61	KA3566G02:1	19.30	30.01	21.41	29.87	6	2.478	2.34E-01	1.6E-07	8.9E-07	6.8E-07	2	248.2	244.3
		61	KA3566G02:2	12.30	18.30	16.23	28.50	14	0.967	1.17E-01	7.0E-08	1.1E-06	6.0E-07	2	108.8	107.2
		61	KA3566G02:3	7.80	11.30	10.25	28.06	-	-	-	-	-	-	0	0.6	-3.9
		61	KA3566G02:4	1.30	6.80	3.99	28.94	11	1.269	1.43E-01	8.3E-06	3.3E-05	5.8E-05	1	3.6	3.9
		61	KA3572G01:1	0.30	12.00	7.67	32.42	-	-	-	-	-	-	0	0.2	0.6
		61	KA3573A:1	18.00	40.07	21.34	43.52	29	1.088	1.63E-01	9.5E-07	9.5E-06	5.8E-06	1	5.8	5.8
		61	KA3573A:2	4.50	17.00	9.16	38.39	18	1.365	1.78E-01	4.3E-07	4.3E-06	2.4E-06	2	18.2	17.2
		61	KA3574G01:1	0.30	12.00	4.93	35.47	-	-	-	-	-	-	0	0.2	0.2
		61	KA3576G01:1	0.30	12.01	5.99	36.68	-	-	-	-	-	-	-	-	-
		61	KA3578G01:1	0.30	12.58	7.03	38.50	-	-	-	-	-	-	0	0	0
		61	KA3579G01:1	0.30	22.65	7.62	39.47	21	1.237	1.69E-01	5.7E-06	1.2E-07	3.4E-05	1	-1.4	2.5
		61	KA3584G01:1	0.30	12.00	6.24	44.50	-	-	-	-	-	-	0	0.2	0.2
		61	KA3590G01:1	0.30	30.06	4.33	51.17	42	1.039	1.71E-01	-	-	-	1	2.4	1
		61	KA3590G02:1	0.30	30.05	26.73	52.99	10	4.680	5.13E-01	2.6E-07	7.0E-07	5.1E-07	2	83.2	81.6
		61	KA3593G01:1	0.30	30.02	6.45	53.50	48	0.994	1.70E-01	-	-	-	1	1.7	3.7
		61	KA3600F:1	22.00	50.10	31.78	90.22	50	2.713	4.67E-01	-	-	-	1	0.8	1.8
		61	KA3600F:2	4.50	21.00	12.51	72.82	44	2.009	3.35E-01	-	-	-	1	1.9	2.5
		61	KG0021A01:1	42.50	48.82	43.53	35.05	6.1	3.357	3.18E-01	-	-	-	2	152.7	151.9
		61	KG0021A01:2	35.00	41.50	37.70	32.36	2.2	7.932	5.70E-01	8.2E-07	1.2E-06	1.4E-06	2	166.3	164.7
		61	KG0021A01:3	25.00	34.00	28.64	30.00	0.9	16.667	9.71E-01	2.6E-06	1.3E-06	2.7E-06	2	173.2	171.6
		61	KG0021A01:4	17.00	24.00	21.80	29.96	40	0.374	6.10E-02	-	-	-	2	39.3	36.7
		61	KG0021A01:5	4.00	16.00	11.64	32.67	22	0.808	1.12E-01	-	-	-	2	33.2	33.4
		61	KG0048A01:1	49.00	54.69	53.81	55.76	17	3.048	3.91E-01	4.9E-07	2.2E-06	1.3E-06	2	18.2	17.2
		61	KG0048A01:2	41.00	48.00	45.90	50.77	12	3.580	4.14E-01	7.7E-07	2.7E-06	1.9E-06	2	22.9	21.4
		61	KG0048A01:3	30.00	40.00	33.50	44.69	8	4.160	4.27E-01	7.1E-07	2.0E-06	1.7E-06	2	45.9	45.1
		61	KG0048A01:4	4.00	29.00	9.12	41.86	27	1.082	1.59E-01	-	-	-	2	45.1	28.3

4.7 Interference test 2:13

The test was carried out in KG0021A01, section 42.50 – 48.82 m. Flow period was for 362 minutes with a final flow of 0.380 l/min, while the pressure build-up time was 1013 minutes. In *Figure 4-13* and *Figure 4-14* the pressure drawdown recordings are shown and in *Table 4-7* the interference test results are presented. Diagrams of evaluated bore hole sections are presented in *Appendix 8*.

The two lowest sections of KA3539G show almost exactly the same pressures during this test. This was a consequence of a leakage between the two measurement sections.

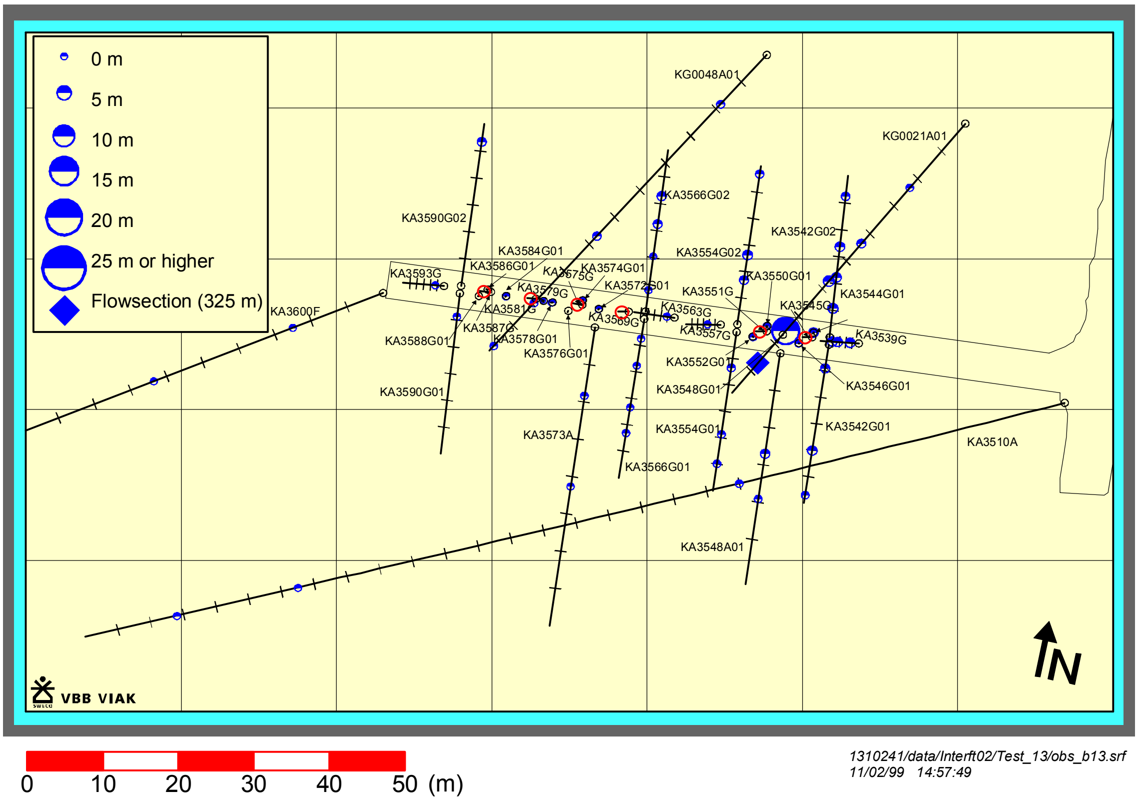

Figure 4-13 Drawdown during flowing of KG0021A01:1 (Interferencetest 2:13) - plan view

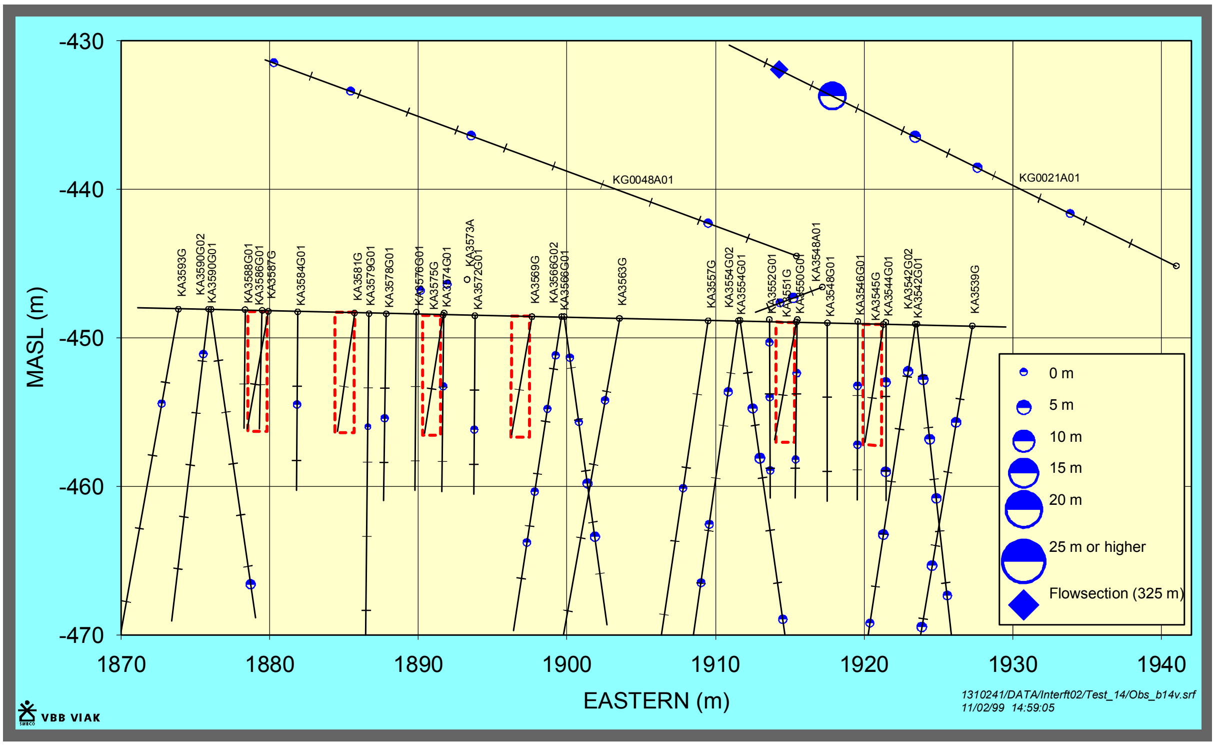

Figure 4-14 Drawdown during flowing of KG0021A01:1 (Interferencetest 2:13) - vertical view

The pressure responses in the observation borehole sections of this test have all very slow response times. No direct hydraulic connection between the flow section and the observation sections have been established.

The evaluated transmissivity of the flow section is $7.2 \cdot 10^{-7}$ m^2/s with the evaluation period 120 – 150 minutes. Due to the late time evaluation this value probably represents more than one hydraulic structure.

Table 4-7 Interference test results for KG0021A01:1, 42.50 – 48.82 m. (r = aprox. distance from flowing bore hole section to observation bore hole section, t_L = time lag for a pressure response of 0.1 m to be registered in an observation section, T = transmissivity, S = storage coefficient, S^* = storage coefficient from diffusivity, $\tilde{\eta}$) The response is classified as 0 = no response (< 0.1 m), 1 = some response (0.1 m - 1.0 m) and 2 = good response (> 1.0 m).

Flowing borehole	Hydraulic centre of borehole (m)	Flowtime dt (min)	Observation borehole	Secup (m)	Seclow (m)	Hydraulic centre of borehole (m)	r (m)	t_L (recovery) (min)	r^2/t_L (m²/s)	η (m²/s)	T_{EVAL} (m²/s)	S (-)	S^* (-)	Response (0 = no, 1 = some, 2 =good response	Po - Pp (kPa)	Pf - Pp (kPa)
KG0021A01:1	**43.53**	362	KA3510A:1	122.02	150.00	136.00	117.93	-	-	-	-	-	-	0	-0.2	0.2
2:13		362	KA3510A:2	114.02	121.02	117.50	100.51	-	-	-	-	-	-	0	-0.8	0.2
		362	KA3510A:3	4.52	113.02	50.00	44.86	65	0.516	5.81E-02	-	-	-	1	3.9	2.9
		362	KA3539G:1	19.30	30.01	20.56	38.83	60	0.419	4.61E-02	-	-	-	2	15.9	16.9
		362	KA3539G:2	9.80	18.30	16.37	35.05	60	0.341	3.75E-02	-	-	-	2	16.4	17.2
		362	KA3539G:3	1.30	8.80	6.59	26.69	35	0.339	3.19E-02	-	-	-	2	15.9	17.6
		362	KA3542G01:1	25.80	30.04	28.50	41.63	70	0.413	4.75E-02	-	-	-	1	3.9	2.3
		362	KA3542G01:2	8.80	24.80	20.06	34.12	55	0.353	3.78E-02	-	-	-	2	16.2	15.6
		362	KA3542G01:3	1.30	7.80	4.50	22.10	75	0.109	1.28E-02	-	-	-	2	14.3	13.7
		362	KA3542G02:1	22.30	30.01	26.21	43.24	90	0.346	4.29E-02	-	-	-	2	8.8	11.5
		362	KA3542G02:2	13.80	21.30	16.83	34.38	60	0.328	3.61E-02	-	-	-	2	16.8	17.8
		362	KA3542G02:3	8.80	12.80	11.13	29.17	65	0.218	2.46E-02	-	-	-	2	17.1	17.7
		362	KA3542G02:4	1.30	7.80	5.36	24.11	58	0.167	1.82E-02	-	-	-	2	18.8	18.6
		362	KA3544G01:1	6.30	12.00	10.07	28.30	65	0.205	2.31E-02	-	-	-	2	15.7	15.7
		362	KA3544G01:2	1.30	5.30	4.03	22.59	68	0.125	1.43E-02	-	-	-	2	11.9	13.8
		362	KA3546G01:1	6.80	12.00	8.30	25.93	95	0.118	1.49E-02	-	-	-	1	1.9	3.1
		362	KA3546G01:2	1.30	5.80	4.33	22.08	105	0.077	1.00E-02	-	-	-	1	2.4	4.7
		362	KA3548A01:1	15.00	30.00	19.56	23.91	75	0.127	1.49E-02	-	-	-	1	3.3	2.5
		362	KA3548A01:2	10.00	14.00	13.49	19.55	55	0.116	1.24E-02	-	-	-	2	14.6	13.8
		362	KA3548G01:1	0.30	12.01	6.18	23.75	-	-	-	-	-	-	-		
		362	KA3550G01:1	6.30	12.03	9.42	26.72	110	0.108	1.42E-02	-	-	-	1	-1.8	6.4
		362	KA3550G01:2	1.30	5.30	3.61	21.05	-	-	-	-	-	-	0	1.2	-1.9
		362	KA3552G01:1	8.80	12.01	10.15	27.21	210	0.059	9.28E-03	-	-	-	1	0.4	1.8
		362	KA3552G01:2	4.05	7.80	5.22	22.33	200	0.042	6.48E-03	-	-	-	1	0.8	1.2
		362	KA3552G01:3	1.30	3.05	1.53	18.70	280	0.021	3.54E-03	-	-	-	1	0	1
		362	KA3554G01:1	22.30	30.01	24.95	37.41	70	0.333	3.84E-02	-	-	-	1	3.7	2.6
		362	KA3554G01:2	12.30	21.30	19.39	32.39	80	0.219	2.62E-02	-	-	-	1	4.1	2.7
		362	KA3554G01:3	1.30	11.30	6.78	21.97	75	0.107	1.26E-02	-	-	-	1	6.7	5.9
		362	KA3554G02:1	22.30	30.01	28.47	44.69	85	0.392	4.78E-02	-	-	-	2	8	11.2
		362	KA3554G02:2	10.30	21.01	13.13	29.85	61	0.243	2.69E-02	-	-	-	2	17.7	18.5
		362	KA3554G02:3	1.30	9.30	8.39	25.38	72	0.149	1.73E-02	-	-	-	2	12.1	12.7
		362	KA3557G:1	0.30	30.04	11.40	29.36	240	0.060	9.79E-03	-	-	-	1	-0.2	1.5
		362	KA3563G01:1	0.30	30.00	5.60	25.90	130	0.086	1.19E-02	1.3E-06	5.7E-05	1.1E-04	1	0.6	1
		362	KA3566G01:1	20.80	30.01	21.57	37.26	100	0.231	2.96E-02	-	-	-	1	1.8	1.6
		362	KA3566G01:2	12.30	19.80	16.71	33.36	105	0.177	2.29E-02	-	-	-	1	0.4	2.3
		362	KA3566G01:3	7.30	11.30	8.81	27.66	150	0.085	1.22E-02	-	-	-	1	-1.2	2.7
		362	KA3566G01:4	1.30	6.30	3.70	24.63	120	0.084	1.14E-02	5.0E-07	4.0E-05	4.4E-05	1	0.6	2.9
		362	KA3566G02:1	19.30	30.01	21.41	40.40	65	0.418	4.71E-02	-	-	-	2	13.5	17
		362	KA3566G02:2	12.30	18.30	16.23	35.80	70	0.305	3.51E-02	-	-	-	2	11.9	13.7
		362	KA3566G02:3	7.80	11.30	10.25	30.73	150	0.105	1.51E-02	4.1E-08	4.9E-06	2.7E-06	1	-1.8	7
		362	KA3566G02:4	1.30	6.80	3.99	25.84	250	0.045	7.35E-03	-	-	-	1	0.4	0.6
		362	KA3572G01:1	0.30	12.00	7.67	32.55	220	0.080	1.28E-02	-	-	-	1	-0.6	1.1
		362	KA3573A:1	18.00	40.07	21.34	32.75	120	0.149	2.01E-02	-	-	-	1	0.5	1.1
		362	KA3573A:2	4.50	17.00	9.16	26.96	75	0.162	1.90E-02	-	-	-	1	3.1	2.1
		362	KA3574G01:1	0.30	12.00	4.93	32.17	-	-	-	-	-	-	0	-0.2	0
		362	KA3576G01:1	0.30	12.01	5.99	33.81	-	-	-	-	-	-	-		
		362	KA3578G01:1	0.30	12.58	7.03	36.33	-	-	-	-	-	-	0	0	0.2
		362	KA3579G01:1	0.30	22.65	7.62	37.58	20	1.177	9.45E-02	-	-	-	2	-11.5	14.3
		362	KA3584G01:1	0.30	12.00	6.24	40.49	-	-	-	-	-	-	0	0.2	0.4
		362	KA3590G01:1	0.30	30.06	4.33	43.66	-	-	-	-	-	-	0	0.9	-0.6
		362	KA3590G02:1	0.30	30.05	26.73	57.67	60	0.924	1.02E-01	-	-	-	2	12.7	14.5
		362	KA3593G01:1	0.30	30.02	6.45	48.35	130	0.300	4.14E-02	6.1E-07	1.1E-05	1.5E-05	1	0	2.5
		362	KA3600F:1	22.00	50.10	31.78	79.20	-	-	-	-	-	-	0	-0.8	-0.2
		362	KA3600F:2	4.50	21.00	12.51	61.69	-	-	-	-	-	-	0	-0.5	0.6
		362	**KG0021A01:1**	**42.50**	**48.82**	**43.53**	**0.00**	-	-	-	**7.2E-07**	-	-	2	3251.1	3249.9
		362	KG0021A01:2	35.00	41.50	37.70	5.83	20	0.028	2.27E-03	-	-	-	2	136.7	137.9
		362	KG0021A01:3	25.00	34.00	28.64	14.89	50	0.074	7.70E-03	-	-	-	2	24.2	26
		362	KG0021A01:4	17.00	24.00	21.80	21.73	44	0.179	1.79E-02	-	-	-	2	12.3	16.2
		362	KG0021A01:5	4.00	16.00	11.64	31.89	80	0.212	2.54E-02	-	-	-	1	2.9	5.7
		362	KG0048A01:1	49.00	54.69	53.81	34.09	70	0.277	3.19E-02	-	-	-	1	3.1	2.3
		362	KG0048A01:2	41.00	48.00	45.90	29.95	70	0.214	2.46E-02	-	-	-	1	3.9	3.9
		362	KG0048A01:3	30.00	40.00	33.50	27.06	60	0.203	2.24E-02	-	-	-	1	8.4	8.8
		362	KG0048A01:4	4.00	29.00	9.12	36.14	80	0.272	3.26E-02	-	-	-	1	5.7	5.5

4.8 Interference test 2:14

The test was carried out in KG0021A01, section 25.00 – 34.00 m. Flow period was for 360 minutes with a final flow of 7.29 l/min, while the pressure build-up time was 1135 minutes. In *Figure 4-15* and *Figure 4-16* the pressure drawdown recordings are shown and in *Table 4-8* the interference test results are presented. Diagrams of evaluated bore hole sections are presented in *Appendix 9*.

The two lowest sections of KA3539G show almost exactly the same pressures during this test. This was a consequence of a leakage between the two measurement sections.

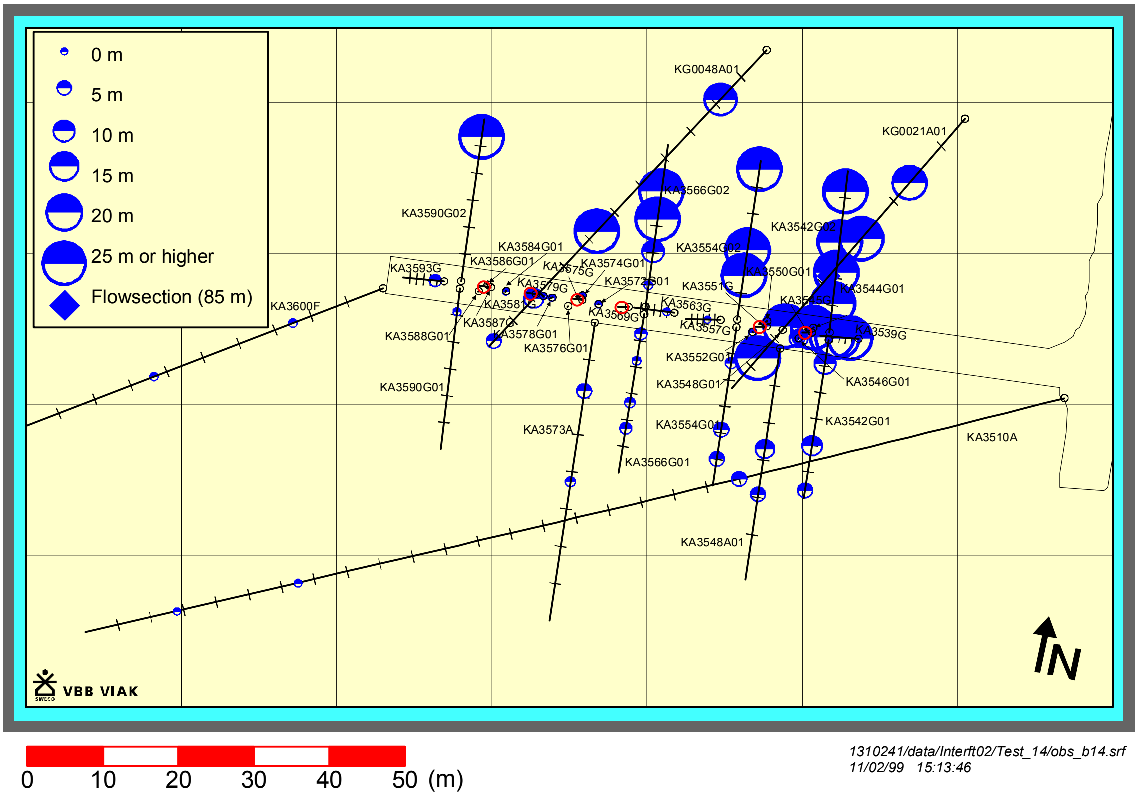

Figure 4-15 Drawdown during flowing of KG0021A01:3 (Interferencetest 2:14) - plan view

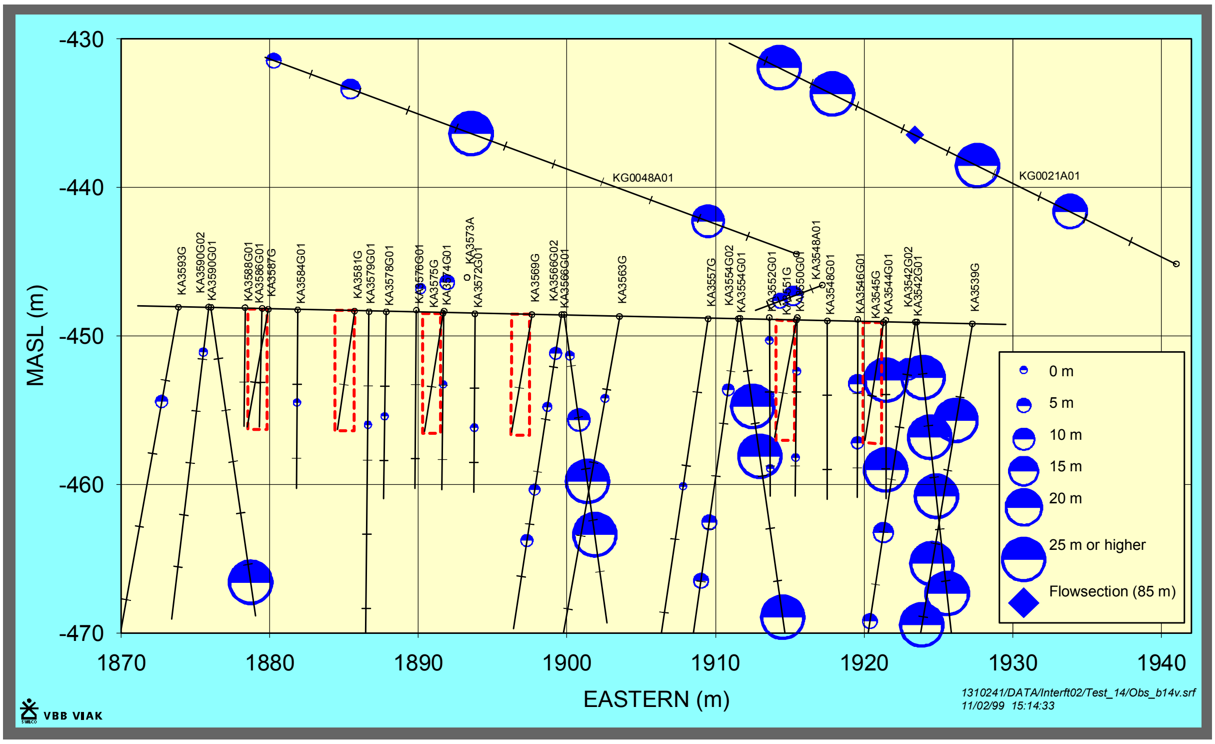

Figure 4-16 Drawdown during flowing of KG0021A01:3 (Interferencetest 2:14) - vertical view

This test shows good connection, with short response times, between the flow section and KA3542G02:4, KA3544G01:2, KA3554G02:2, KG0048A01:3 and the sections of KA3539G. The transmissivity of these sections is within the range $2 \cdot 10^{-6}$ and $5 \cdot 10^{-6}$ m^2/s while the storativity is between $3 \cdot 10^{-7}$ and $2 \cdot 10^{-6}$. The evaluated transmissivity of the flow section is $7.3 \cdot 10^{-7}$ m^2/s with the evaluation period 7 –15 minutes.

Considering the short response times and the magnitude of the evaluated hydraulic properties is seem probable that the same structure, or system of hydraulic features, is activated in all of these borehole sections.

Table 4-8 **Interference test results for KG0021A01:1, 42.50 – 48.82 m. (r = aprox. distance from flowing bore hole section to observation bore hole section, t_L = time lag for a pressure response of 0.1 m to be registered in an observation section, T = transmissivity, S = storage coefficient, S^* = storage coefficient from diffusivity, η) The response is classified as 0 = no response (< 0.1 m), 1 = some response (0.1 m - 1.0 m) and 2 = good response (> 1.0 m).**

Flowing borehole	Hydraulic centre of borehole (m)	Flowtime dt (min)	Observation borehole	Secup (m)	Seclow (m)	Hydraulic centre of borehole (m)	r (m)	t_L (recovery) (min)	r^2/t_L (m²/s)	η (m²/s)	T_{EVAL} (m²/s)	S (-)	S^* (-)	Response (0 = no, 1 = some, 2 =good response	Po - Pp (kPa)	Pf - Pp (kPa)
KG0021A01:3	**28.64**	360	KA3510A:1	122.02	150.00	136.00	124.33	46	5.601	5.70E-01	1.2E-04	1.7E-05	2.1E-04	1	1.6	2
2:14		360	KA3510A:2	114.02	121.02	117.50	106.64	70	2.707	3.12E-01	2.3E-05	2.8E-05	7.4E-05	1	4.3	4.5
		360	KA3510A:3	4.52	113.02	50.00	47.40	5	7.489	4.30E-01	3.3E-06	5.3E-06	7.7E-06	2	53.6	50.1
		360	KA3539G:1	19.30	30.01	20.56	33.97	0.42	45.784	1.69E+00	3.7E-06	7.3E-07	2.2E-06	2	453.5	452.5
		360	KA3539G:2	9.80	18.30	16.37	30.00	0.4	37.501	1.38E+00	5.4E-06	1.1E-06	3.9E-06	2	453.5	452.5
		360	KA3539G:3	1.30	8.80	6.59	21.08	0.51	14.519	5.52E-01	2.5E-06	1.8E-06	4.5E-06	2	440.3	421.2
		360	KA3542G01:1	25.80	30.04	28.50	43.43	2	15.720	7.52E-01	3.6E-06	6.2E-06	4.8E-06	2	52.2	48.7
		360	KA3542G01:2	8.80	24.80	20.06	35.02	2.5	8.177	4.08E-01	1.9E-06	5.9E-06	4.7E-06	2	88.8	87.4
		360	KA3542G01:3	1.30	7.80	4.50	19.59	2.1	3.045	1.47E-01	3.6E-05	3.1E-05	2.4E-04	2	96.5	98.9
		360	KA3542G02:1	22.30	30.01	26.21	32.94	9.5	1.903	1.27E-01	6.0E-07	4.3E-06	4.7E-06	2	292.8	331.8
		360	KA3542G02:2	13.80	21.30	16.83	24.81	1.1	9.324	4.01E-01	4.8E-07	1.1E-06	1.2E-06	2	496.8	511.1
		360	KA3542G02:3	8.80	12.80	11.13	20.40	0.3	23.115	8.14E-01	4.0E-06	1.5E-06	4.9E-06	2	539.6	572.1
		360	KA3542G02:4	1.30	7.80	5.36	16.75	0.07	66.793	1.95E+00	2.0E-06	3.0E-07	1.0E-06	2	560.1	554.4
		360	KA3544G01:1	6.30	12.00	10.07	23.65	1.4	6.659	2.99E-01	1.2E-06	2.2E-06	4.0E-06	2	743.5	741.6
		360	KA3544G01:2	1.30	5.30	4.03	17.98	0.85	6.339	2.61E-01	-	-	-	2	357.8	359
		360	KA3546G01:1	6.80	12.00	8.30	22.65	3	2.850	1.47E-01	5.7E-06	2.7E-05	3.9E-05	2	34.3	35.6
		360	KA3546G01:2	1.30	5.80	4.33	19.07	10	0.606	4.08E-02	-	-	-	2	75.6	77
		360	KA3548A01:1	15.00	30.00	19.56	32.28	4	4.343	2.38E-01	3.7E-06	1.1E-05	1.6E-05	2	51.1	47.8
		360	KA3548A01:2	10.00	14.00	13.49	26.63	1.5	7.880	3.58E-01	2.2E-06	1.0E-05	6.2E-06	2	81.6	79.7
		360	KA3548G01:1	0.30	12.01	6.18	20.88	-	-	-	-	-	-	-	-	-
		360	KA3550G01:1	6.30	12.03	9.42	23.93	30	0.318	2.86E-02	8.0E-05	3.1E-04	2.8E-03	1	2.2	5.5
		360	KA3550G01:2	1.30	5.30	3.61	18.77	-	-	-	-	-	-	0	4.3	-5.1
		360	KA3552G01:1	8.80	12.01	10.15	25.58	100	0.109	1.40E-02	-	-	-	1	2.7	3.1
		360	KA3552G01:2	4.05	7.80	5.22	21.39	1.3	5.867	2.60E-01	2.0E-05	3.1E-04	7.7E-05	1	7	8.3
		360	KA3552G01:3	1.30	3.05	1.53	18.49	30	0.190	1.71E-02	-	-	-	1	2.3	3.7
		360	KA3554G01:1	22.30	30.01	24.95	41.17	4.4	6.422	3.59E-01	3.5E-06	7.0E-06	9.7E-06	2	52.2	48.7
		360	KA3554G01:2	12.30	21.30	19.39	35.85	4.5	4.761	2.68E-01	3.3E-06	1.0E-05	1.2E-05	2	53.2	49.5
		360	KA3554G01:3	1.30	11.30	6.78	24.19	0.8	12.192	4.98E-01	5.1E-05	9.2E-06	1.0E-04	2	30.4	30.6
		360	KA3554G02:1	22.30	30.01	28.47	36.55	9.5	2.344	1.56E-01	6.4E-07	3.6E-07	4.1E-06	2	258.7	263.7
		360	KA3554G02:2	10.30	21.01	13.13	24.28	0.15	65.489	2.10E+00	2.4E-06	3.3E-07	1.1E-06	2	558.2	583.6
		360	KA3554G02:3	1.30	9.30	8.39	21.30	0.47	16.094	6.05E-01	7.4E-05	6.3E-06	1.2E-04	2	368.1	368.1
		360	KA3557G:1	0.30	30.04	11.40	28.92	200	0.070	1.09E-02	-	-	-	1	0	2
		360	KA3563G01:1	0.30	30.00	5.60	27.79	45	0.286	2.89E-02	1.5E-05	2.6E-04	5.2E-04	1	4.9	6.7
		360	KA3566G01:1	20.80	30.01	21.57	42.83	11	2.779	1.92E-01	5.1E-06	1.5E-05	2.7E-05	2	33	31.3
		360	KA3566G01:2	12.30	19.80	16.71	38.81	18	1.395	1.09E-01	6.0E-06	3.4E-05	5.5E-05	2	24	21.9
		360	KA3566G01:3	7.30	11.30	8.81	32.76	21	0.852	6.94E-02	6.4E-05	1.2E-04	9.2E-04	2	12.3	12.5
		360	KA3566G01:4	1.30	6.30	3.70	29.32	6	2.388	1.43E-01	-	-	-	2	33.1	32.1
		360	KA3566G02:1	19.30	30.01	21.41	36.28	1.7	12.903	5.99E-01	5.2E-07	7.9E-07	8.7E-07	2	451.8	458.1
		360	KA3566G02:2	12.30	18.30	16.23	32.98	3	6.044	3.12E-01	4.5E-07	1.2E-06	1.4E-06	2	357.6	359.4
		360	KA3566G02:3	7.80	11.30	10.25	29.85	107	0.139	1.82E-02	-	-	-	2	102	99.9
		360	KA3566G02:4	1.30	6.80	3.99	27.61	4.5	2.822	1.59E-01	1.4E-05	2.4E-05	8.8E-05	2	10.8	11.8
		360	KA3572G01:1	0.30	12.00	7.67	35.81	110	0.194	2.56E-02	-	-	-	1	1.7	3.5
		360	KA3573A:1	18.00	40.07	21.34	44.23	9	3.622	2.38E-01	9.7E-06	1.9E-05	4.1E-05	2	20.3	19.5
		360	KA3573A:2	4.50	17.00	9.16	36.34	3	7.338	3.79E-01	3.9E-06	7.7E-06	1.0E-05	2	51.3	48.5
		360	KA3574G01:1	0.30	12.00	4.93	36.02	-	-	-	-	-	-	0	0	0.2
		360	KA3576G01:1	0.30	12.01	5.99	38.23	-	-	-	-	-	-	-	-	-
		360	KA3578G01:1	0.30	12.58	7.03	40.51	-	-	-	-	-	-	0	-0.2	0
		360	KA3579G01:1	0.30	22.65	7.62	41.75	200	0.145	2.27E-02	-	-	-	1	0.2	9.6
		360	KA3584G01:1	0.30	12.00	6.24	45.37	250	0.137	2.27E-02	-	-	-	1	-0.4	0.8
		360	KA3590G01:1	0.30	30.06	4.33	50.30	30	1.405	1.26E-01	1.9E-05	5.6E-05	1.5E-04	1	7.4	6.1
		360	KA3590G02:1	0.30	30.05	26.73	56.99	1.1	49.206	2.12E+00	9.1E-07	2.3E-07	4.3E-07	2	379.5	379.1
		360	KA3593G01:1	0.30	30.02	6.45	53.78	30	1.607	1.45E-01	2.7E-06	1.5E-05	1.9E-05	2	34.4	33.8
		360	KA3600F:1	22.00	50.10	31.78	88.53	29	4.504	4.01E-01	1.9E-05	2.1E-05	4.7E-05	1	8.4	8.2
		360	KA3600F:2	4.50	21.00	12.51	69.96	18	4.532	3.54E-01	1.7E-05	2.0E-05	4.8E-05	2	10.7	10.5
		360	KG0021A01:1	42.50	48.82	43.53	14.89	0.03	123.174	3.28E+00	3.5E-07	1.2E-06	1.1E-07	2	563	559.9
		360	KG0021A01:2	35.00	41.50	37.70	9.06	0.03	45.607	1.21E+00	5.2E-07	1.2E-06	4.3E-07	2	688.8	687.8
		360	**KG0021A01:3**	**25.00**	**34.00**	**28.64**	**0.00**	-	-	-	**7.3E-07**	-	-	2	854.7	854.9
		360	KG0021A01:4	17.00	24.00	21.80	6.84	0.03	25.987	6.92E-01	-	-	-	2	407.1	422
		360	KG0021A01:5	4.00	16.00	11.64	17.00	0.03	160.551	4.27E+00	-	-	-	2	184	190.5
		360	KG0048A01:1	49.00	54.69	53.81	44.28	3	10.893	5.63E-01	3.7E-06	5.2E-06	6.6E-06	2	51.6	48.7
		360	KG0048A01:2	41.00	48.00	45.90	38.22	1.2	20.285	8.86E-01	3.0E-06	2.3E-06	3.4E-06	2	85.1	85.3
		360	KG0048A01:3	30.00	40.00	33.50	30.46	0.65	23.793	9.40E-01	4.8E-06	1.6E-06	5.1E-06	2	401.3	200.3
		360	KG0048A01:4	4.00	29.00	9.12	27.88	1.4	9.257	4.15E-01	2.5E-05	9.9E-06	6.0E-05	2	171.7	178.1

4.9 Hydraulic diffusivity

The diffusivity, η, versus the distance, r, and the timelag versus the distance, r, are shown in *Figure 4-17* below. Data are from all 14 interference tests performed during the two test campaigns.

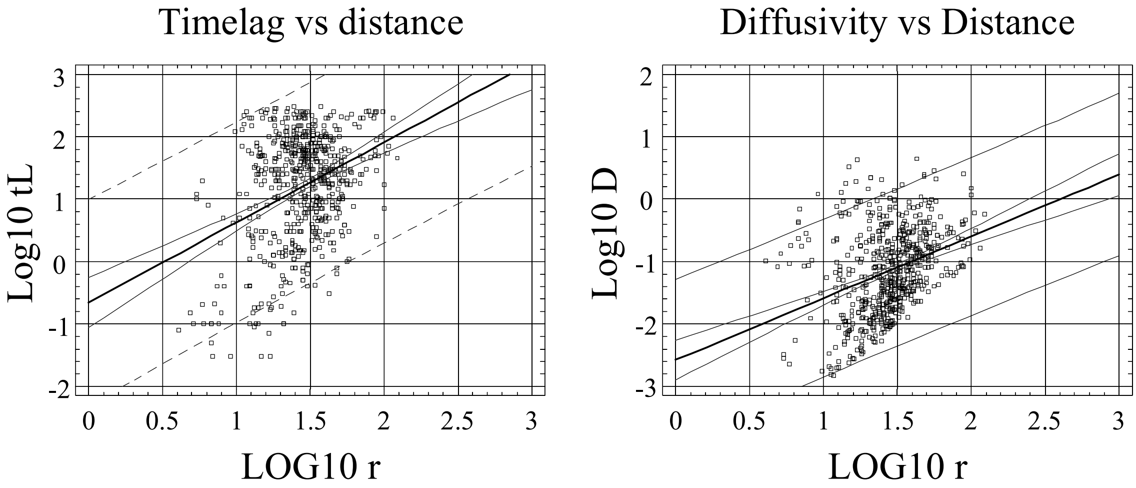

Figure 4-17 Linear regression plots of timelag and diffusivity versus distance

The equations of the regression lines in *Figure 4-17* are

$$\mathrm{Log}_{10}\, t_L = 1.282 * \mathrm{Log}_{10}\, r - 0.655$$

$$\mathrm{Log}_{10}\, \eta = 0.991 * \mathrm{Log}_{10}\, r - 2.579$$

When compared with the regression analysis of the above shown parameters it is noticed that the r - t_L is more flat than earlier when only the first six tests, reported in *Forsmark T, Rhén I, 1999b*, were included. It is the other way around when comparing the two r - η relationships. When all fourteen tests are included the relationship is steeper than before.

4.10 Storativity

The storativity is not always received from a hydraulic test. In order to estimate an approximate value of the parameter a relationship between the evaluated transmissivity T_{EVAL} and the evaluated storativity S is established from the fourteen evaluated interference tests 1:1-2:14. The results are shown in *Figure 4-18.*

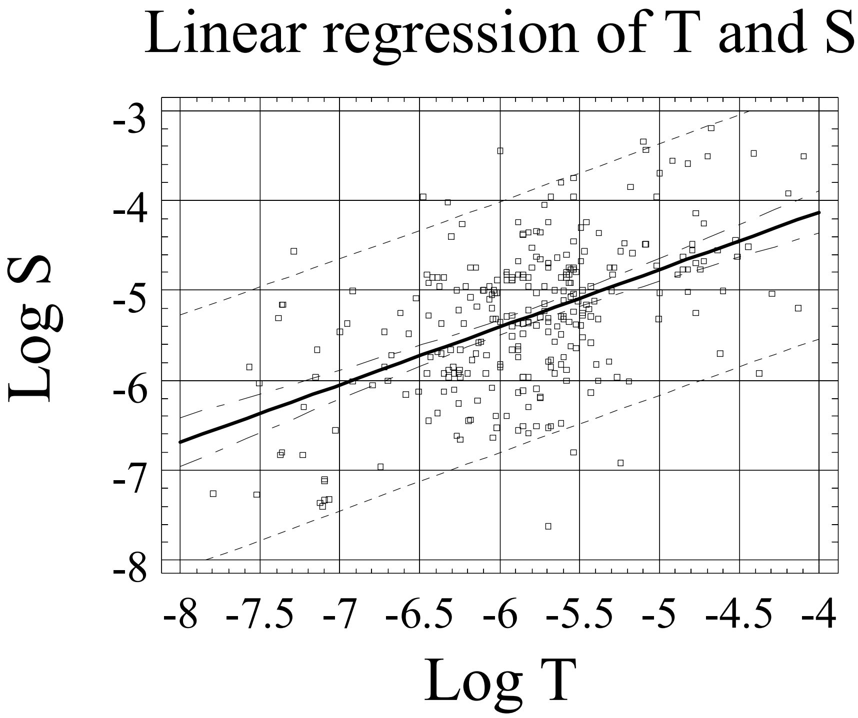

Figure 4-18 Linear regression of T_{EVAL} and S.

The equation of the regression line in Figure 4-18 is

$$Log_{10}\ S = 0.640 * Log_{10}\ T_{EVAL} - 1.570$$

When comparing with relationship reported in *Forsmark T, Rhén I, 1999b*, it is steeper now by a factor 2, when all fourteen tests are included.

The relationship between T_{EVAL} and the storativity estimated from the diffusivity, η, is shown in *Figure 4-19*. Results from all fourteen tests 1:1 to 2:14 are included.

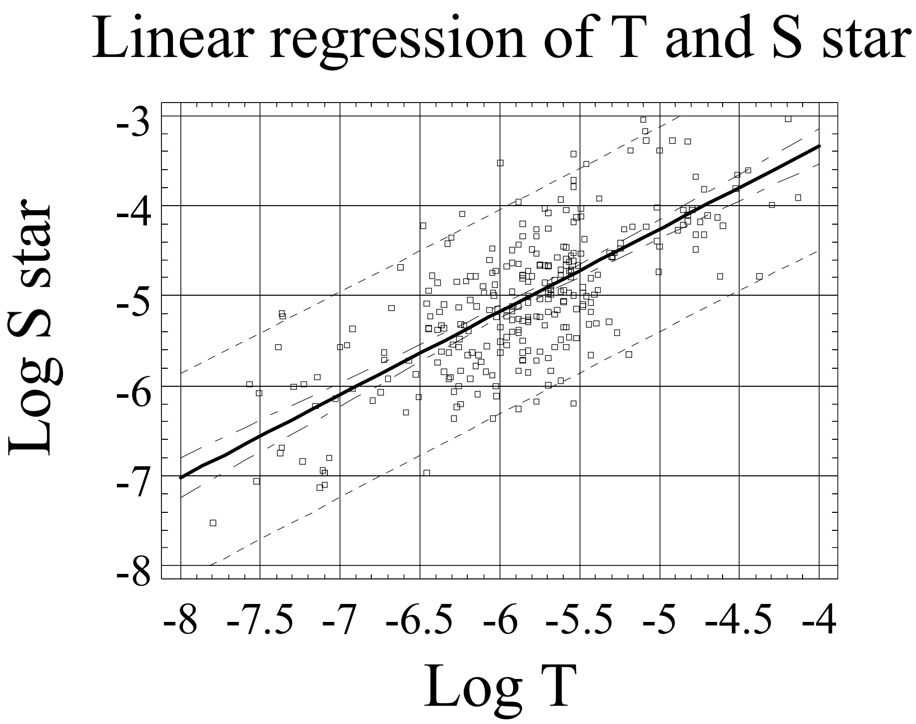

Figure 4-19 Linear regression of T_{EVAL} *and S**.

The equation of the regression line in *Figure 4-19* is

$$Log_{10}\ S^* = 0.919 * Log_{10}\ T + 0.338$$

5 SUGGESTED CALIBRATION CASES FOR NUMERICAL MODELING

During interference test campaign 2 eight interference tests were made.

All eight tests were successful. Seven of the eight tests received at least 20 pressure responses in the monitored observation sections in surrounding boreholes. The only test with fewer responses is test 2:13.

Consequently, all tests but test 2:13 can be utilised as calibration cases for numerical modeling.

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APPENDIX 1

Key pressure data from interference tests

- P_0 = Initial pressure before opening of the valve
- P_p = Pressure just before closing the valve
- P_f = Pressure at the end of the pressure build-up period

All pressure data is in kPa.

Table A-1 Key pressure data , draw-down and recovery respectively of each borehole section. Interference test 2:7 in KG0048A01, section 49.00 – 54.69 m. Prototype repository, June 1999

Borehole section	Po (Kpa)	Pp (Kpa)	Pf (Kpa)	Po – Pp (Kpa)	Pf – Pp (Kpa)	Recovery (%)
KA3510A:1	4124.2	4122.3	4123.6	1.9	1.3	68.4
KA3510A:2	4110.9	4109.2	4109.9	1.7	0.7	41.2
KA3510A:3	3863	3803.4	3863.6	59.6	60.2	101.0
KA3539G:1	3076.5	3062.6	3075.1	13.9	12.5	89.9
KA3542G01:1	3747.7	3697	3748.1	50.7	51.1	100.8
KA3542G02:1	3211.6	3199.1	3211.4	12.5	12.3	98.4
KA3544G01:1	2950.2	2938.4	2949.2	11.8	10.8	91.5
KA3546G01:1	436.6	436	437.4	0.6	1.4	233.3
KA3548A01:1	3860.9	3791.8	3861.1	69.1	69.3	100.3
KA3548A01:2	3764.5	3713.2	3765	51.3	51.8	101.0
KA3548G01:1	147.6	147.6	147.4	0	-0.2	<0
KA3550G01:1	97.3	96.9	97.1	0.4	0.2	50.0
KA3552G01:1	263.5	262.9	263.3	0.6	0.4	66.7
KA3554G01:1	3688.5	3628.2	3688.9	60.3	60.7	100.7
KA3554G02:1	3269.8	3257.7	3269.4	12.1	11.7	96.7
KA3557G:1	133.9	133.7	133.7	0.2	0	0
KA3563G01:1	1394	1389.1	1393.8	4.9	4.7	95.9
KA3563G01:2	1394.6	1389.7	1394.4	4.9	4.7	95.9
KA3563G01:3	241.4	240.8	241.2	0.6	0.4	66.7
KA3566G01:1	2560.1	2524.7	2559.8	35.4	35.1	99.2
KA3566G01:2	1977.3	1957.7	1977.1	19.6	19.4	99.0
KA3566G01:3	3201.9	3201.9	3206.1	0	4.2	-
KA3566G01:4	2773.8	2769.3	2776.4	4.5	7.1	157.8
KA3566G02:1	3323.8	3316.5	3327.7	7.3	11.2	153.4
KA3566G02:2	3467.3	3458.9	3470	8.4	11.1	132.1
KA3566G02:3	2686	2691.9	2705.4	-5.9	13.5	-
KA3566G02:4	337.2	336.4	337.2	0.8	0.8	100.0
KA3572G01:1	1849.2	1850.2	1851.4	-1	1.2	-
KA3572G01:2	369.9	370.1	370.1	-0.2	0	0
KA3573A:1	4014.5	3993.4	4014.7	21.1	21.3	100.9
KA3573A:2	3873.3	3794.1	3873.6	79.2	79.5	100.4
KA3574G01:1	1026.7	1025.7	1026.5	1	0.8	80.0
KA3574G01:2	944.6	943.2	942.8	1.4	-0.4	<0
KA3574G01:3	190.5	190.7	190.3	-0.2	-0.4	-

Borehole section	Po (Kpa)	Pp (Kpa)	Pf (Kpa)	Po – Pp (Kpa)	Pf – Pp (Kpa)	Recovery (%)
KA3576G01:1	1171.7	1170.7	1171.5	1	0.8	80.0
KA3576G01:2	168.4	168.6	169	-0.2	0.4	-
KA3576G01:3	395.2	394.8	395.6	0.4	0.8	200.0
KA3578G01:1	1273	1272.1	1272.8	0.9	0.7	77.8
KA3578G01:2	161.9	162.1	161.9	-0.2	-0.2	-
KA3579G01:1	1966.6	1967.2	1968.6	-0.6	1.4	-
KA3579G01:2	507.1	507.1	507.3	0	0.2	-
KA3579G01:3	334.6	334.2	334.4	0.4	0.2	50.0
KA3584G01:1	113	113.2	113	-0.2	-0.2	-
KA3590G01:1	3928.6	3890.7	3928.8	37.9	38.1	100.5
KA3590G01:2	3864.5	3786.9	3864.9	77.6	78	100.5
KA3590G01:3	1589.3	1573.2	1589.3	16.1	16.1	100.0
KA3590G02:1	3602.6	3591.1	3604.4	11.5	13.3	115.7
KA3590G02:2	3261.4	3254.6	3265.2	6.8	10.6	155.9
KA3590G02:3	2686.6	2682.9	2687.2	3.7	4.3	116.2
KA3590G02:4	917	915.2	913.3	1.8	-1.9	<0
KA3593G01:1	2052.1	2034.3	2052.3	17.8	18	101.1
KA3593G01:2	1994.7	1994.5	1997.6	0.2	3.1	1550.0
KA3600F:1	4079.9	4078.2	4079.7	1.7	1.5	88.2
KA3600F:2	4057.4	4052.6	4057.4	4.8	4.8	100.0
KG0021A01:1	3479.8	3471.4	3481.3	8.4	9.9	117.9
KG0021A01:2	3486.9	3479.1	3488.1	7.8	9	115.4
KG0021A01:3	3487.3	3480.9	3488.5	6.4	7.6	118.7
KG0021A01:4	3277.1	3277.3	3289.8	-0.2	12.5	-
KG0021A01:5	2304.4	2303.4	2306.7	1	3.3	330.0
KG0048A01:1	**3856.7**	**-**	**3856.7**			**100**
KG0048A01:2	3635	3588.2	3633.6	46.8	45.4	97.0
KG0048A01:3	3700.3	3668.8	3701.2	31.5	32.4	102.9
KG0048A01:4	2248.2	2245.2	2250.3	3	5.1	170.0

Table A-2 Key pressure data , draw-down and recovery respectively of each borehole section. Interference test 2:8 in KA3554G01, section 22.30 – 30.01 m. Prototype repository, August 1999.

Borehole section	Po (Kpa)	Pp (Kpa)	Pf (Kpa)	Po – Pp (Kpa)	Pf – Pp (Kpa)	Recovery (%)
KA3510A:1	4130.5	4125.8	4130.1	4.7	4.3	91.5
KA3510A:2	4102.9	4096.8	4102.7	6.1	5.9	96.7
KA3510A:3	3861.3	3702.8	3858.7	158.5	155.9	98.4
KA3539G:1	2970	2928.3	2966.7	41.7	38.4	92.1
KA3539G:2	2970	2928.3	2966.7	41.7	38.4	92.1
KA3539G:3	2822	2781.5	2817.9	40.5	36.4	89.9
KA3542G01:1	3847.3	3692.9	3844.4	154.4	151.5	98.1
KA3542G01:2	3743.9	3610.7	3741.6	133.2	130.9	98.3
KA3542G01:3	1241.5	1215.2	1220.9	26.3	5.7	21.7
KA3542G02:1	3001.9	2978.4	3000.3	23.5	21.9	93.2
KA3542G02:2	3156	3117.8	3154.4	38.2	36.6	95.8
KA3542G02:3	3138.6	3100.8	3136.3	37.8	35.5	93.9
KA3542G02:4	3101.6	3061.1	3097.5	40.5	36.4	89.9
KA3544G01:1	2849,3	2807,6	2844,2	41,7	36,6	87,8
KA3544G01:2	2161	2119,1	2154,3	41,9	35,2	84,0
KA3546G01:1	344.6	282	281.8	62.6	-0.2	<0
KA3546G01:2	552.4	527.1	516.9	25.3	-10.2	<0
KA3548A01:1	3860.7	3723.2	3858	137.5	134.8	98.0
KA3548A01:2	3774.6	3640.8	3771.7	133.8	130.9	97.8
KA3548G01:1	161.3	-	-	-	-	-
KA3550G01:1	138.7	51.41	51.2	87.29	-0.21	<0
KA3550G01:2	206.9	203	178.4	3.9	-24.6	<0
KA3552G01:1	671.2	668.7	666.1	2.5	-2.6	<0
KA3552G01:2	240.3	209.7	210.7	30.6	1	3.3
KA3552G01:3	230.8	228	221.8	2.8	-6.2	<0
KA3554G01:1	**3845.7**	**1234.4**	**3841.2**	**2611.3**	**2606.8**	**99.8**
KA3554G01:2	3828	3639.7	3826.9	188.3	187.2	99.4
KA3554G01:3	1082.1	1049.4	1080.4	32.7	31	94.8
KA3554G02:1	3383.5	3331.9	3381.2	51.6	49.3	95.5
KA3554G02:2	3146.9	3108.8	3144.6	38.1	35.8	94.0
KA3554G02:3	3337.7	3302.1	3335.6	35.6	33.5	94.1
KA3557G01:1	137.2	137.4	136.3	-0.2	-1.1	-
KA3563G01:1	282.1	280.2	286.6	1.9	6.4	336.8
KA3566G01:1	2591.6	2492.1	2589.7	99.5	97.6	98.1

Borehole section	Po (Kpa)	Pp (Kpa)	Pf (Kpa)	Po – Pp (Kpa)	Pf – Pp (Kpa)	Recovery (%)
KA3566G01:2	1906.5	1823.3	1906.5	83.2	83.2	100.0
KA3566G01:3	3209.8	3194.5	3207.6	15.3	13.1	85.6
KA3566G01:4	2747.7	2709.6	2747.2	38.1	37.6	98.7
KA3566G02:1	3304	3265.3	3302.5	38.7	37.2	96.1
KA3566G02:2	3472.2	3438.7	3471.6	33.5	32.9	98.2
KA3566G02:3	2733.2	2721.4	2731.4	11.8	10	84.7
KA3566G02:4	339	333.9	335.8	5.1	1.9	37.3
KA3572G01:1	320.1	320.1	321.2	0	1.1	-
KA3573A:1	4008.1	3969.2	4006.7	38.9	37.5	96.4
KA3573A:2	3870.7	3745.8	3868.2	124.9	122.4	98.0
KA3574G01:1	101.2	101.2	101	0	-0.2	-
KA3578G01:1	92	92.2	92.2	-0.2	0	-
KA3579G01:1	414.1	428.8	455.8	-14.7	27	-
KA3584G01:1	107.5	107.9	107.1	-0.4	-0.8	-
KA3590G01:1	747.1	724.4	750.6	22.7	26.2	115.4
KA3590G02:1	3561.6	3529.1	3561.4	32.5	32.3	99.4
KA3593G01:1	1395.4	1371.6	1396.4	23.8	24.8	104.2
KA3600F:1	4071.5	4065.3	4071.3	6.2	6	96.8
KA3600F:2	4048	4038.3	4049.6	9.7	11.3	116.5
KG0021A01:1	3491.3	3440.1	3490.9	51.2	50.8	99.2
KG0021A01:2	3487.7	3448.1	3487.9	39.6	39.8	100.5
KG0021A01:3	3486.6	3455.1	3488.1	31.5	33	104.8
KG0021A01:4	3290.8	3266.1	3290	24.7	23.9	96.8
KG0021A01:5	2265.6	2252.2	2264.8	13.4	12.6	94.0
KG0048A01:1	3855.1	3731.8	3852.6	123.3	120.8	98.0
KG0048A01:2	3609.3	3524.6	3607.4	84.7	82.8	97.8
KG0048A01:3	3690.5	3626.2	3689.5	64.3	63.3	98.4
KG0048A01:4	2198.5	2185.8	2197.5	12.7	11.7	92.1

" – " in the Recovery column means that there has been no drawdown
" <0 " in the Recovery column means that there has been no recovery

Table A-3 Key pressure data , draw-down and recovery respectively of each borehole section. Interference test 2:9 in KA3554G02, section 10.30 – 21.30 m. Prototype repository, August 1999.

Borehole section	Po (Kpa)	Pp (Kpa)	Pf (Kpa)	Po - Pp	Pf - Pp	Recovery (%)
KA3510A:1	4130.1	4129.9	4130.5	0.2	0.6	300.0
KA3510A:2	4101.1	4100.7	4102.1	0.4	1.4	350.0
KA3510A:3	3866.7	3861.7	3864	5	2.3	46.0
KA3539G:1	2987.4	2928.7	2975.1	58.7	46.4	79.0
KA3539G:2	2987.1	2928.7	2975.1	58.4	46.4	79.5
KA3539G:3	2837.7	2782.1	2825.6	55.6	43.5	78.2
KA3542G01:1	3853	3848.1	3850.2	4.9	2.1	42.9
KA3542G01:2	3750.8	3742.5	3747.8	8.3	5.3	63.9
KA3542G01:3	1241.7	1234	1240.9	7.7	6.9	89.6
KA3542G02:1	3004.4	2924.8	3002.3	79.6	77.5	97.4
KA3542G02:2	3145.4	2724	3156.8	421.4	432.8	102.7
KA3542G02:3	3145.3	2653.1	3140.8	492.2	487.7	99.1
KA3542G02:4	3115.1	3055	3105.3	60.1	50.3	83.7
KA3544G01:1	2874,2	2810	2854,4	64,2	44,4	69,2
KA3544G01:2	2799	2136,7	2165,5	662,3	28,8	4,3
KA3546G01:1	350.1	344.4	348.4	5.7	4	70.2
KA3546G01:2	568.4	549.8	556.1	18.6	6.3	33.9
KA3548A01:1	3866	3861.5	3863.3	4.5	1.8	40.0
KA3548A01:2	3779.3	3771.7	3776.4	7.6	4.7	61.8
KA3548G01:1	166.3	165	167.1	1.3	2.1	161.5
KA3550G01:1	147.5	146.1	148.5	1.4	2.4	171.4
KA3550G01:2	210.1	209.7	211.5	0.4	1.8	450.0
KA3552G01:1	667.9	668.9	672	-1	3.1	-
KA3552G01:2	240.1	240.5	241.6	-0.4	1.1	-
KA3552G01:3	231.8	231.6	232	0.2	0.4	200.0
KA3554G01:1	3848.7	3843.8	3845.7	4.9	1.9	38.8
KA3554G01:2	3829.4	3824.3	3826.3	5.1	2	39.2
KA3554G01:3	1076.2	1074.5	1075.9	1.7	1.4	82.4
KA3554G02:1	3380.2	3270.2	3384.5	110	114.3	103.9
KA3554G02:2	**3154**	**119.2**	**3148.5**	**3034.8**	**3029.3**	**99.8**
KA3554G02:3	3323.8	3286.6	3341.4	37.2	54.8	147.3
KA3557G01:1	134.5	134.9	135.9	-0.4	1	-
KA3563G01:1	281.7	281.7	281	0	-0.7	-
KA3566G01:1	2595.4	2592.6	2593	2.8	0.4	14.3

Borehole section	Po (Kpa)	Pp (Kpa)	Pf (Kpa)	Po - Pp	Pf - Pp	Recovery (%)
KA3566G01:2	1903.3	1902	1905.1	1.3	3.1	238.5
KA3566G01:3	3200.6	3201.9	3208.2	-1.3	6.3	-
KA3566G01:4	2750.1	2748.7	2751.3	1.4	2.6	185.7
KA3566G02:1	3311.3	3171.1	3305	140.2	133.9	95.5
KA3566G02:2	3474.7	3445.6	3472.6	29.1	27	92.8
KA3566G02:3	2735.5	2728.9	2734.1	6.6	5.2	78.8
KA3566G02:4	337.8	337.4	338.6	0.4	1.2	300.0
KA3572G01:1	316.5	316.7	318.5	-0.2	1.8	-
KA3573A:1	4007.7	4006.3	4007.9	1.4	1.6	114.3
KA3573A:2	3875.2	3870.7	3872.7	4.5	2	44.4
KA3574G01:1	101	101	101	0	0	-
KA3578G01:1	93.4	92.2	92.4	1.2	0.2	16.7
KA3579G01:1	330.5	341.3	372.2	-10.8	30.9	-
KA3584G01:1	106.7	106.9	107.5	-0.2	0.6	-
KA3590G01:1	747.3	746.9	746.3	0.4	-0.6	<0
KA3590G02:1	3563.5	3538.5	3561.6	25	23.1	92.4
KA3593G01:1	1391	1389.9	1394.2	1.1	4.3	390.9
KA3600F:1	4070.1	4069.6	4070.9	0.5	1.3	260.0
KA3600F:2	4048.6	4047.7	4049.6	0.9	1.9	211.1
KG0021A01:1	3490.5	3463.1	3487.4	27.4	24.3	88.7
KG0021A01:2	3489.5	3458.8	3486.7	30.7	27.9	90.9
KG0021A01:3	3489.5	3456.3	3486.8	33.2	30.5	91.9
KG0021A01:4	3292.9	3250.5	3290.6	42.4	40.1	94.6
KG0021A01:5	2267.3	2257.5	2266.3	9.8	8.8	89.8
KG0048A01:1	3859.4	3854.9	3857.2	4.5	2.3	51.1
KG0048A01:2	3612.1	3606.8	3610.9	5.3	4.1	77.4
KG0048A01:3	3692.5	3681.9	3691.3	10.6	9.4	88.7
KG0048A01:4	2199.9	2190.7	2199.3	9.2	8.6	93.5

"– " in the Recovery column means that there has been no drawdown
" <0 " in the Recovery column means that there has been no recovery

Table A-4 Key pressure data , draw-down and recovery respectively of each borehole section. Interference test 2:10 in KA3542G01, section 8.80– 24.80m. Prototype Repository, August 1999.

Borehole section	Po (Kpa)	Pp (Kpa)	Pf (Kpa)	Po – Pp (Kpa)	Pf – Pp (Kpa)	Recovery (%)
KA3510A:1	4130.5	4127	4130.5	3.5	3.5	100.0
KA3510A:2	4102.3	4098.8	4102.9	3.5	4.1	117.1
KA3510A:3	3861.5	3749.9	3861.5	111.6	111.6	100.0
KA3539G:1	2975.3	2924.4	2970.2	50.9	45.8	90.0
KA3539G:2	2975.3	2924.4	2970.2	50.9	45.8	90.0
KA3539G:3	2825.6	2778	2822	47.6	44	92.4
KA3542G01:1	3848.1	3774.5	3847.5	73.6	73	99.2
KA3542G01:2	**3745.1**	**374.2**	**3743.9**	**3370.9**	**3369.7**	**100.0**
KA3542G01:3	1240.5	1173.9	1241.5	66.6	67.6	101.5
KA3542G02:1	3002.7	2979.4	3001.9	23.3	22.5	96.6
KA3542G02:2	3157.3	3118.6	3155.8	38.7	37.2	96.1
KA3542G02:3	3141	3102.8	3138.6	38.2	35.8	93.7
KA3542G02:4	3105.7	3059.9	3101.8	45.8	41.9	91.5
KA3544G01:1	2854,6	2805,9	2849,1	48,7	43,2	88,7
KA3544G01:2	2164,9	2131	2160,8	33,9	29,8	87,9
KA3546G01:1	344.6	336.4	344.8	8.2	8.4	102.4
KA3546G01:2	555.1	545.1	552.4	10	7.3	73.0
KA3548A01:1	3861.5	3796.3	3860.7	65.2	64.4	98.8
KA3548A01:2	3774	3278.2	3774.4	495.8	496.2	100.1
KA3548G01:1	160.7	159.5	161.3	1.2	1.8	150
KA3550G01:1	137.5	137.7	138.7	-0.2	1	-
KA3550G01:2	212.2	210.9	206.9	1.3	-4	<0
KA3552G01:1	672	671.2	671	0.8	-0.2	<0
KA3552G01:2	239.7	219.7	240.5	20	20.8	104.0
KA3552G01:3	232	224.3	230.8	7.7	6.5	84.4
KA3554G01:1	3846.5	3773.8	3845.7	72.7	71.9	98.9
KA3554G01:2	3829.4	3733.9	3828	95.5	94.1	98.5
KA3554G01:3	1075.7	786.8	1082.3	288.9	295.5	102.3
KA3554G02:1	3385.1	3330	3383.3	55.1	53.3	96.7
KA3554G02:2	3148.9	3110.4	3146.7	38.5	36.3	94.3
KA3554G02:3	3341.8	3309.3	3337.5	32.5	28.2	86.8
KA3557G01:1	136.3	134.9	137.2	1.4	2.3	164.3
KA3563G01:1	280.4	233.4	282.1	47	48.7	103.6
KA3566G01:1	2591.4	2551.3	2591.6	40.1	40.3	100.5

Borehole section	Po (Kpa)	Pp (Kpa)	Pf (Kpa)	Po – Pp (Kpa)	Pf – Pp (Kpa)	Recovery (%)
KA3566G01:2	1904.1	1875.4	1906.7	28.7	31.3	109.1
KA3566G01:3	3208.4	3202.3	3209.8	6.1	7.5	123.0
KA3566G01:4	2751.5	2701.4	2747.7	50.1	46.3	92.4
KA3566G02:1	3305.4	3265.1	3303.9	40.3	38.8	96.3
KA3566G02:2	3472.8	3444.6	3472.2	28.2	27.6	97.9
KA3566G02:3	2734.3	2725.5	2733.5	8.8	8	90.9
KA3566G02:4	338.2	324.3	339.1	13.9	14.8	106.5
KA3572G01:1	318.5	318.7	320.1	-0.2	1.4	-
KA3573A:1	4007.3	3988.9	4007.9	18.4	19	103.3
KA3573A:2	3871.1	3811.5	3870.7	59.6	59.2	99.3
KA3574G01:1	101.2	100.8	101.2	0.4	0.4	100.0
KA3578G01:1	92.4	92.4	92.2	0	-0.2	-
KA3579G01:1	374.8	385	413.9	-10.2	28.9	-
KA3584G01:1	107.5	107.5	107.5	0	0	-
KA3590G01:1	745.9	738.3	747.1	7.6	8.8	115.8
KA3590G02:1	3561.6	3535.6	3561.6	26	26	100.0
KA3593G01:1	1394.2	1385.2	1395.4	9	10.2	113.3
KA3600F:1	4071.1	4067.4	4071.5	3.7	4.1	110.8
KA3600F:2	4049.6	4043.5	4050.2	6.1	6.7	109.8
KG0021A01:1	3486.8	3367.3	3491.3	119.5	124	103.8
KG0021A01:2	3486.2	3423.2	3487.7	63	64.5	102.4
KG0021A01:3	3486.8	3454.9	3486.8	31.9	31.9	100.0
KG0021A01:4	3291	3268.1	3290.8	22.9	22.7	99.1
KG0021A01:5	2266.7	2254.2	2265.4	12.5	11.2	89.6
KG0048A01:1	3855.5	3796.9	3855.1	58.6	58.2	99.3
KG0048A01:2	3609.5	3567.7	3609.5	41.8	41.8	100.0
KG0048A01:3	3690.5	3655.3	3690.5	35.2	35.2	100.0
KG0048A01:4	2199.5	2187.6	2198.5	11.9	10.9	91.6

" – " in the Recovery column means that there has been no drawdown
" <0 " in the Recovery column means that there has been no recovery

Table A-5 Key pressure data , draw-down and recovery respectively of each borehole section. Interference test 2:11 in KA3542G02, section 1.30 – 7.80 m Prototype repository, August 1999.

Borehole section	Po (Kpa)	Pp (Kpa)	Pf (Kpa)	Po – Pp (Kpa)	Pf – Pp (Kpa)	Recovery (%)
KA3510A:1	4130.1	4129.5	4130.3	0.6	0.8	133.3
KA3510A:2	4102.7	4100.9	4102.9	1.8	2	111.1
KA3510A:3	3858.7	3826.8	3855.2	31.9	28.4	89.0
KA3539G:1	2966.7	2287.8	2976.5	678.9	688.7	101.4
KA3539G:2	2966.7	2287.8	2976.5	678.9	688.7	101.4
KA3539G:3	2817.9	2158.4	2826.9	659.5	668.5	101.4
KA3542G01:1	3844.4	3815.8	3841	28.6	25.2	88.1
KA3542G01:2	3741.4	3681.9	3737.5	59.5	55.6	93.4
KA3542G01:3	1221.3	1142	1233.9	79.3	91.9	115.9
KA3542G02:1	3000.5	2866.8	2994.6	133.7	127.8	95.6
KA3542G02:2	3154.4	2845.5	3154.8	308.9	309.3	100.1
KA3542G02:3	3136.5	2805.1	3136.3	331.4	331.2	99.9
KA3542G02:4	**3097.3**	**312.5**	**3110**	**2784.8**	**2797.5**	**100.5**
KA3544G01:1	2844.2	2187.6	2857.7	656.6	670.1	102.1
KA3544G01:2	2153.9	1611.5	2167.8	542.4	556.3	102.6
KA3546G01:1	281.6	235.4	311.4	46.2	76	164.5
KA3546G01:2	516.9	408.3	523	108.6	114.7	105.6
KA3548A01:1	3858	3831.1	3855	26.9	23.9	88.8
KA3548A01:2	3771.7	3719.7	3767.8	52	48.1	92.5
KA3550G01:1	51.4	45.9	50.8	5.5	4.9	89.1
KA3550G01:2	178.6	171.3	161.9	7.3	-9.4	<0
KA3552G01:1	666.1	663.8	666.7	2.3	2.9	126.1
KA3552G01:2	210.5	205.2	236.4	5.3	31.2	588.7
KA3552G01:3	221.8	219.2	224.1	2.6	4.9	188.5
KA3554G01:1	3841.2	3812.9	3838.1	28.3	25.2	89.0
KA3554G01:2	3826.9	3797.7	3823.5	29.2	25.8	88.4
KA3554G01:3	1080.4	1059.4	1080	21	20.6	98.1
KA3554G02:1	3381.2	3161.8	3377.7	219.4	215.9	98.4
KA3554G02:2	3144.6	2742.9	3151.4	401.7	408.5	101.7
KA3554G02:3	3335.4	3104.9	3332	230.5	227.1	98.5
KA3557G01:1	136.1	135.9	137.6	0.2	1.7	850.0
KA3563G01:1	286.6	282.7	287.8	3.9	5.1	130.8
KA3566G01:1	2589.9	2573.3	2587.9	16.6	14.6	88.0
KA3566G01:2	1906.5	1894.5	1904.1	12	9.6	80.0

Borehole section	Po (Kpa)	Pp (Kpa)	Pf (Kpa)	Po – Pp (Kpa)	Pf – Pp (Kpa)	Recovery (%)
KA3566G01:3	3207.6	3204.5	3211.7	3.1	7.2	232.3
KA3566G01:4	2747.2	2735	2747	12.2	12	98.4
KA3566G02:1	3202.8	2951.6	3298.5	251.2	346.9	138.1
KA3566G02:2	3471.8	3311	3469.8	160.8	158.8	98.8
KA3566G02:3	2731.6	2694.4	2725.1	37.2	30.7	82.5
KA3566G02:4	335.8	330.5	337.6	5.3	7.1	134.0
KA3572G01:1	321.2	321.2	322.2	0	1	-
KA3573A:1	4006.7	3997.3	4006.1	9.4	8.8	93.6
KA3573A:2	3862.2	3842.2	3865.4	20	23.2	116.0
KA3574G01:1	101.2	101	101.4	0.2	0.4	200.0
KA3578G01:1	92.2	92.2	92.4	0	0.2	-
KA3579G01:1	455.8	471.1	439	-15.3	-32.1	-
KA3584G01:1	107.1	106.9	107.3	0.2	0.4	200.0
KA3590G01:1	750.4	746.3	749.2	4.1	2.9	70.7
KA3590G02:1	3561.6	3434.2	3556.3	127.4	122.1	95.8
KA3593G01:1	1396.4	1384.9	1396.2	11.5	11.3	98.3
KA3600F:1	4071.3	4068.2	4071.3	3.1	3.1	100.0
KA3600F:2	4049.4	4045.1	4049.6	4.3	4.5	104.7
KG0021A01:1	3490.7	3303.2	3481.7	187.5	178.5	95.2
KG0021A01:2	3488.1	3281.6	3479.9	206.5	198.3	96.0
KG0021A01:3	3488.1	3270.6	3479.7	217.5	209.1	96.1
KG0021A01:4	3290	3156.9	3284.3	133.1	127.4	95.7
KG0021A01:5	2264.6	2202.4	2263.2	62.2	60.8	97.7
KG0048A01:1	3852.6	3826.6	3849.8	26	23.2	89.2
KG0048A01:2	3607.2	3574.5	3605	32.7	30.5	93.3
KG0048A01:3	3689.5	3624.6	3686.2	64.9	61.6	94.9
KG0048A01:4	2197.2	2139.6	2196	57.6	56.4	97.9

" – " in the Recovery column means that there has been no drawdown
" <0 " in the Recovery column means that there has been no recovery

Table A-6 Key pressure data , draw-down and recovery respectively of each borehole section. Interference test 2:12 in KA3539G, section 9.8 – 18.30 m. Prototype Repository, August 1999.

Borehole section	Po (Kpa)	Pp (Kpa)	Pf (Kpa)	Po – Pp (Kpa)	Pf – Pp (Kpa)	Recovery (%)
KA3510A:1	4131.1	4130.1	4131.3	1	1.2	120.0
KA3510A:2	4103.9	4103.3	4104.7	0.6	1.4	233.3
KA3510A:3	3850.9	3826.8	3849.7	24.1	22.9	95.0
KA3539G:1	2976.5	1160.5	2979.2	1816	1818.7	100.1
KA3539G:2	**2976.5**	**1160.7**	**2979.2**	**1815.8**	**1818.5**	**100.1**
KA3539G:3	2809.5	1896.9	2782.7	912.6	885.8	97.1
KA3542G01:1	3835.9	3815.4	3834.6	20.5	19.2	93.7
KA3542G01:2	3735.5	3691.7	3733	43.8	41.3	94.3
KA3542G01:3	1235	1198.4	1234.4	36.6	36	98.4
KA3542G02:1	3036.3	3012.3	3032.4	24	20.1	83.7
KA3542G02:2	3169.5	2970.3	3184.2	199.2	213.9	107.4
KA3542G02:3	3169.4	2913.2	3170.3	256.2	257.1	100.4
KA3542G02:4	3104.3	2343.7	3109.4	760.6	765.7	100.7
KA3544G01:1	2855,6	1907,2	2875,1	948,4	967,9	102,1
KA3544G01:2	2170,9	1673,1	2178,8	497,8	505,7	101,6
KA3546G01:1	314.3	265	315.1	49.3	50.1	101.6
KA3546G01:2	526.7	477.2	528.9	49.5	51.7	104.4
KA3548A01:1	3850.9	3831.7	3849.6	19.2	17.9	93.2
KA3548A01:2	3765	3726.5	3762.9	38.5	36.4	94.5
KA3550G01:1	62.2	59.4	65.7	2.8	6.3	225.0
KA3550G01:2	149.2	148.8	148.4	0.4	-0.4	<0
KA3552G01:1	668.5	667.5	668.5	1	1	100.0
KA3552G01:2	237.9	234.8	237.9	3.1	3.1	100.0
KA3552G01:3	226.5	225.1	227.1	1.4	2	142.9
KA3554G01:1	3833.2	3812.9	3832.2	20.3	19.3	95.1
KA3554G01:2	3818.1	3798.3	3816.7	19.8	18.4	92.9
KA3554G01:3	1079.6	1071.2	1078.2	8.4	7	83.3
KA3554G02:1	3386.3	3281.9	3380.8	104.4	98.9	94.7
KA3554G02:2	3177.8	2798.8	3185.1	379	386.3	101.9
KA3554G02:3	3332.4	3153.1	3332.2	179.3	179.1	99.9
KA3557G01:1	141.5	141.5	141.9	0	0.4	-
KA3563G01:1	290	288.6	289.6	1.4	1	71.4
KA3566G01:1	2586	2577.4	2585.8	8.6	8.4	97.7
KA3566G01:2	1903.5	1898.6	1903.7	4.9	5.1	104.1

Borehole section	Po (Kpa)	Pp (Kpa)	Pf (Kpa)	Po – Pp (Kpa)	Pf – Pp (Kpa)	Recovery (%)
KA3566G01:3	3216	3214.9	3216.8	1.1	1.9	172.7
KA3566G01:4	2748.1	2745.6	2747.2	2.5	1.6	64.0
KA3566G02:1	3308.3	3060.1	3304.4	248.2	244.3	98.4
KA3566G02:2	3473.2	3364.4	3471.6	108.8	107.2	98.5
KA3566G02:3	2731.6	2731	2727.1	0.6	-3.9	<0
KA3566G02:4	338.6	335	338.9	3.6	3.9	108.3
KA3572G01:1	326.1	325.9	326.5	0.2	0.6	300.0
KA3573A:1	4005.7	3999.9	4005.7	5.8	5.8	100.0
KA3573A:2	3861.5	3843.3	3860.5	18.2	17.2	94.5
KA3574G01:1	101.6	101.4	101.6	0.2	0.2	100.0
KA3578G01:1	92.6	92.6	92.6	0	0	-
KA3579G01:1	474.2	475.6	478.1	-1.4	2.5	-
KA3584G01:1	108.7	108.5	108.7	0.2	0.2	100.0
KA3590G01:1	746.5	744.1	745.1	2.4	1	41.7
KA3590G02:1	3557.7	3474.5	3556.1	83.2	81.6	98.1
KA3593G01:1	1397.9	1396.2	1399.9	1.7	3.7	217.6
KA3600F:1	4071.7	4070.9	4072.7	0.8	1.8	225.0
KA3600F:2	4050	4048.1	4050.6	1.9	2.5	131.6
KG0021A01:1	3477.6	3324.9	3476.8	152.7	151.9	99.5
KG0021A01:2	3480.5	3314.2	3478.9	166.3	164.7	99.0
KG0021A01:3	3481.7	3308.5	3480.1	173.2	171.6	99.1
KG0021A01:4	3303.1	3263.8	3300.5	39.3	36.7	93.4
KG0021A01:5	2268.7	2235.5	2268.9	33.2	33.4	100.6
KG0048A01:1	3846.1	3827.9	3845.1	18.2	17.2	94.5
KG0048A01:2	3605	3582.1	3603.5	22.9	21.4	93.4
KG0048A01:3	3686	3640.1	3685.2	45.9	45.1	98.3
KG0048A01:4	2201.8	2173.5	2201.8	28.3	28.3	100.0

" – " in the Recovery column means that there has been no drawdown
" <0 " in the Recovery column means that there has been no recovery

Table A-7 Key pressure data , draw-down and recovery respectively of each borehole section. Interference test 2:13 in KG0021A01, section 42.50 – 48.82 m. Prototype Repository, August 1999.

Borehole section	Po (Kpa)	Pp (Kpa)	Pf (Kpa)	Po – Pp (Kpa)	Pf – Pp (Kpa)	Recovery (%)
KA3510A:1	4130.7	4130.9	4131.1	-0.2	0.2	-
KA3510A:2	4103.1	4103.9	4104.1	-0.8	0.2	-
KA3510A:3	3851.9	3848	3850.9	3.9	2.9	74.4
KA3539G:1	2975.5	2959.6	2976.5	15.9	16.9	106.3
KA3539G:2	2975.7	2959.3	2976.5	16.4	17.2	104.9
KA3539G:3	2807.8	2791.9	2809.5	15.9	17.6	110.7
KA3542G01:1	3837.5	3833.6	3835.9	3.9	2.3	59.0
KA3542G01:2	3735.9	3719.7	3735.3	16.2	15.6	96.3
KA3542G01:3	1235.4	1221.1	1234.8	14.3	13.7	95.8
KA3542G02:1	3033.6	3024.8	3036.3	8.8	11.5	130.7
KA3542G02:2	3168.7	3151.9	3169.7	16.8	17.8	106.0
KA3542G02:3	3168.8	3151.7	3169.4	17.1	17.7	103.5
KA3542G02:4	3104.5	3085.7	3104.3	18.8	18.6	98.9
KA3544G01:1	2855,8	2840,1	2855,8	15,7	15,7	100,0
KA3544G01:2	2168,8	2156,9	2170,7	11,9	13,8	116,0
KA3546G01:1	312.9	311	314.1	1.9	3.1	163.2
KA3546G01:2	524.4	522	526.7	2.4	4.7	195.8
KA3548A01:1	3851.7	3848.4	3850.9	3.3	2.5	75.8
KA3548A01:2	3765.8	3751.2	3765	14.6	13.8	94.5
KA3550G01:1	54.1	55.9	62.3	-1.8	6.4	-
KA3550G01:2	152.5	151.3	149.4	1.2	-1.9	<0
KA3552G01:1	667.1	666.7	668.5	0.4	1.8	450.0
KA3552G01:2	237.5	236.7	237.9	0.8	1.2	150.0
KA3552G01:3	225.7	225.7	226.7	0	1	-
KA3554G01:1	3834.6	3830.9	3833.5	3.7	2.6	70.3
KA3554G01:2	3819.8	3815.7	3818.4	4.1	2.7	65.9
KA3554G01:3	1080.2	1073.5	1079.4	6.7	5.9	88.1
KA3554G02:1	3383.1	3375.1	3386.3	8	11.2	140.0
KA3554G02:2	3177.2	3159.5	3178	17.7	18.5	104.5
KA3554G02:3	3331.8	3319.7	3332.4	12.1	12.7	105.0
KA3557G01:1	139.8	140	141.5	-0.2	1.5	-
KA3563G01:1	289.4	288.8	289.8	0.6	1	166.7
KA3566G01:1	2586.2	2584.4	2586	1.8	1.6	88.9
KA3566G01:2	1901.6	1901.2	1903.5	0.4	2.3	575.0

Borehole section	Po (Kpa)	Pp (Kpa)	Pf (Kpa)	Po – Pp (Kpa)	Pf – Pp (Kpa)	Recovery (%)
KA3566G01:3	3212.1	3213.3	3216	-1.2	2.7	-
KA3566G01:4	2745.8	2745.2	2748.1	0.6	2.9	483.3
KA3566G02:1	3304.8	3291.3	3308.3	13.5	17	125.9
KA3566G02:2	3471.4	3459.5	3473.2	11.9	13.7	115.1
KA3566G02:3	2722.8	2724.6	2731.6	-1.8	7	-
KA3566G02:4	338.4	338	338.6	0.4	0.6	150.0
KA3572G01:1	324	324.6	325.7	-0.6	1.1	-
KA3573A:1	4005.1	4004.6	4005.7	0.5	1.1	220.0
KA3573A:2	3862.3	2859.2	3861.3	1003.1	1002.1	99.9
KA3574G01:1	101.4	101.6	101.6	-0.2	0	-
KA3578G01:1	92.4	92.4	92.6	0	0.2	-
KA3579G01:1	448.2	459.7	474	-11.5	14.3	-
KA3584G01:1	108.3	108.1	108.5	0.2	0.4	200.0
KA3590G01:1	748	747.1	746.5	0.9	-0.6	<0
KA3590G02:1	3556.1	3543.4	3557.9	12.7	14.5	114.2
KA3593G01:1	1395.6	1395.6	1398.1	0	2.5	-
KA3600F:1	4071.1	4071.9	4071.7	-0.8	-0.2	-
KA3600F:2	4049.1	4049.6	4050.2	-0.5	0.6	-
KG0021A01:1	**3478.8**	**227.7**	**3477.6**	**3251.1**	**3249.9**	**100.0**
KG0021A01:2	3479.1	3342.4	3480.3	136.7	137.9	100.9
KG0021A01:3	3479.9	3455.7	3481.7	24.2	26	107.4
KG0021A01:4	3299	3286.7	3302.9	12.3	16.2	131.7
KG0021A01:5	2265.9	2263	2268.7	2.9	5.7	196.6
KG0048A01:1	3846.9	3843.8	3846.1	3.1	2.3	74.2
KG0048A01:2	3605	3601.1	3605	3.9	3.9	100.0
KG0048A01:3	3685.6	3677.2	3686	8.4	8.8	104.8
KG0048A01:4	2202.2	2196.5	2202	5.7	5.5	96.5

" – " in the Recovery column means that there has been no draw down
" <0 " in the Recovery column means that there has been no recovery

Table A-8 Key pressure data , draw-down and recovery respectively of each borehole section. Interference test 2:14 in KG0021A01, section 25.00 – 34.00 m. Prototype Repository, August 1999.

Borehole section	Po (Kpa)	Pp (Kpa)	Pf (Kpa)	Po – Pp (Kpa)	Pf – Pp (Kpa)	Recovery (%)
KA3510A:1	4130.3	4128.7	4130.7	1.6	2	125.0
KA3510A:2	4102.9	4098.6	4103.1	4.3	4.5	104.7
KA3510A:3	3855.4	3801.8	3851.9	53.6	50.1	93.5
KA3539G:1	2976.5	2523	2975.5	453.5	452.5	99.8
KA3539G:2	2976.5	2523	2975.5	453.5	452.5	99.8
KA3539G:3	2826.9	2386.6	2807.8	440.3	421.2	95.7
KA3542G01:1	3840.8	3788.6	3837.3	52.2	48.7	93.3
KA3542G01:2	3737.3	3648.5	3735.9	88.8	87.4	98.4
KA3542G01:3	1233	1136.5	1235.4	96.5	98.9	102.5
KA3542G02:1	2994.6	2701.8	3033.6	292.8	331.8	113.3
KA3542G02:2	3154.6	2657.8	3168.9	496.8	511.1	102.9
KA3542G02:3	3136.1	2596.5	3168.6	539.6	572.1	106.0
KA3542G02:4	3110.2	2550.1	3104.5	560.1	554.4	99.0
KA3544G01:1	2857,9	2114,4	2856	743,5	741,6	99,7
KA3544G01:2	2167,6	1809,8	2168,8	357,8	359	100,3
KA3546G01:1	311.6	277.3	312.9	34.3	35.6	103.8
KA3546G01:2	523	447.4	524.4	75.6	77	101.9
KA3548A01:1	3855	3803.9	3851.7	51.1	47.8	93.5
KA3548A01:2	3767.8	3686.2	3765.9	81.6	79.7	97.7
KA3550G01:1	50.8	48.6	54.1	2.2	5.5	250.0
KA3550G01:2	161.9	157.6	152.5	4.3	-5.1	<0
KA3552G01:1	666.9	664.2	667.3	2.7	3.1	114.8
KA3552G01:2	236.2	229.2	237.5	7	8.3	118.6
KA3552G01:3	224.1	221.8	225.5	2.3	3.7	160.9
KA3554G01:1	3837.9	3785.7	3834.4	52.2	48.7	93.3
KA3554G01:2	3823.5	3770.3	3819.8	53.2	49.5	93.0
KA3554G01:3	1080	1049.6	1080.2	30.4	30.6	100.7
KA3554G02:1	3377.9	3119.2	3382.9	258.7	263.7	101.9
KA3554G02:2	3151.6	2593.4	3177	558.2	583.6	104.6
KA3554G02:3	3331.8	2963.7	3331.8	368.1	368.1	100.0
KA3557G01:1	137.8	137.8	139.8	0	2	-
KA3563G01:1	287.6	282.7	289.4	4.9	6.7	136.7
KA3566G01:1	2587.9	2554.9	2586.2	33	31.3	94.8
KA3566G01:2	1903.9	1879.9	1901.8	24	21.9	91.2

Borehole section	Po (Kpa)	Pp (Kpa)	Pf (Kpa)	Po – Pp (Kpa)	Pf – Pp (Kpa)	Recovery (%)
KA3566G01:3	3211.7	3199.4	3211.9	12.3	12.5	101.6
KA3566G01:4	2747	2713.9	2746	33.1	32.1	97.0
KA3566G02:1	3298.5	2846.7	3304.8	451.8	458.1	101.4
KA3566G02:2	3469.6	3112	3471.4	357.6	359.4	100.5
KA3566G02:3	2725.1	2623.1	2723	102	99.9	97.9
KA3566G02:4	337.4	326.6	338.4	10.8	11.8	109.3
KA3572G01:1	322.4	320.7	324.2	1.7	3.5	205.9
KA3573A:1	4006.1	3985.8	4005.3	20.3	19.5	96.1
KA3573A:2	3865.1	3813.8	3862.3	51.3	48.5	94.5
KA3574G01:1	101.4	101.4	101.6	0	0.2	-
KA3578G01:1	92.2	92.4	92.4	-0.2	0	-
KA3579G01:1	438.8	438.6	448.2	0.2	9.6	4800.0
KA3584G01:1	107.1	107.5	108.3	-0.4	0.8	-
KA3590G01:1	749.2	741.8	747.9	7.4	6.1	82.4
KA3590G02:1	3556.3	3176.8	3555.9	379.5	379.1	99.9
KA3593G01:1	1396	1361.6	1395.4	34.4	33.8	98.3
KA3600F:1	4071.3	4062.9	4071.1	8.4	8.2	97.6
KA3600F:2	4049.4	4038.7	4049.2	10.7	10.5	98.1
KG0021A01:1	3481.7	2918.7	3478.6	563	559.9	99.4
KG0021A01:2	3480.1	2791.3	3479.1	688.8	687.8	99.9
KG0021A01:3	**3479.7**	**2625**	**3479.9**	**854.7**	**854.9**	**100.0**
KG0021A01:4	3284.3	2877.2	3299.2	407.1	422	103.7
KG0021A01:5	2263	2079	2269.5	184	190.5	103.5
KG0048A01:1	3849.8	3798.2	3846.9	51.6	48.7	94.4
KG0048A01:2	3605	3519.9	3605.2	85.1	85.3	100.2
KG0048A01:3	3886.4	3485.1	3685.4	401.3	200.3	49.9
KG0048A01:4	2195.8	2024.1	2202.2	171.7	178.1	103.7

“ – “ in the Recovery column means that there has been no drawdown
“ <0 “ in the Recovery column means that there has been no recovery

APPENDIX 2

Interference test 2:7 in borehole KG0048A01, section 49.00 m – 54.69 m

Date: 99-06-17 Field Crew: A. Bern, J. Olausson
Borehole length: 54.69 m Borehole diameter: 76 mm

Flowing borehole: KG0048A01, section #1: 49.00 – 54.69 m

Valve opened: 990617 08:00.00 Valve closed: 990617 09:25.00
End of Test: 990617 14:00
Total flowing time : 85 min Tot. Pr. Build-up time: 275 min.

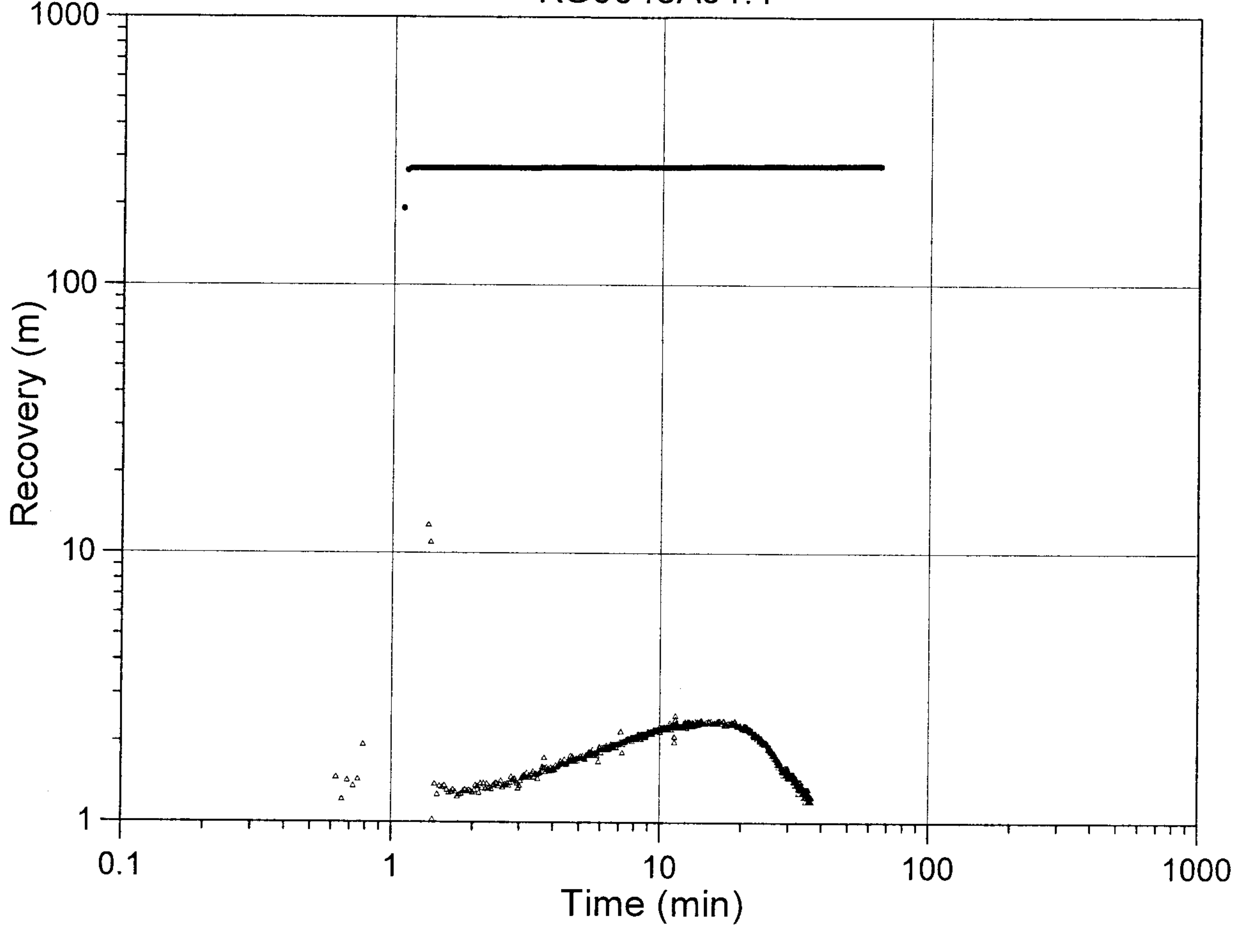
The test was performed as an Interference test. Pressure responses were monitored in 63 borehole sections.

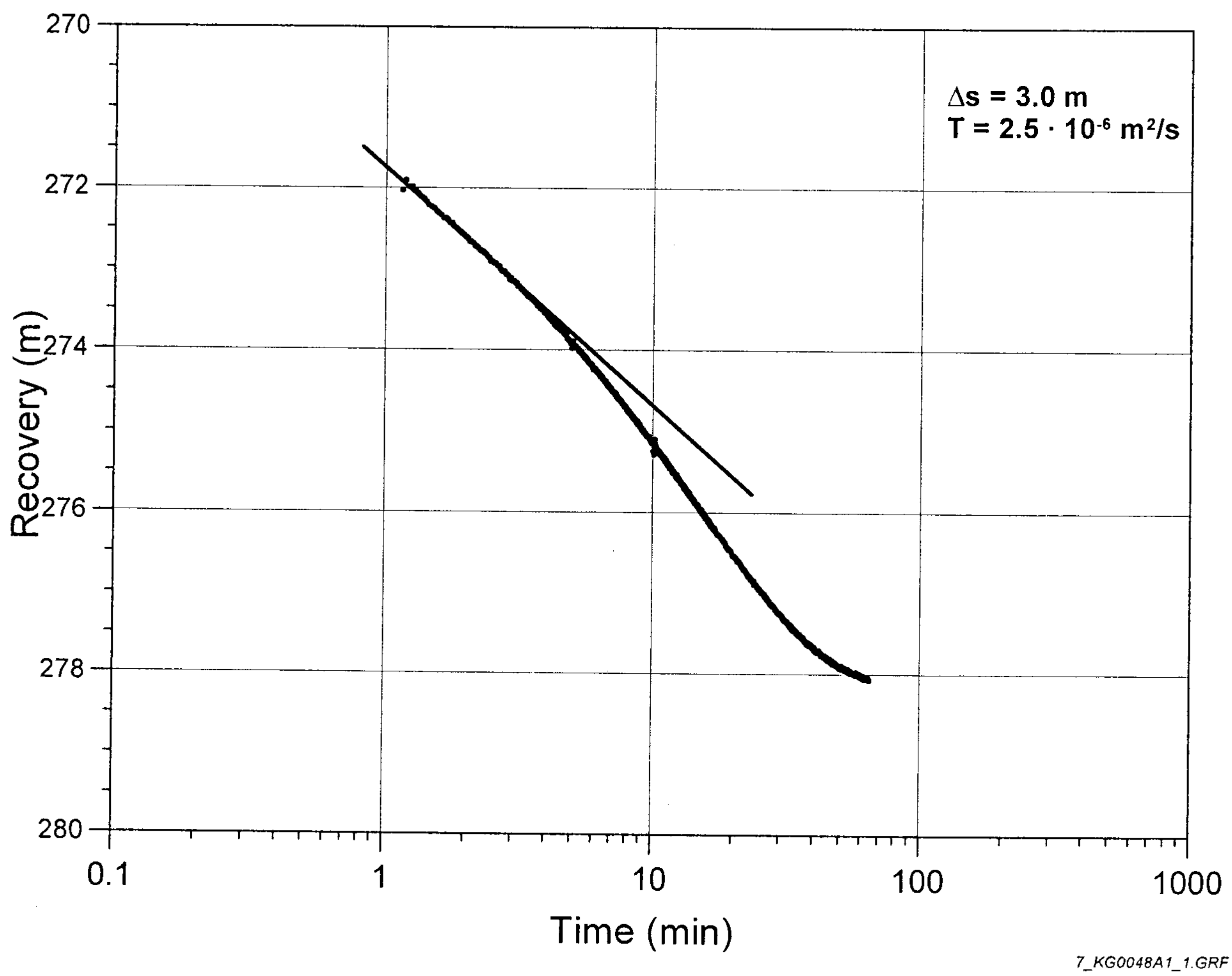
Flow data
Manually measured flow rates of KG0048A01, section 49.00– 54.69 m are presented in the table below:

Table Manually measured flow rates, Interference test in KG0048A01, section 49.00 – 54.69 m (test #07). Prototype Repository, June 1999

Time	Flow rate (l/min)
08:00.45	2.500
08:02:30	2.500
08:04:30	2.430
08:06.30	2.410
08:10:30	2.400
08:15:30	2.370
08:25:30	2.350
08:30:30	2.290
08:35.30	2.320
08:40.30	2.490
08:48.30	2.410
08:50.30	2.410
09:00.30	2.410
09:05.30	2.400
09:12.30	2.420
09:15.30	2.440
09:20.30	2.410
09:22:30	2.410

KG0048A01:1





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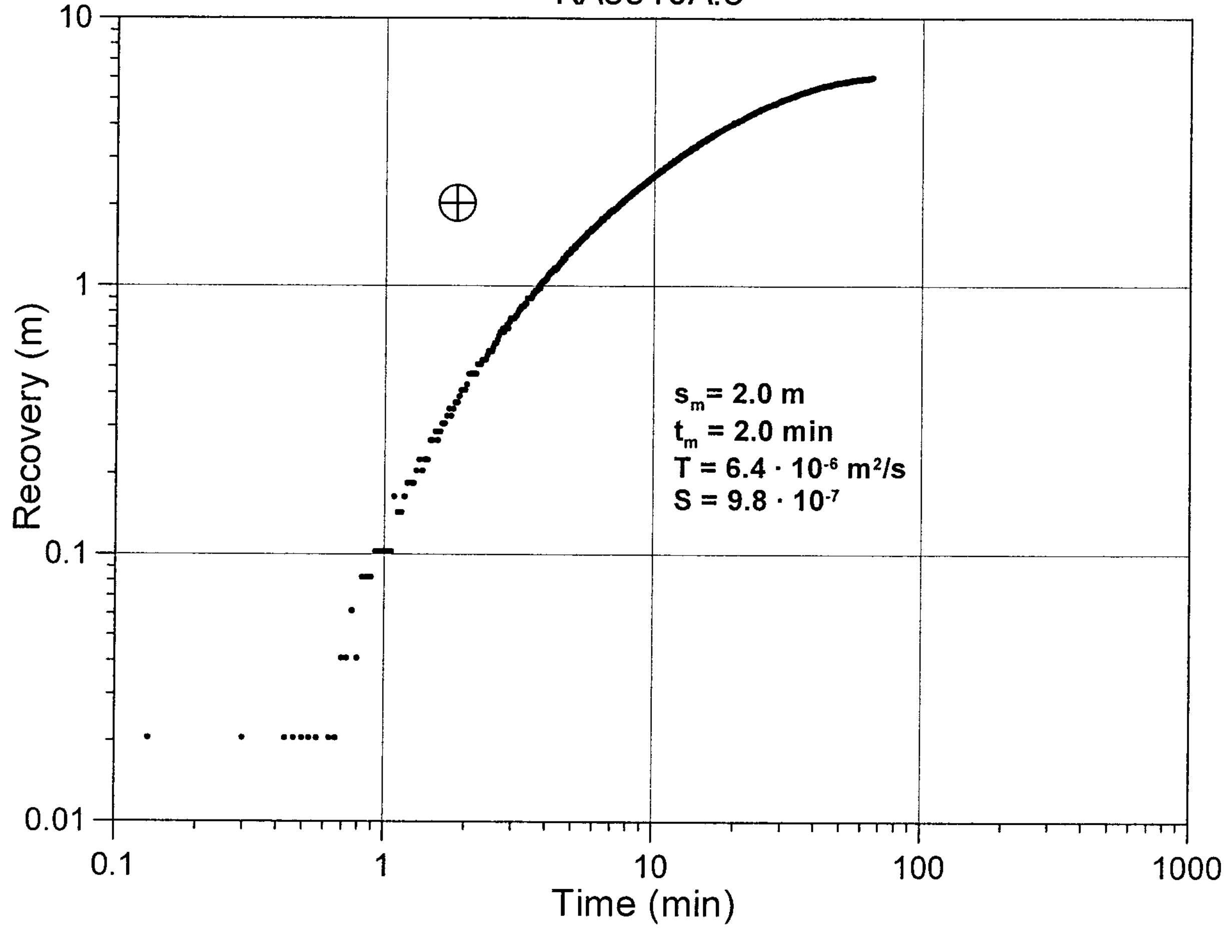

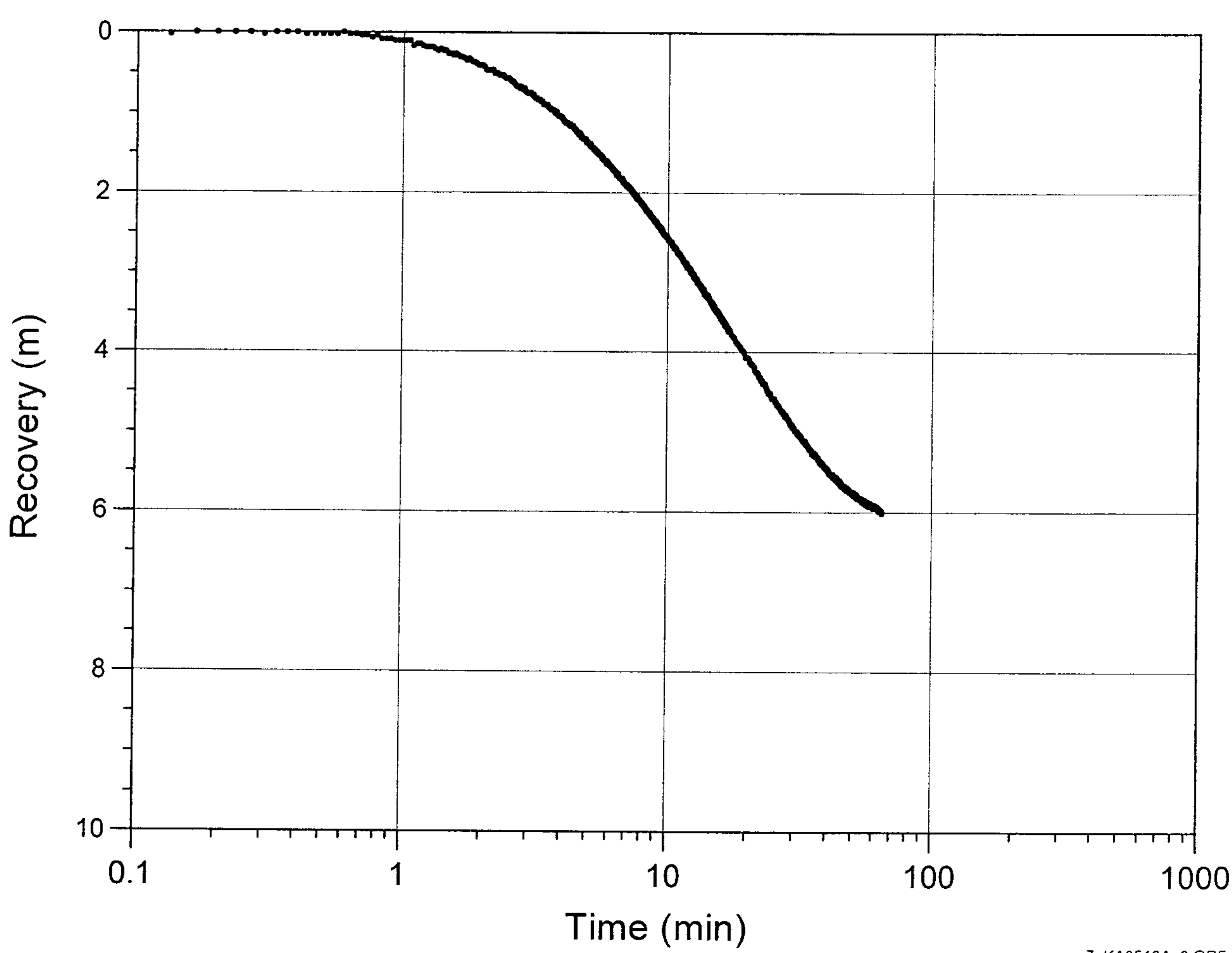

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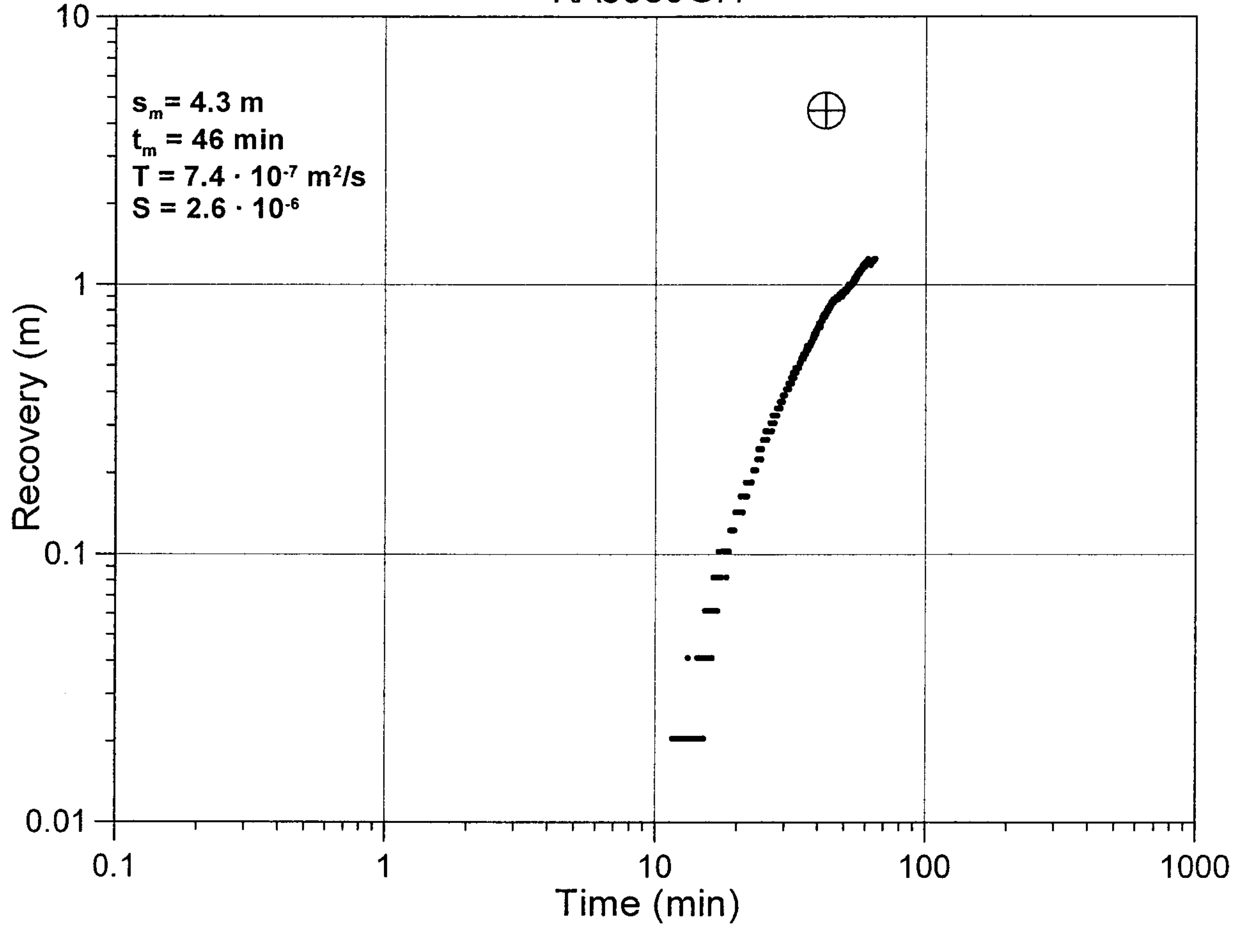

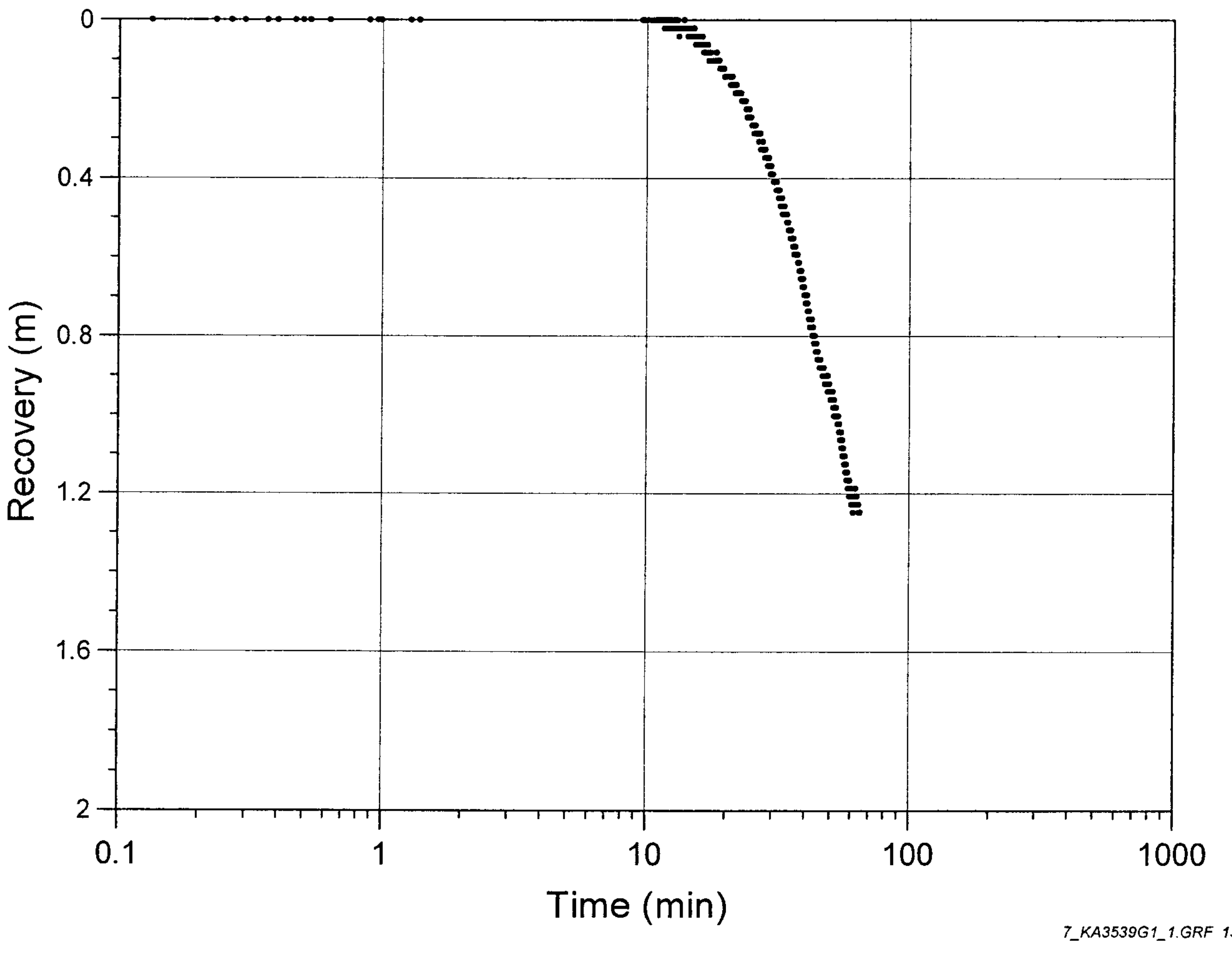

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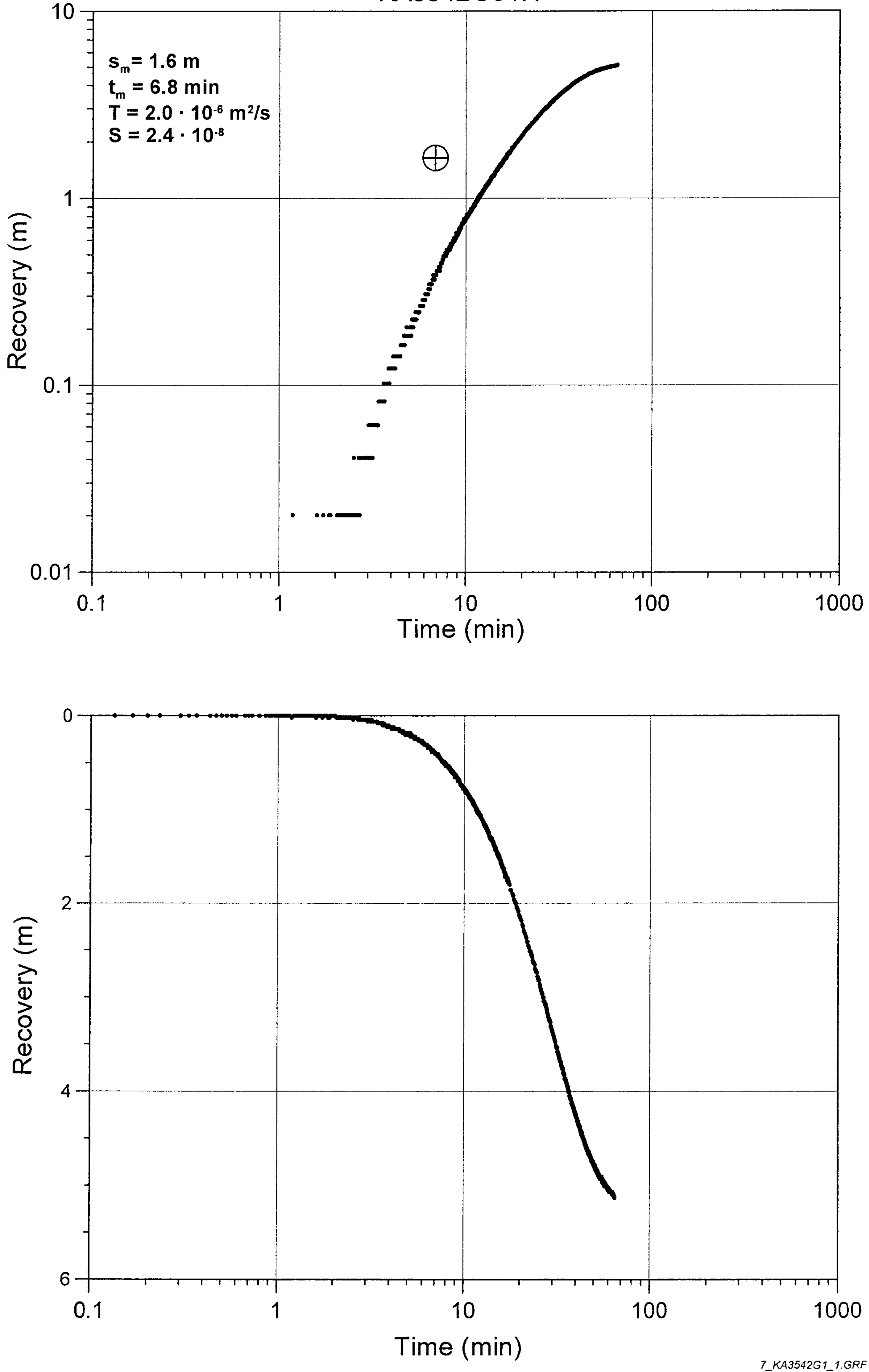

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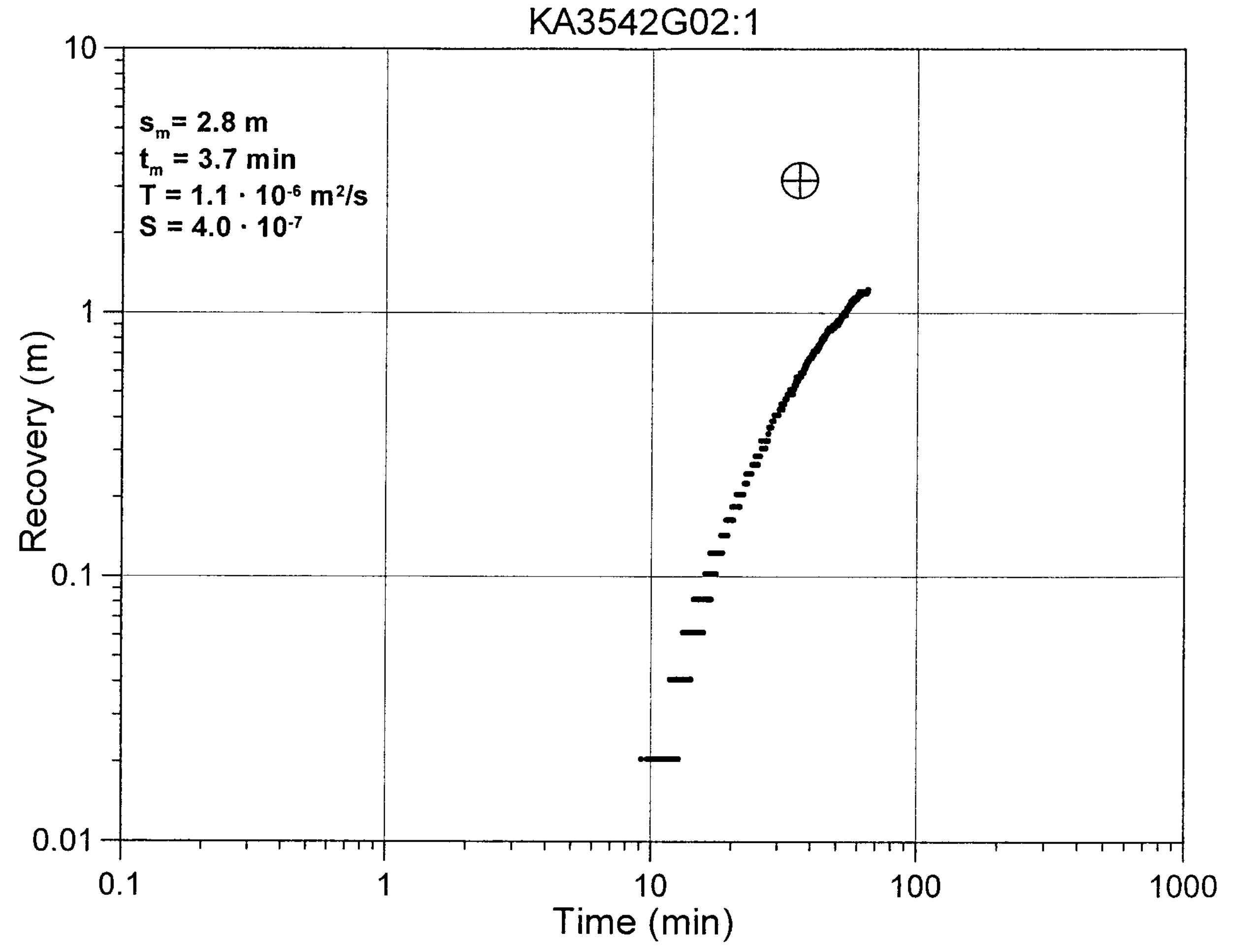

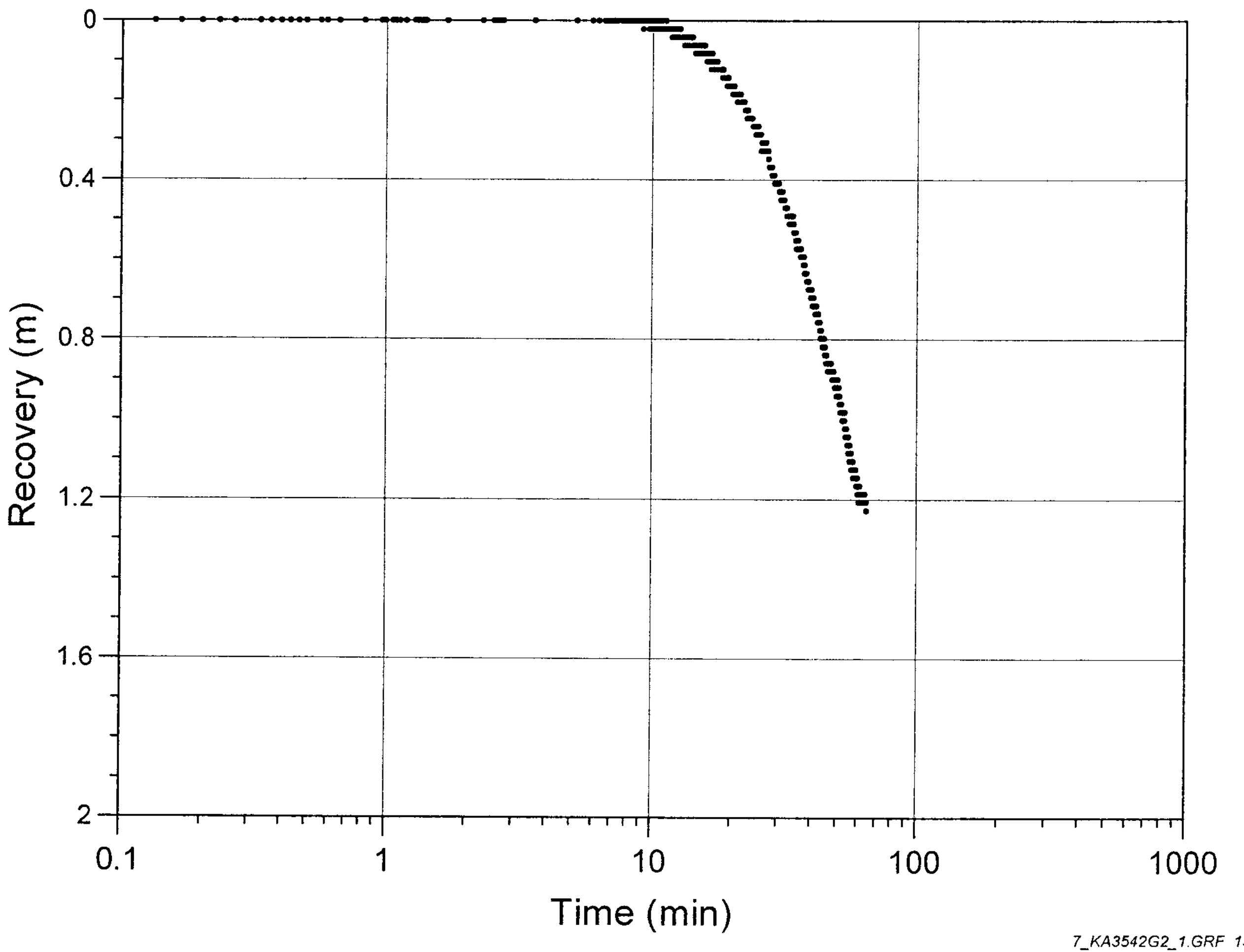

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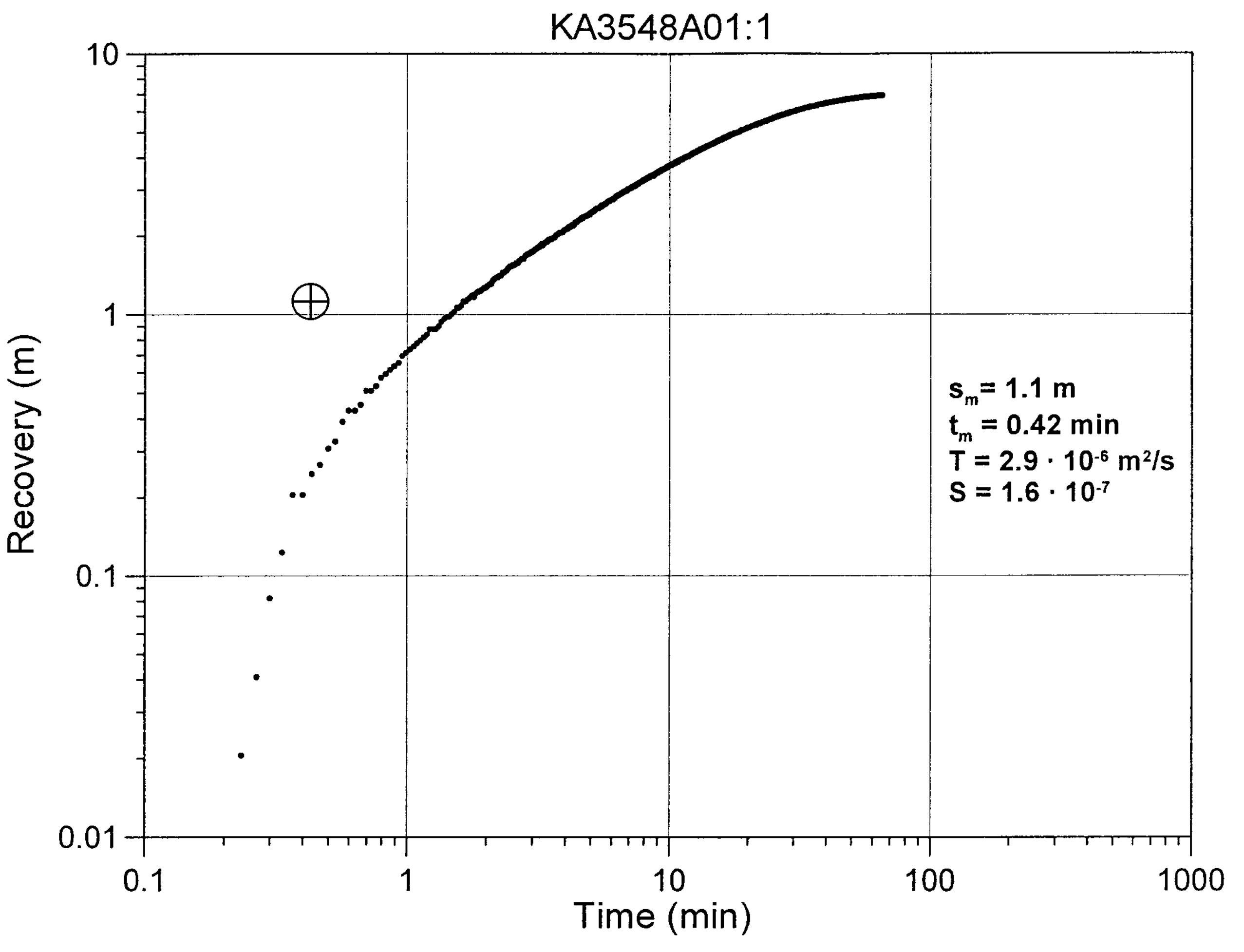

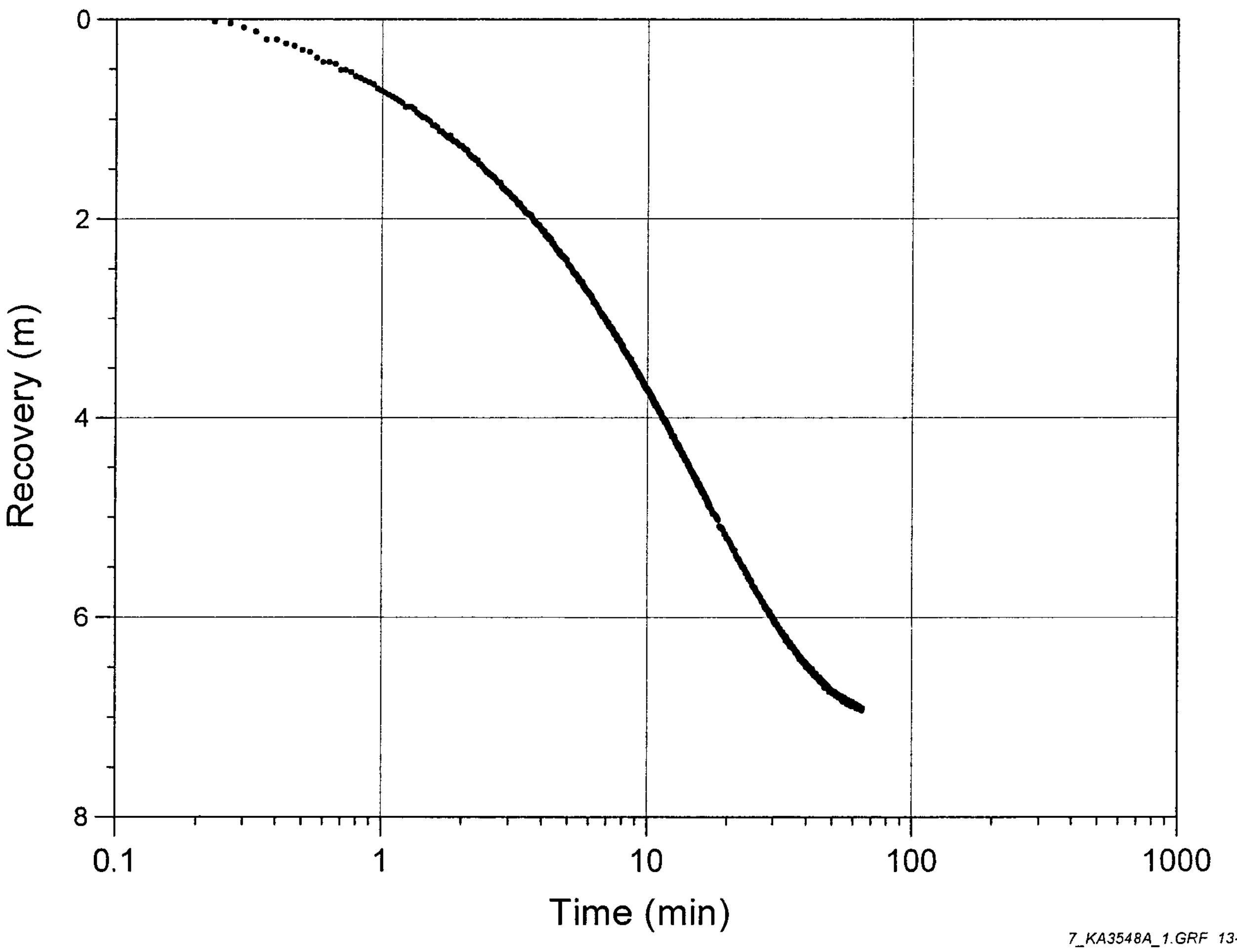

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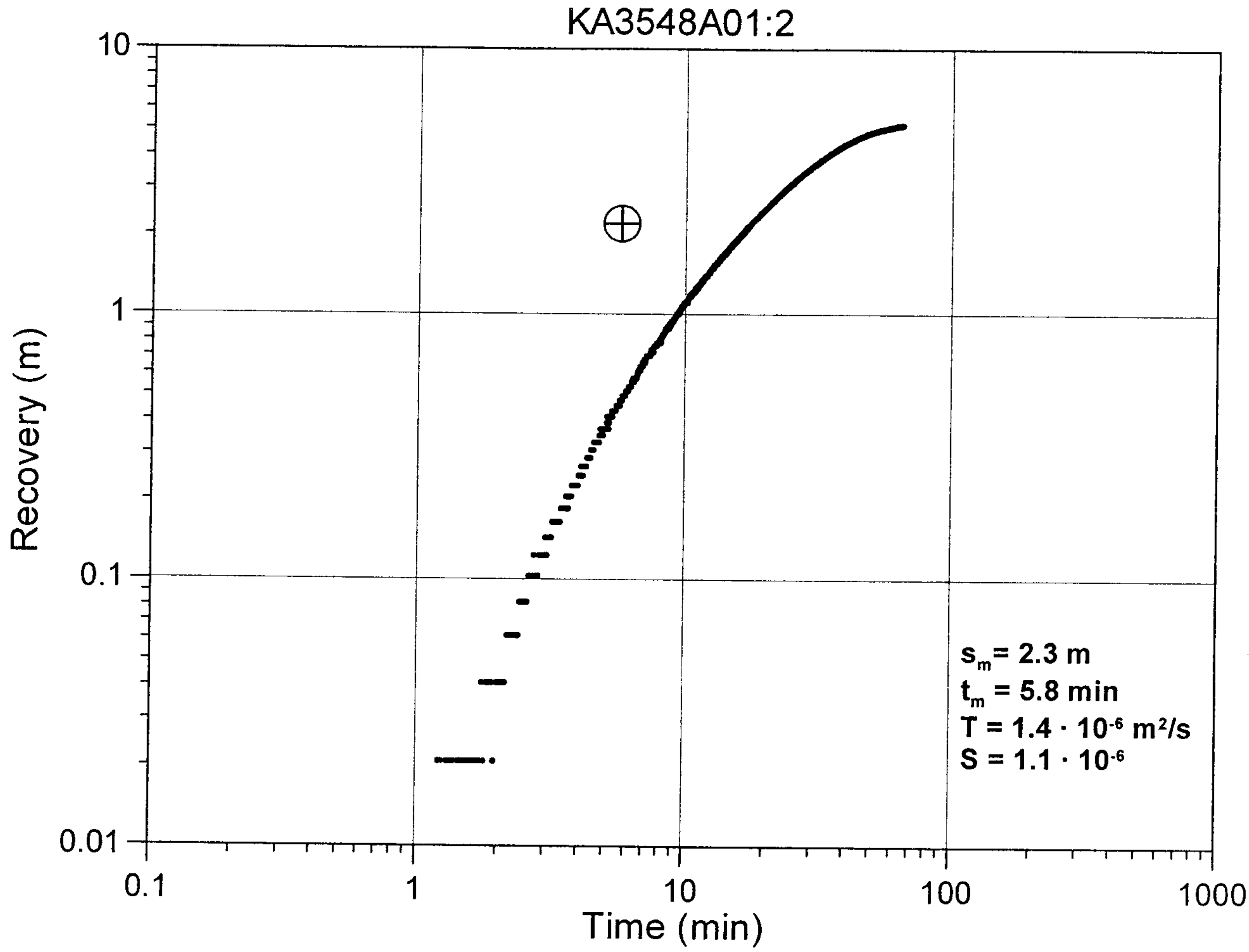

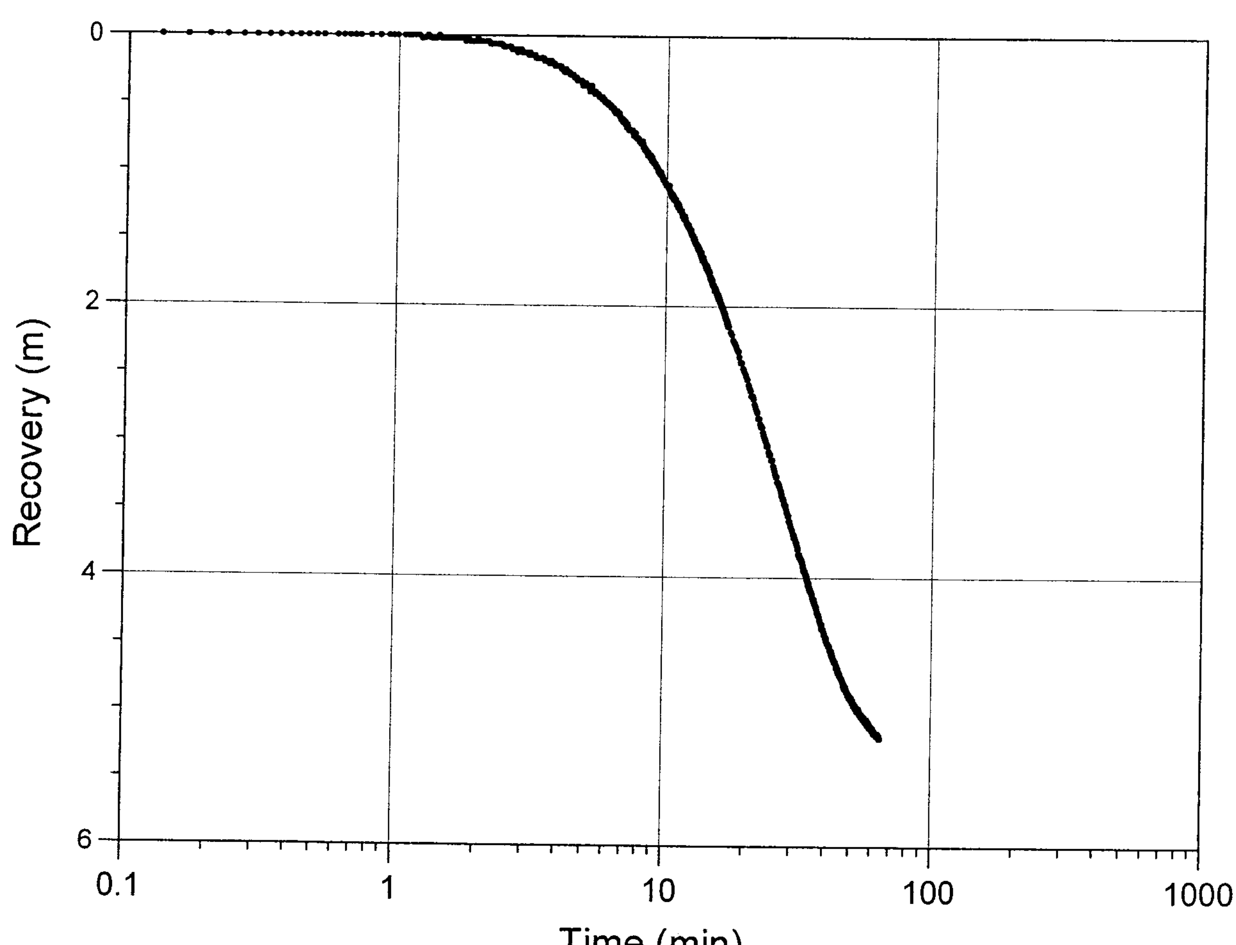

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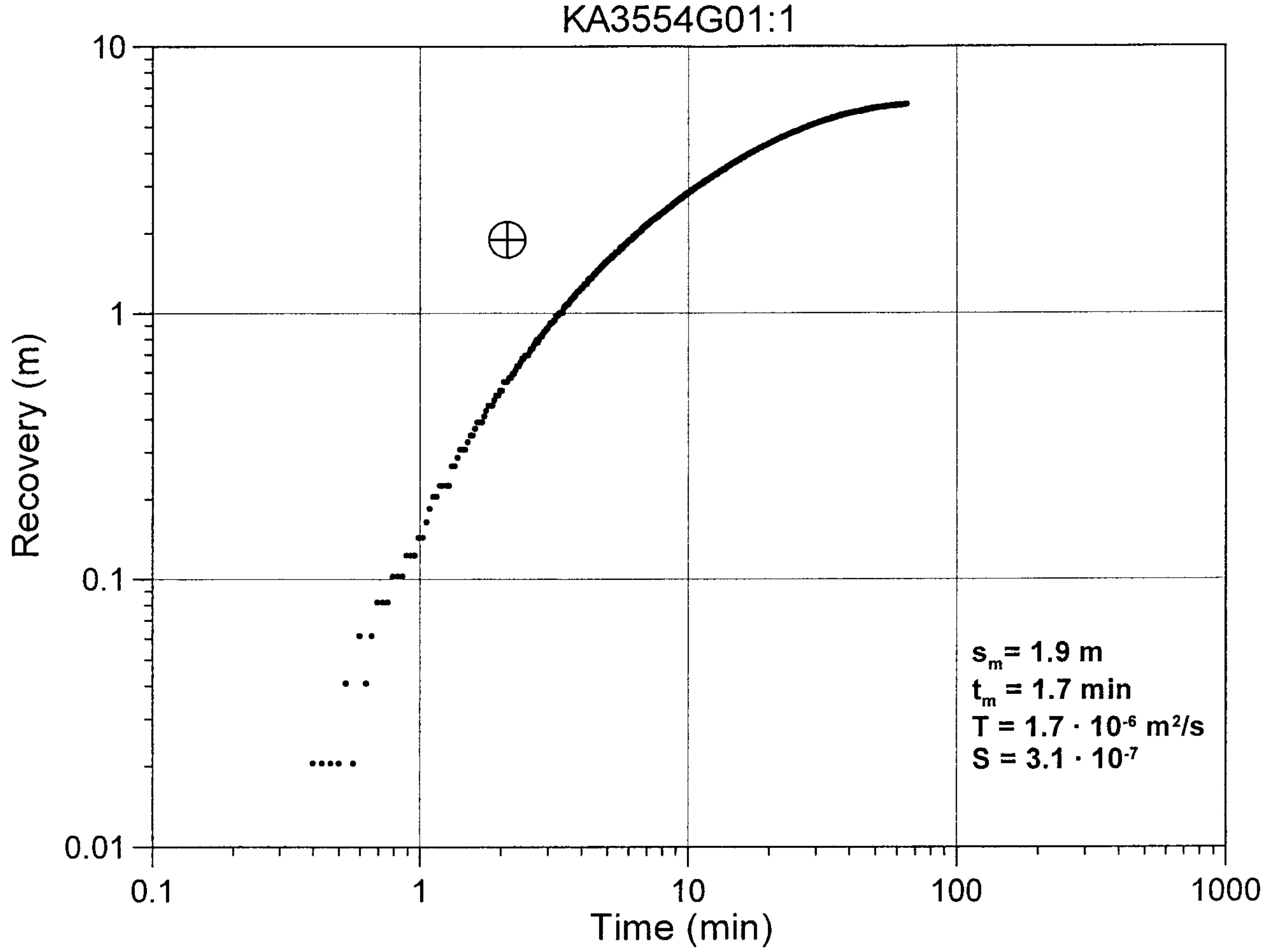

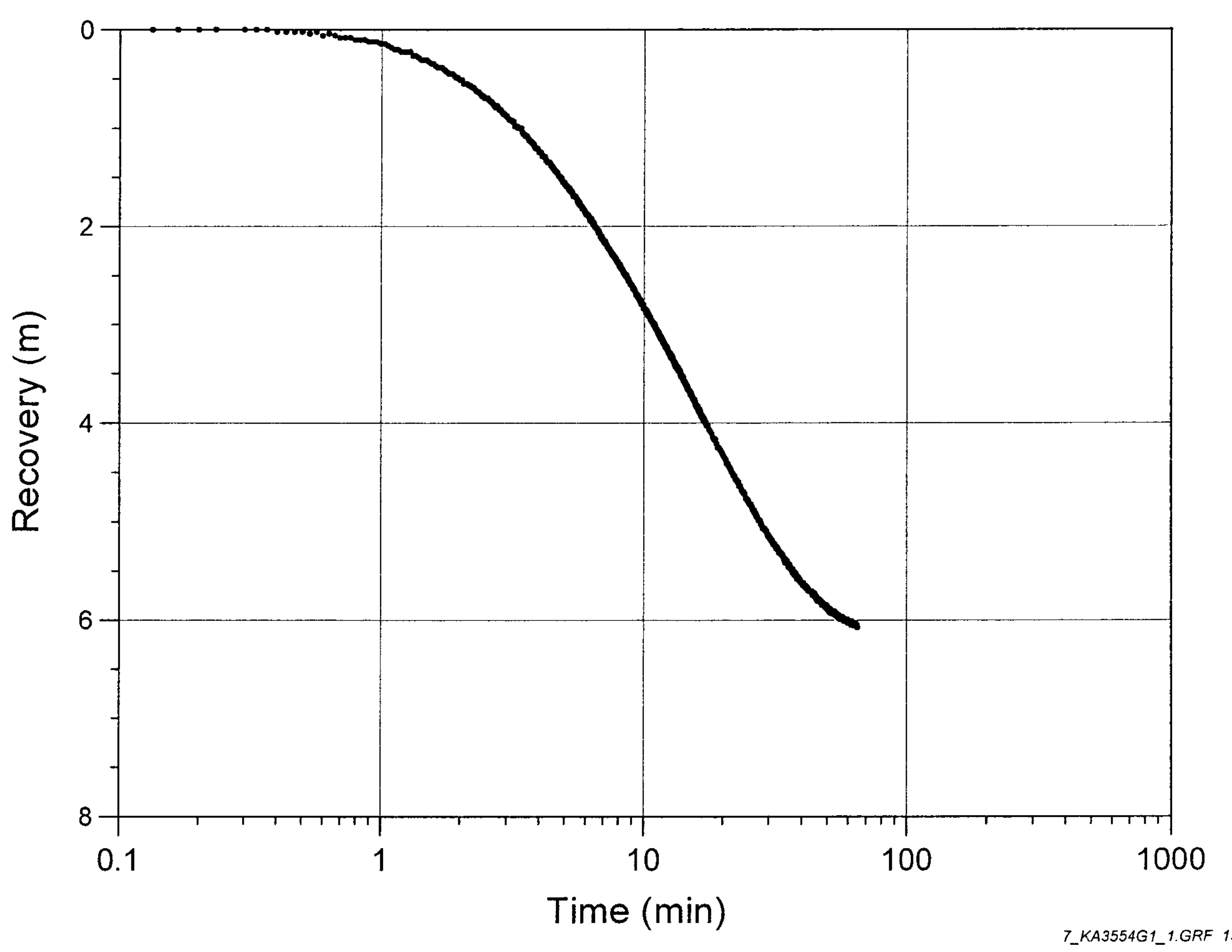

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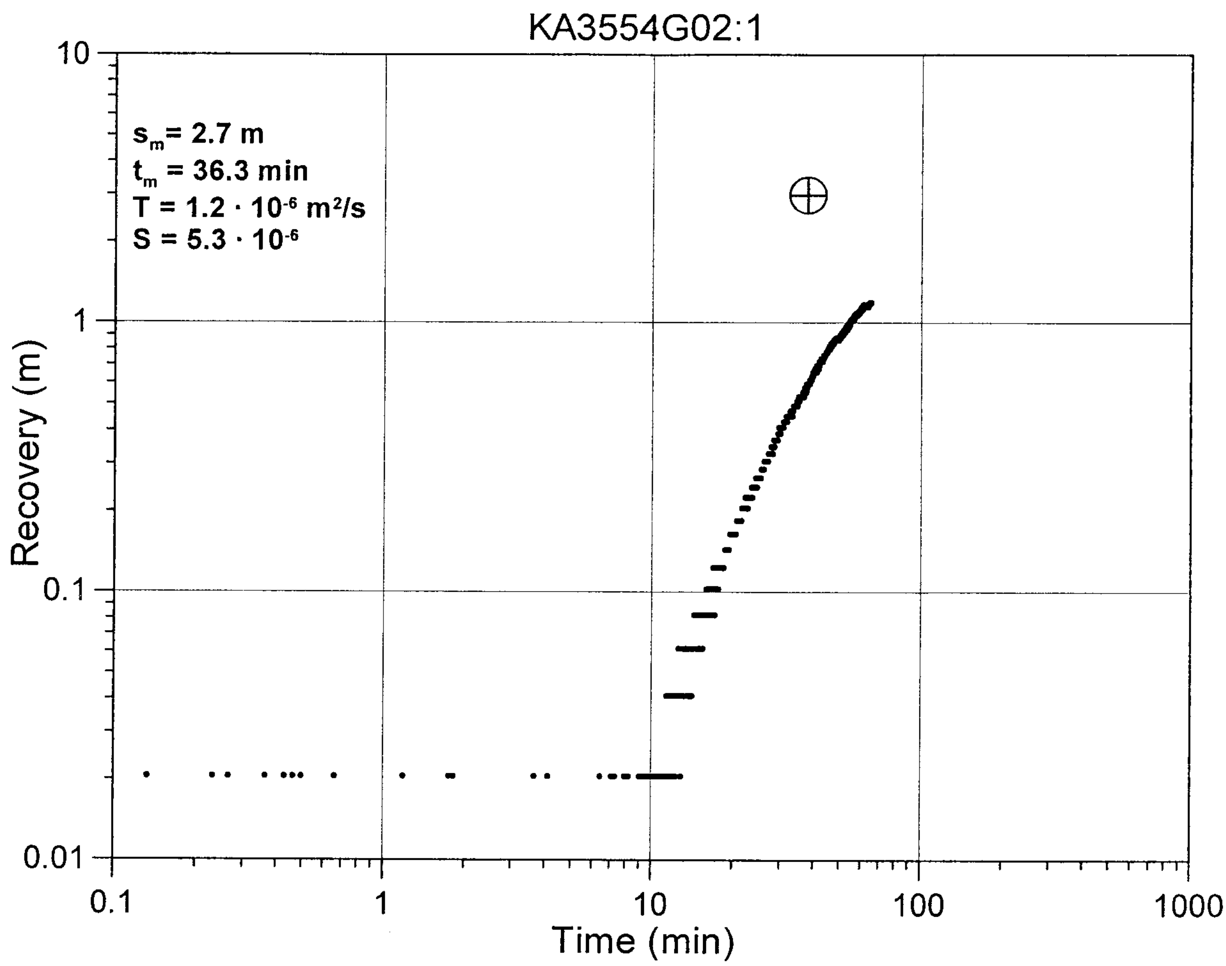

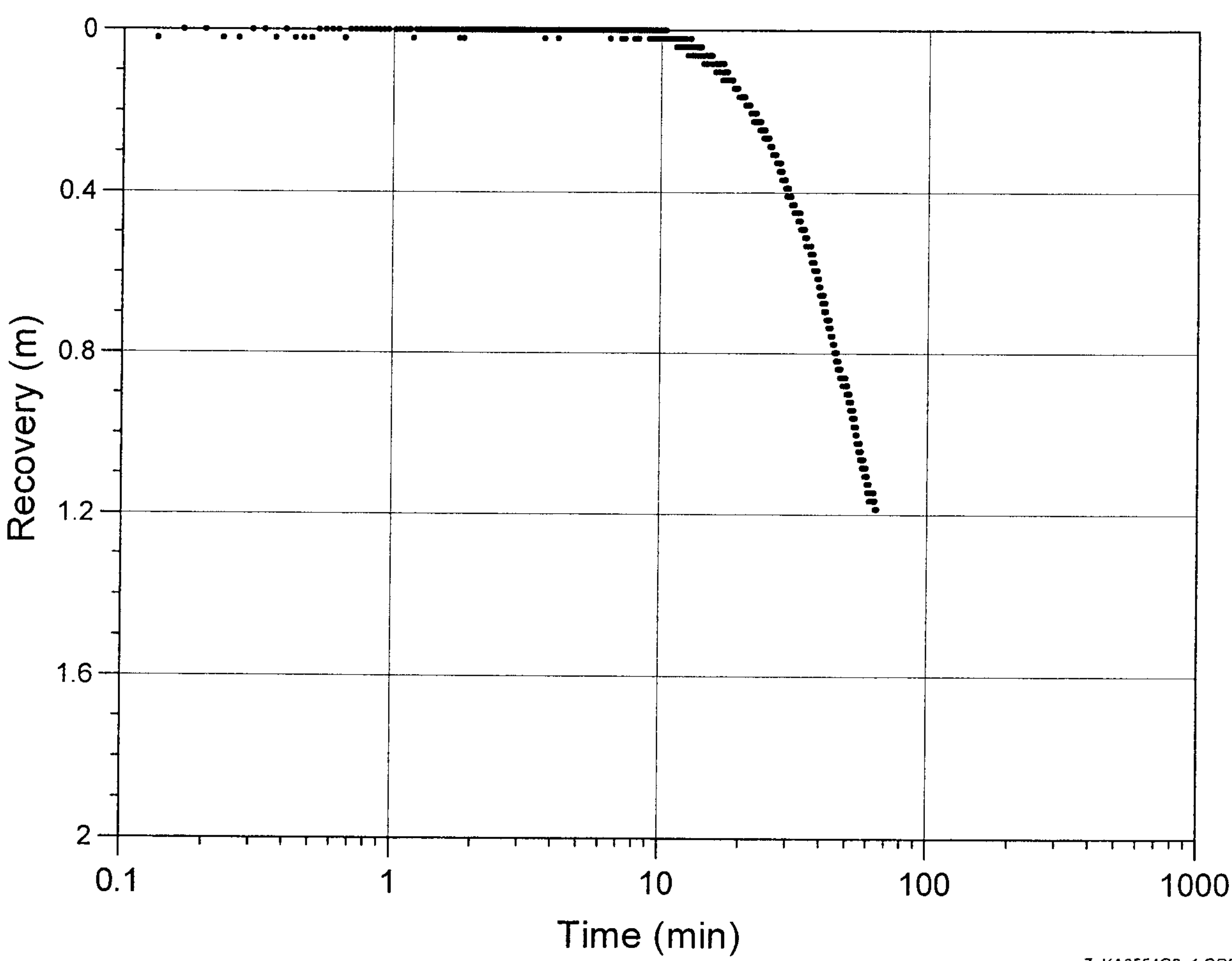

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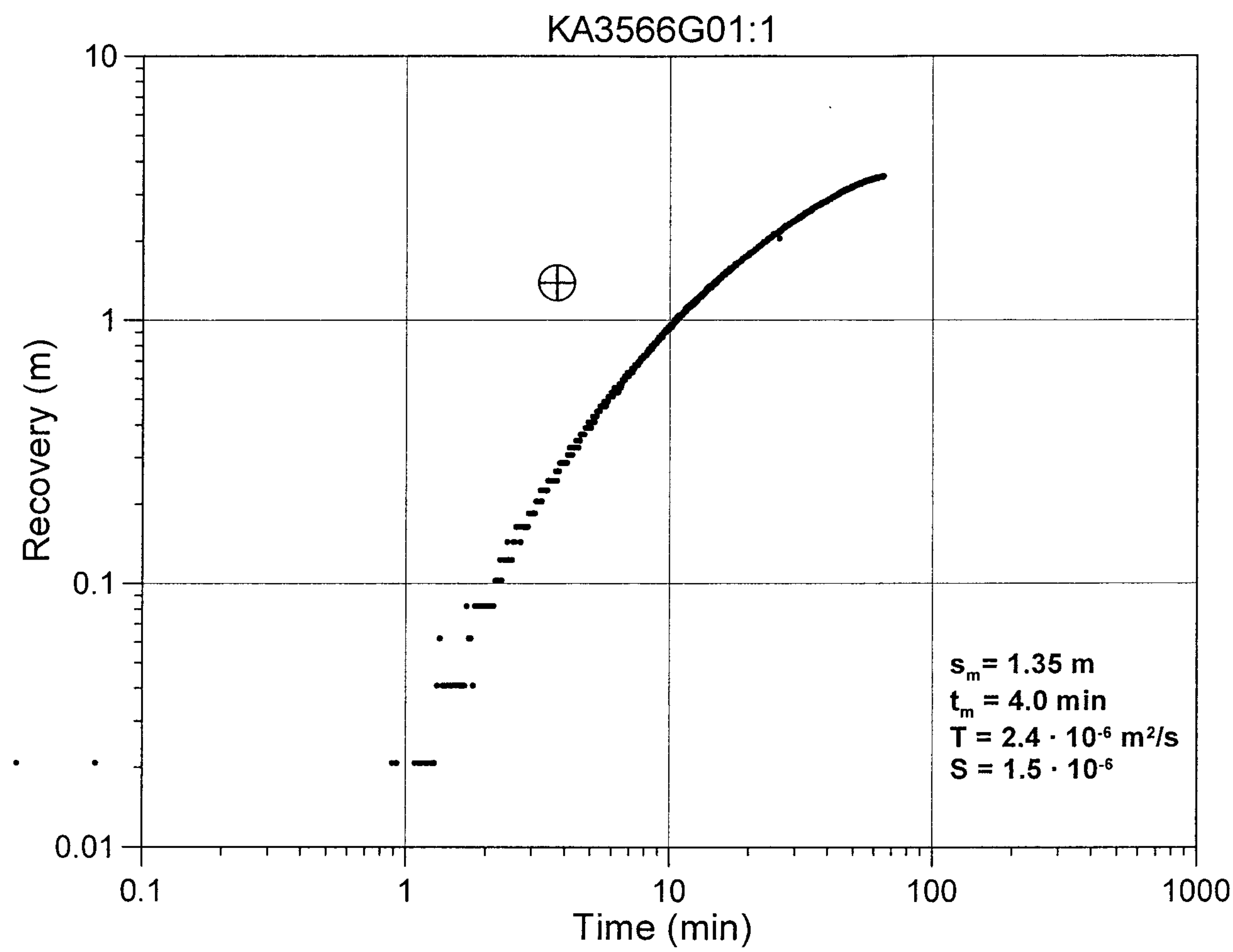
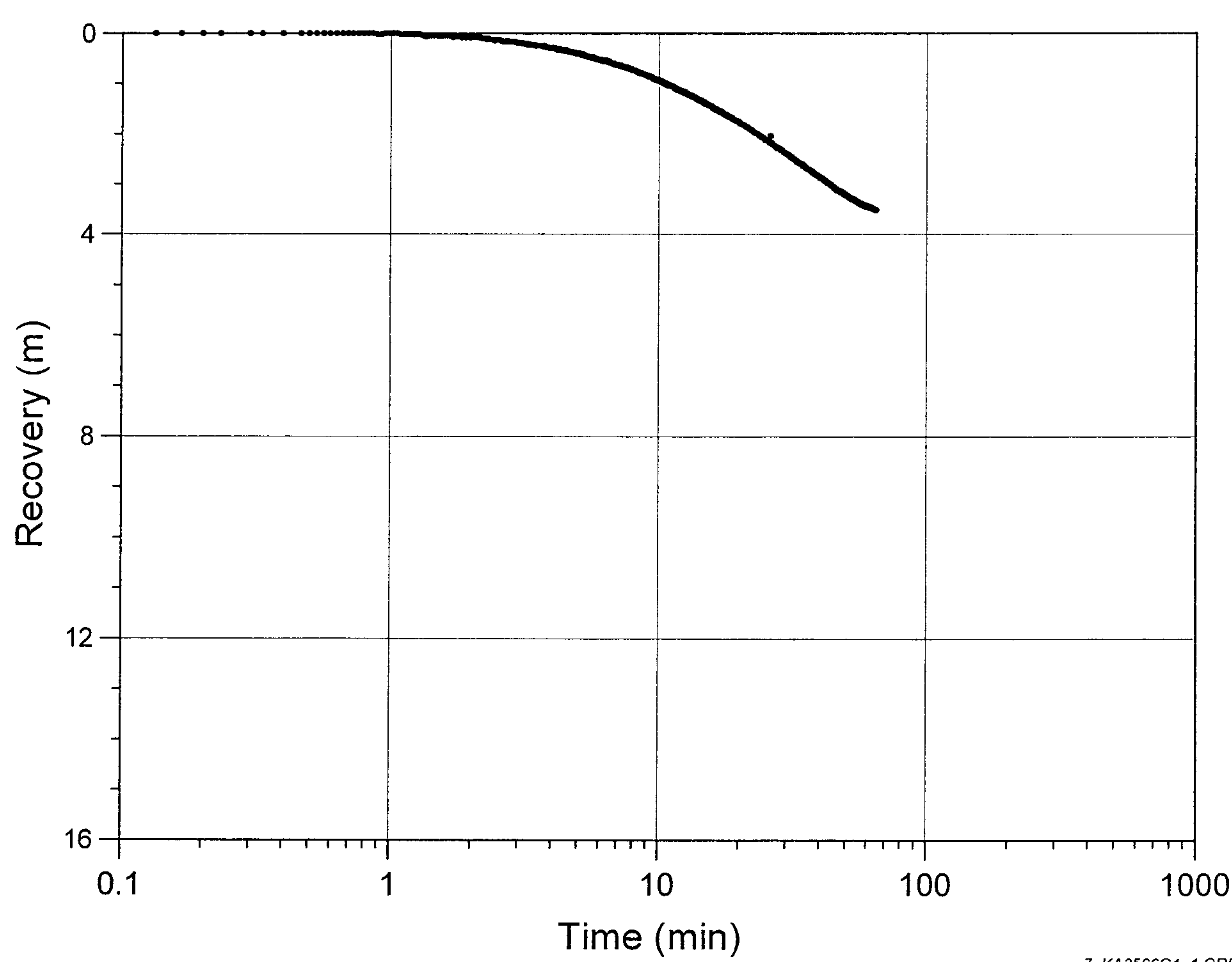
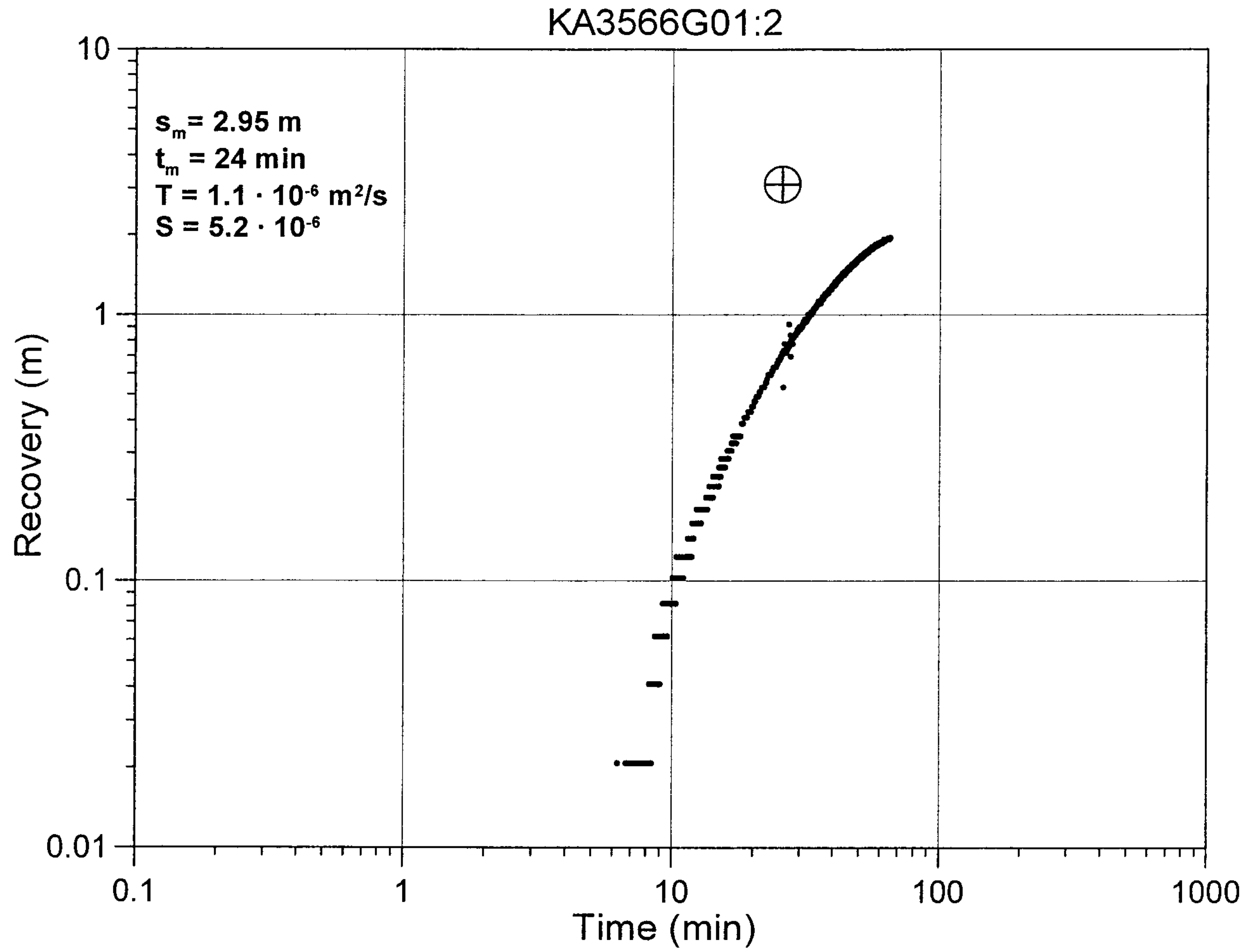
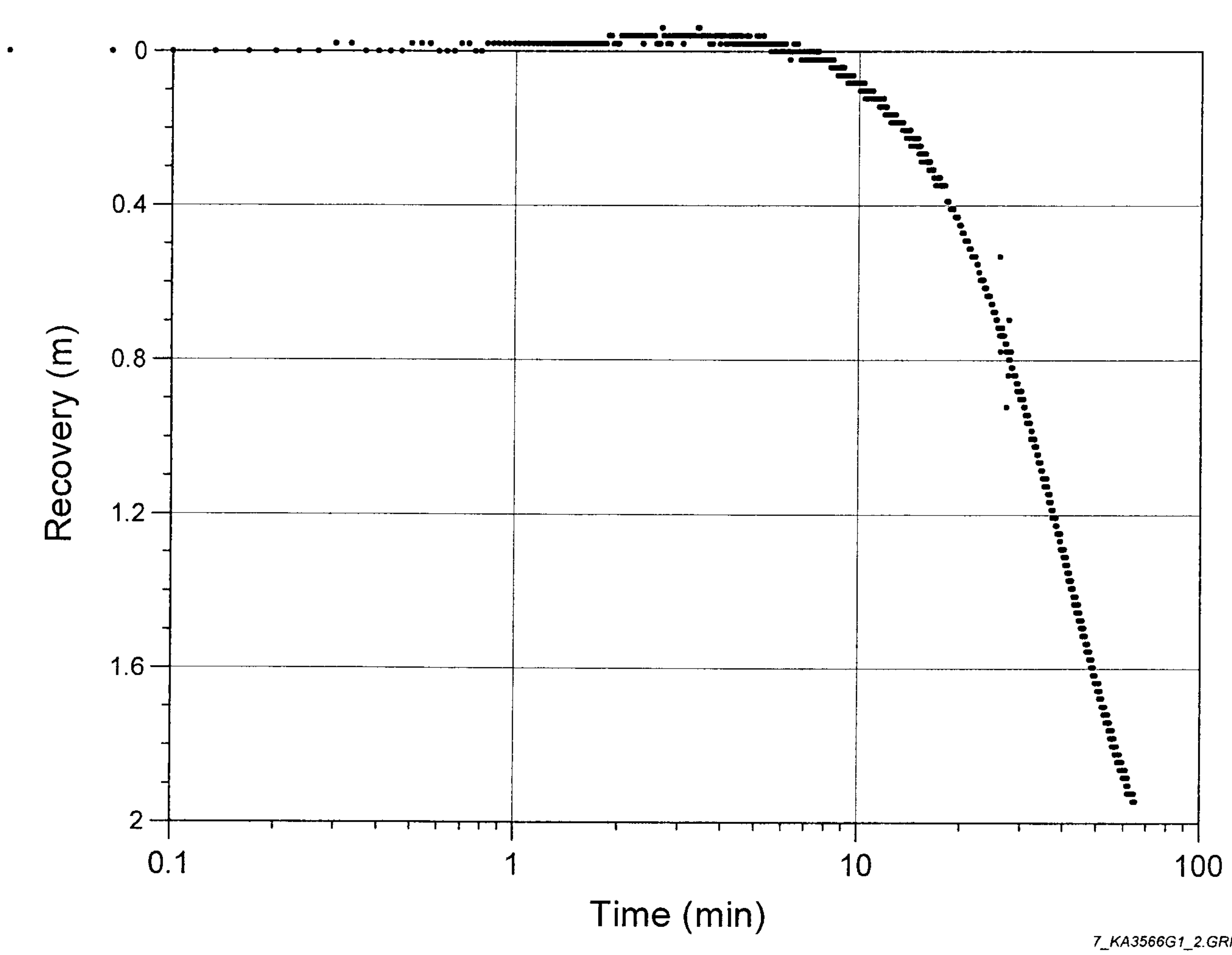

KA3566G01:1
Recovery (m)
Time (min)
10
1
0.1
0.01
0.1
1
10
100
1000
s_m= 1.35 m
t_m = 4.0 min
T = 2.4 · 10^{-6} m²/s
S = 1.5 · 10^{-6}

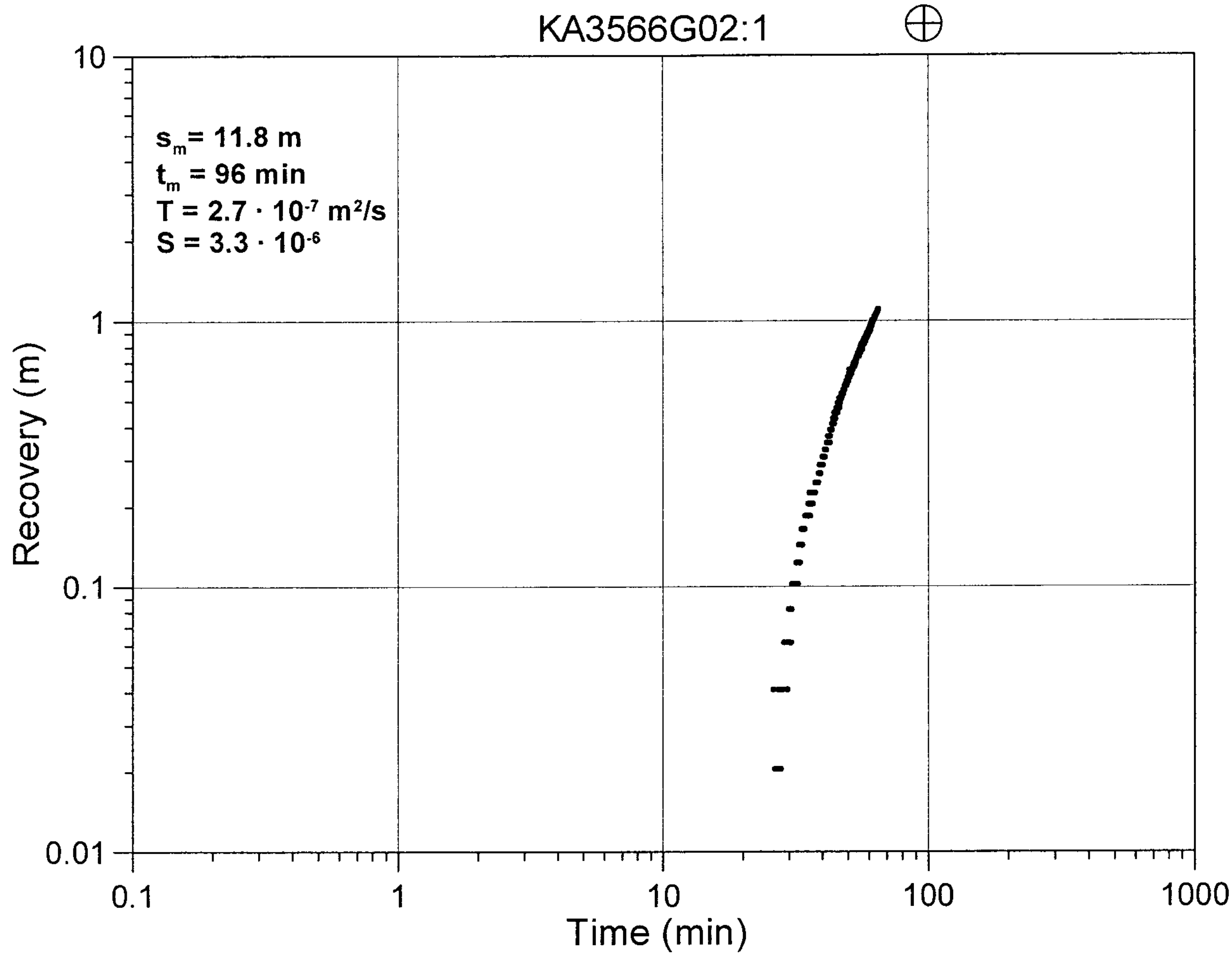

Recovery (m)
Time (min)
0
4
8
12
16
0.1
1
10
100
1000

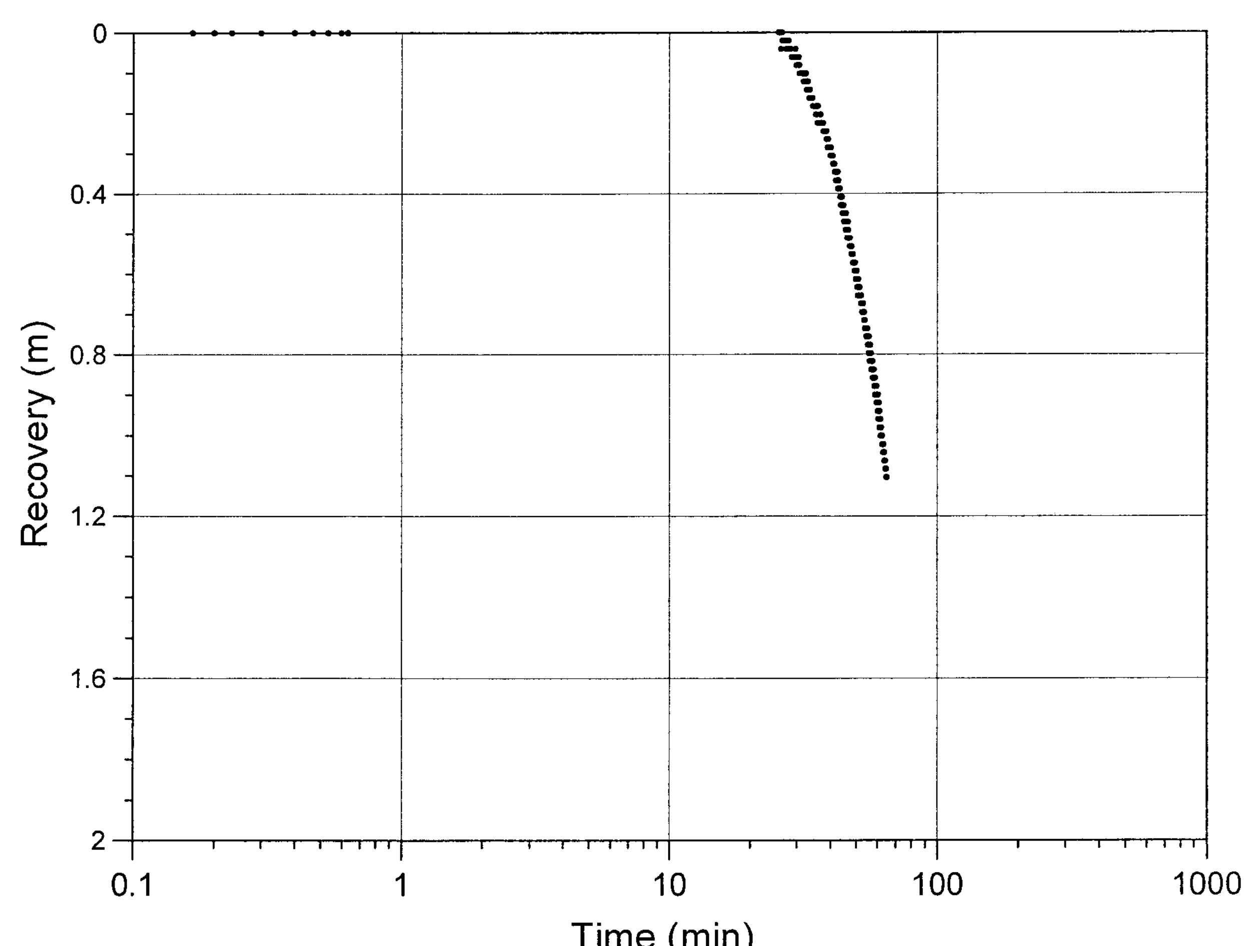




7_KA3566G1_2.GRF 13-okt-99

KA3566G02:1





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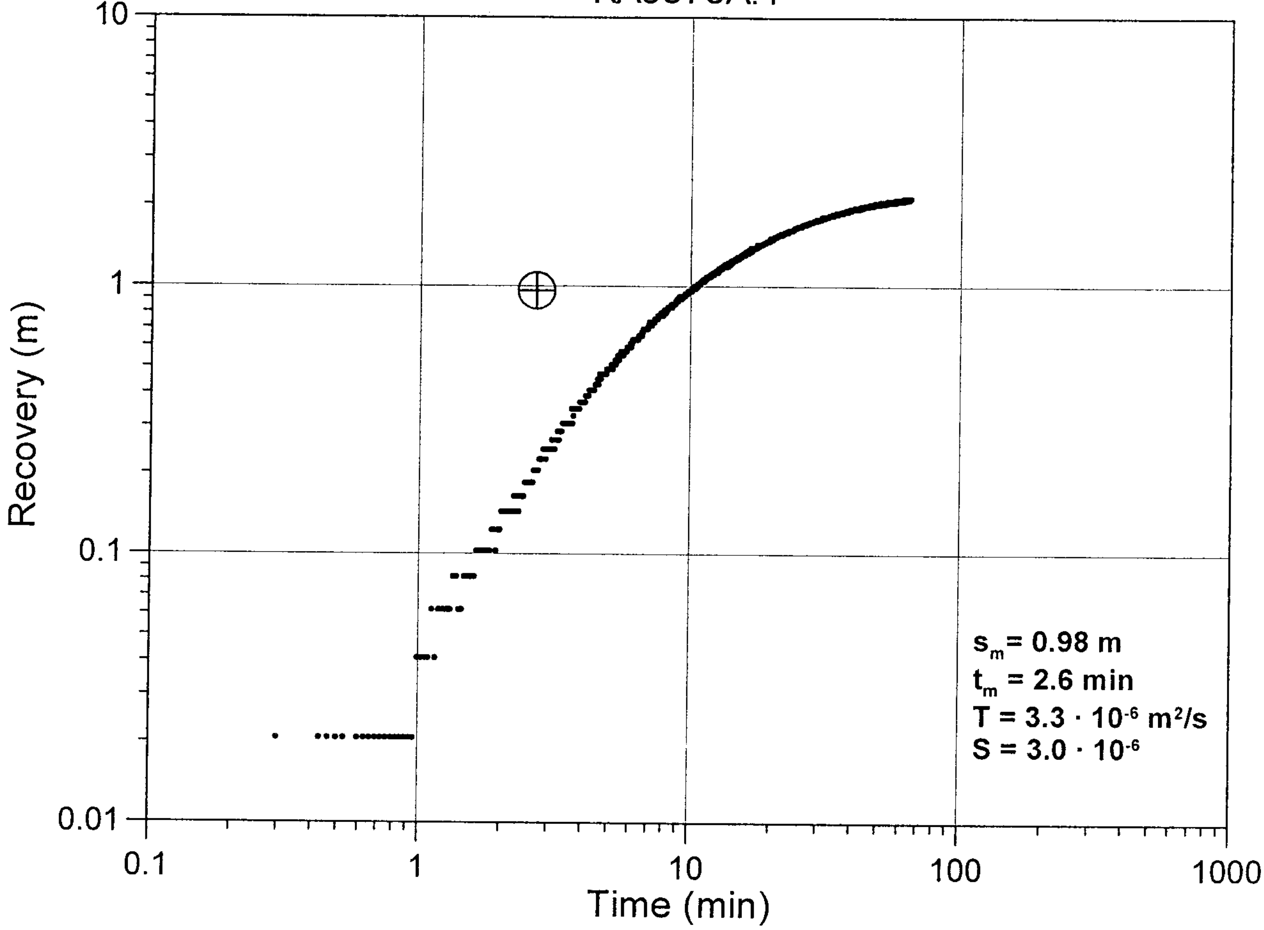

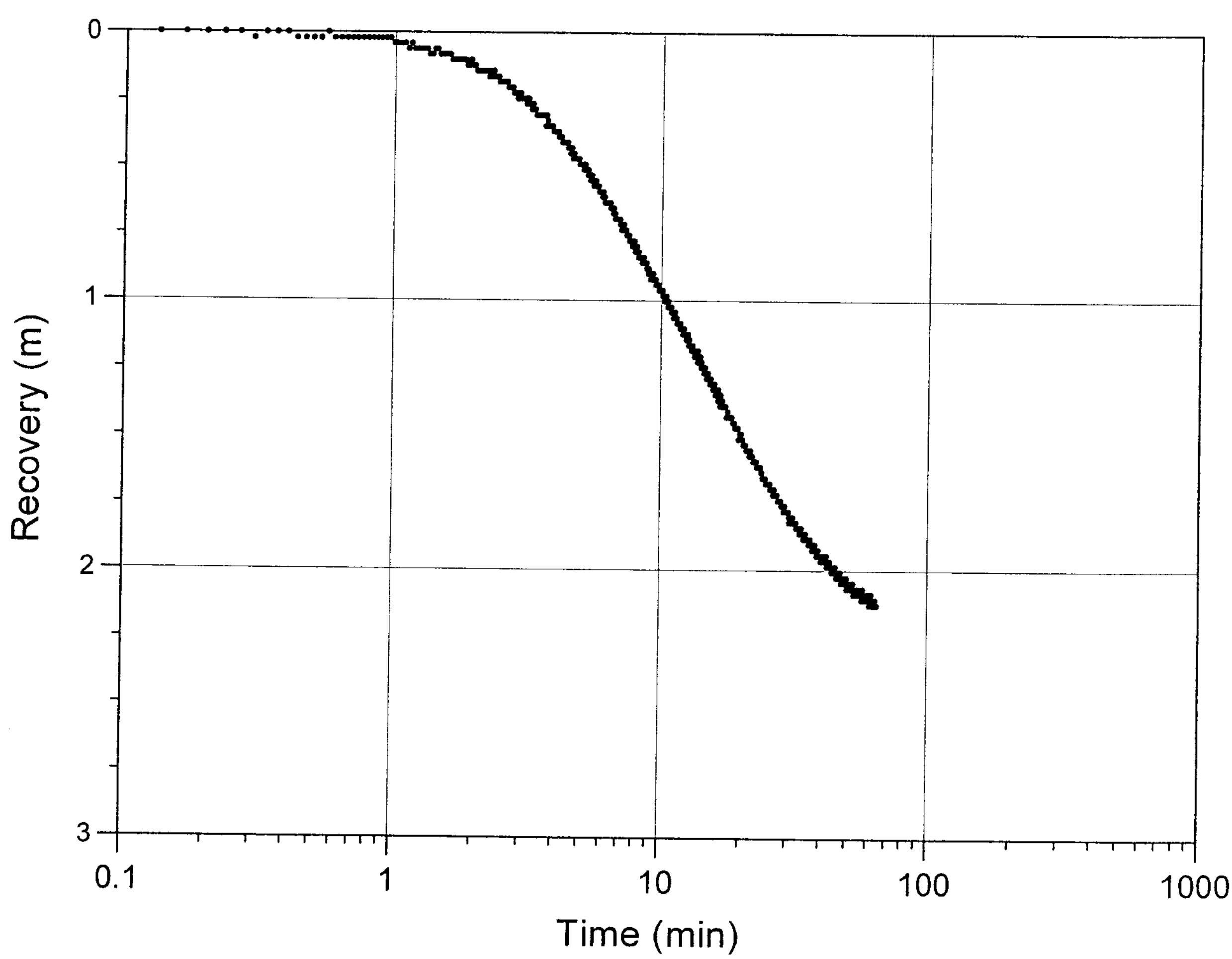

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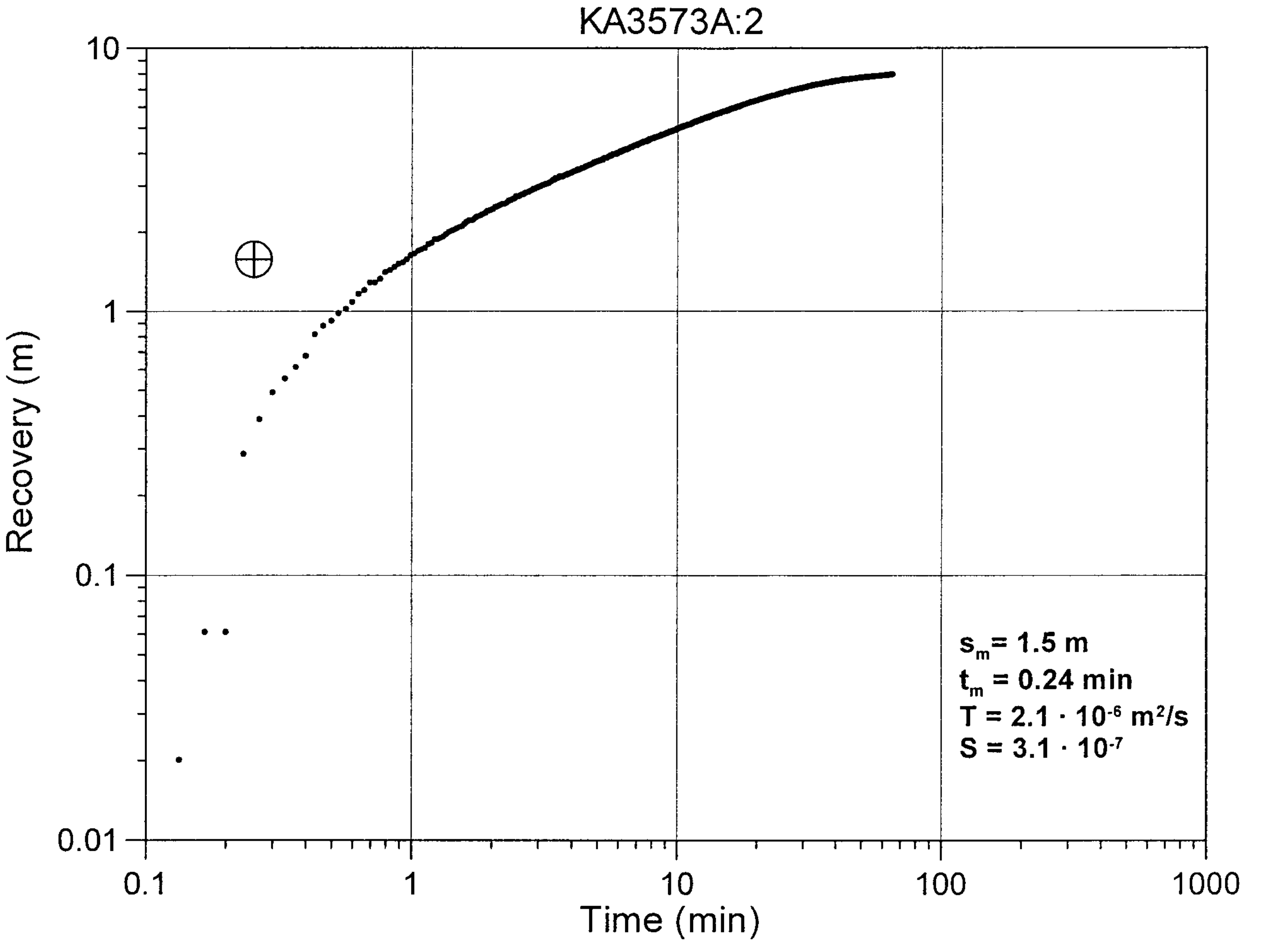

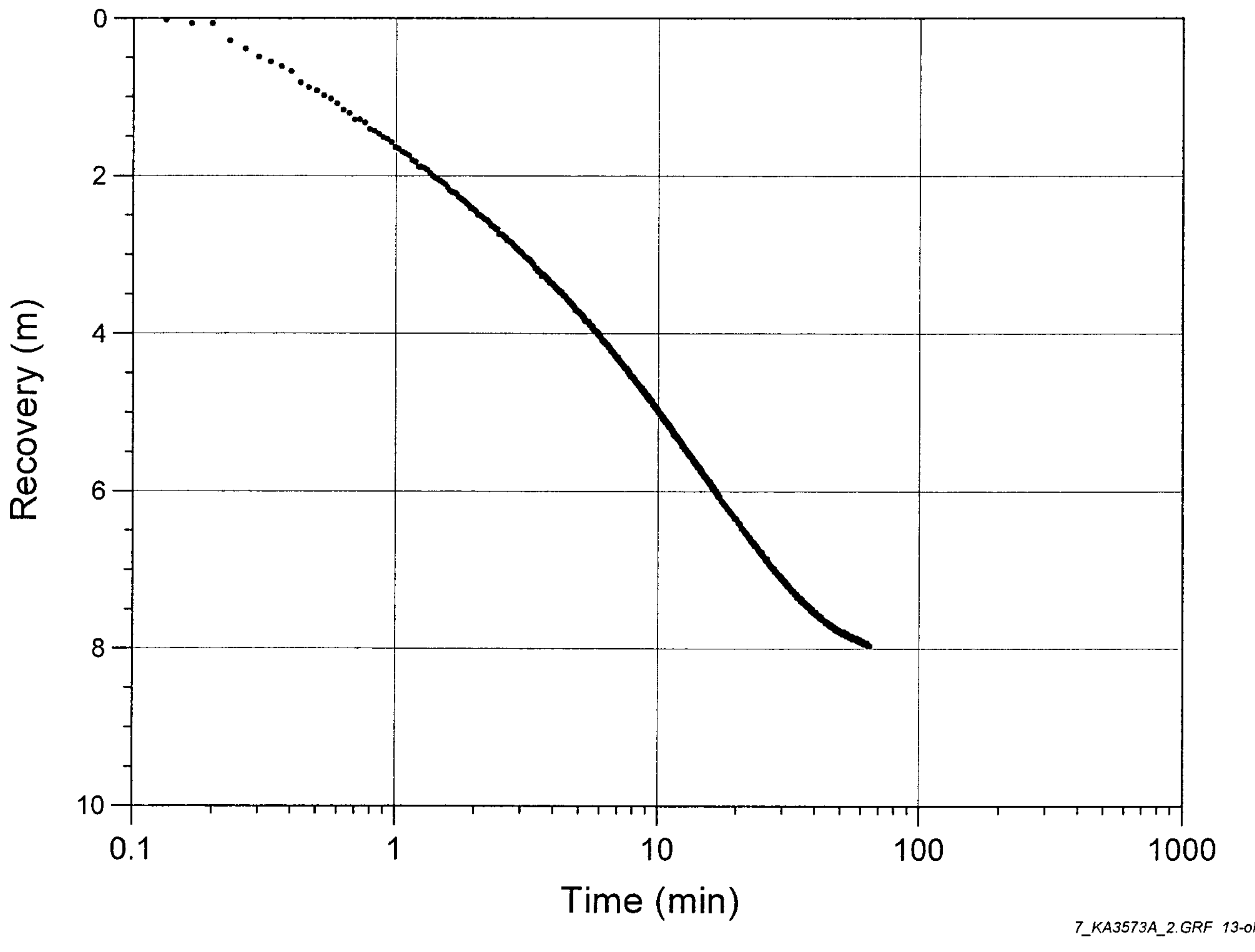

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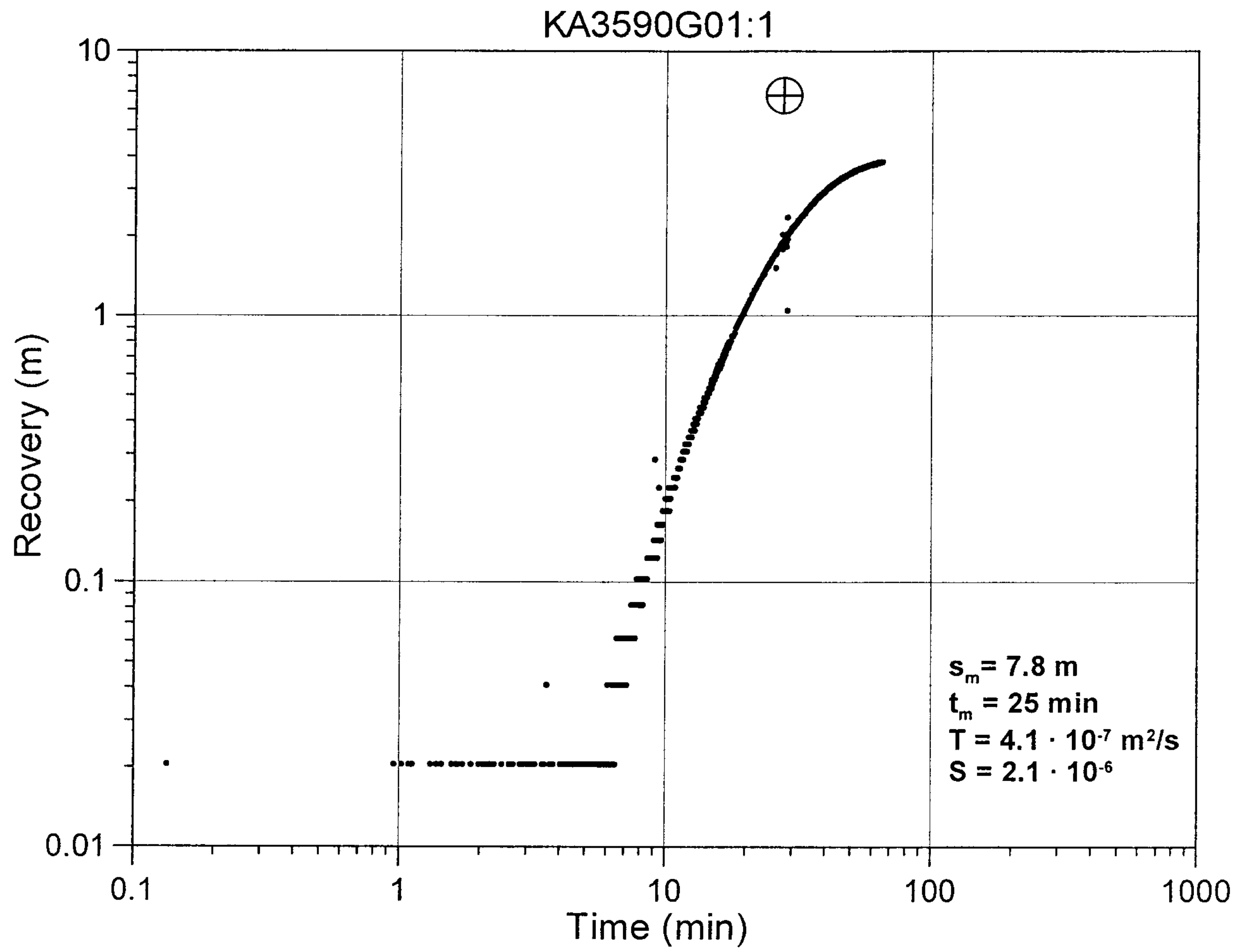

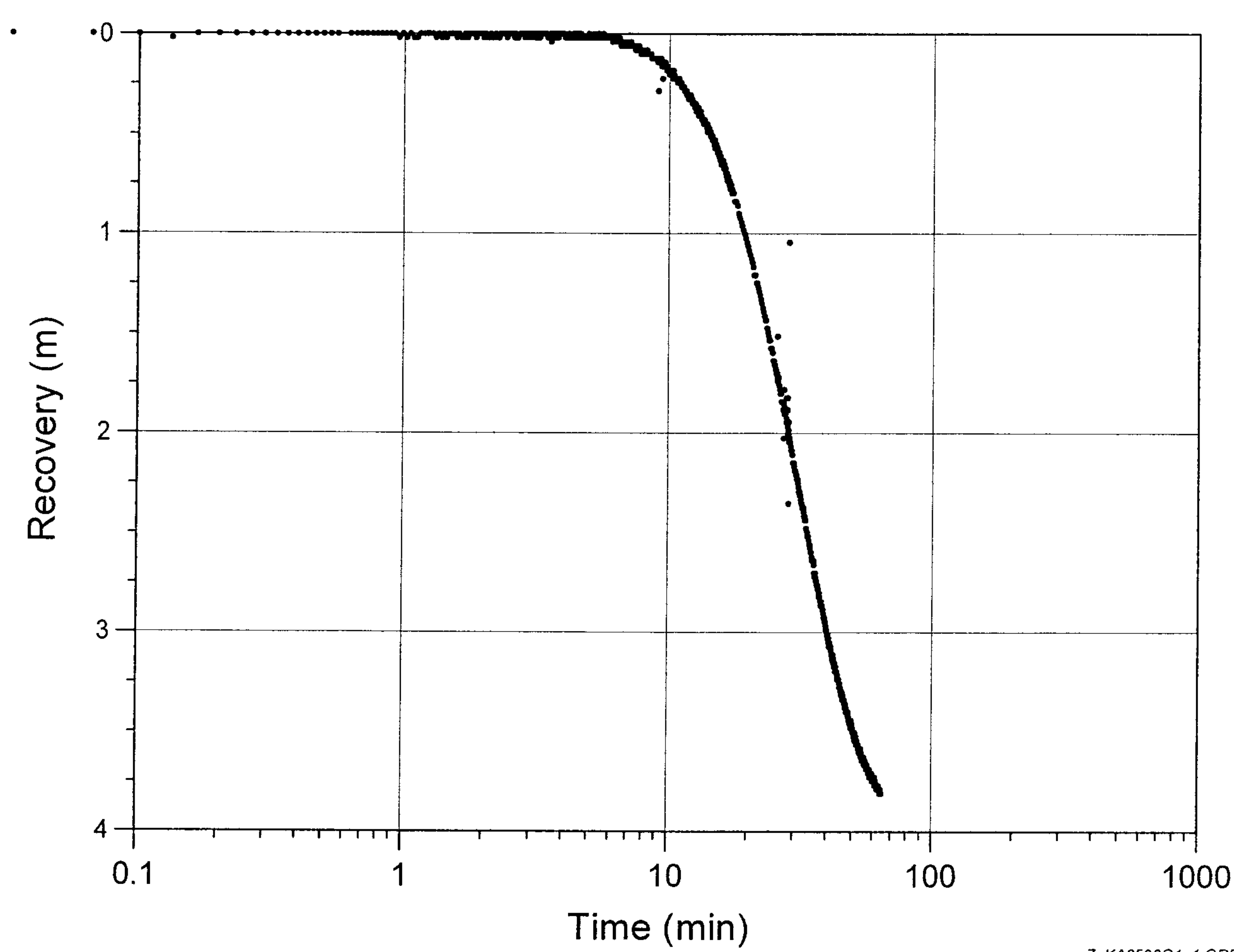

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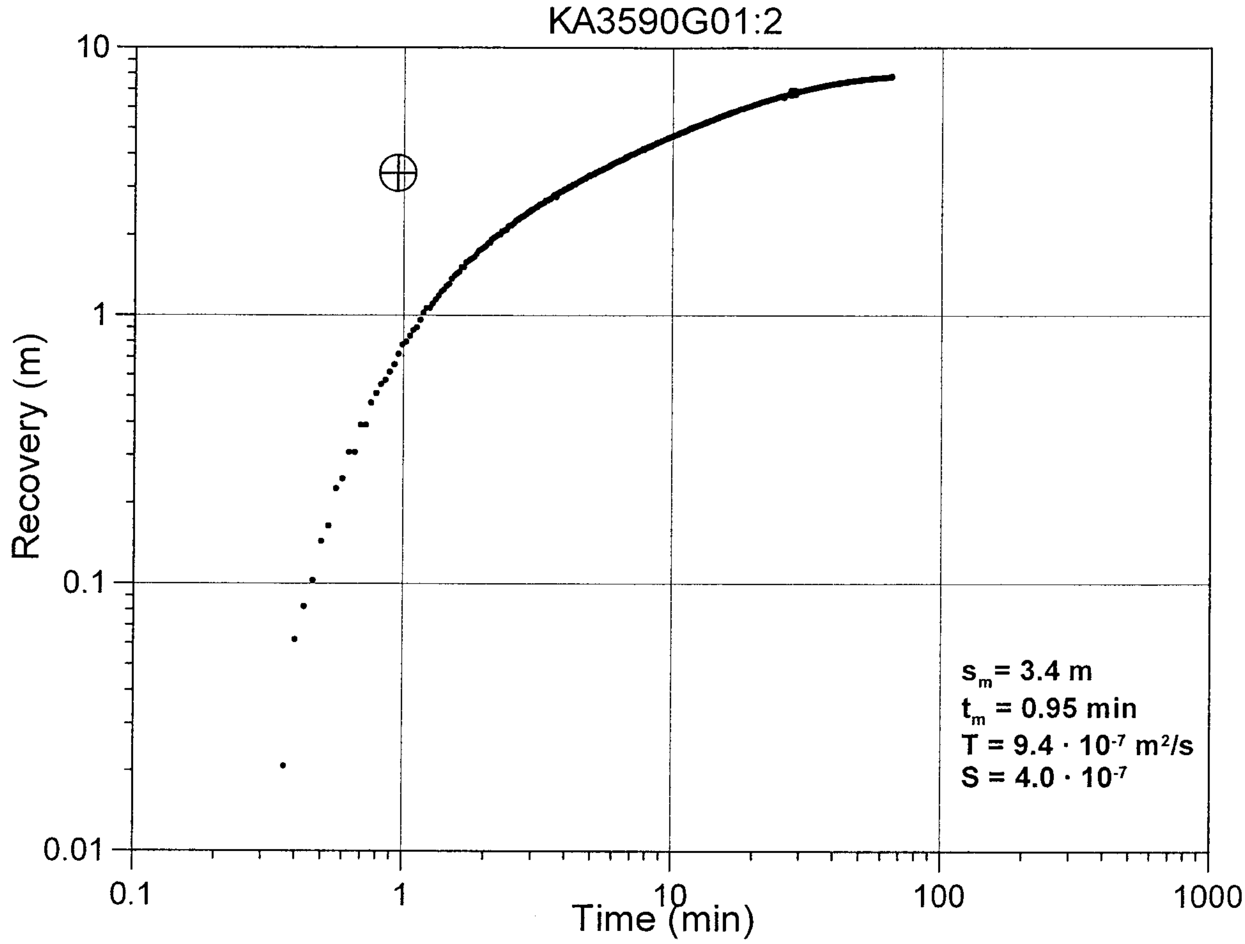

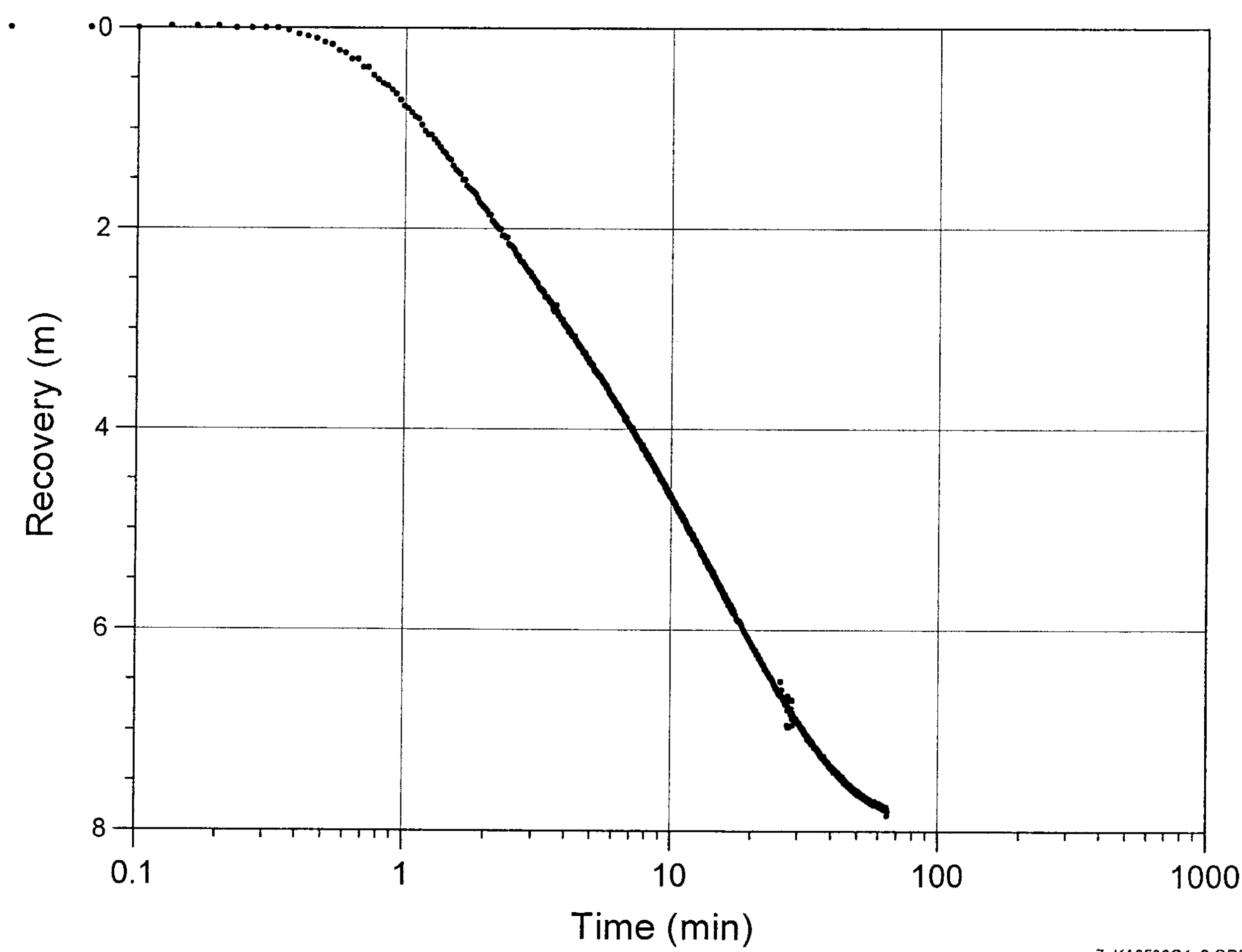

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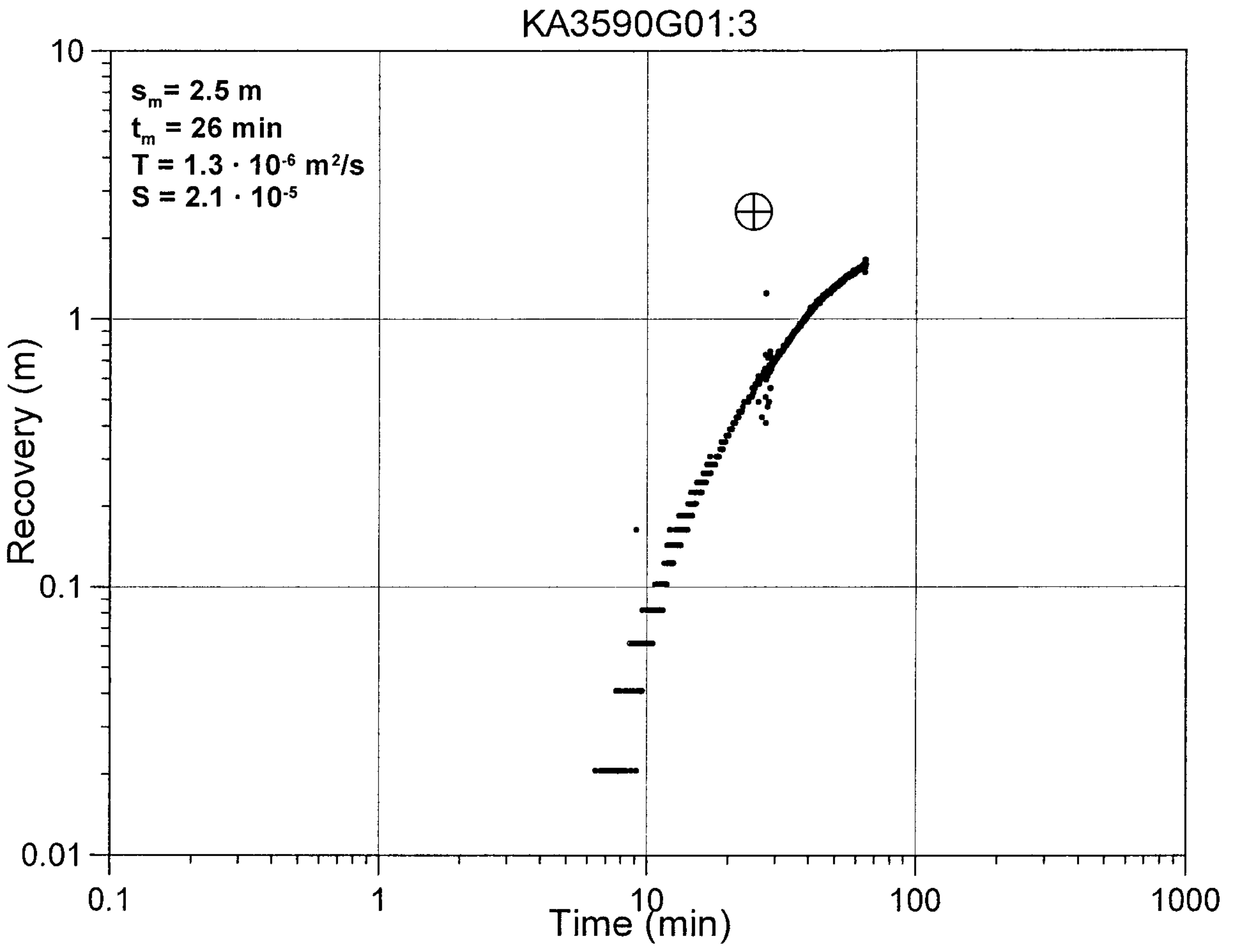

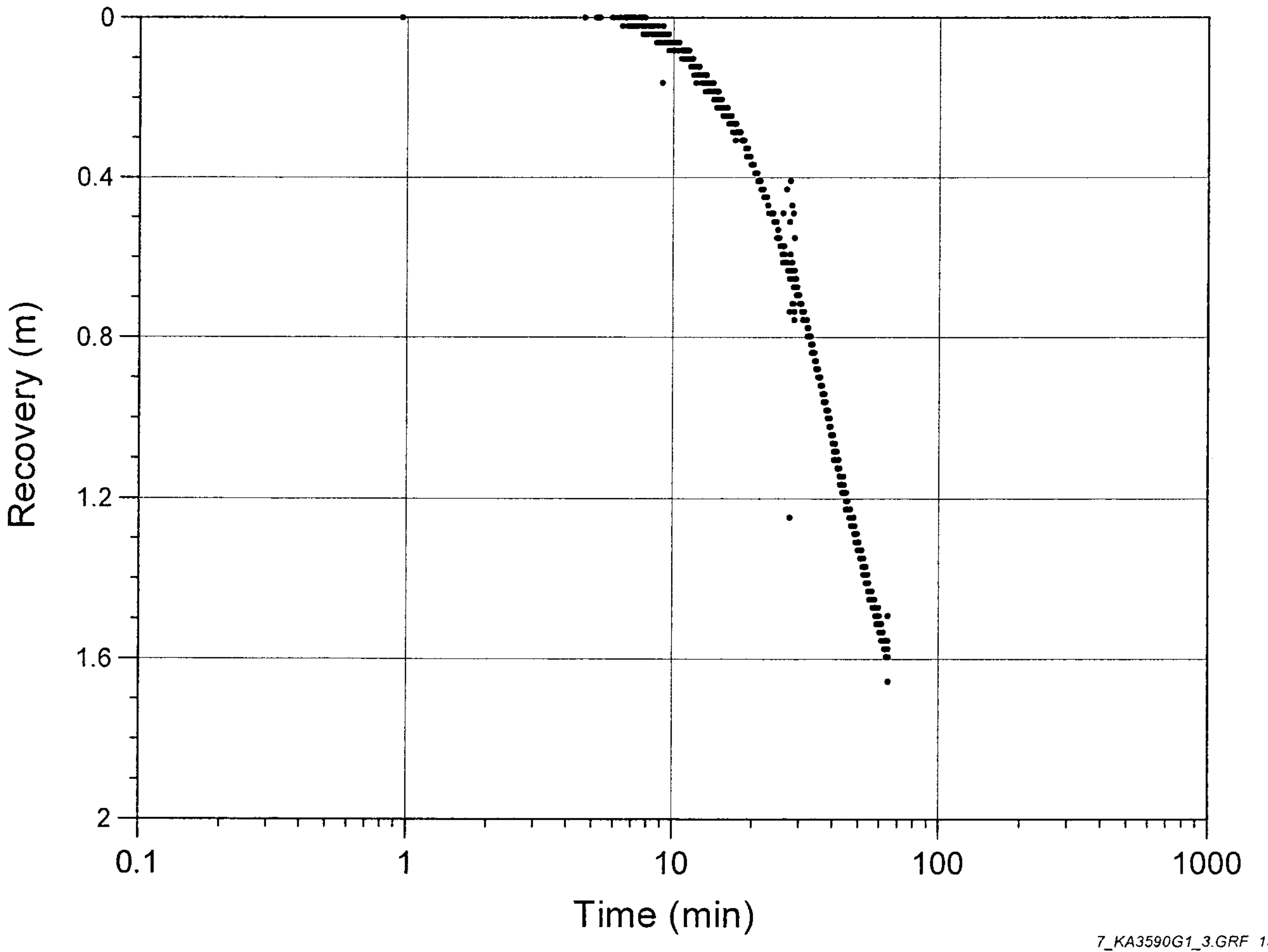

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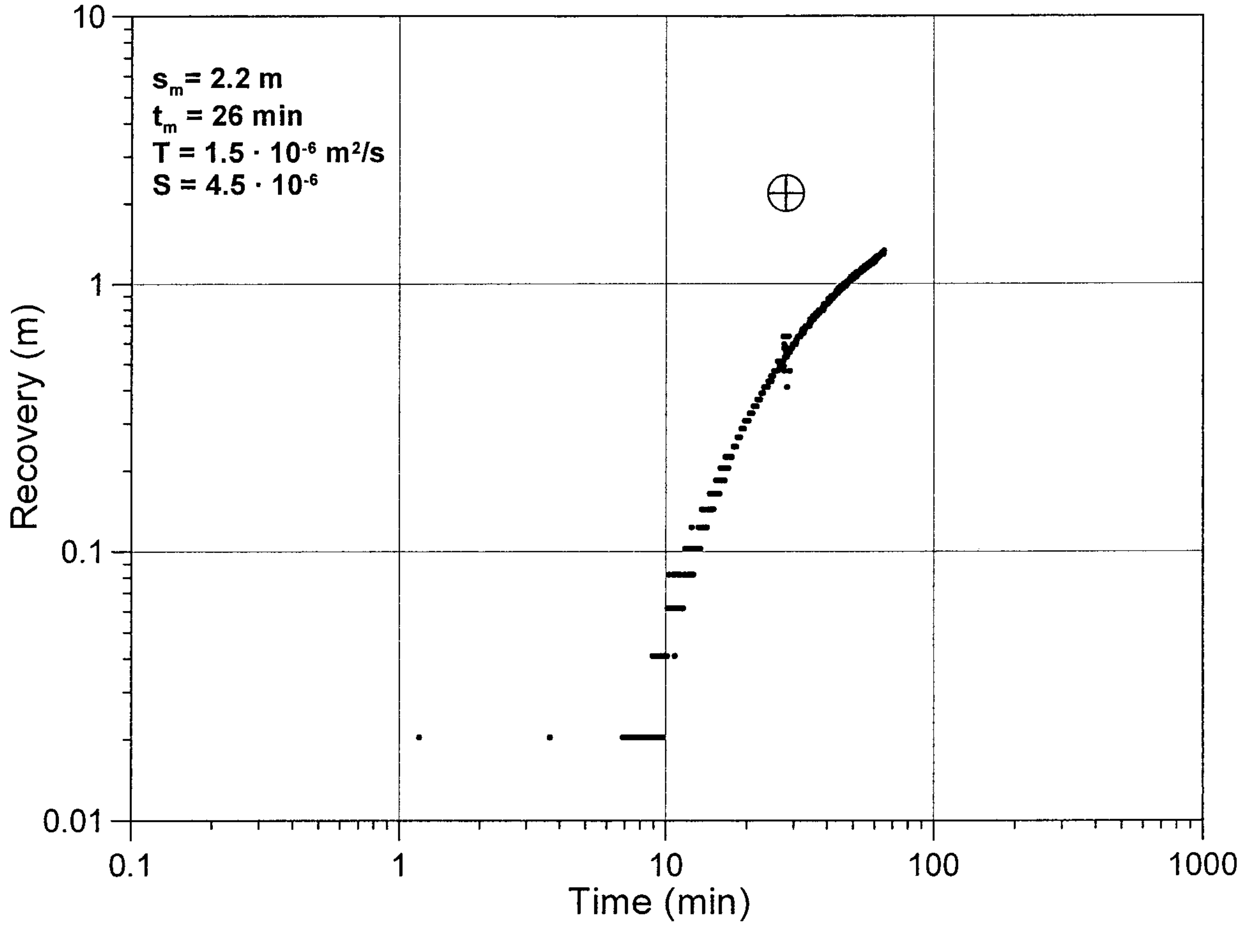

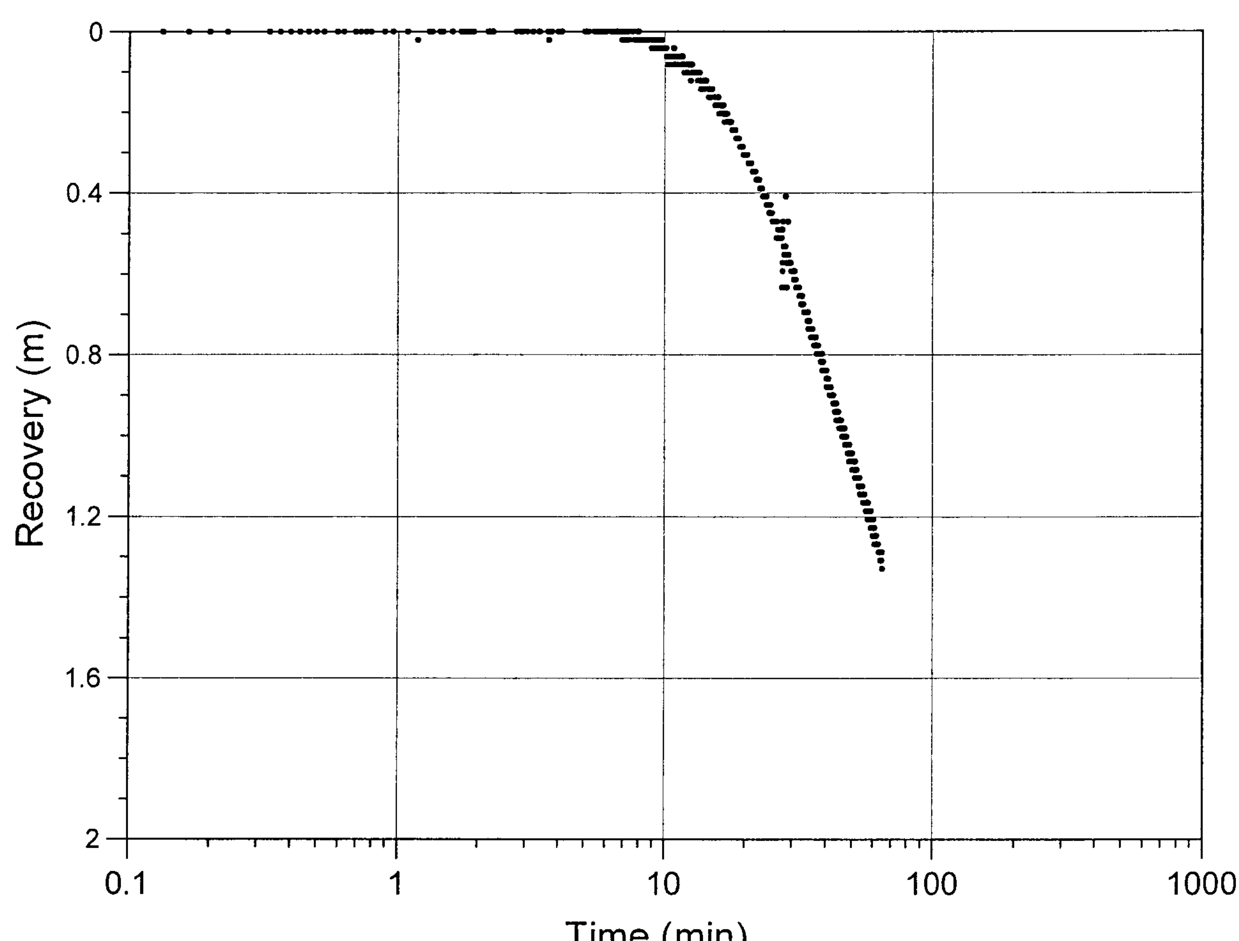

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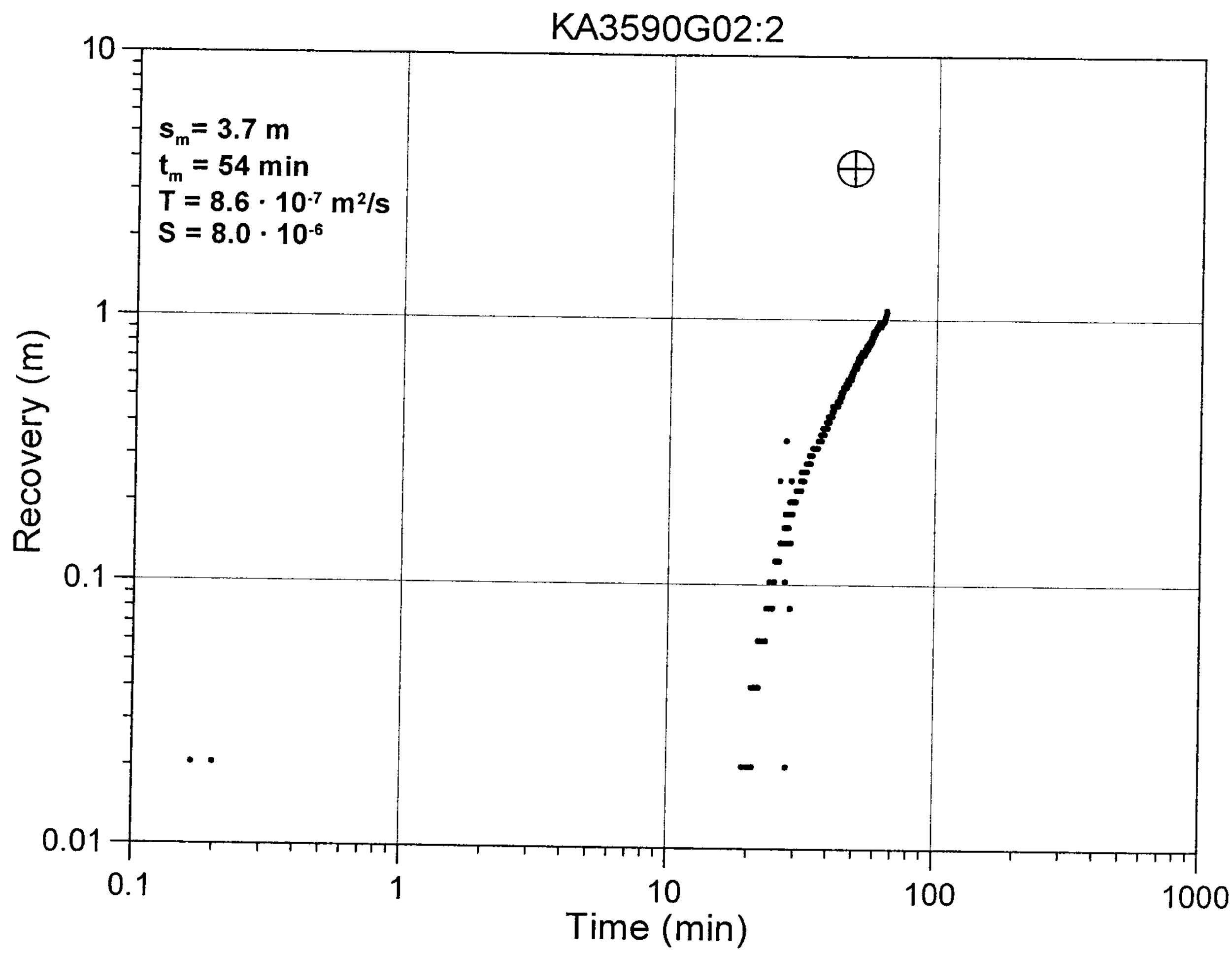

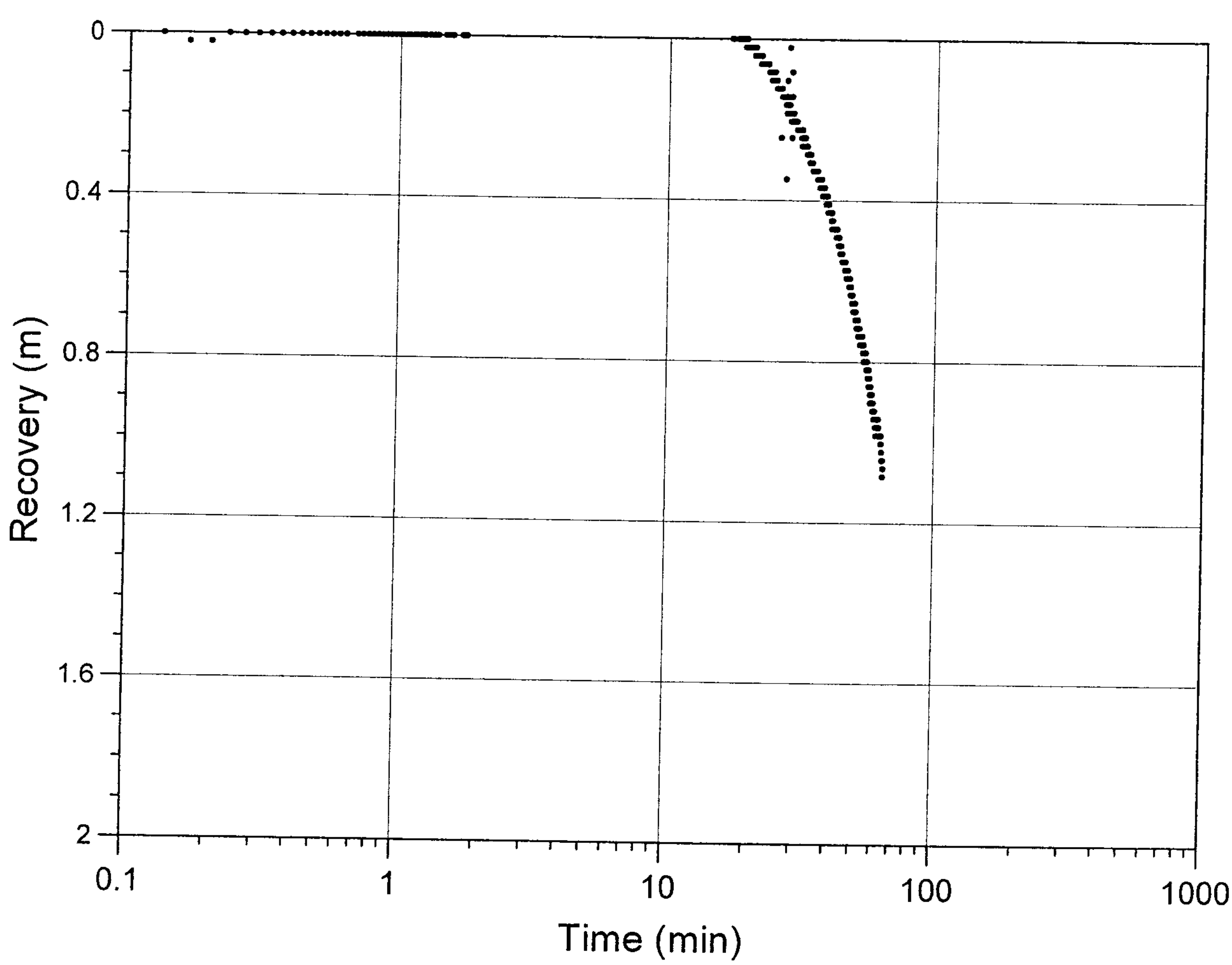

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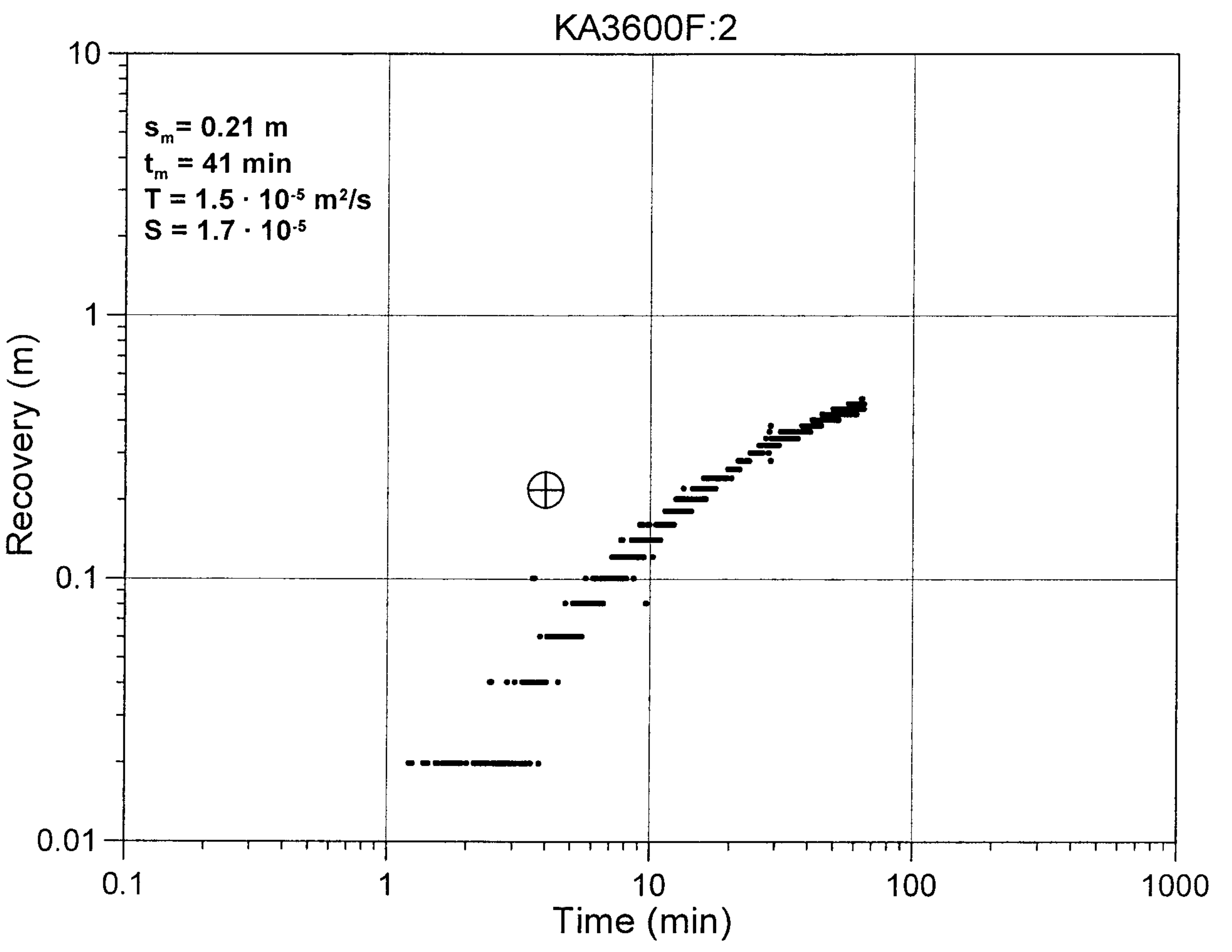

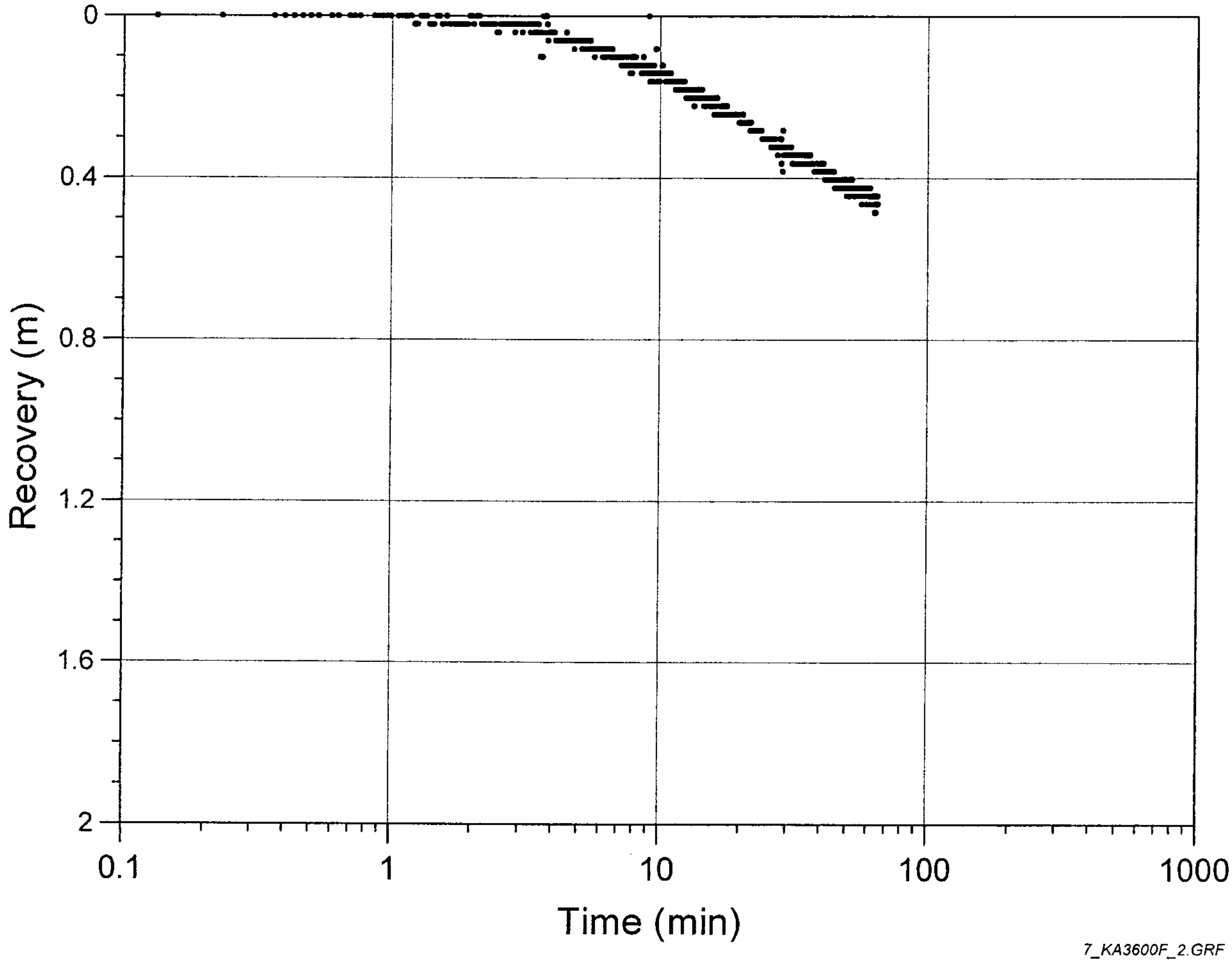

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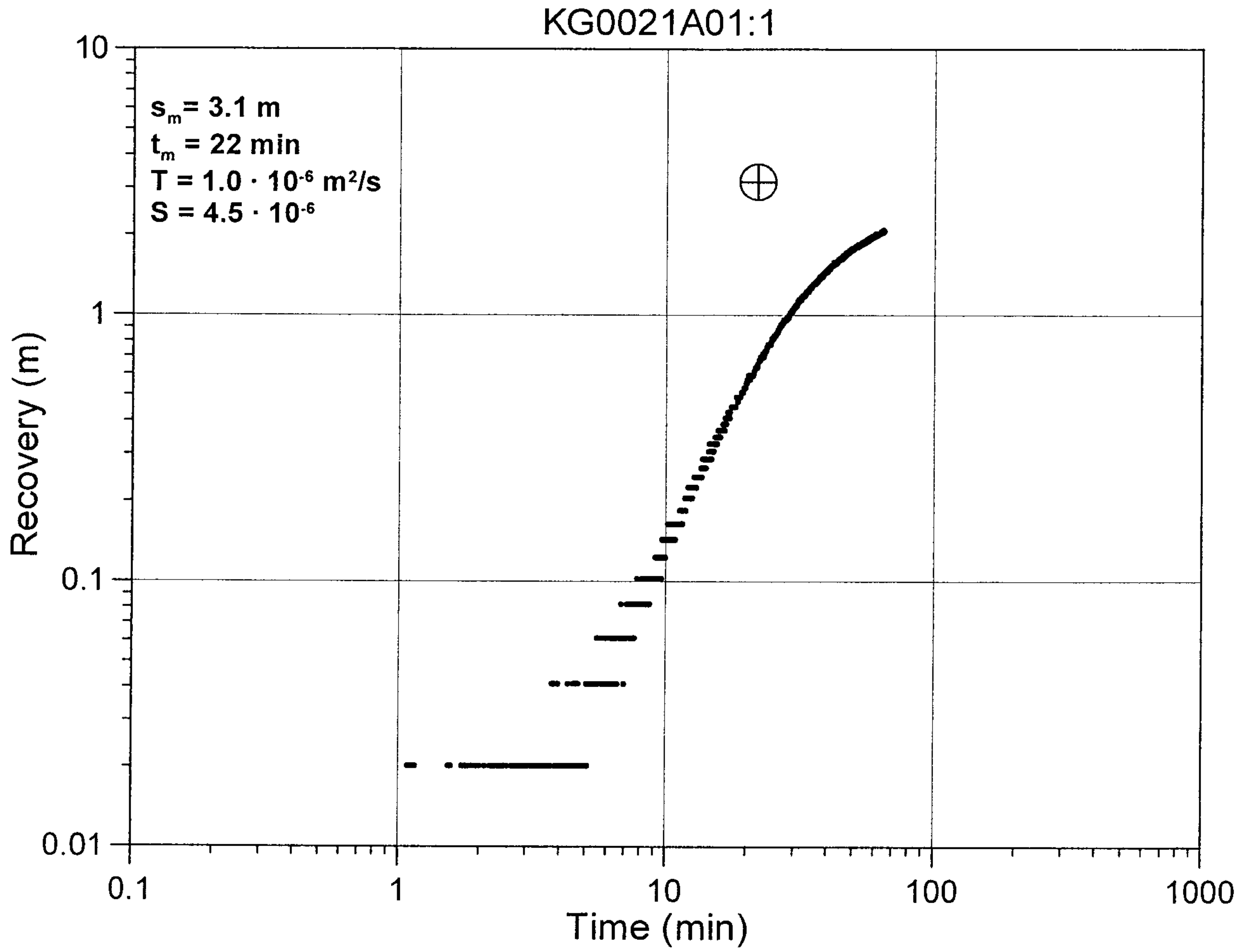

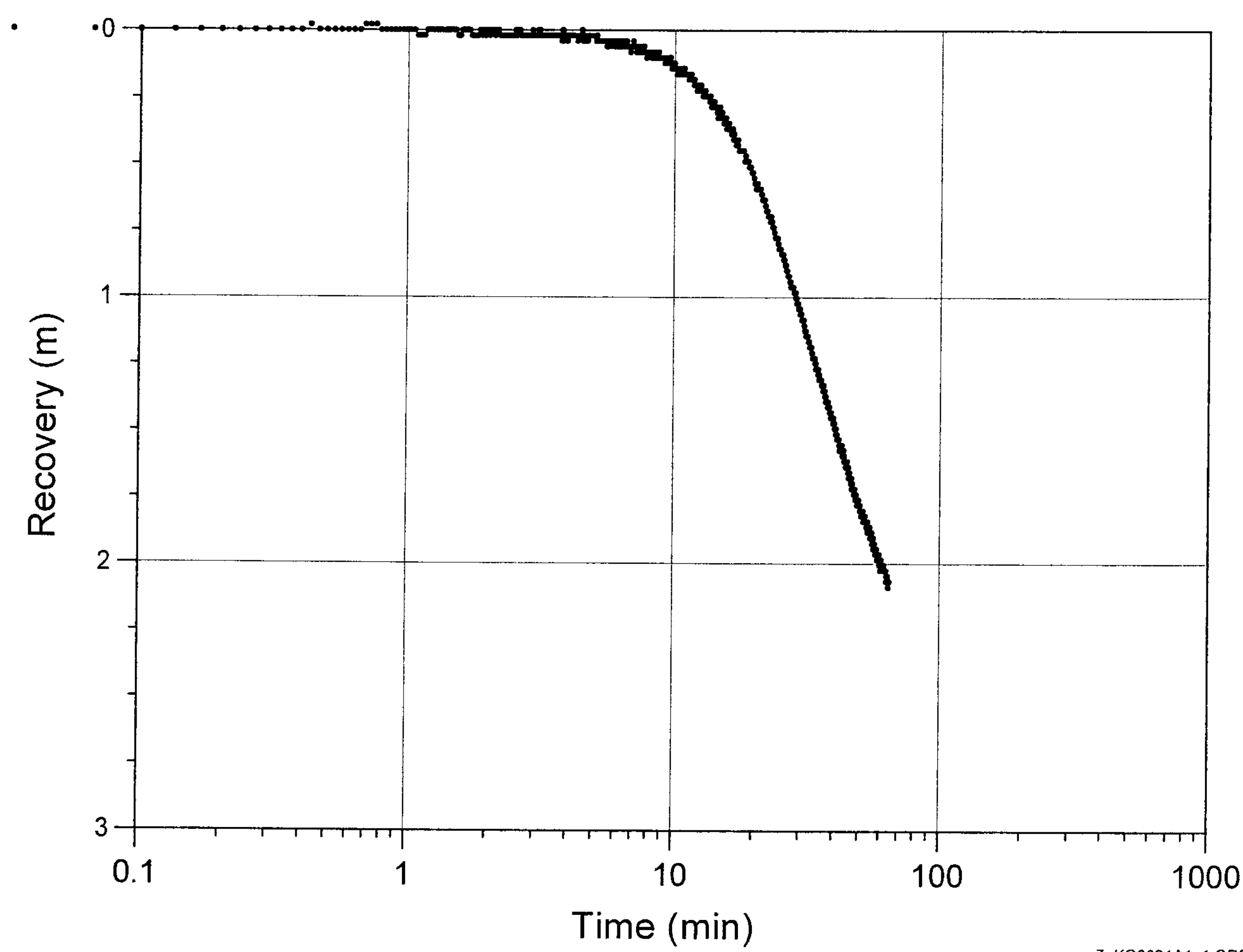

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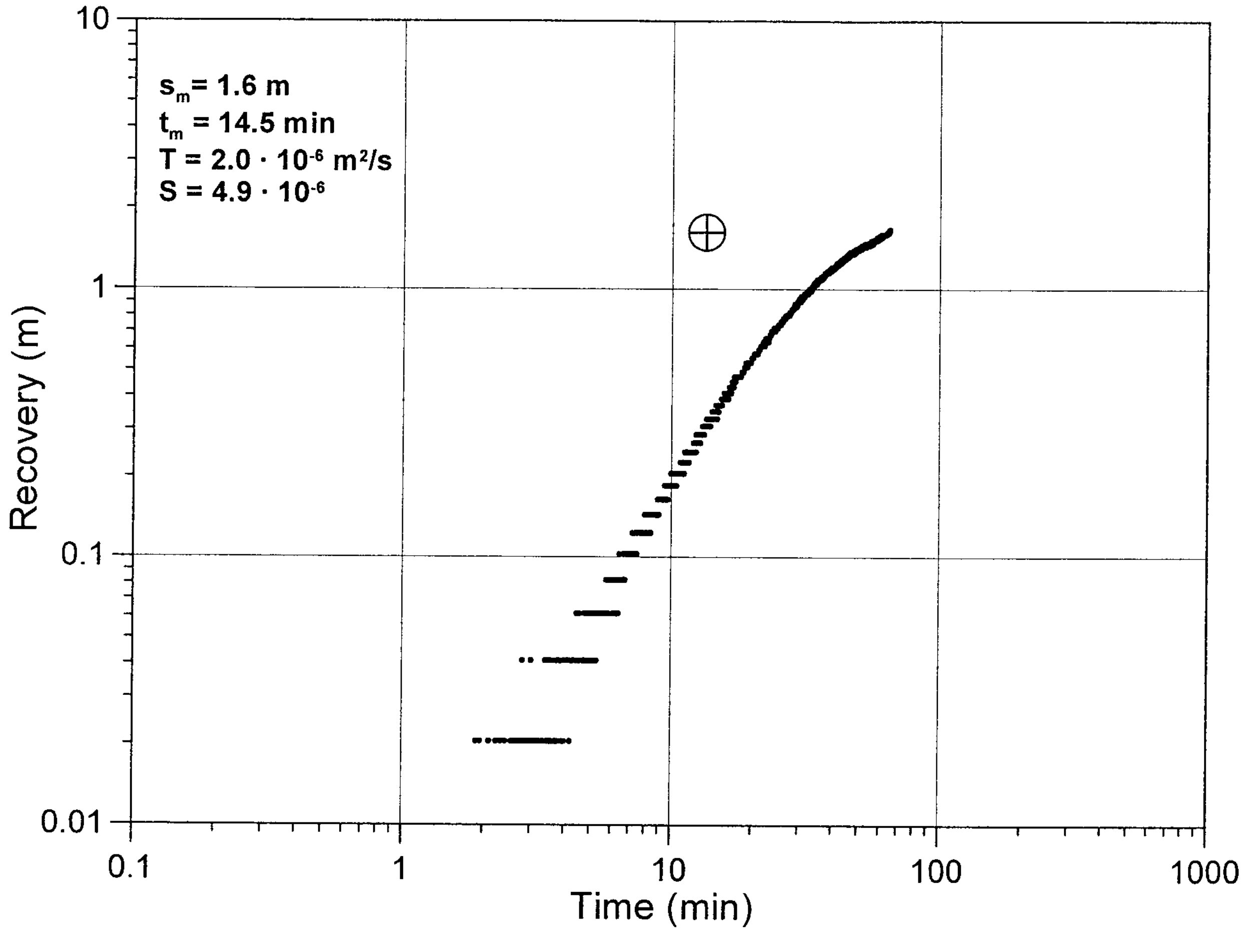

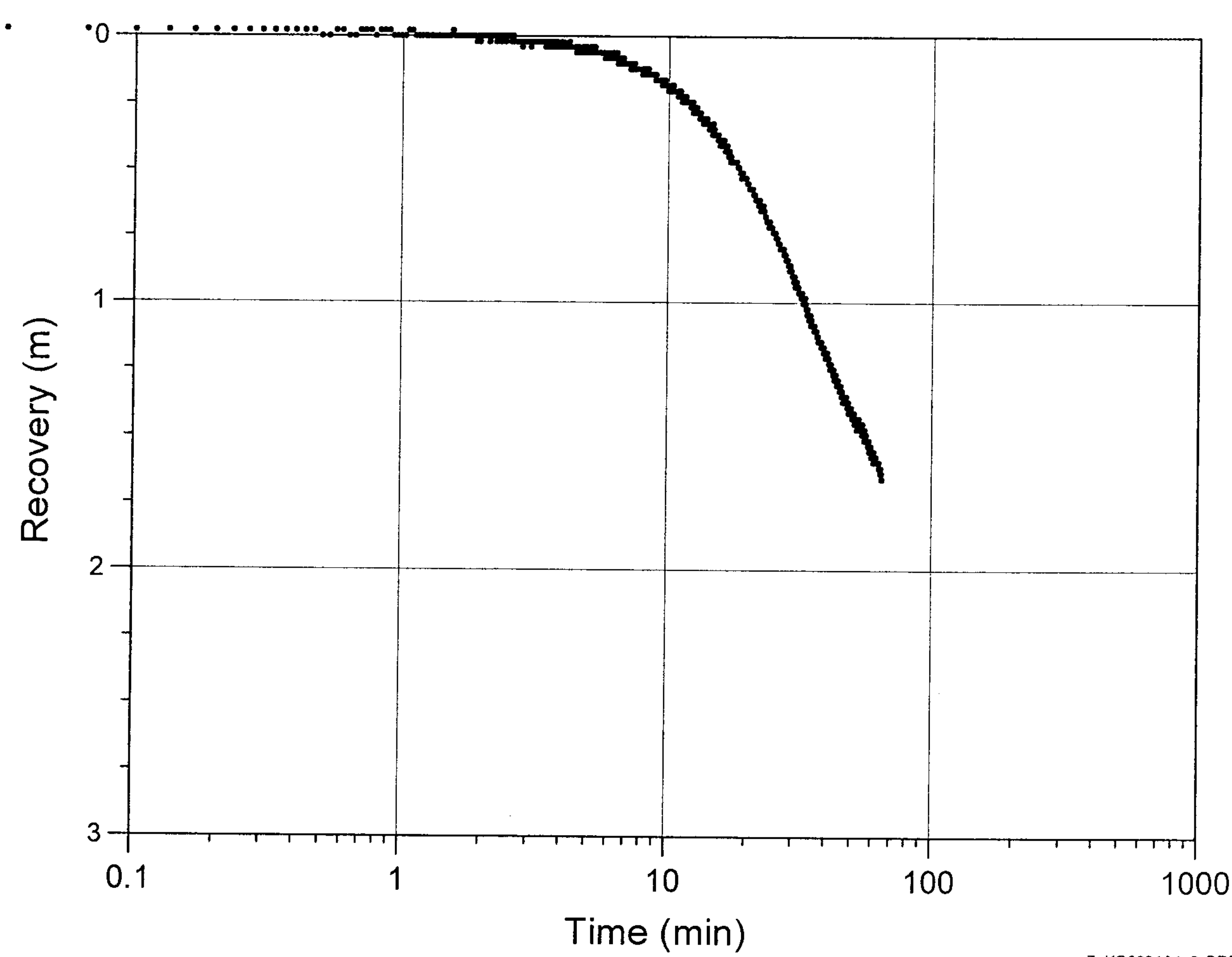

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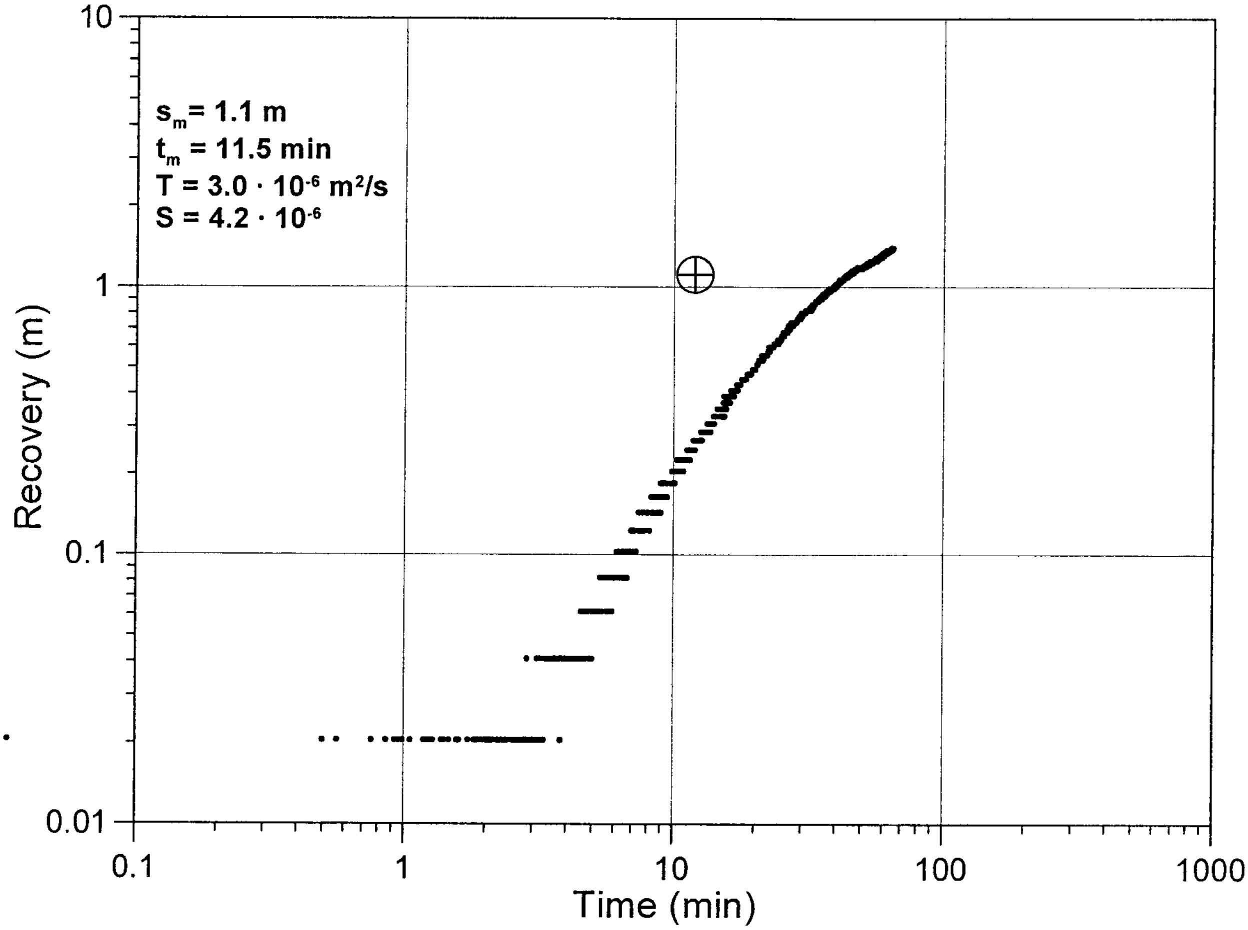

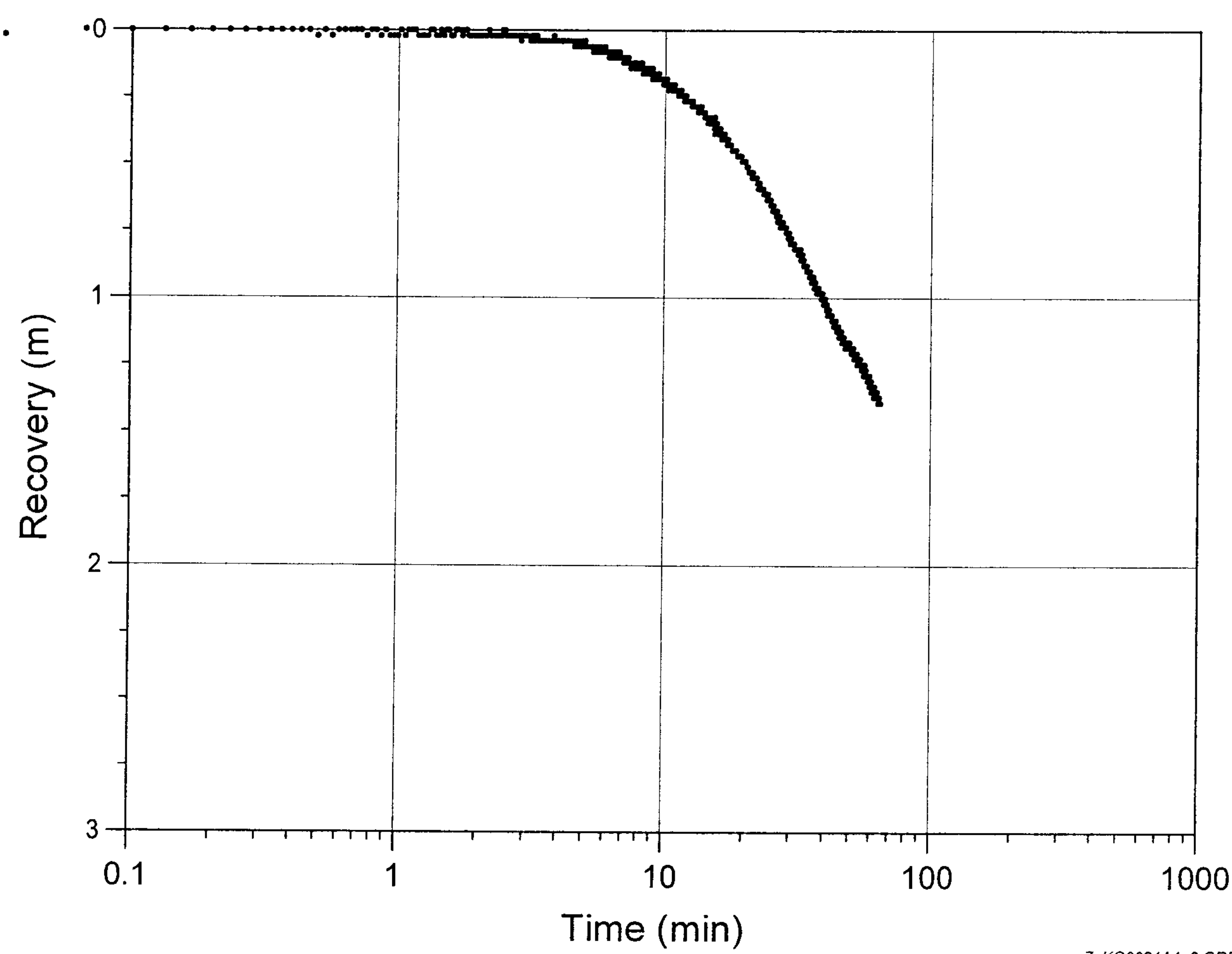

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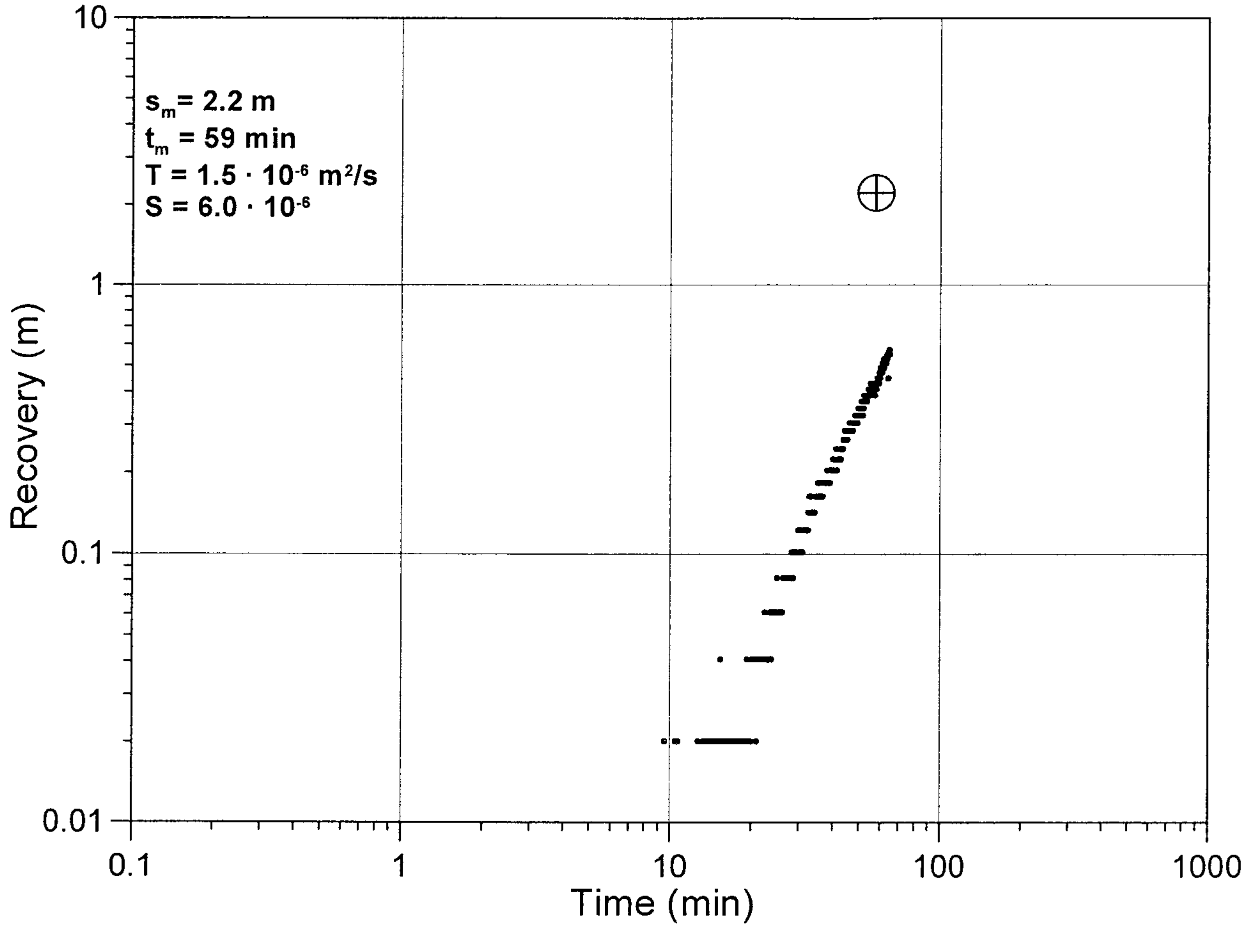

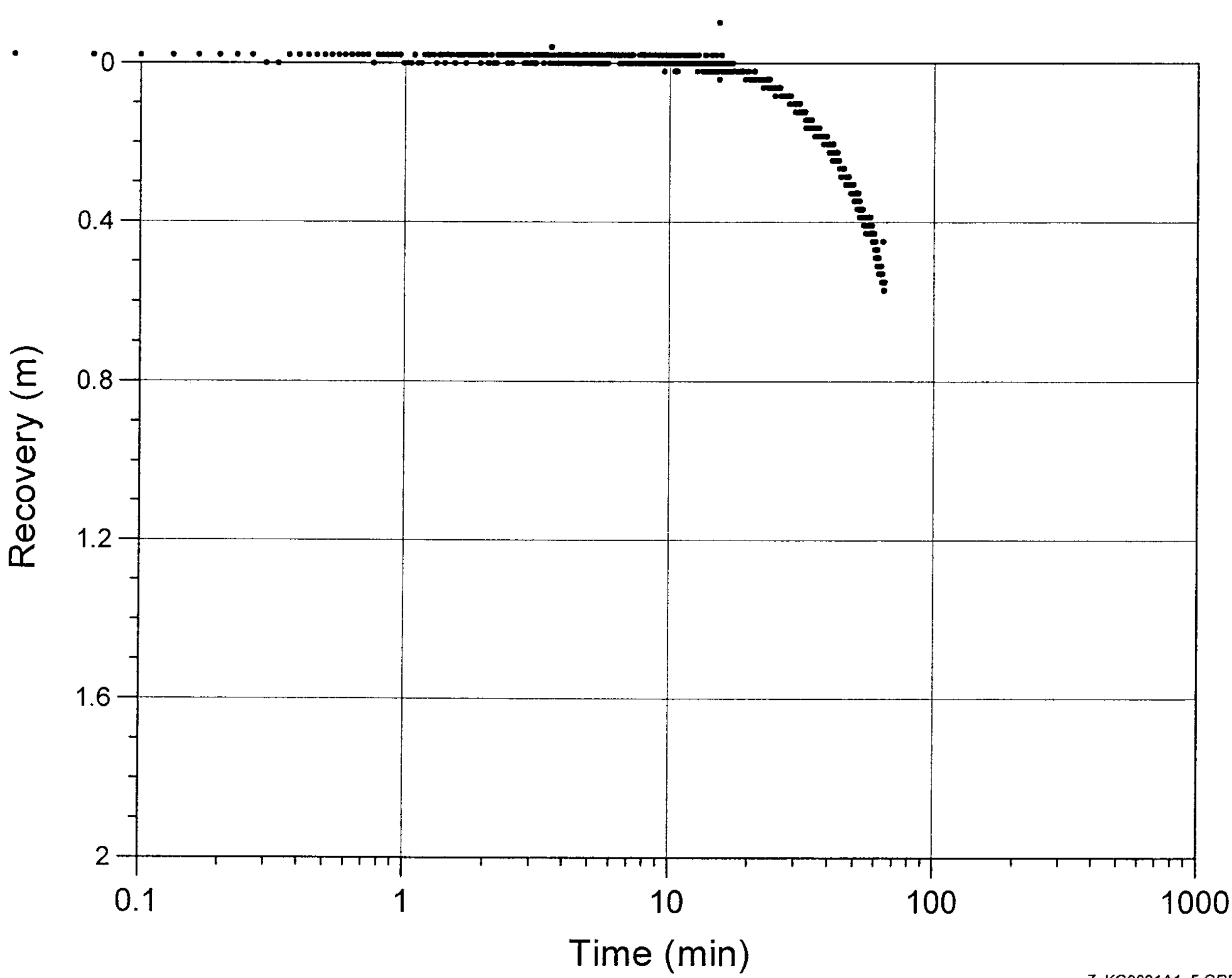

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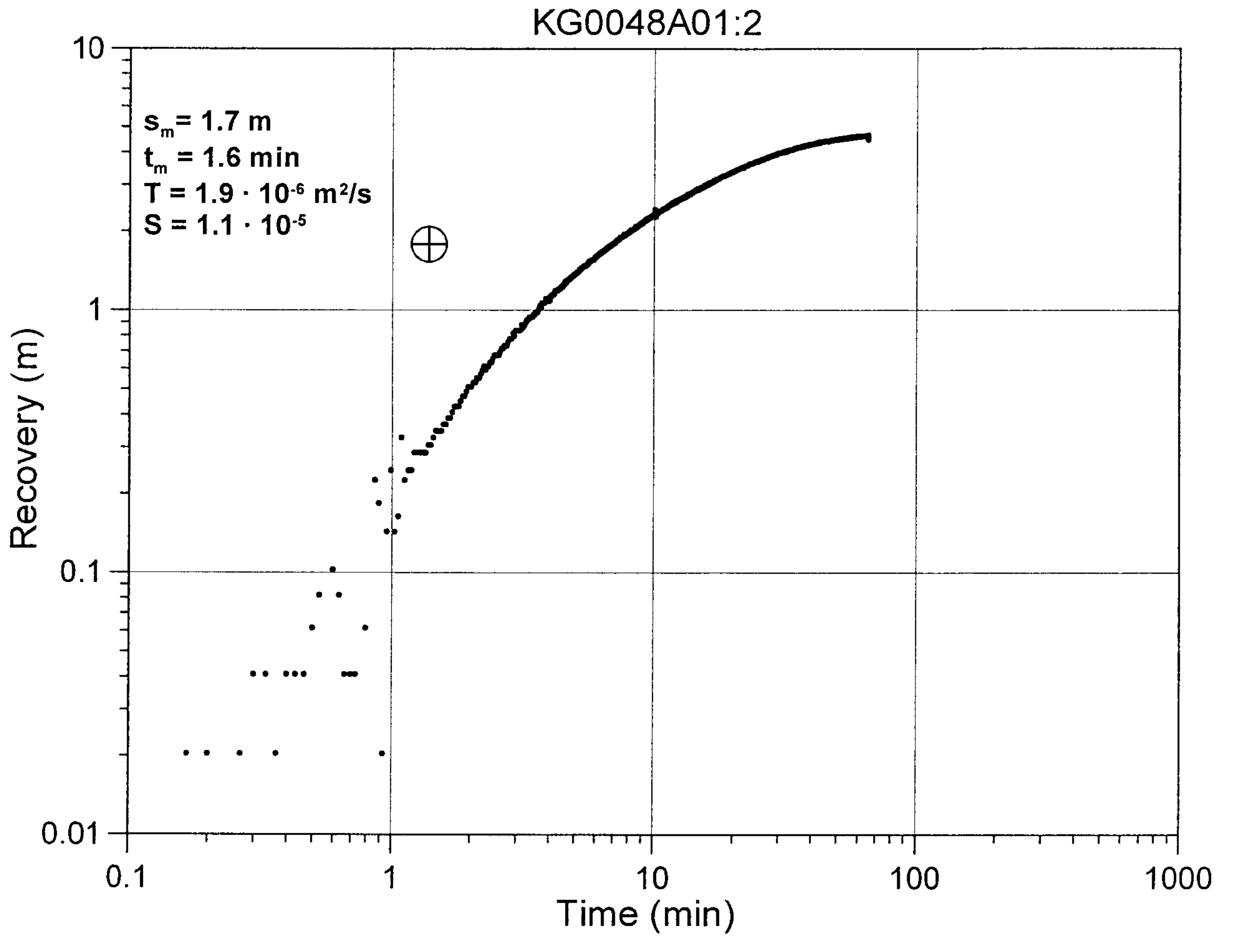

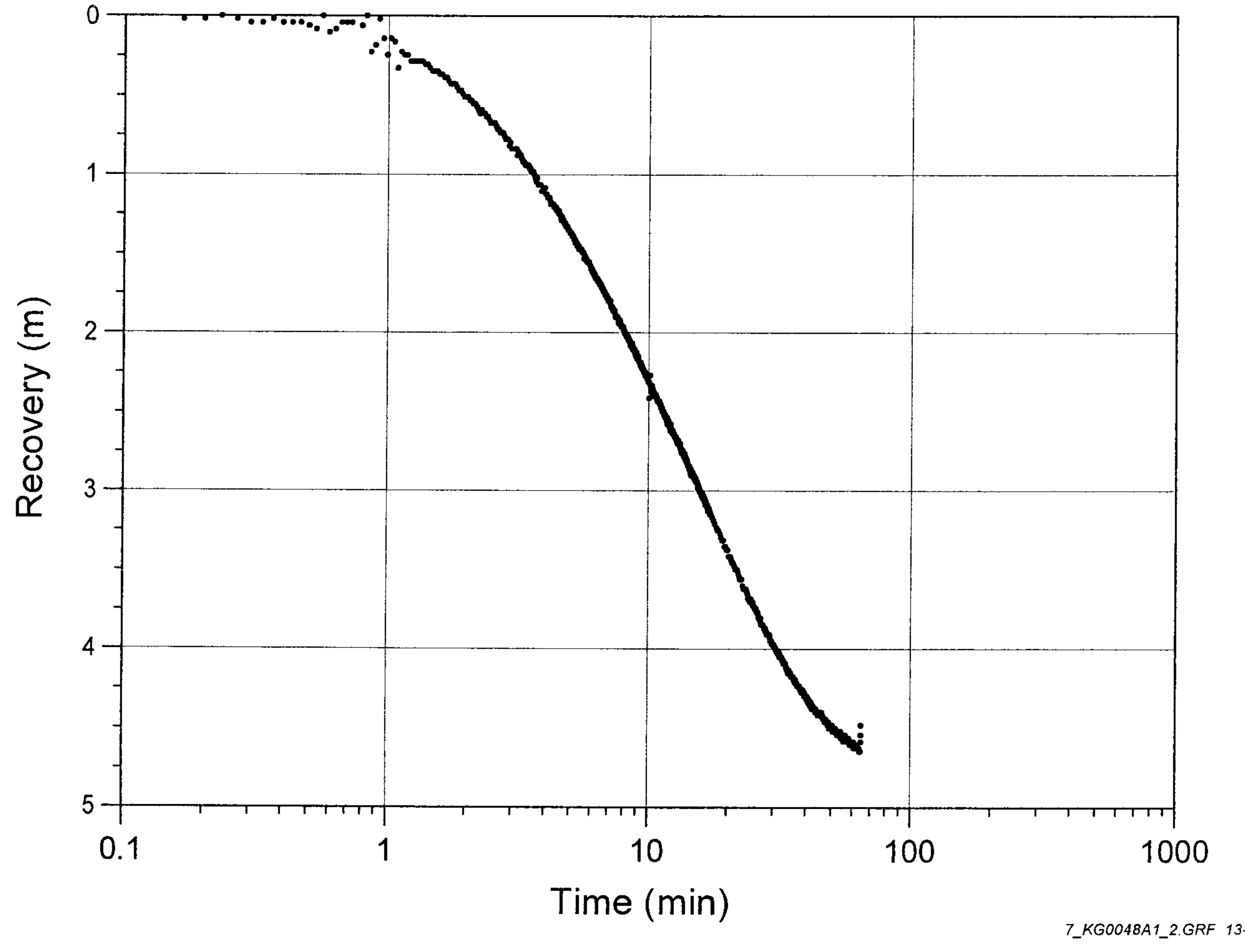

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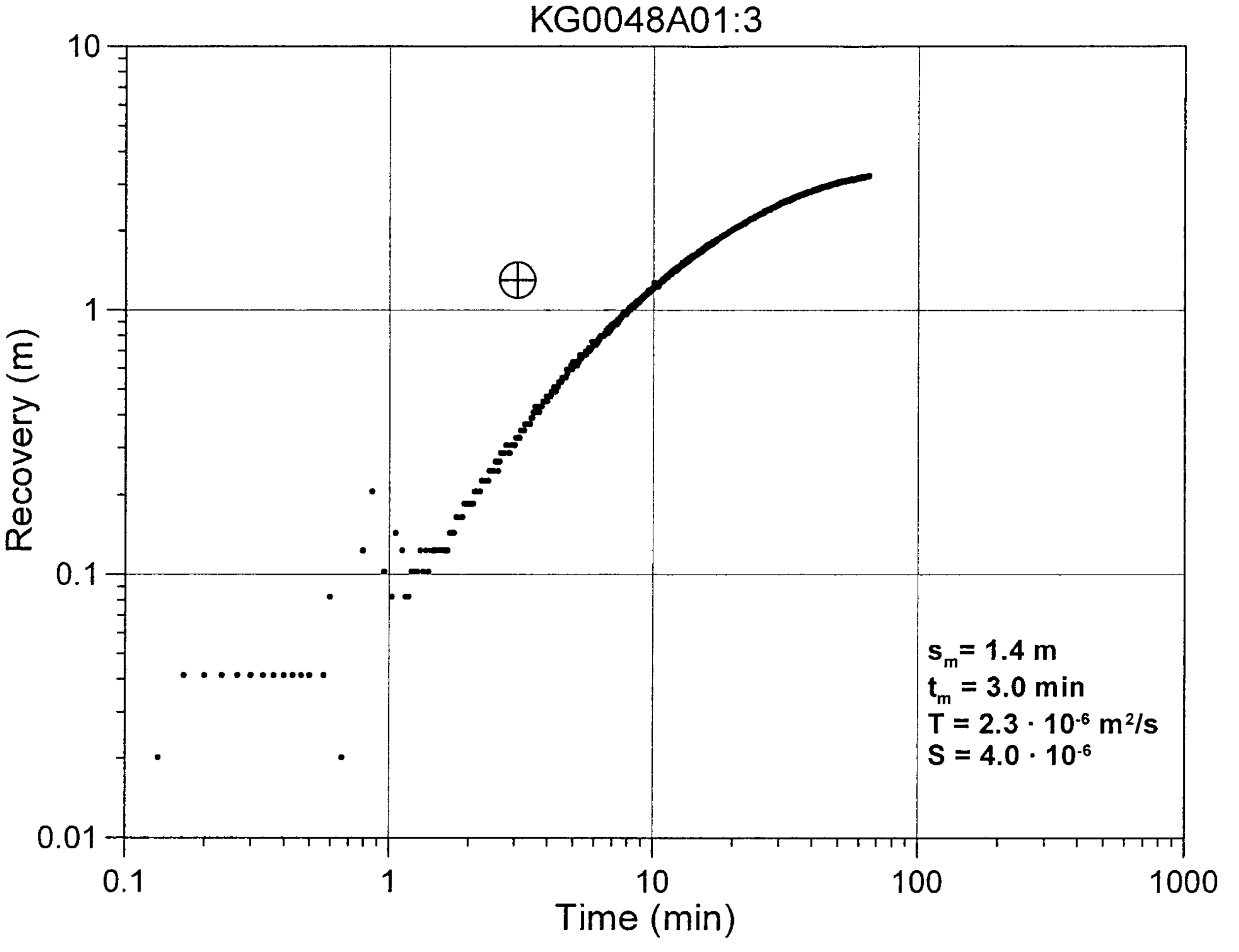

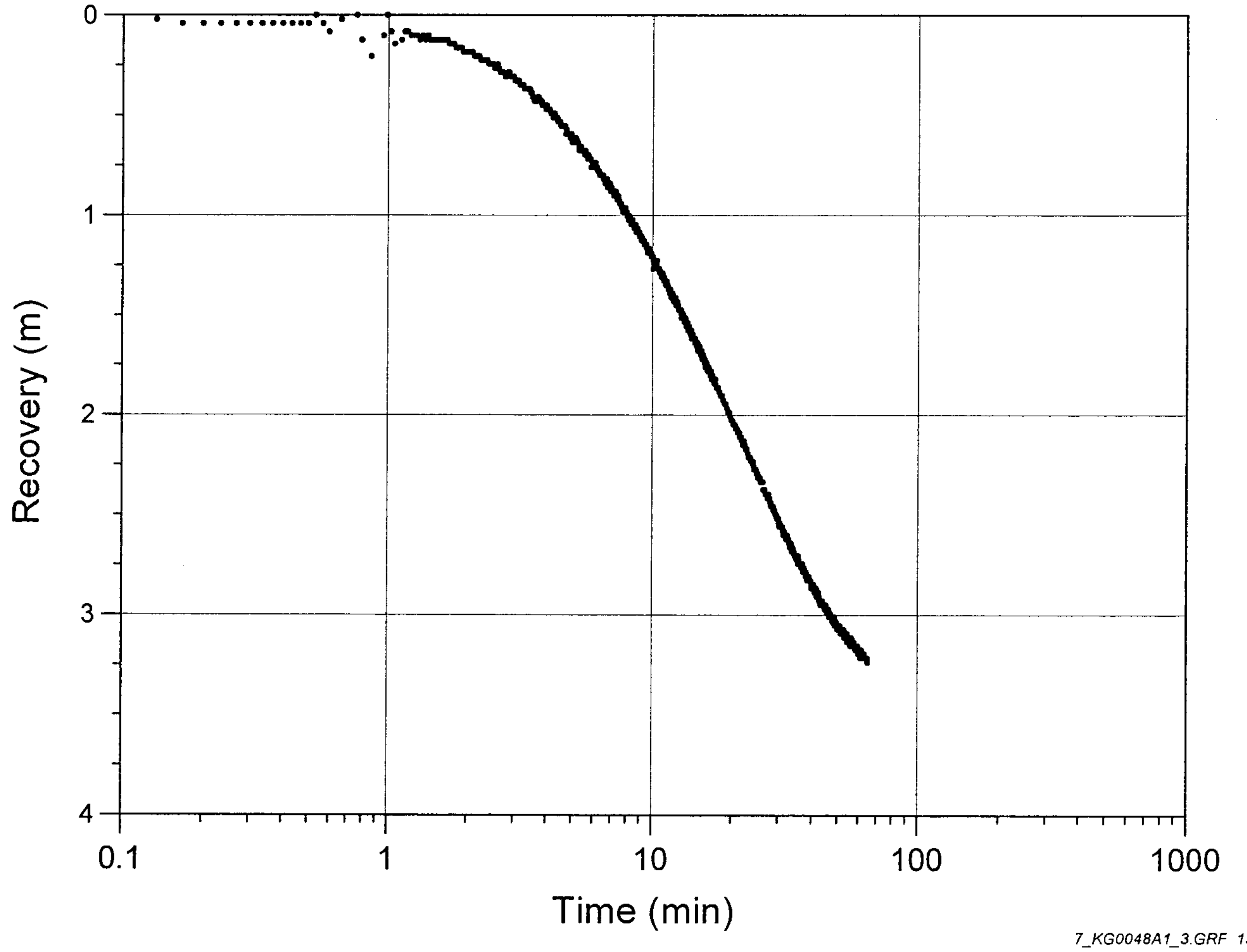

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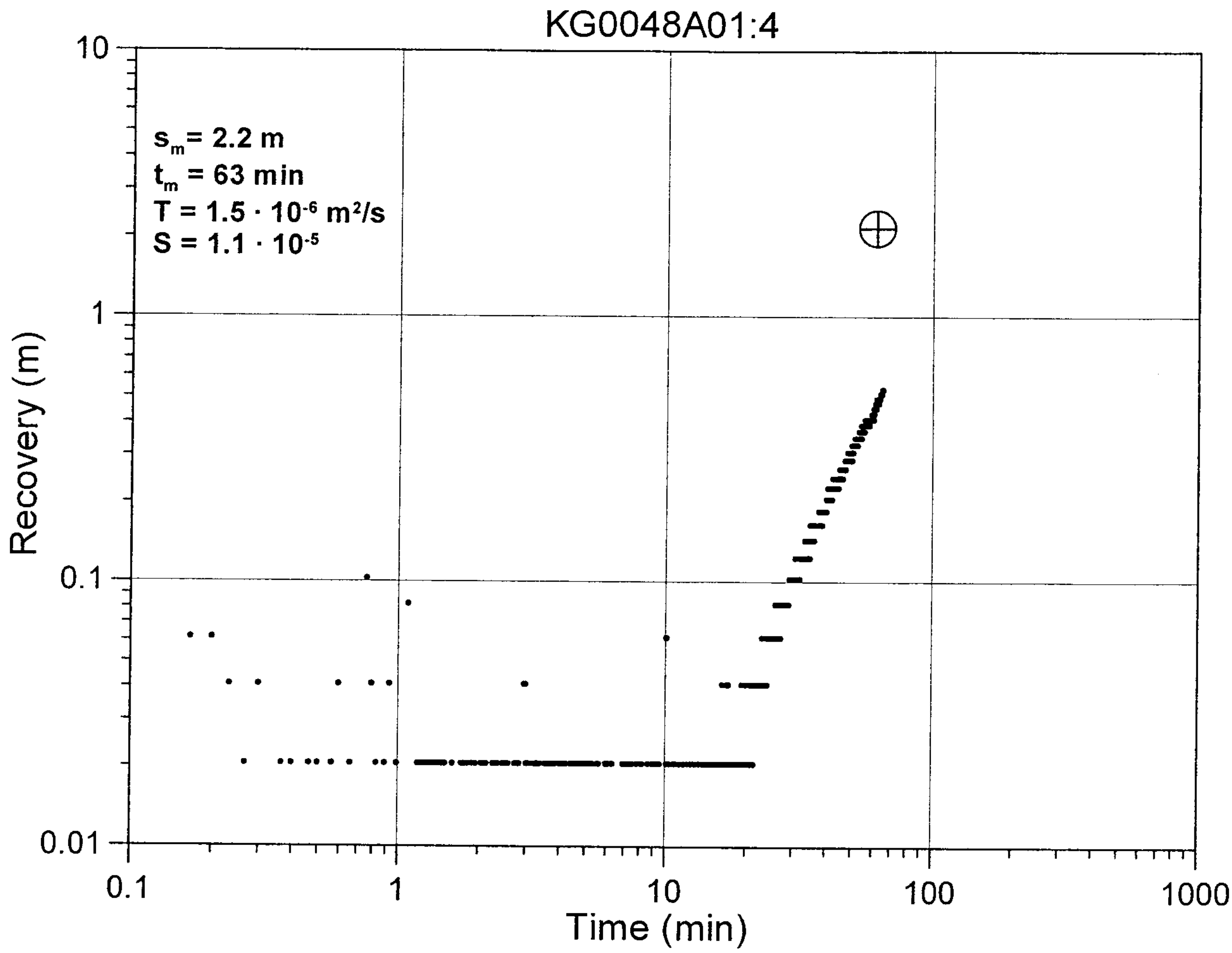
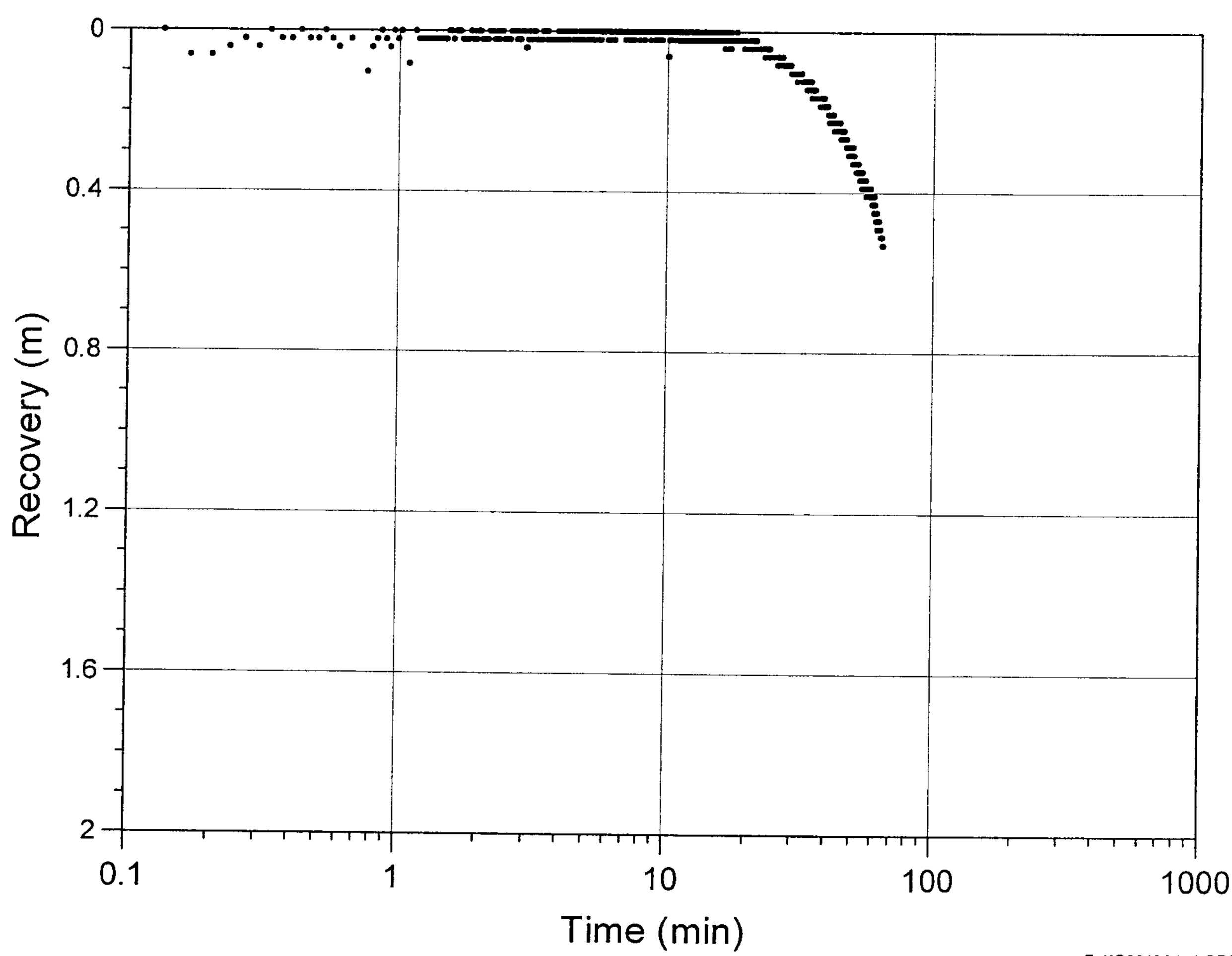




7_KG0048A1_4.GRF 13-okt-99

APPENDIX 3

Interference test 2:8 in borehole KA3554G01, section 22.30 m –30.01 m

Date: 99-08-18 | Field Crew: Bengt Gentzschein
Borehole length: 30.01 m | Borehole diameter: 76 mm

Flowing borehole: KA3554G01, section #1: 22.3 – 30.01 m

Valve opened: 990818 10:00.03 Valve closed: 990818 16:04.05
End of Test: 990819 08:50
Total flowing time : 364 min Tot. Pr. Build-up time 1011 min.

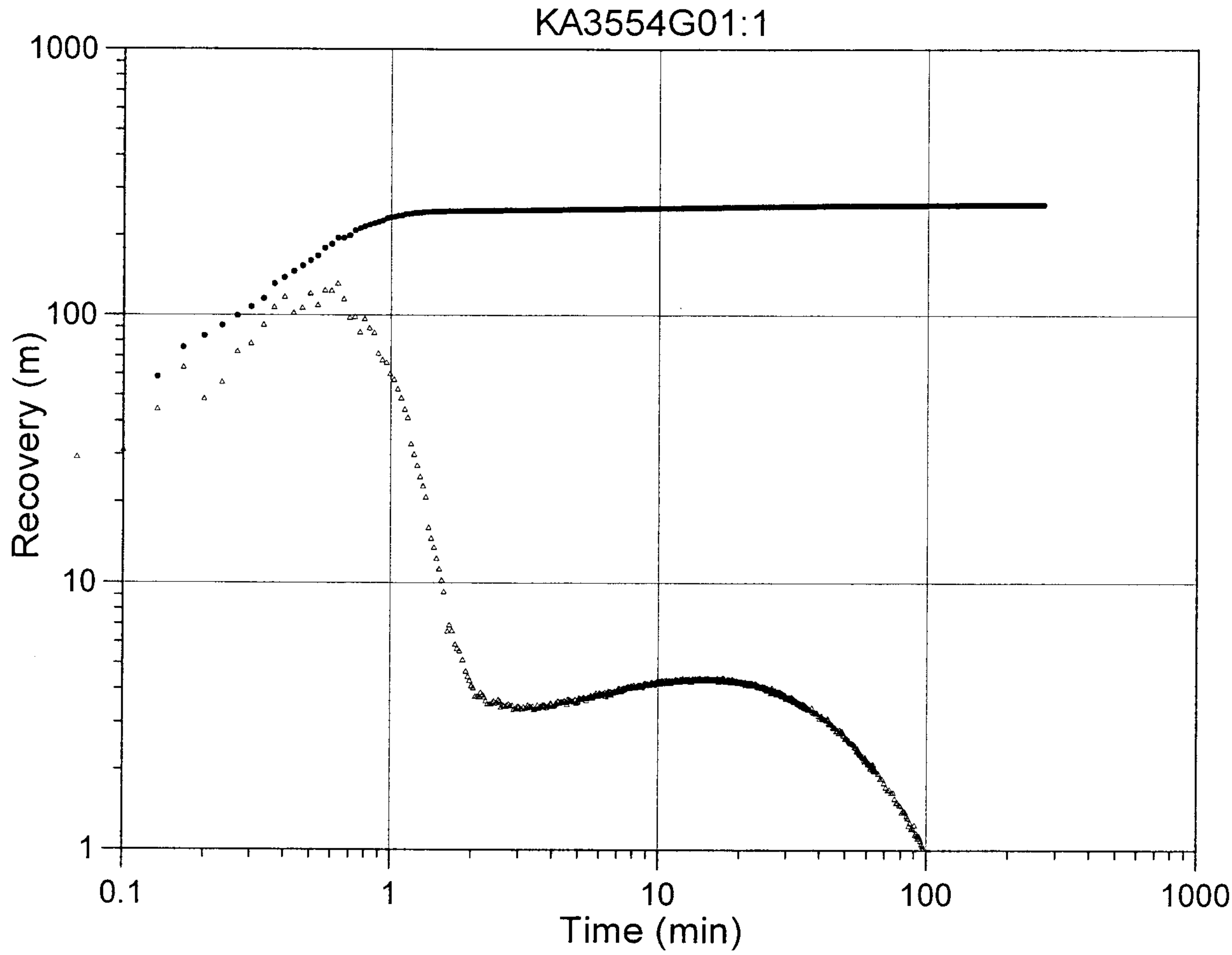
The test was performed as an Interference test. Pressure responses were monitored in 62 borehole sections.

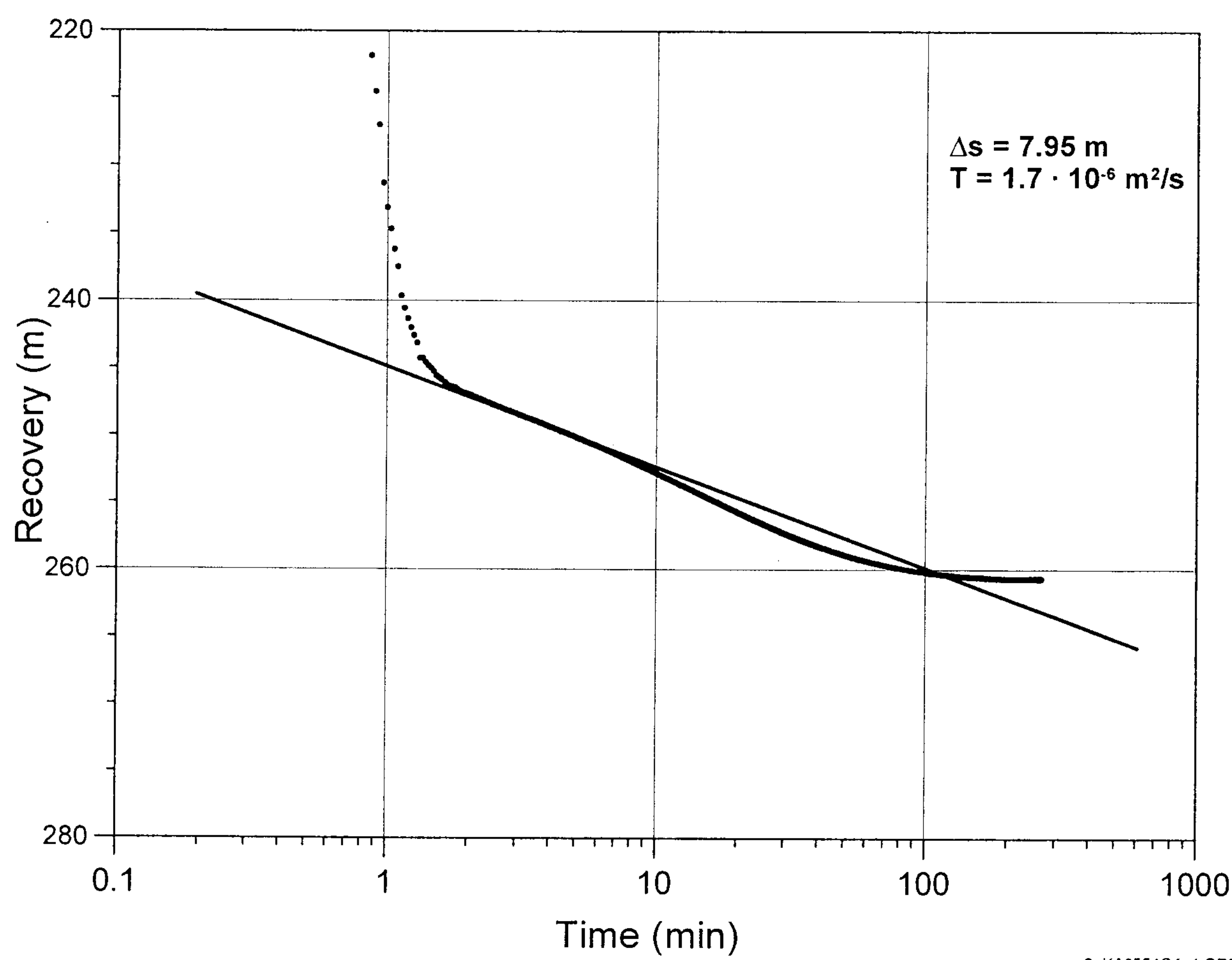
Flow data

Manually measured flow rates of KA3554G01, section 22.30 – 30.01 m are presented in the table below:

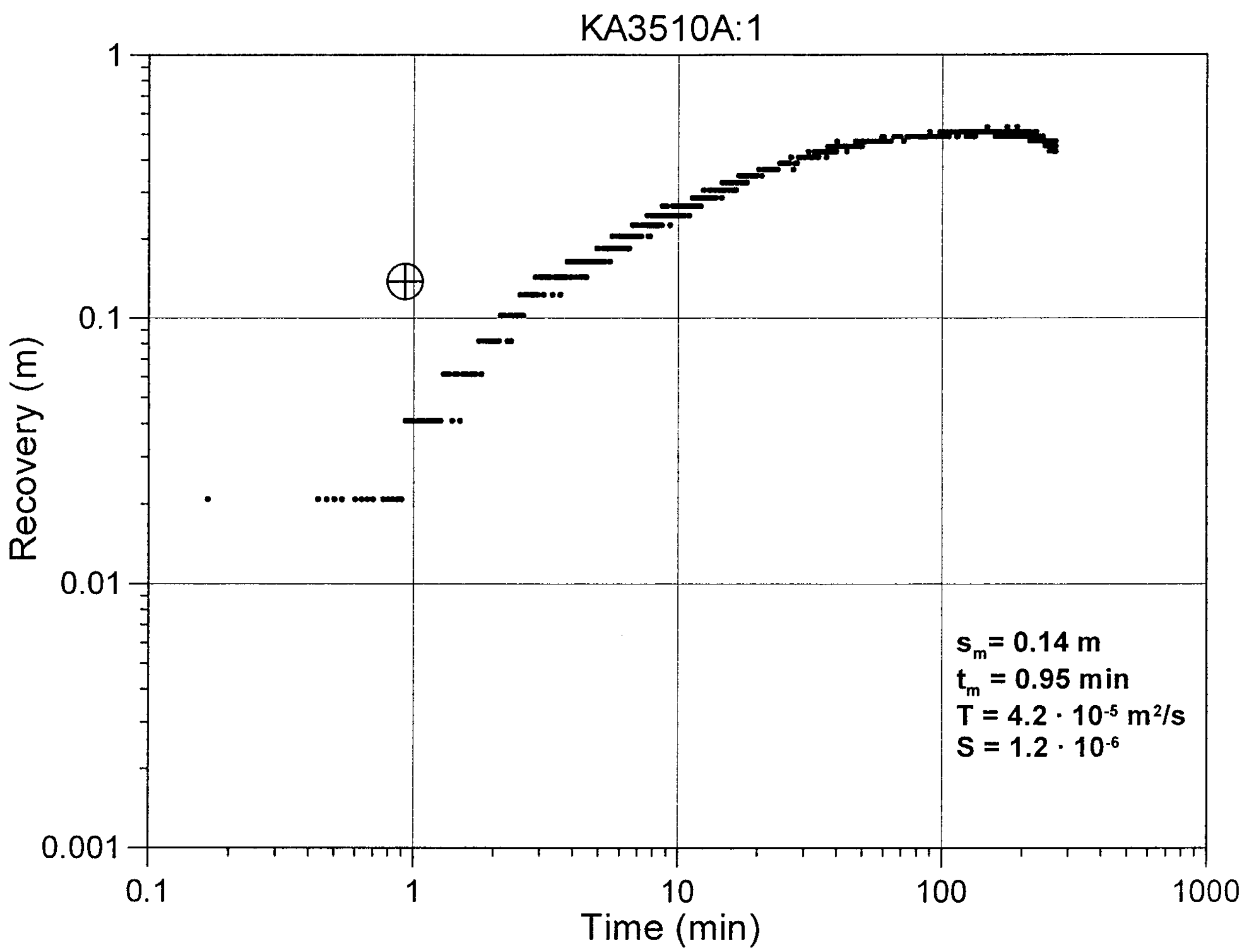
Table Manually measured flow rates, Interference test in KA3554G01, section, 22.30 – 30.01 m (test #8). Prototype Repository, August 1999.

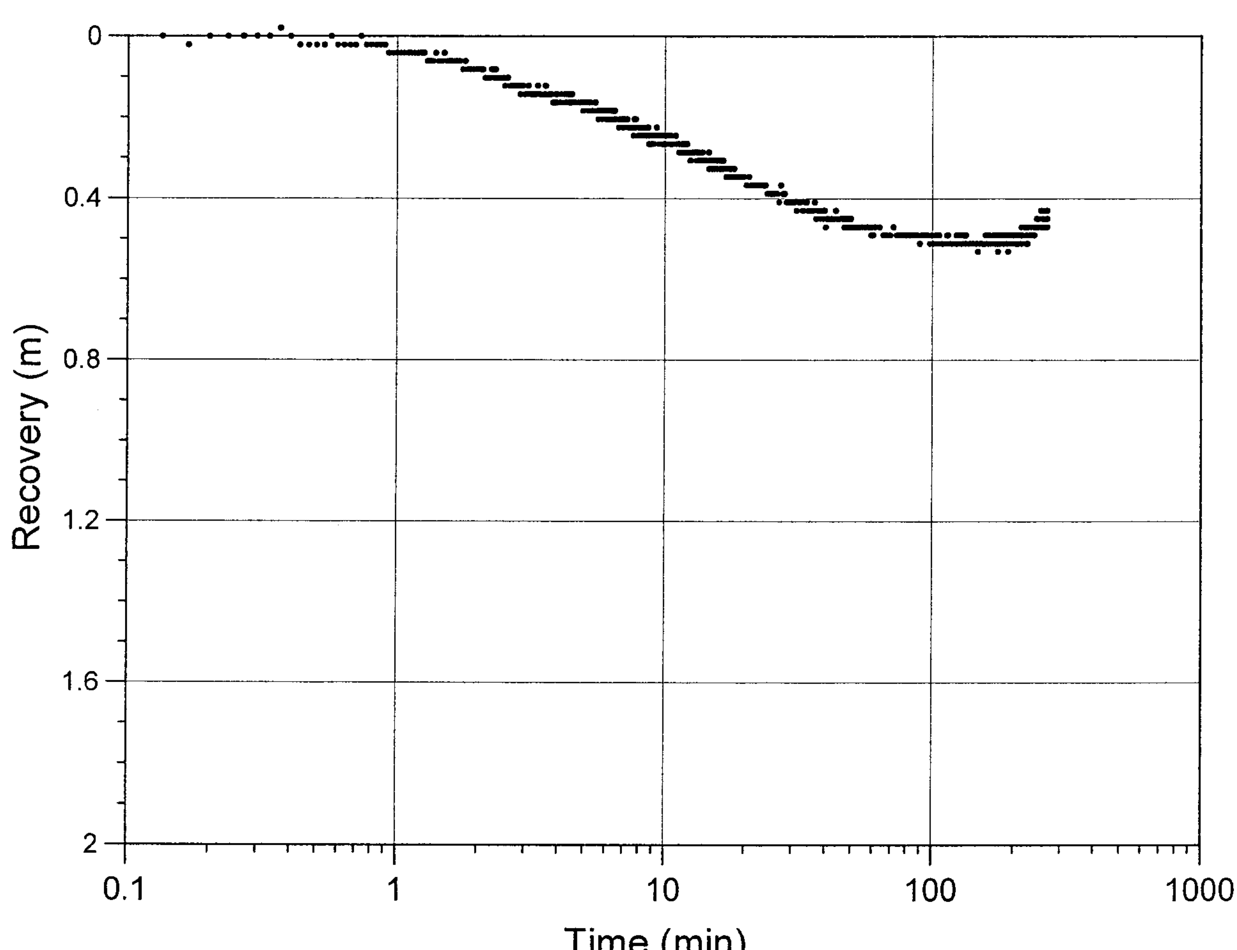
Time	Flow rate (l/min)
10:00.33	6.15
10:02.33	5.84
10:06.03	4.94
10:18	4.80
10:30	4.79
10:45	4.54
11:01	4.51
15:51	4.47
15:56	4.455
16:02:30	4.47





8_KA3554G1_1.GRF 27-okt-99





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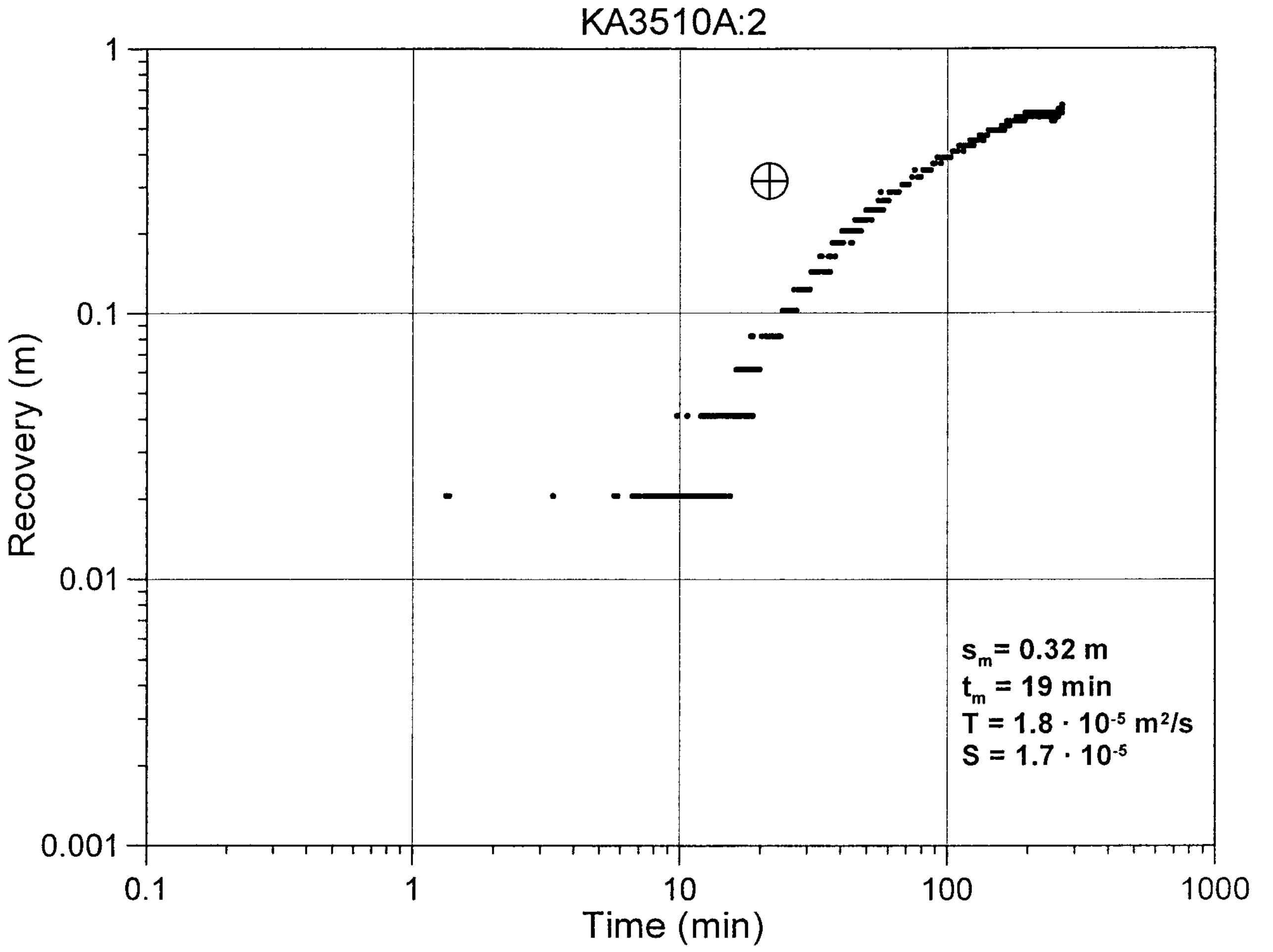

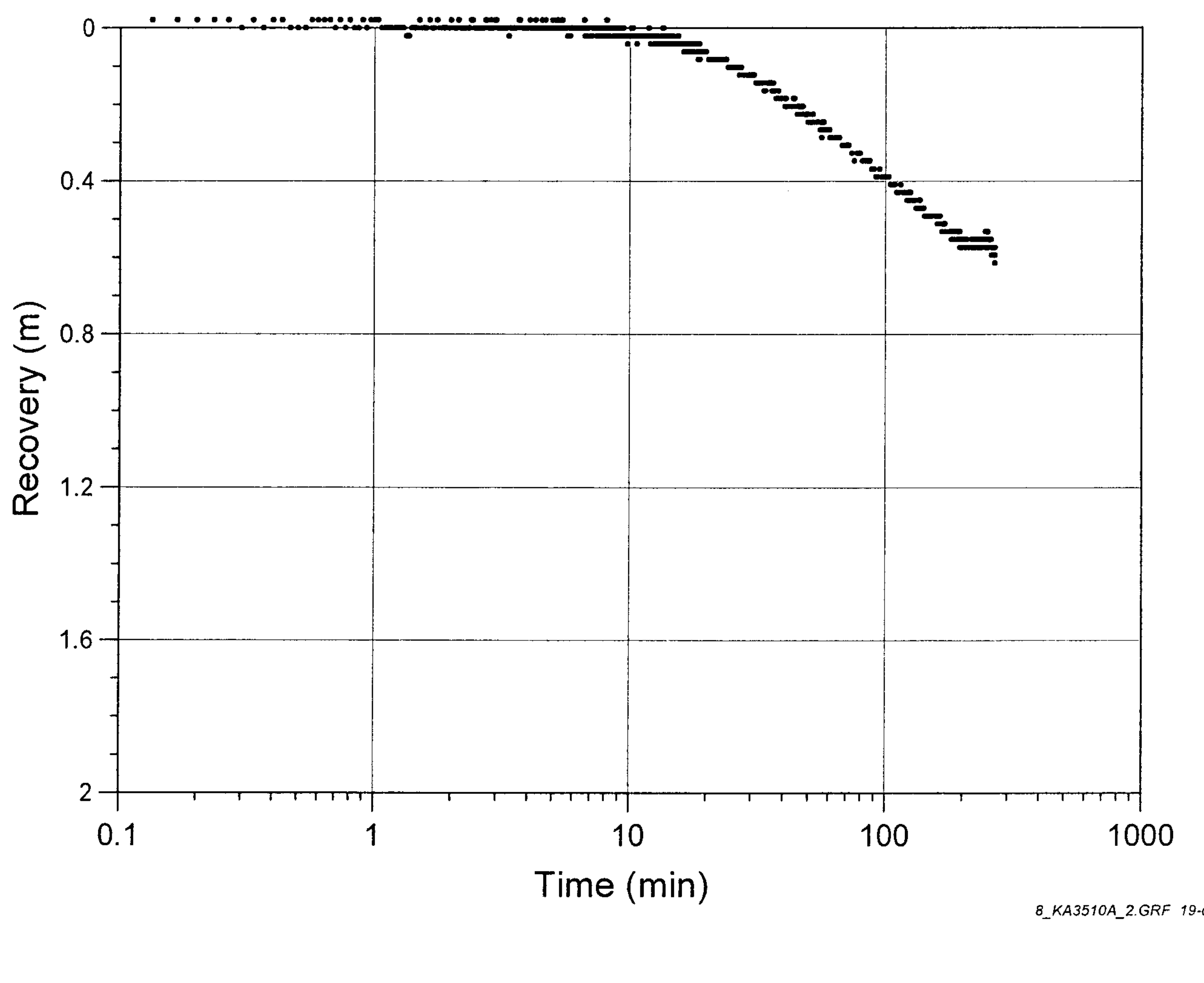

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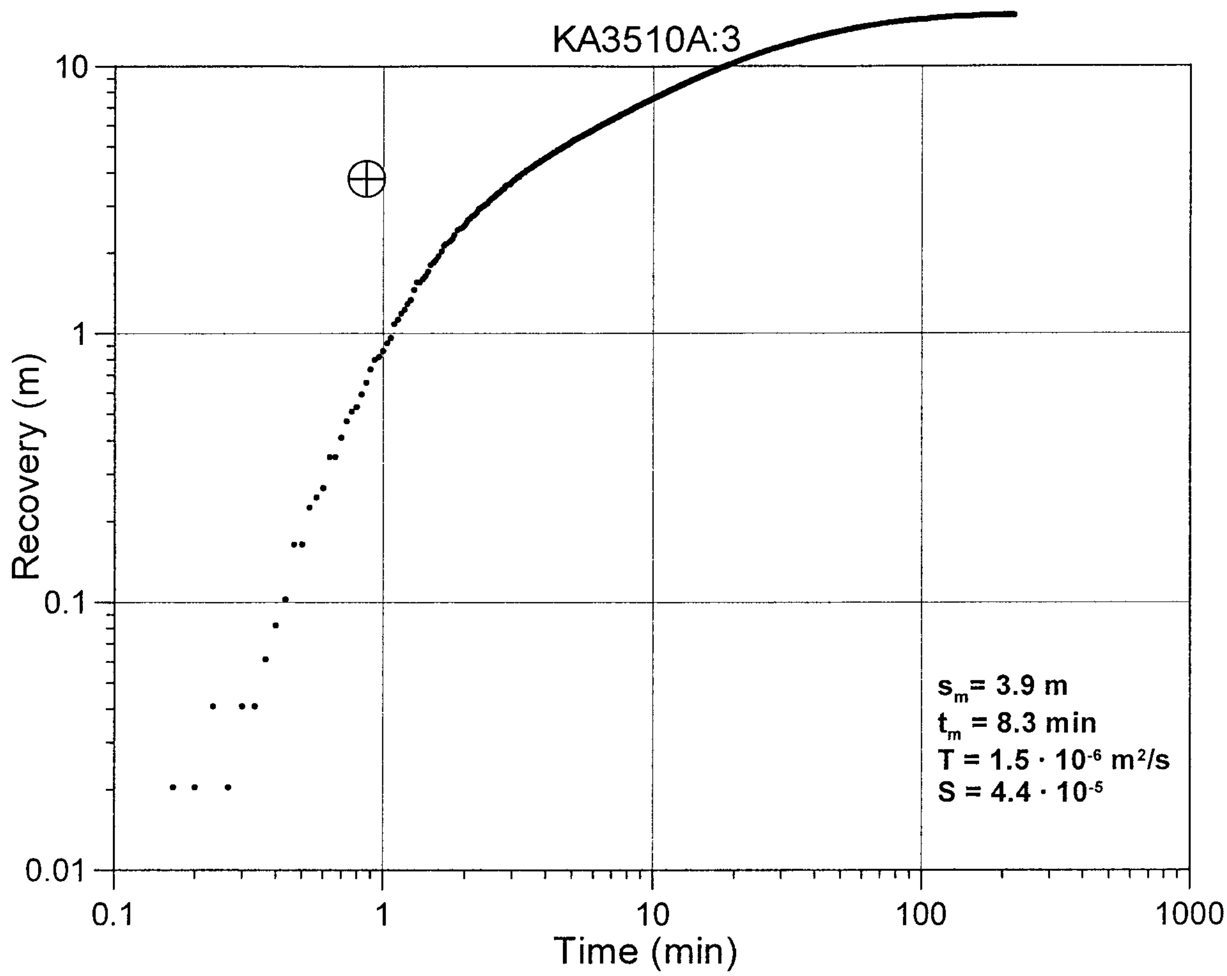
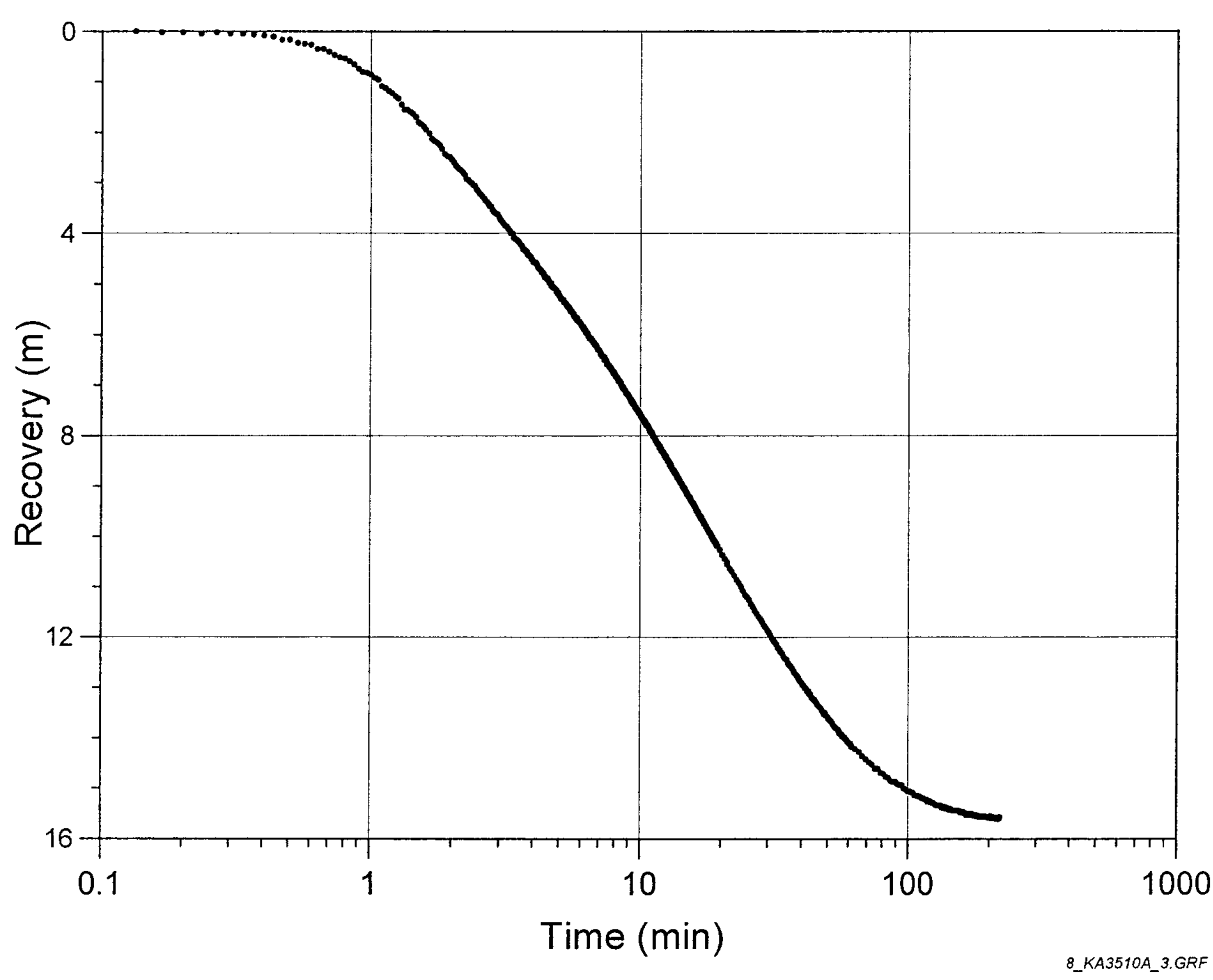
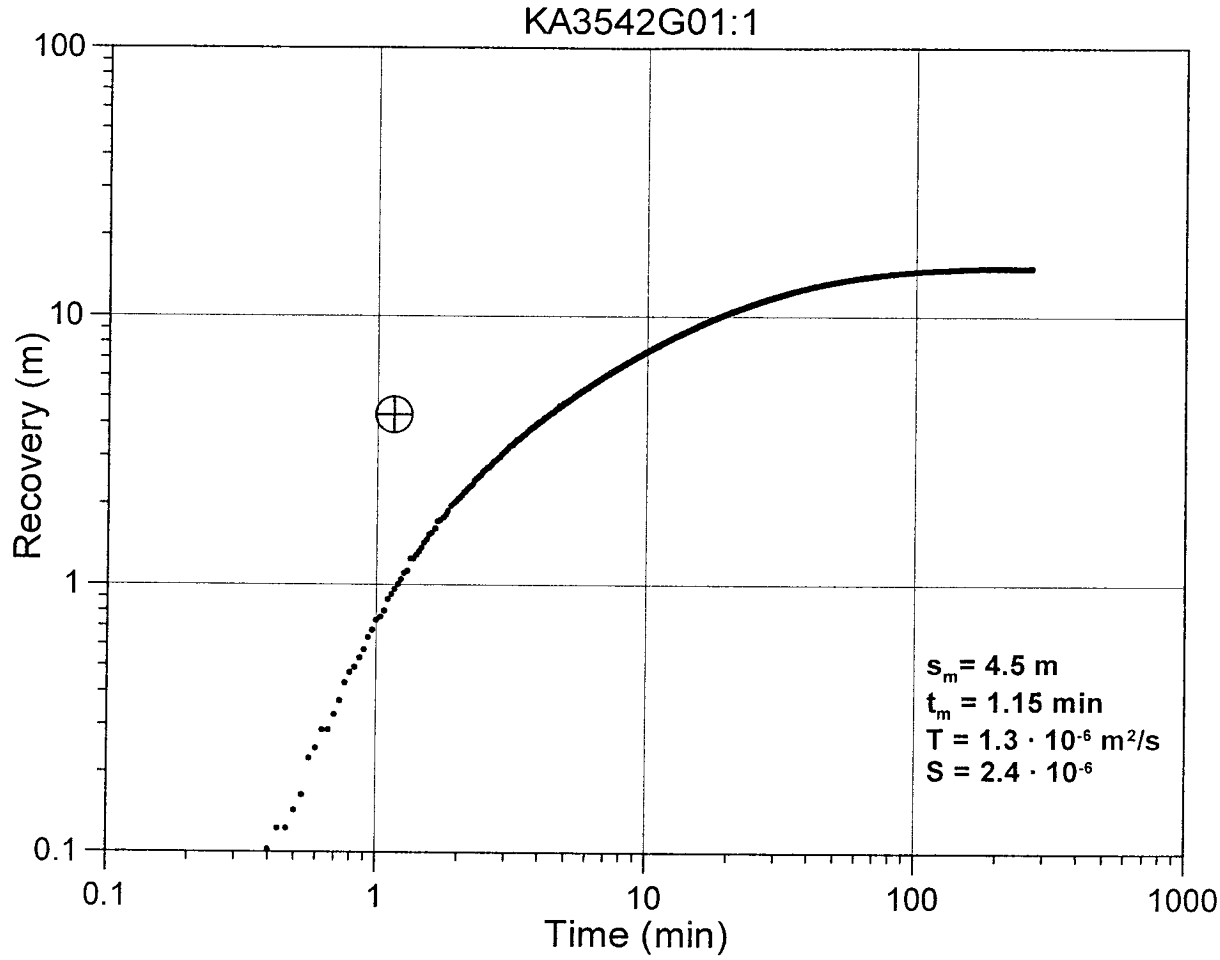
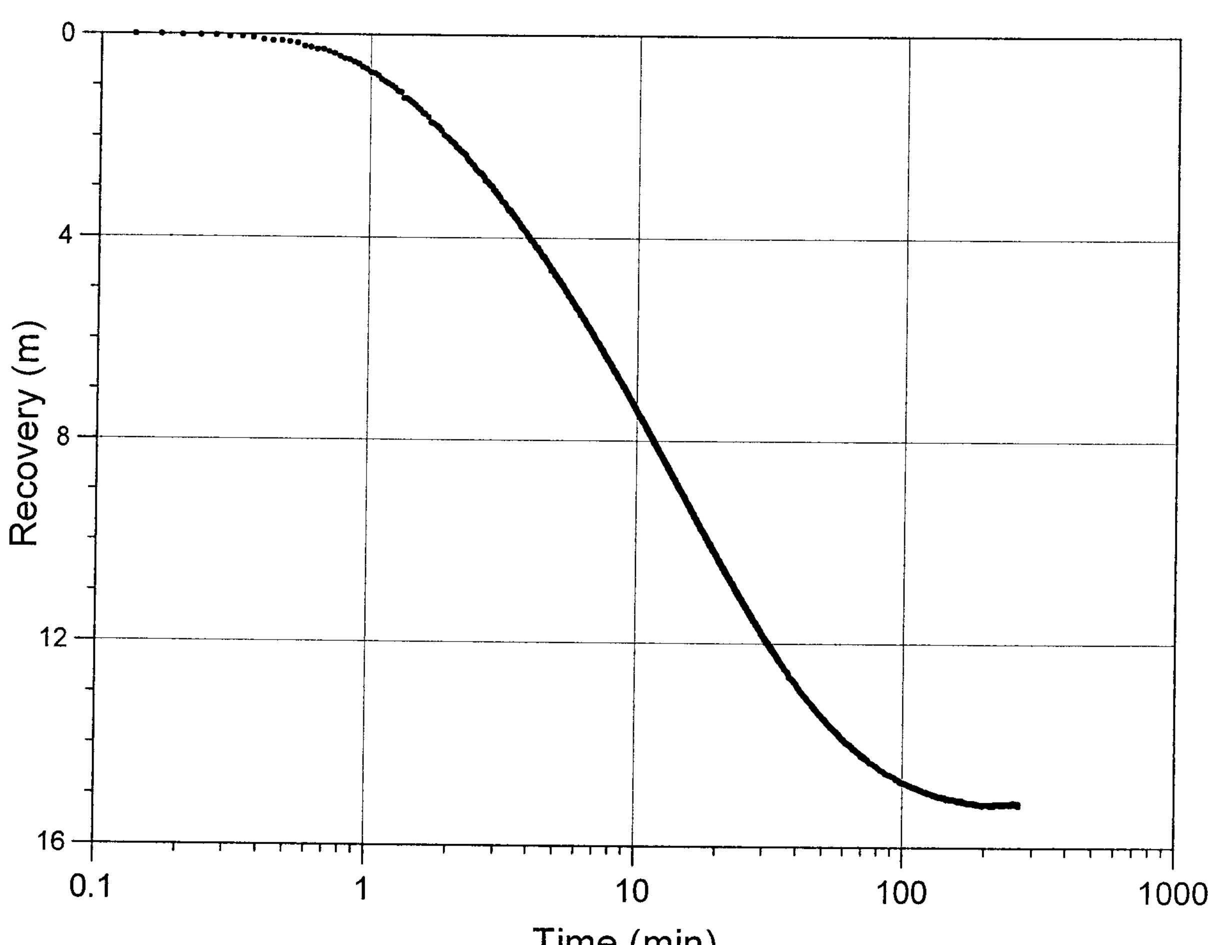




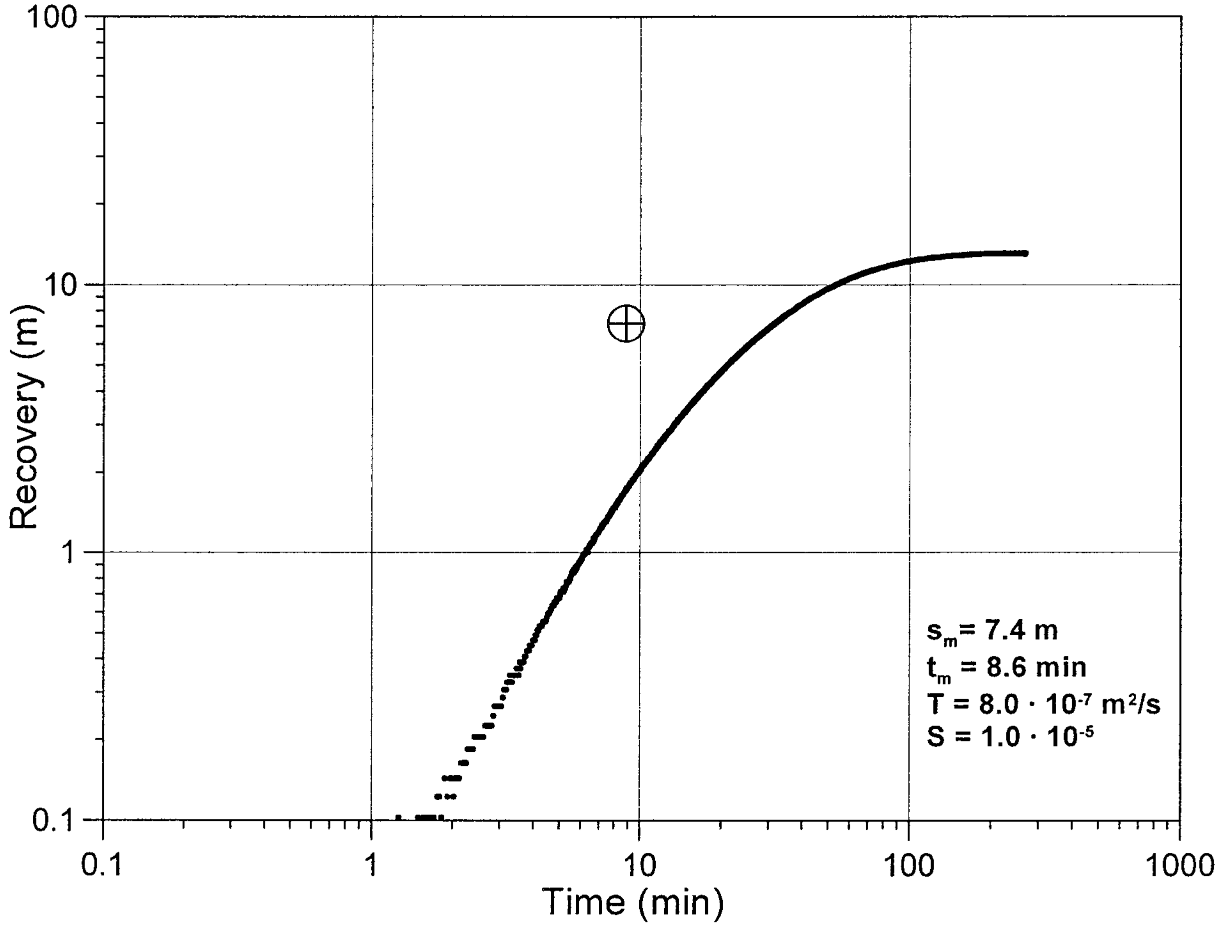
8_KA3510A_3.GRF 19-okt-99

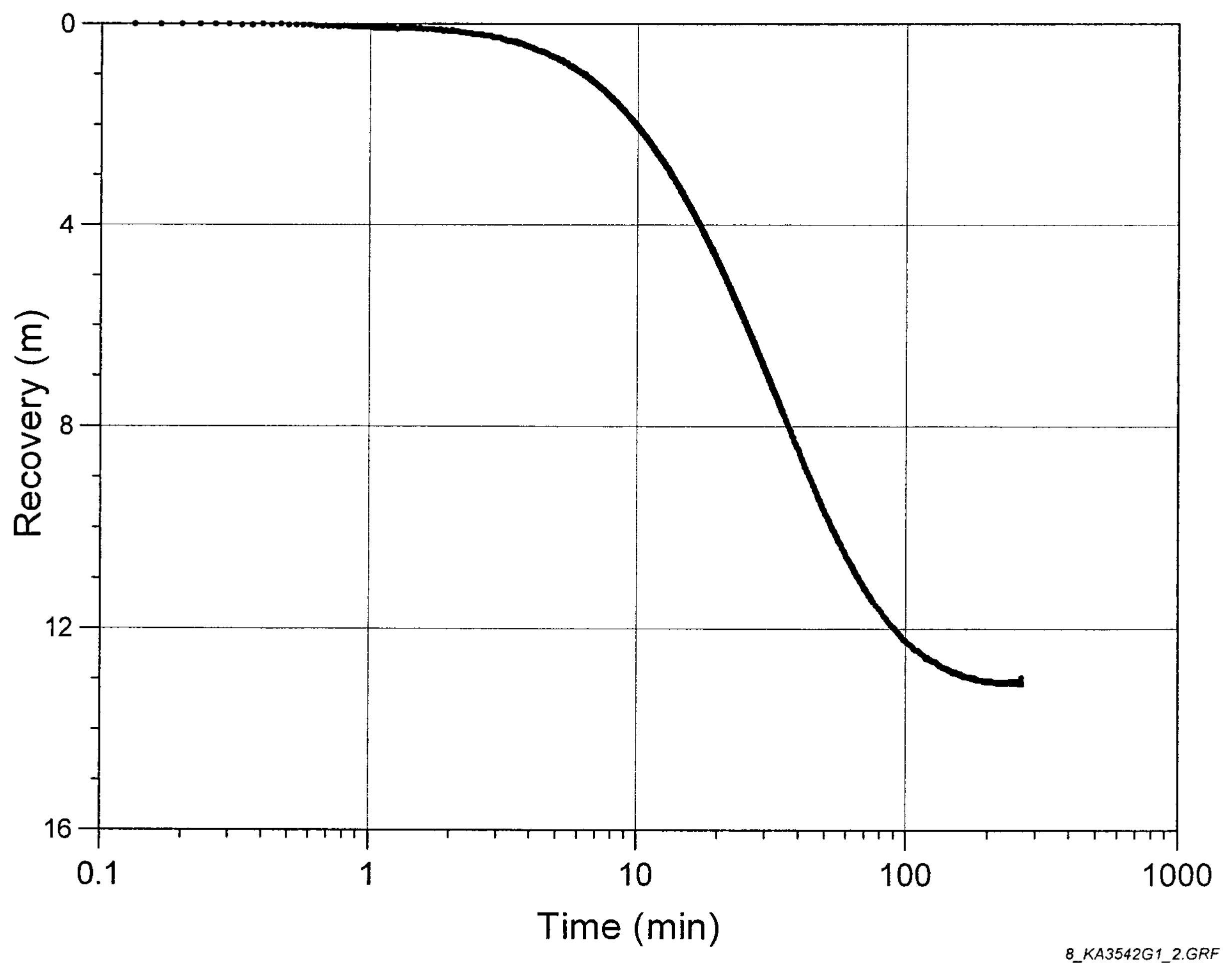




8_KA3542G1_1.GRF 19-okt-99

KA3542G01:2





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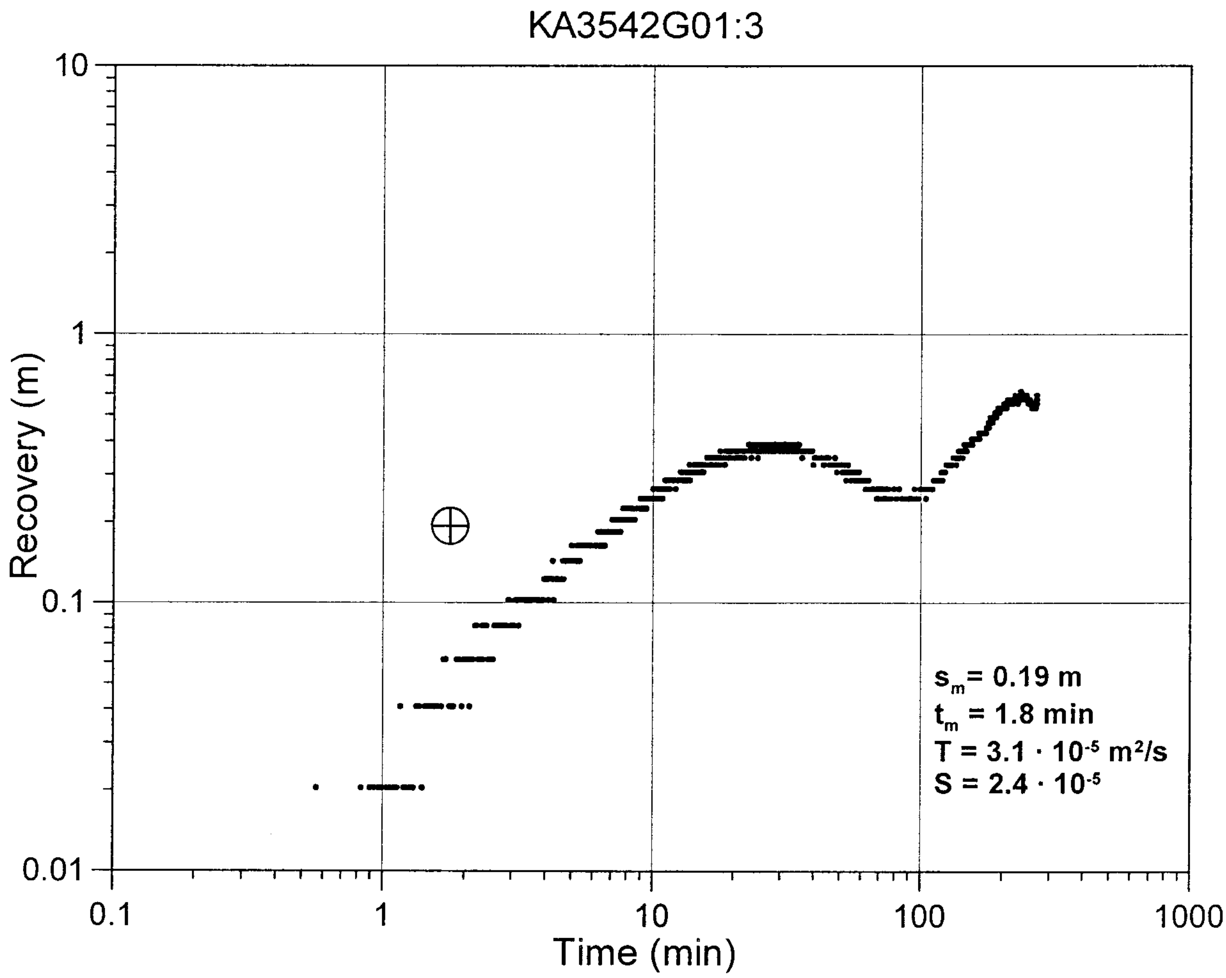

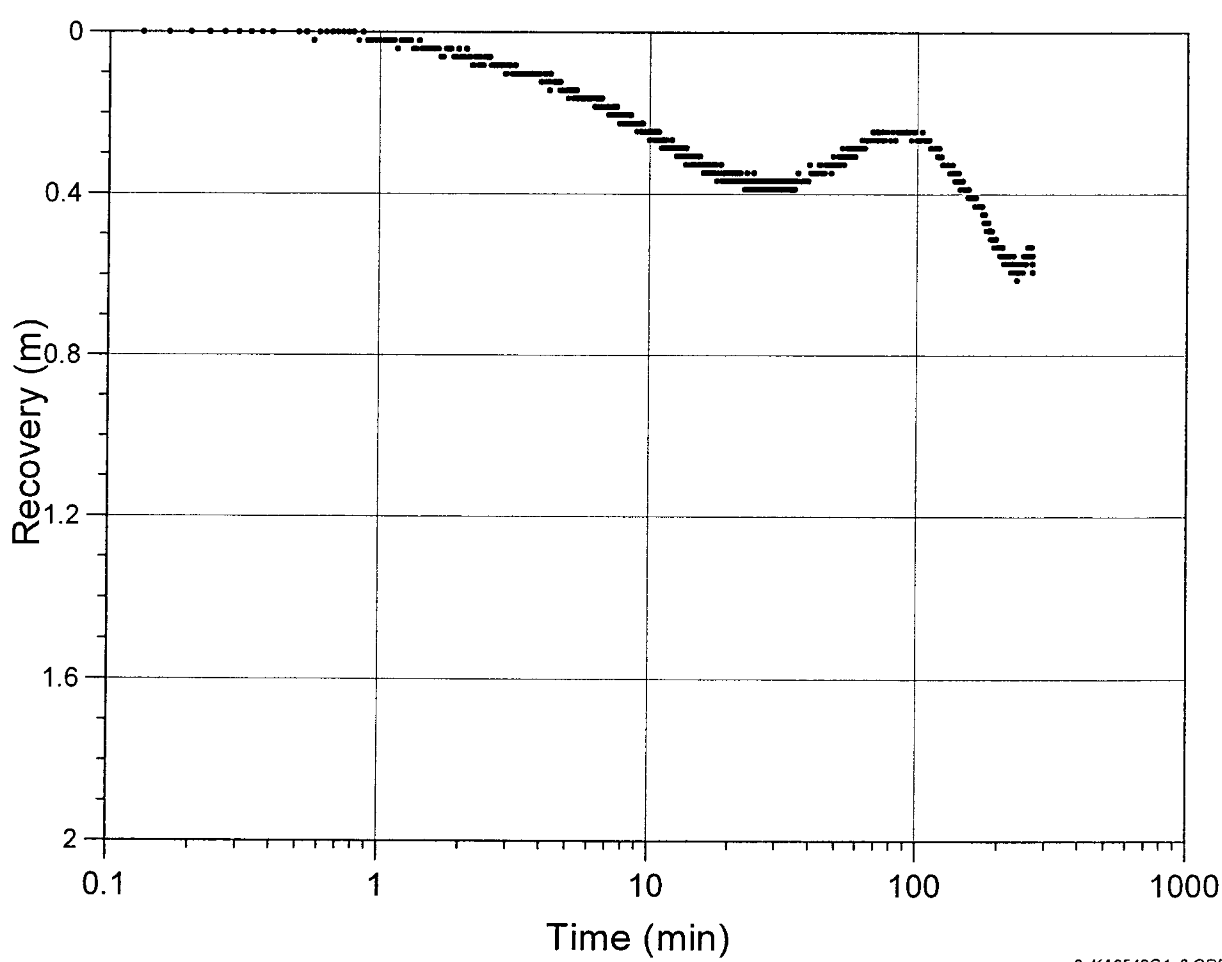

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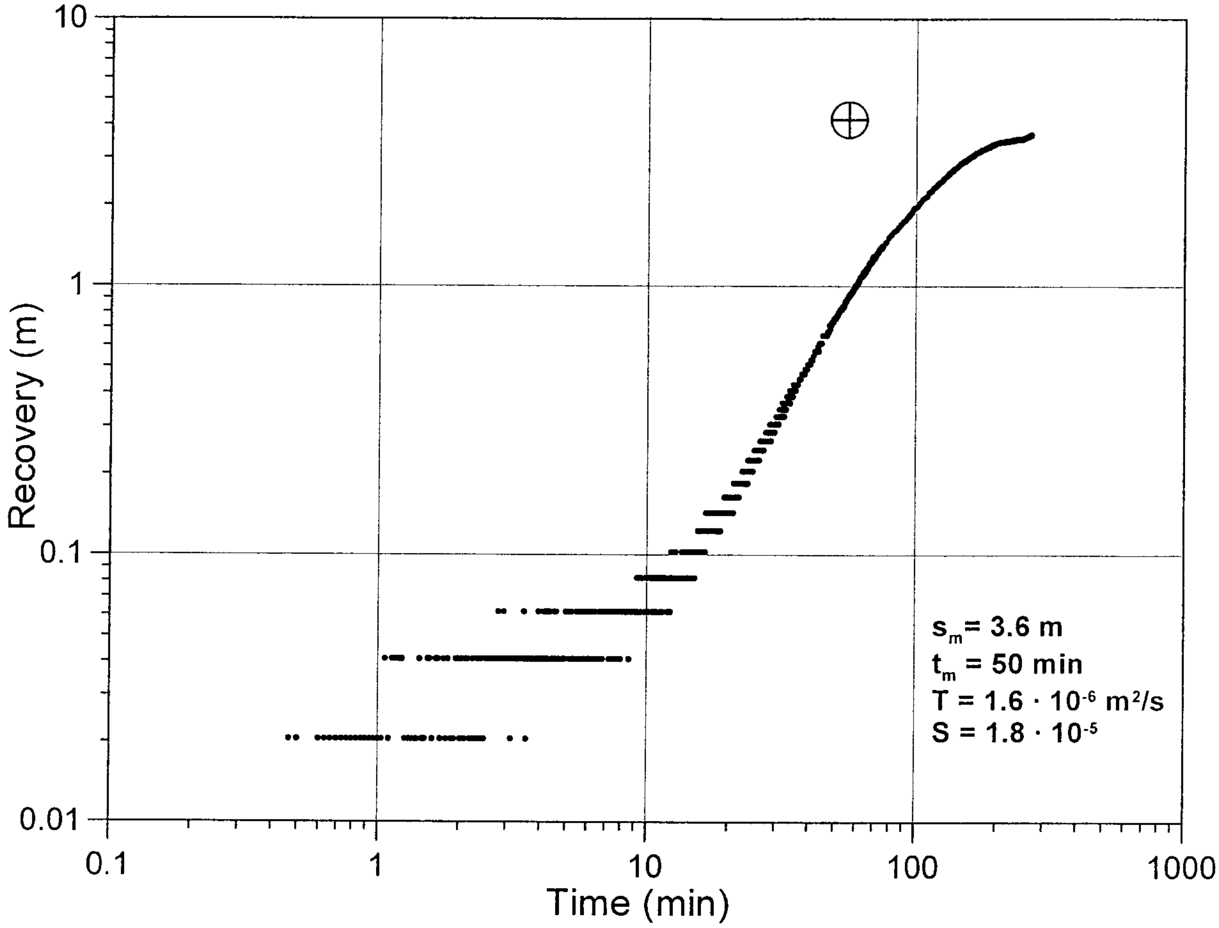

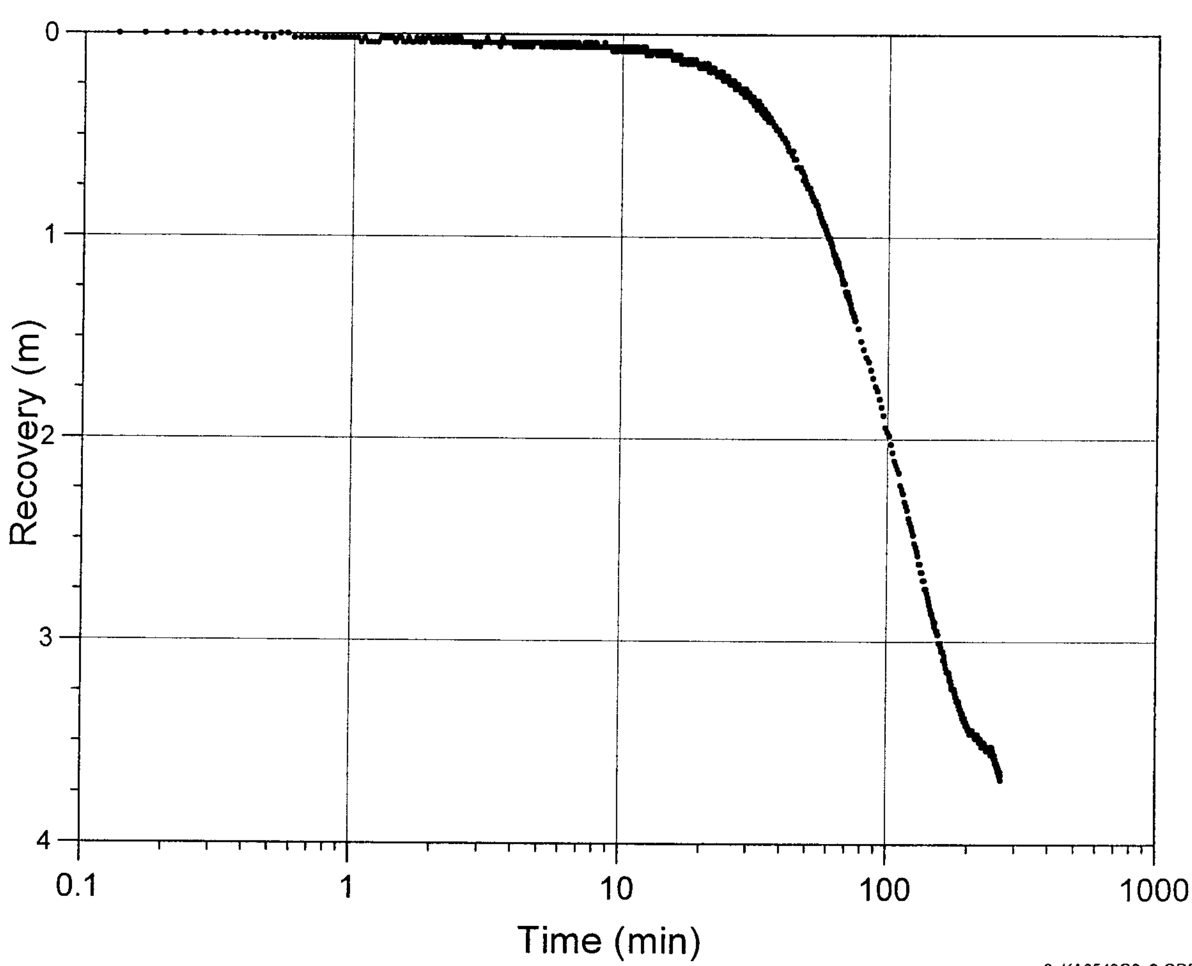

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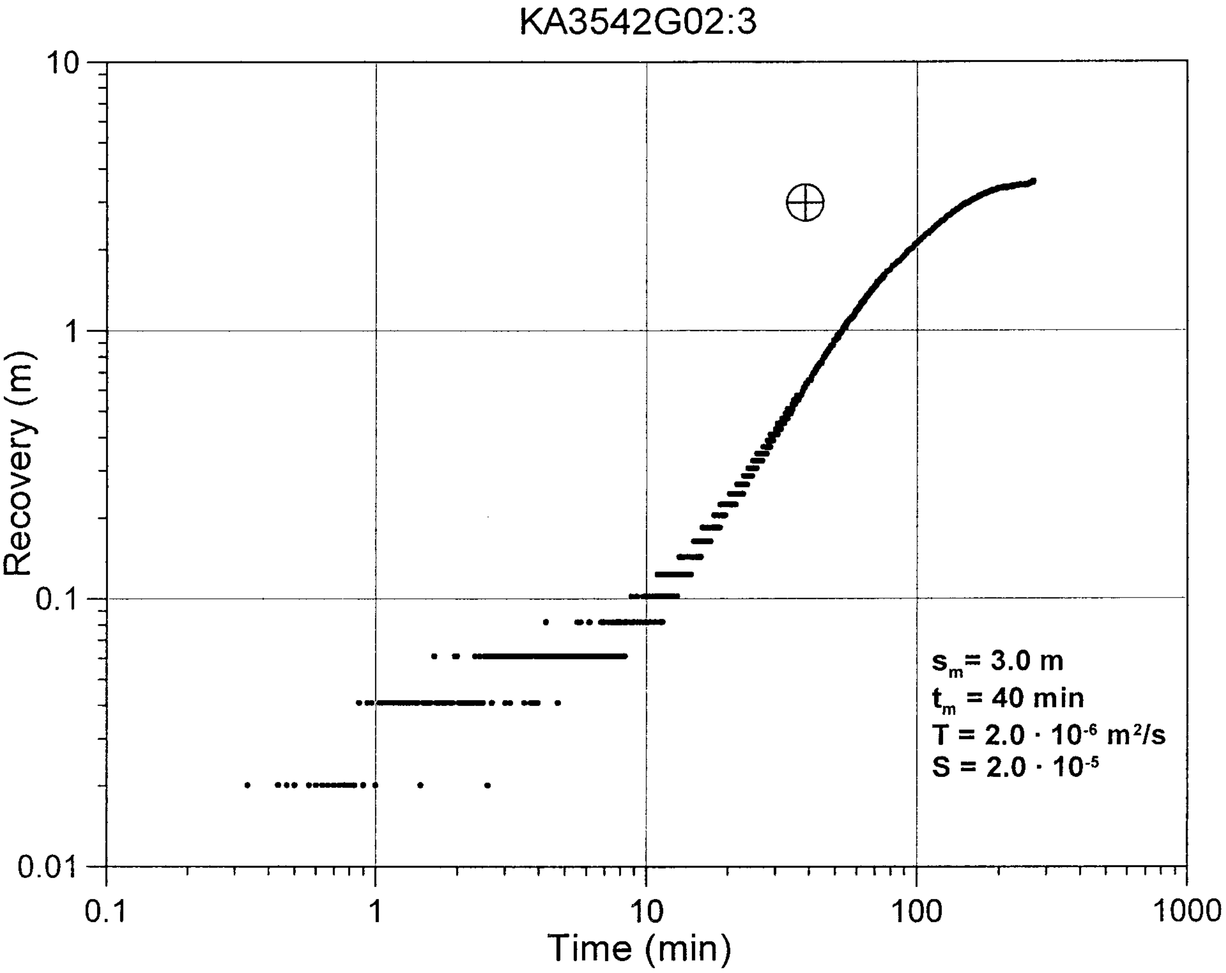

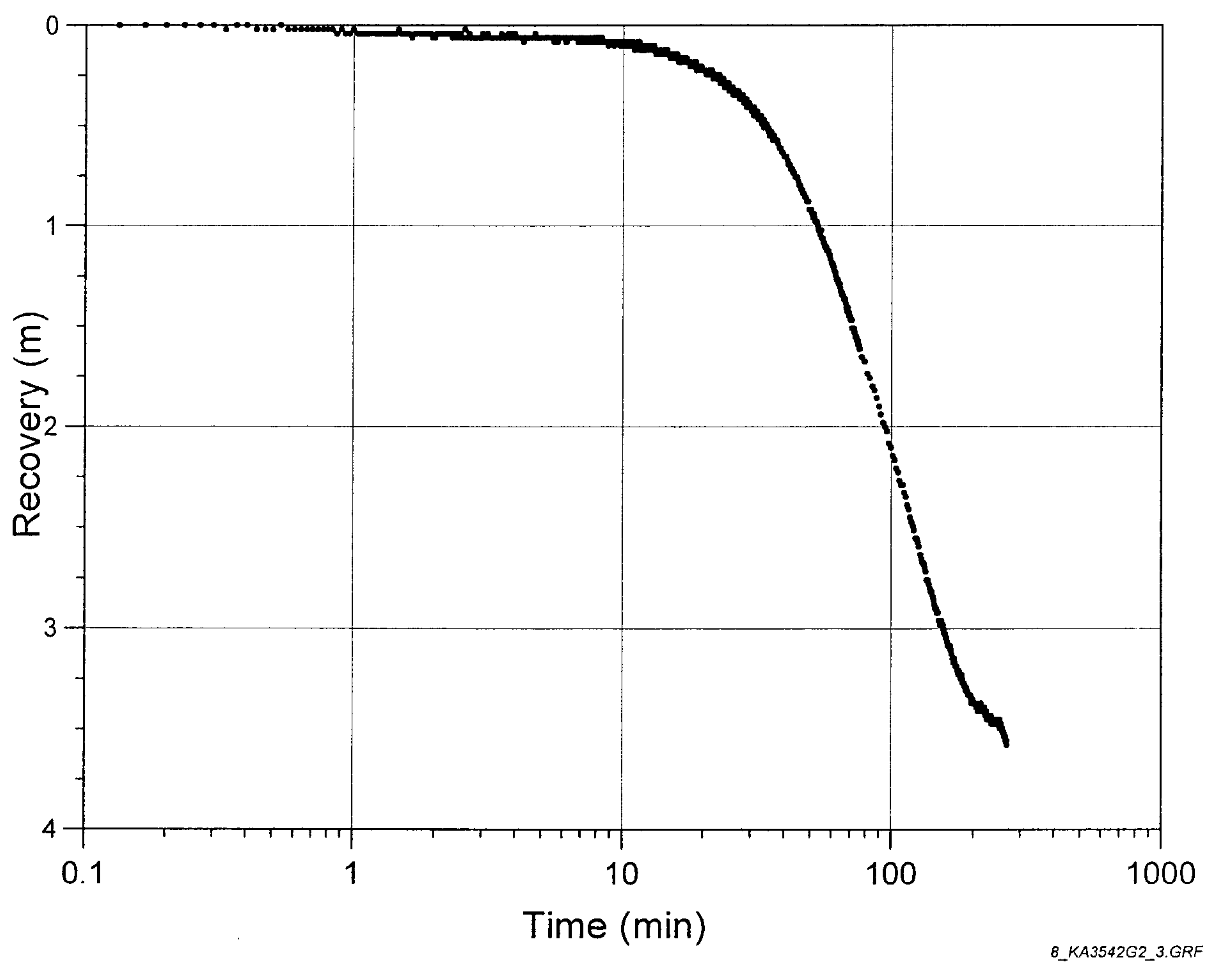

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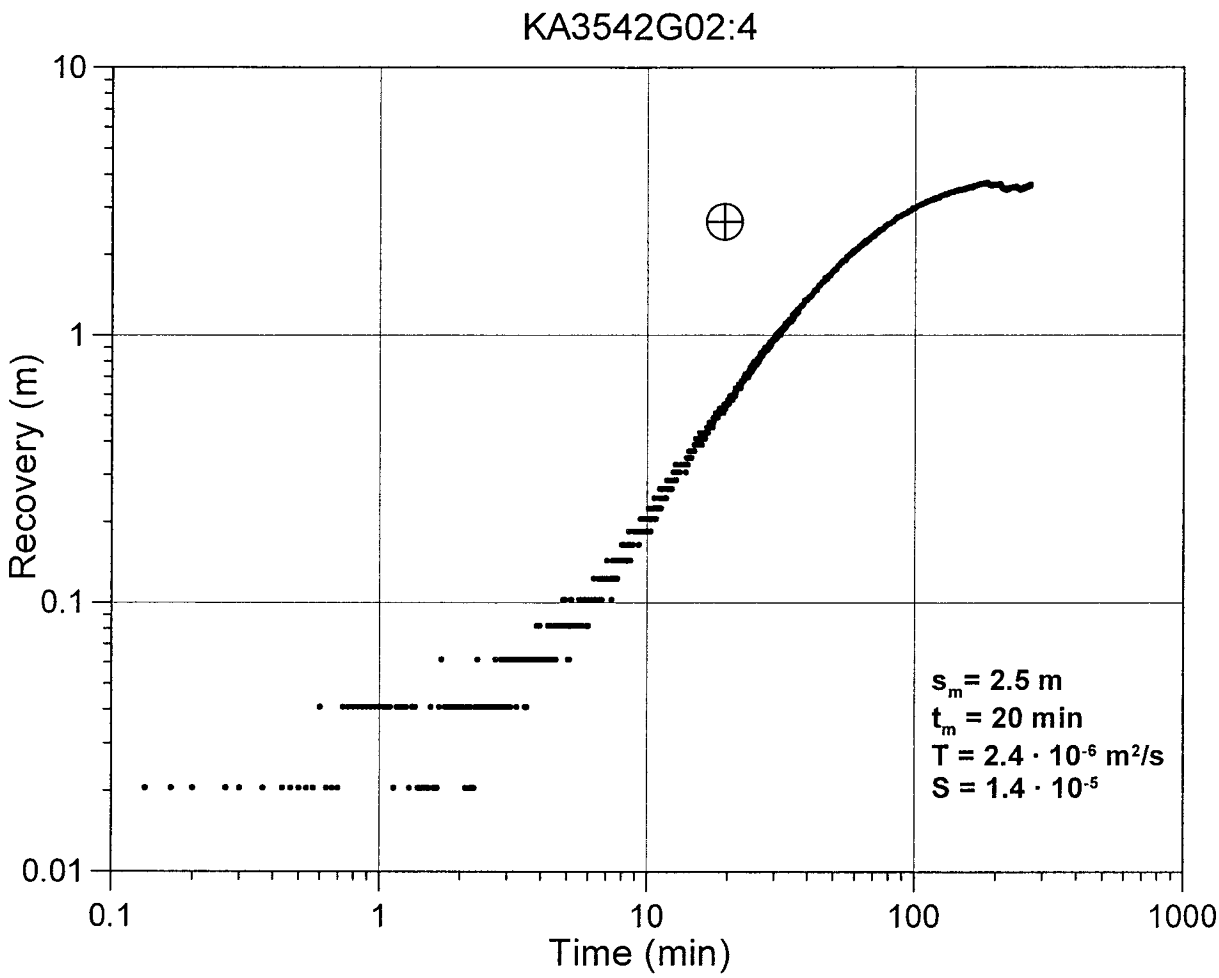

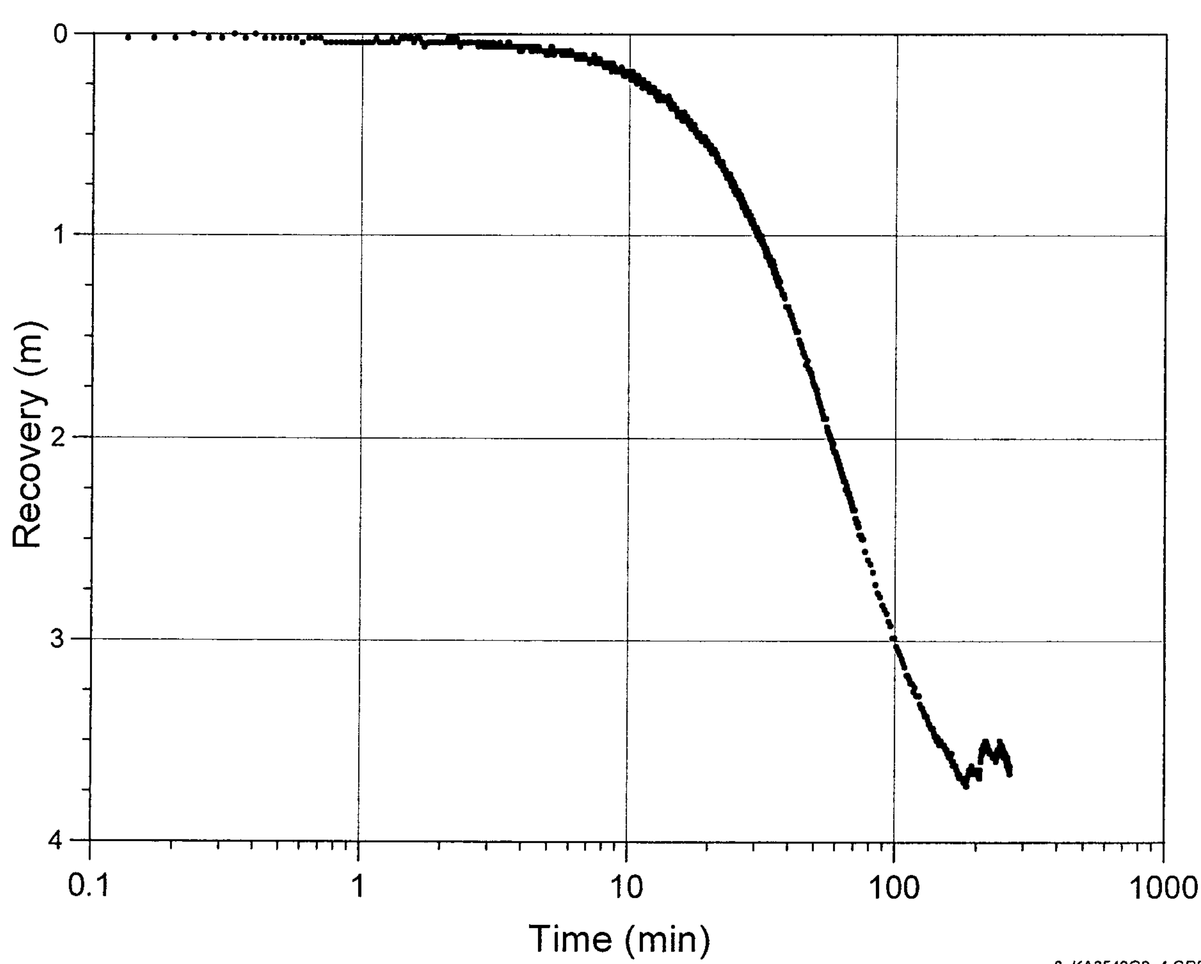

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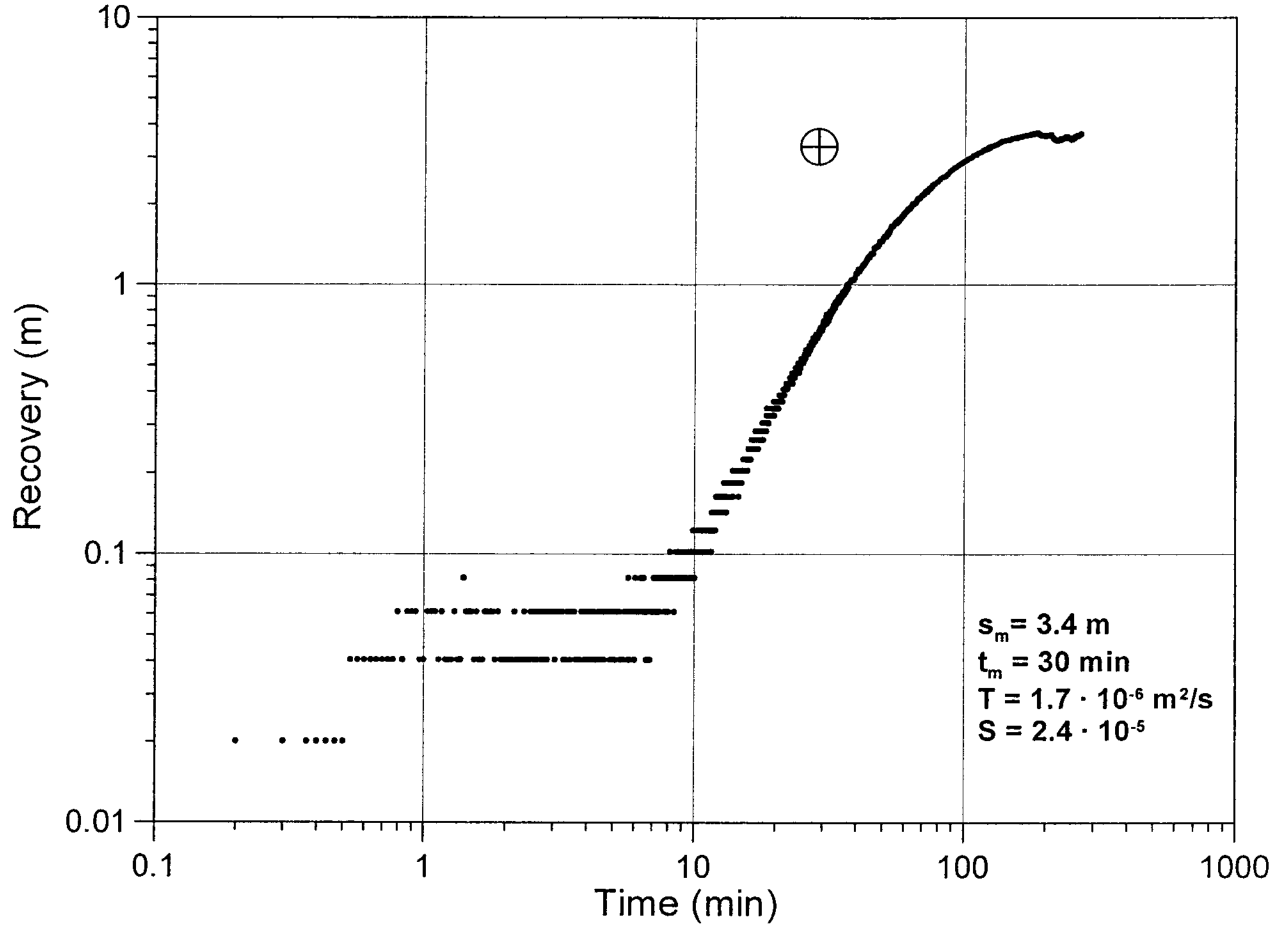

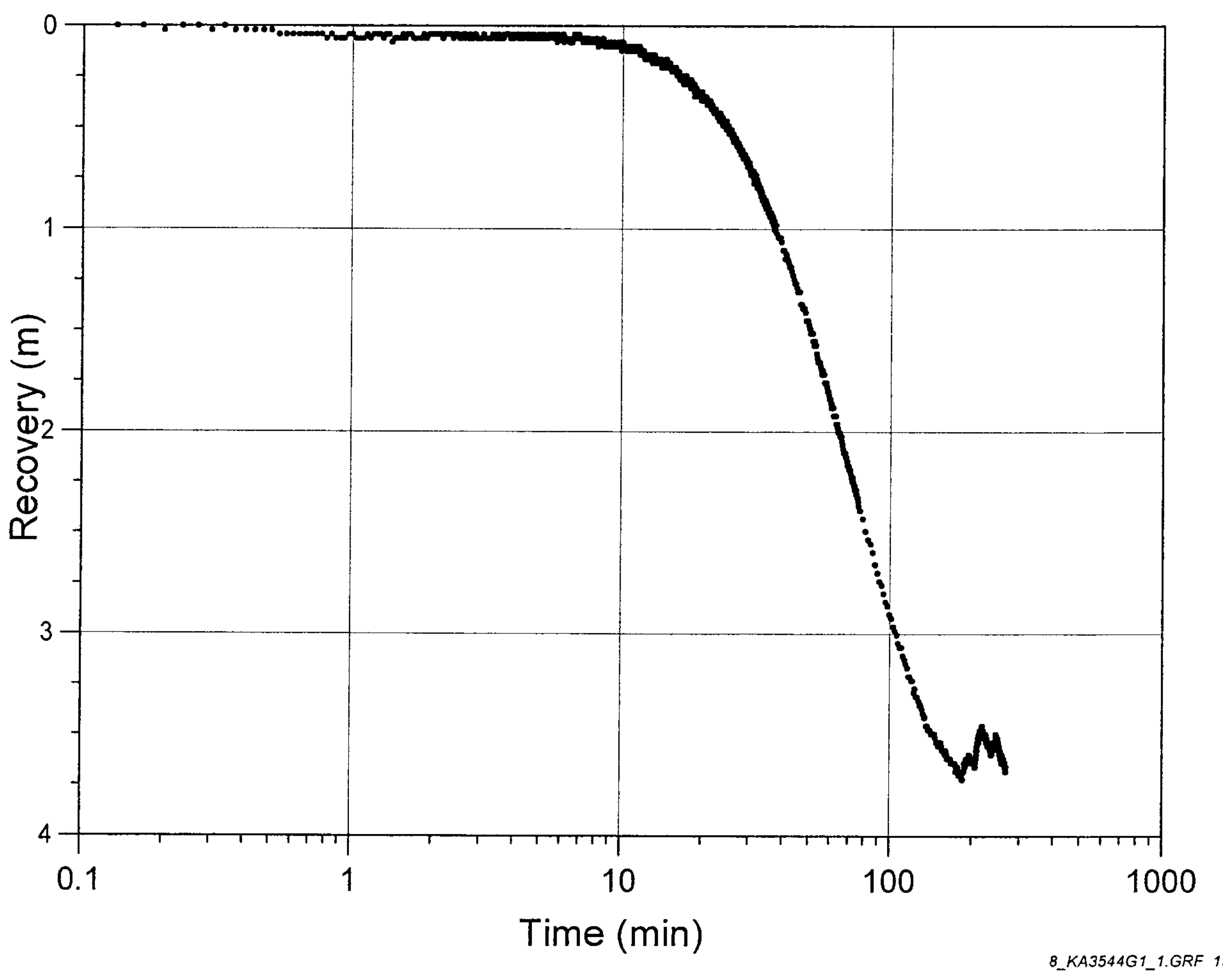

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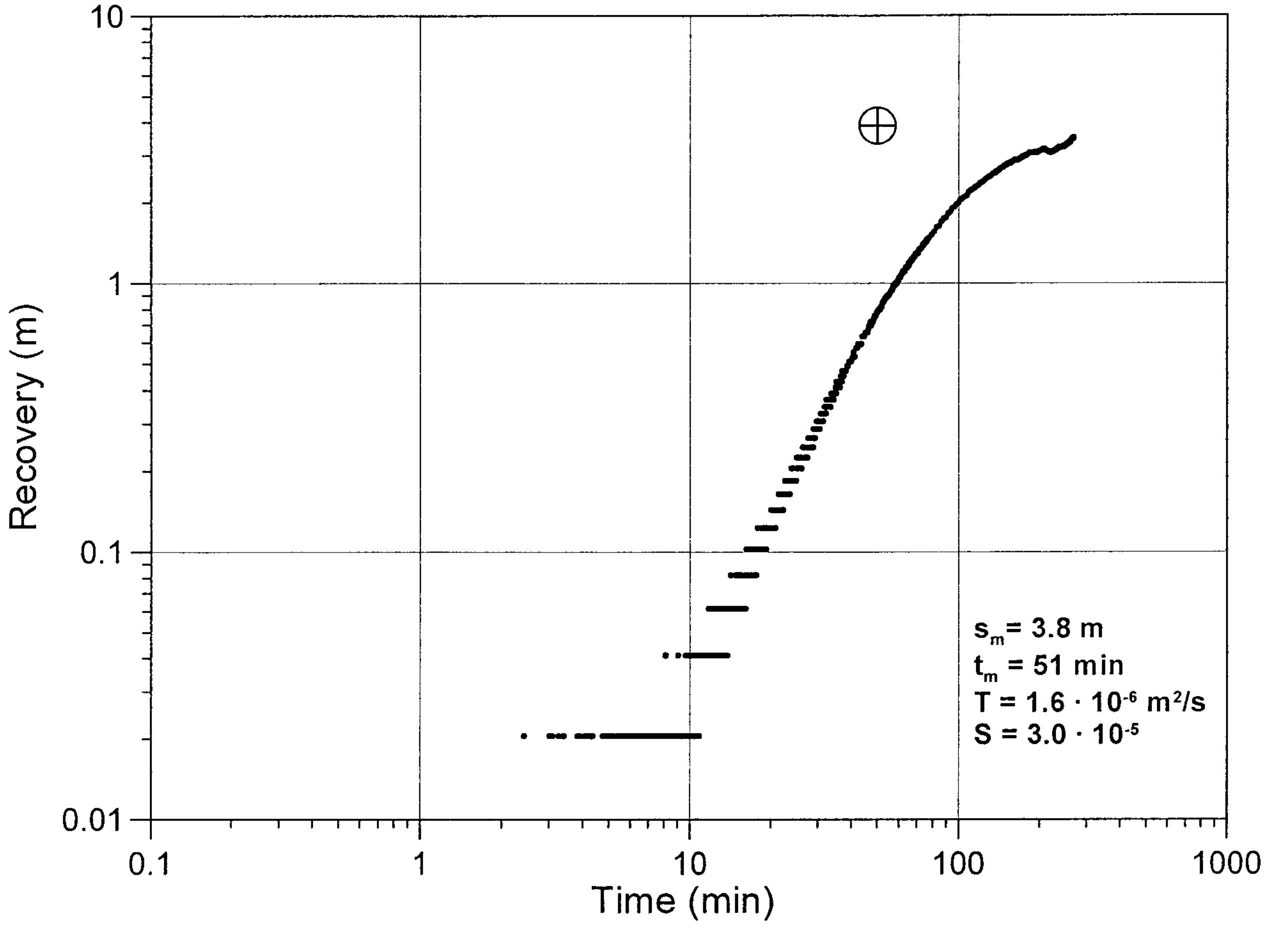

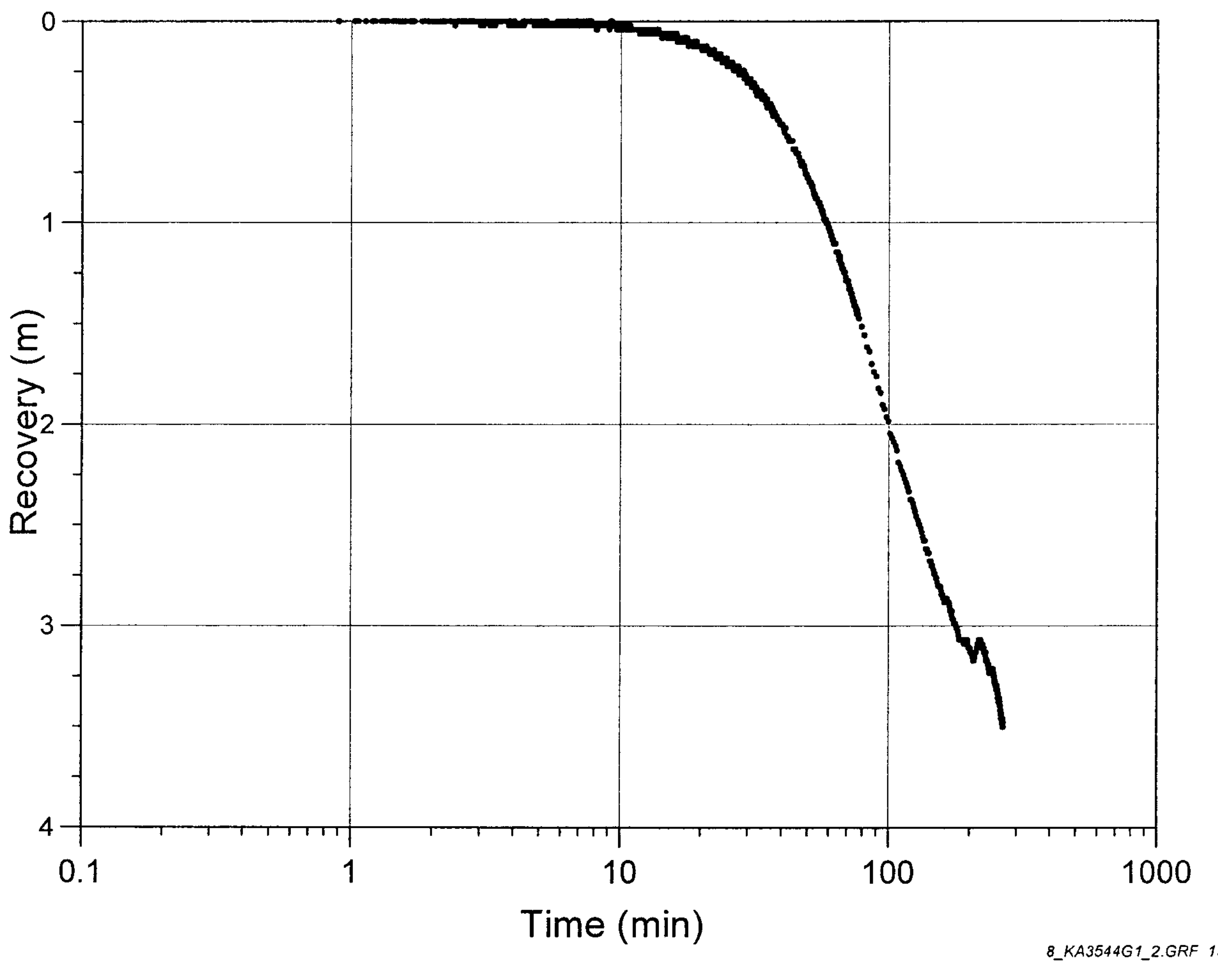

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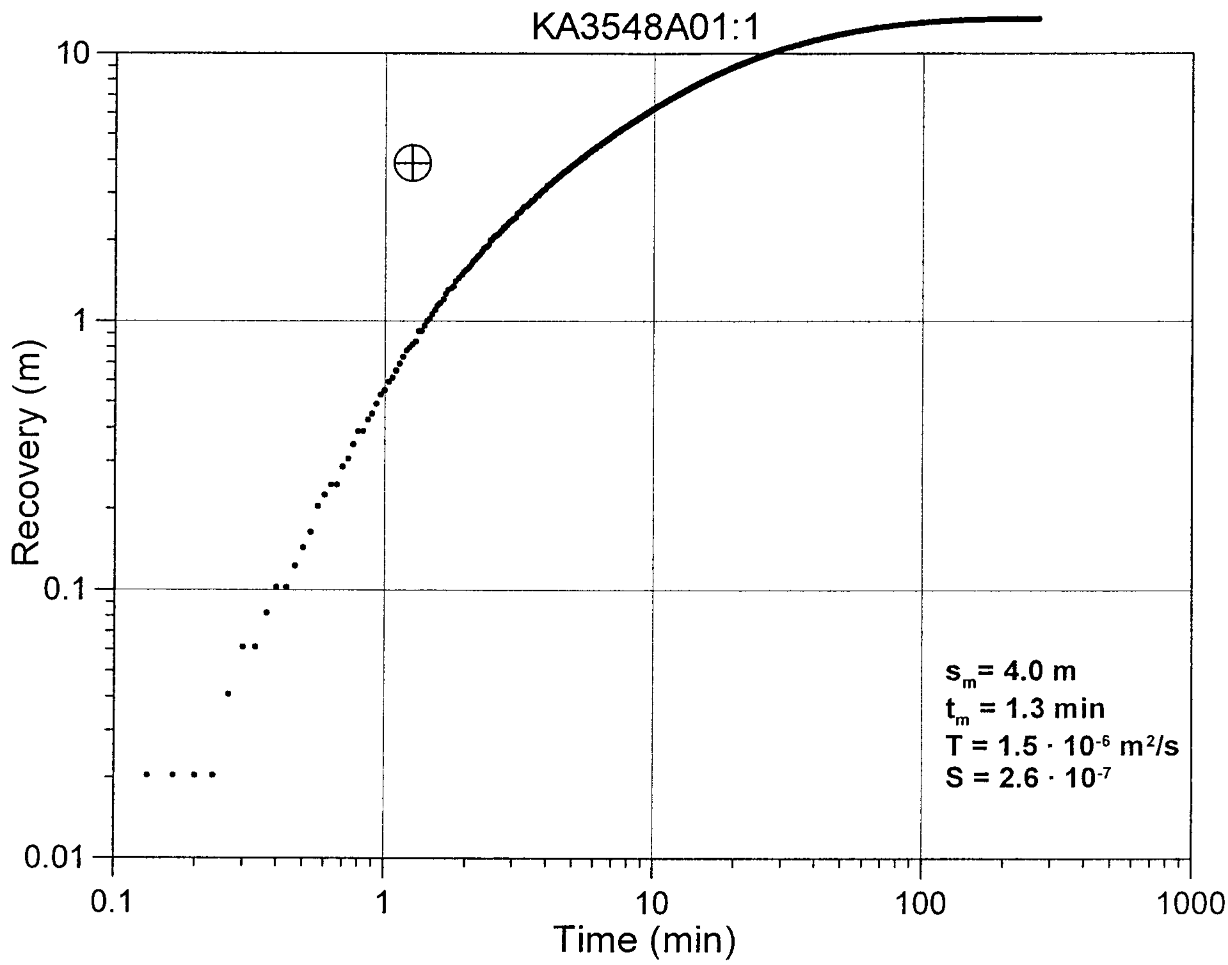

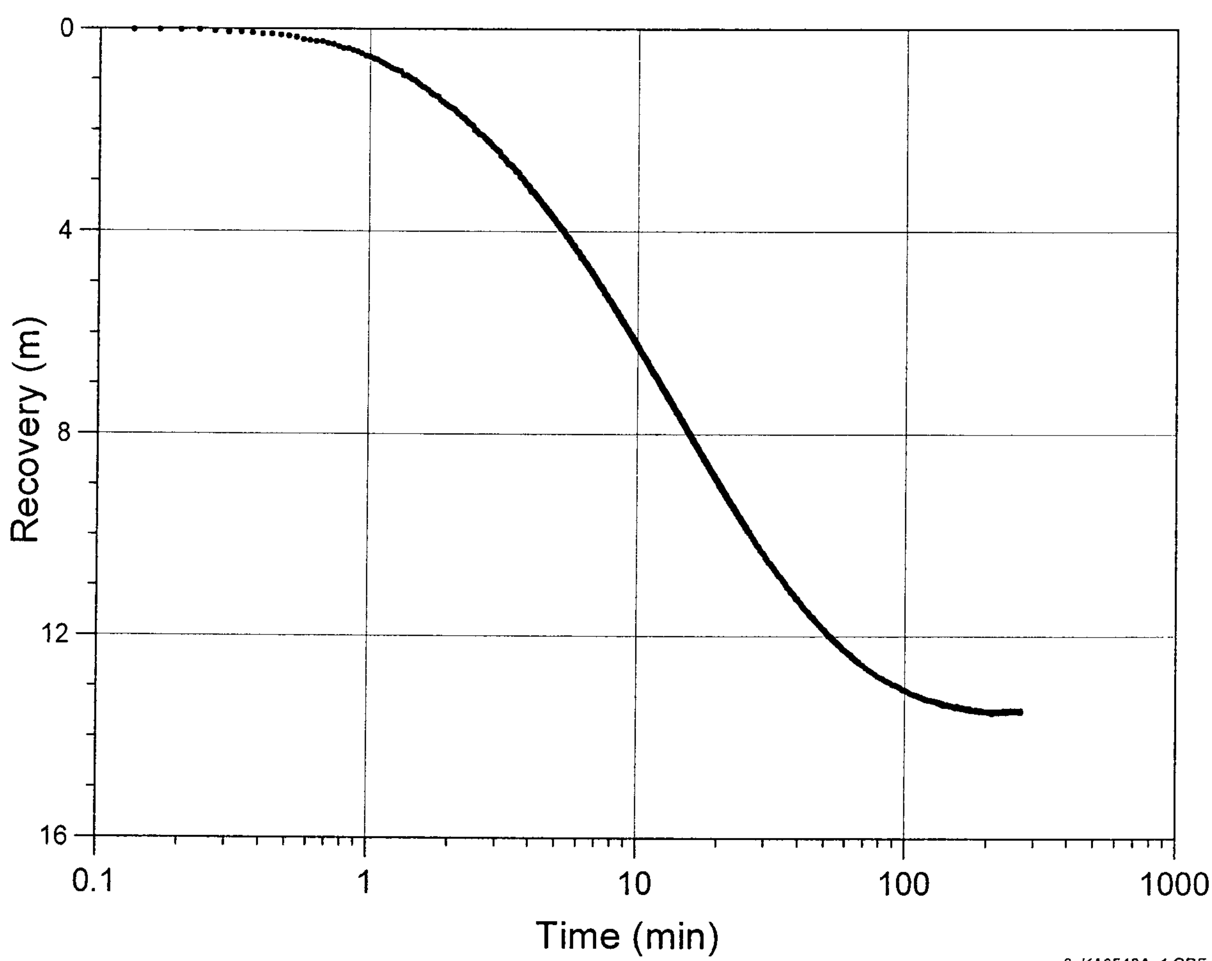

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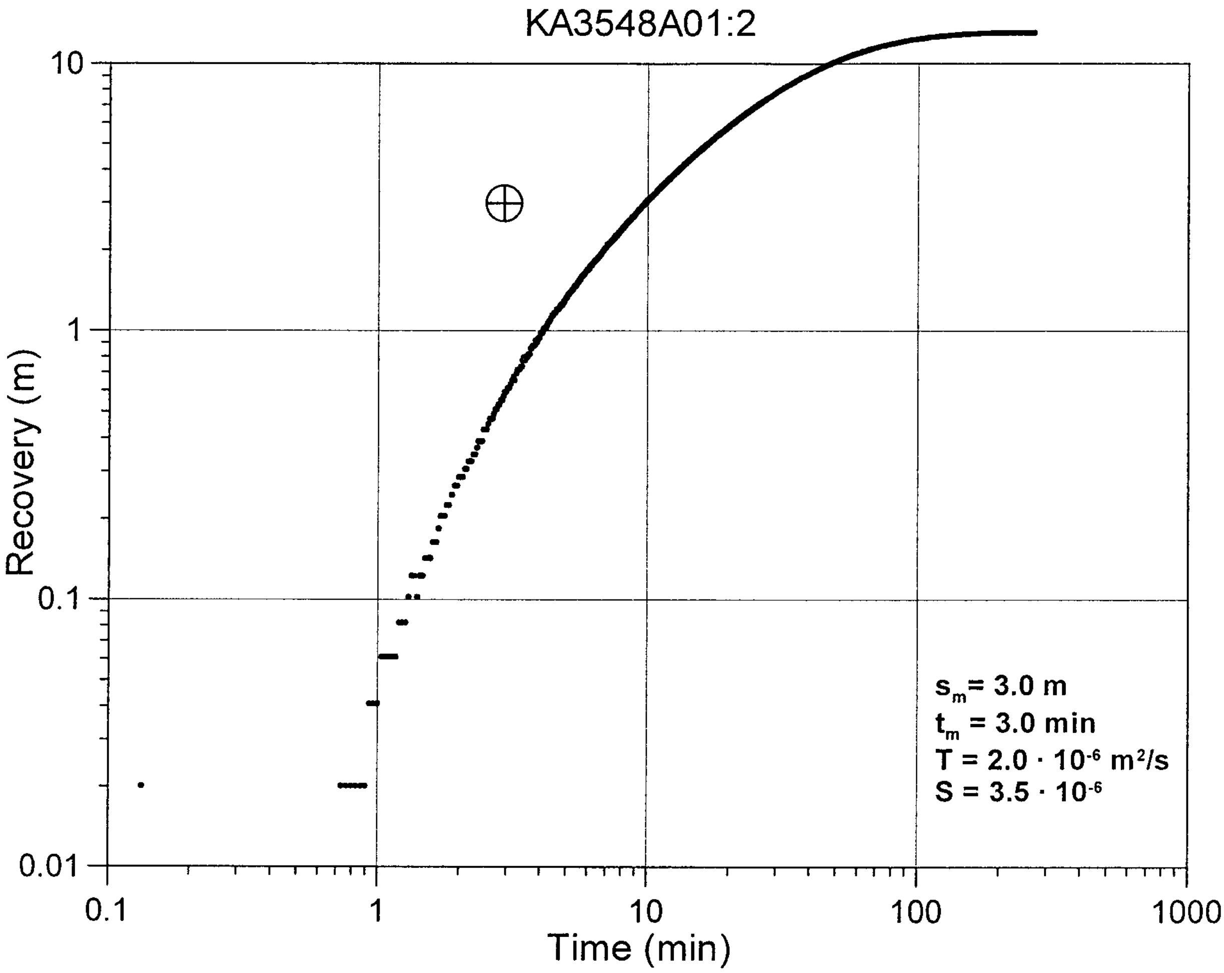

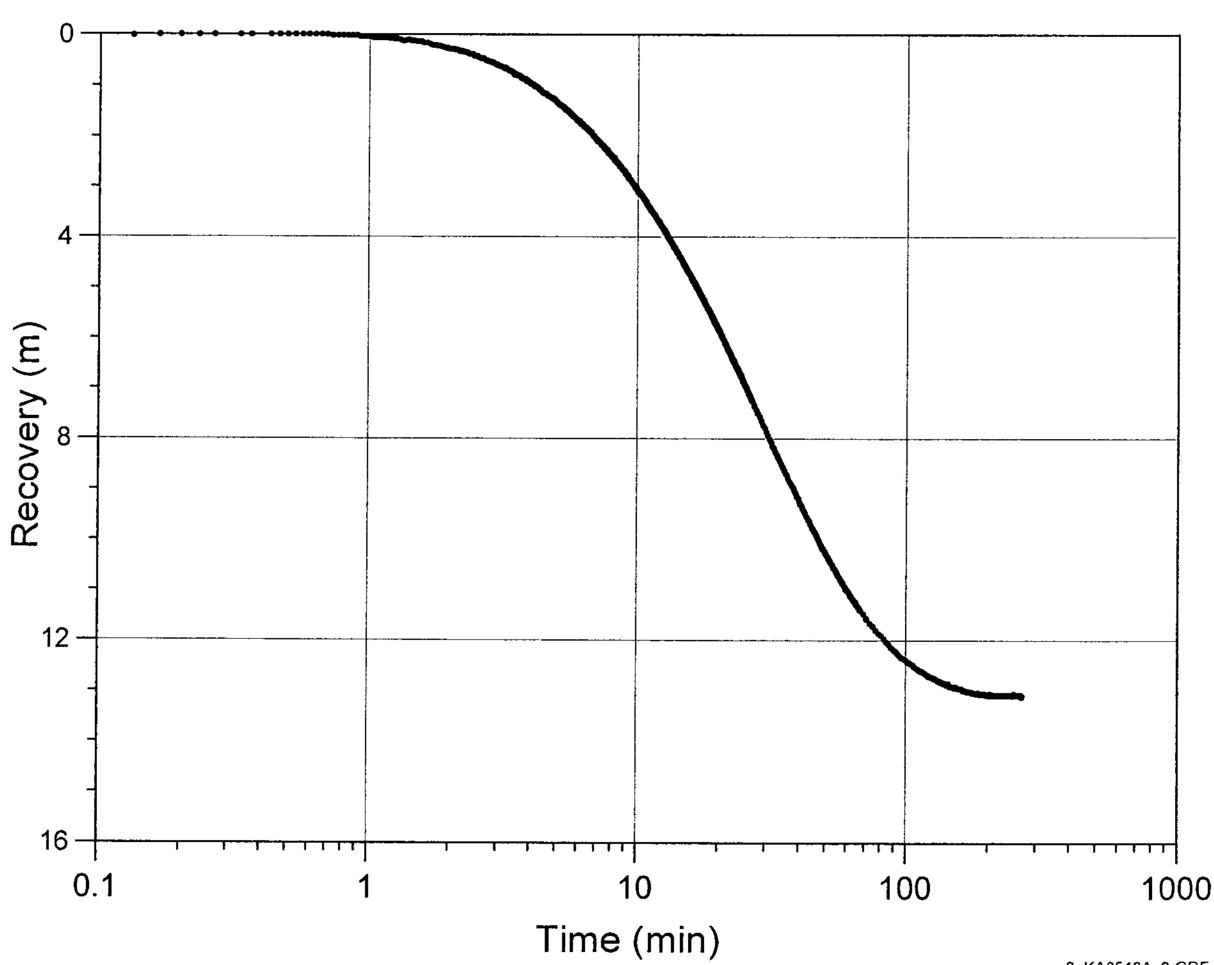

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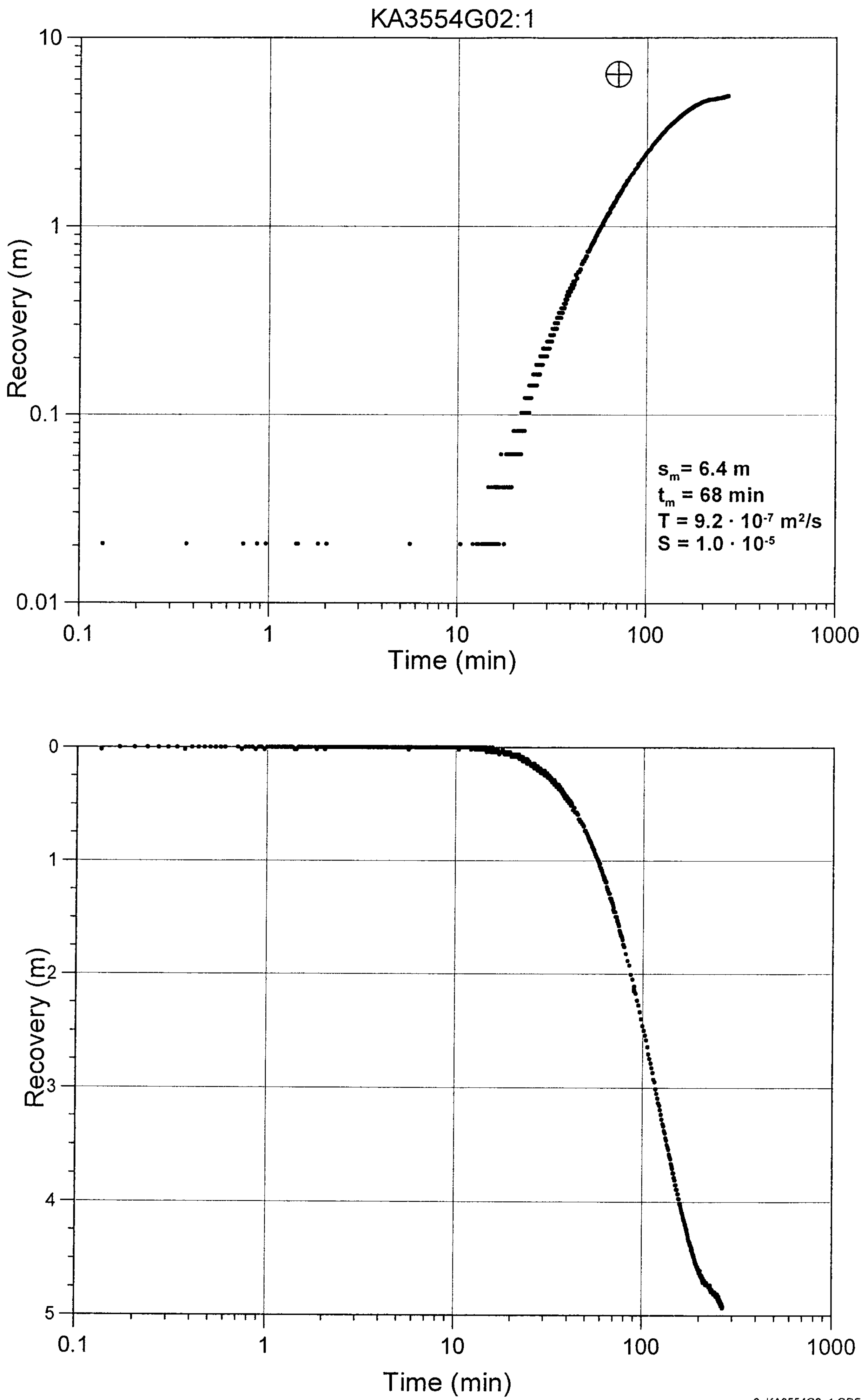

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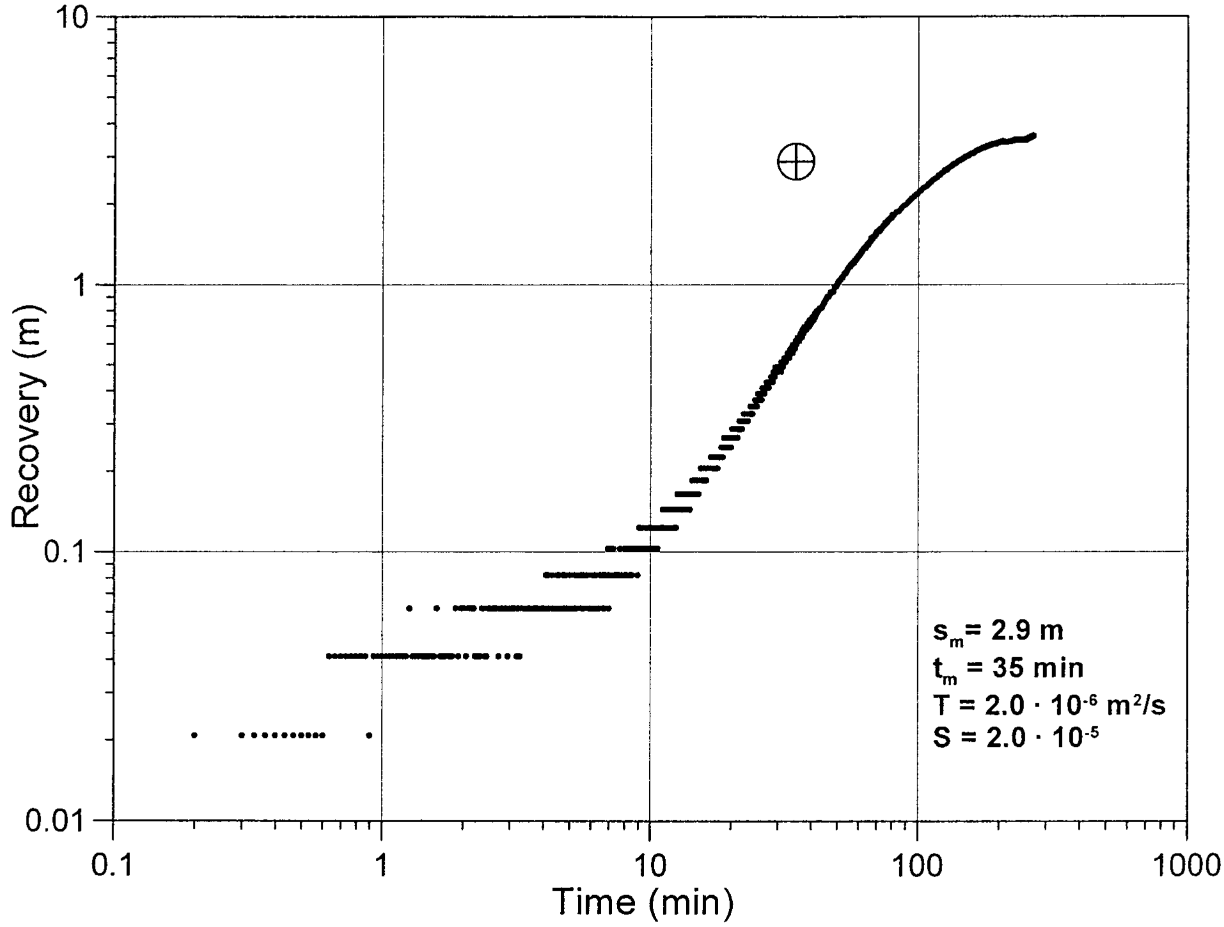

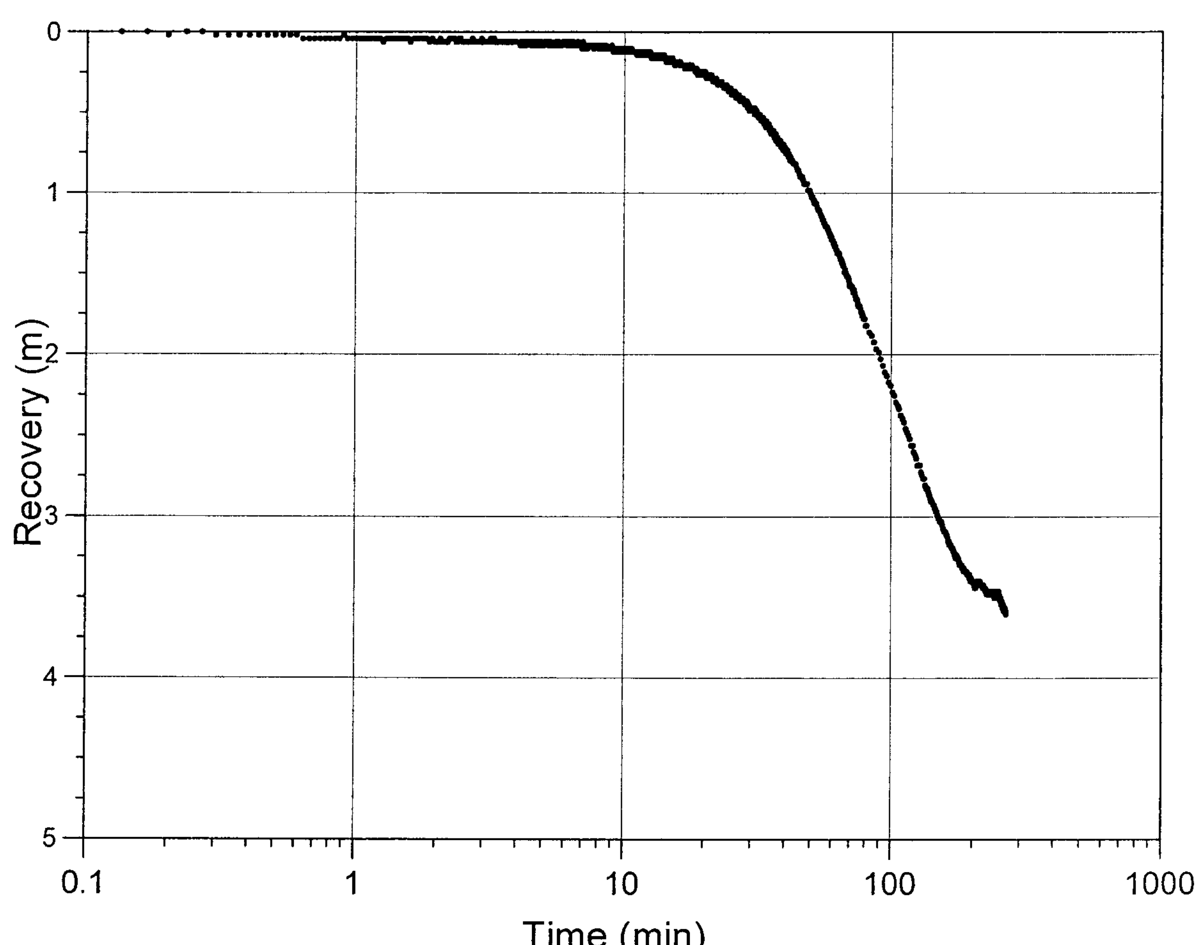

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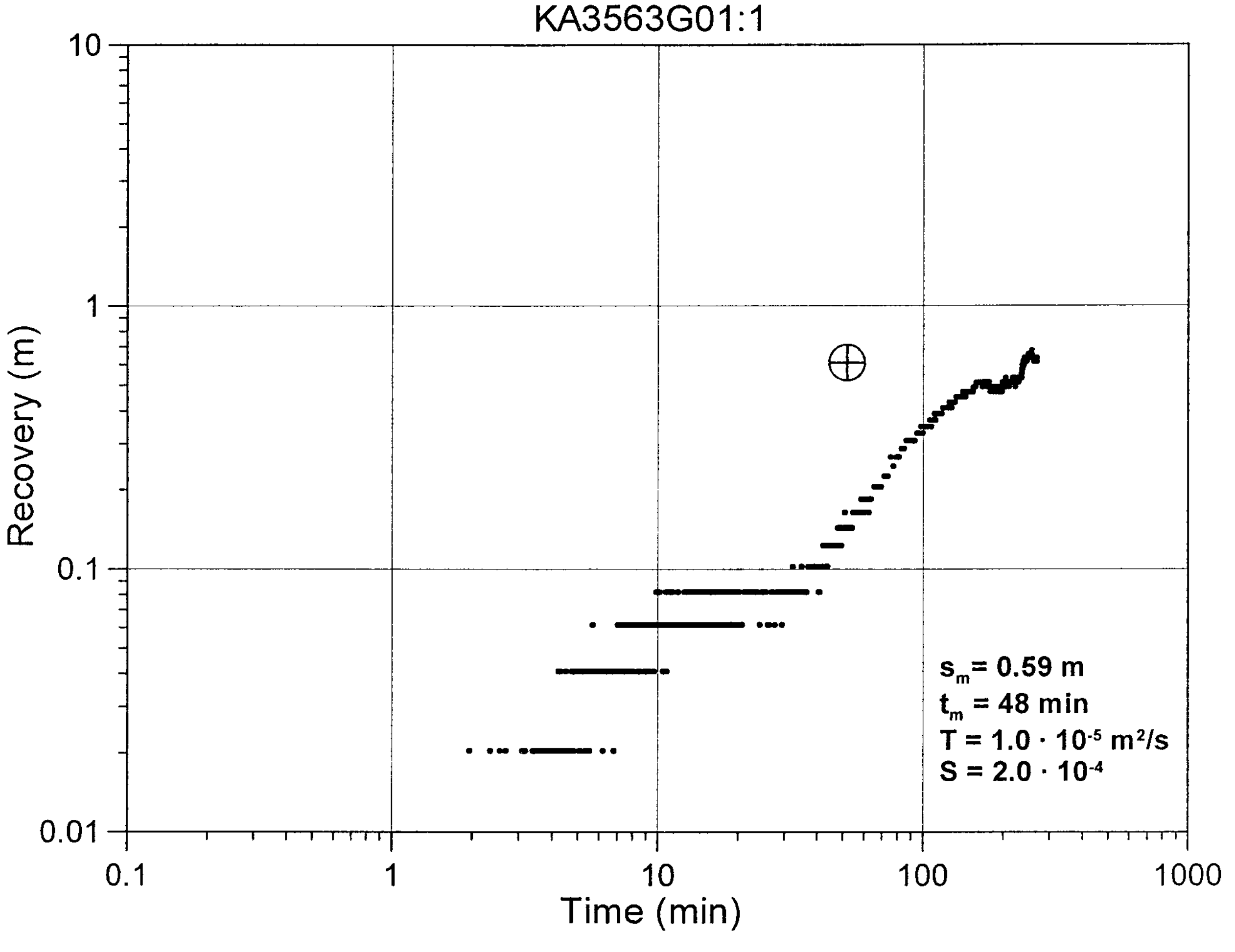

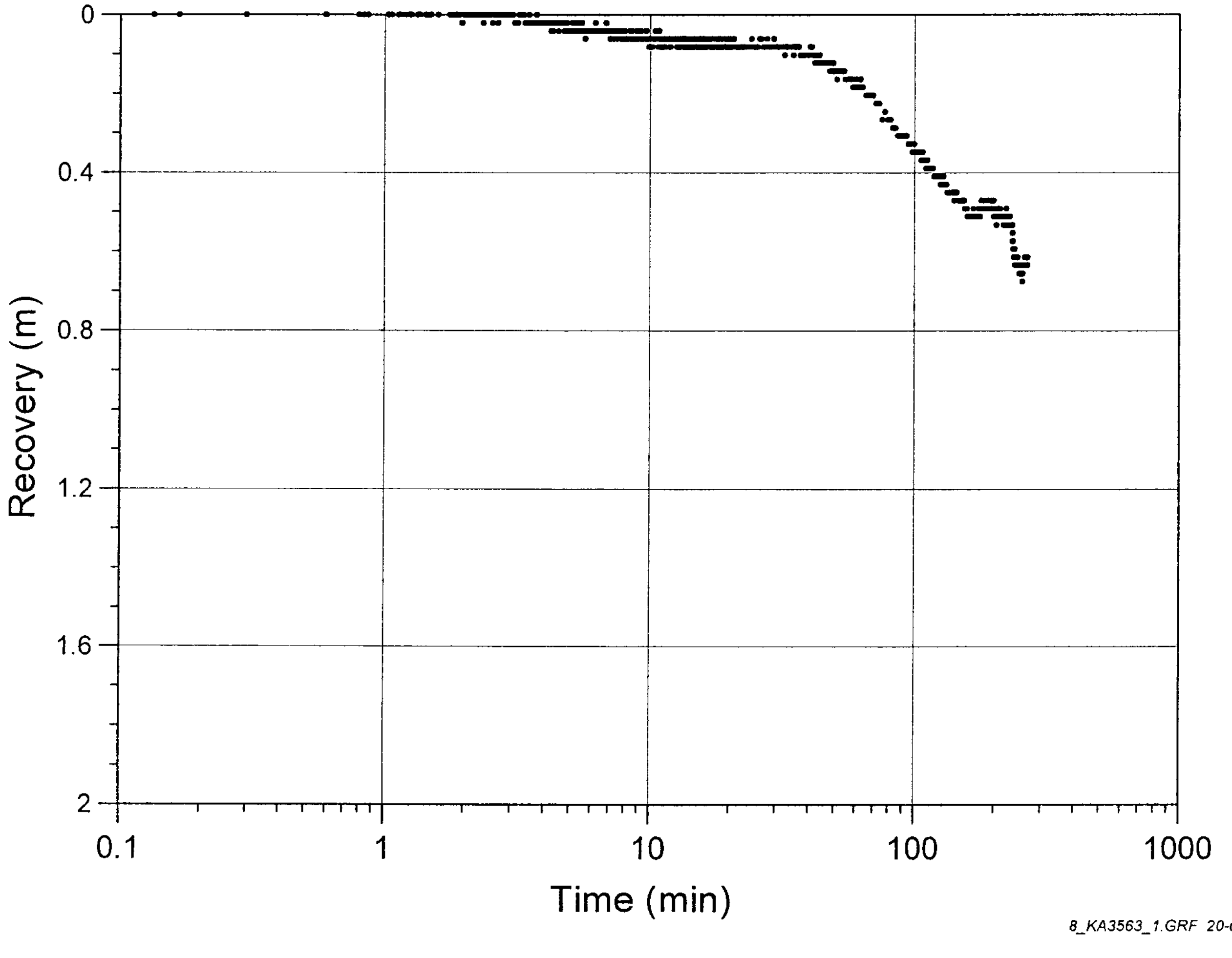

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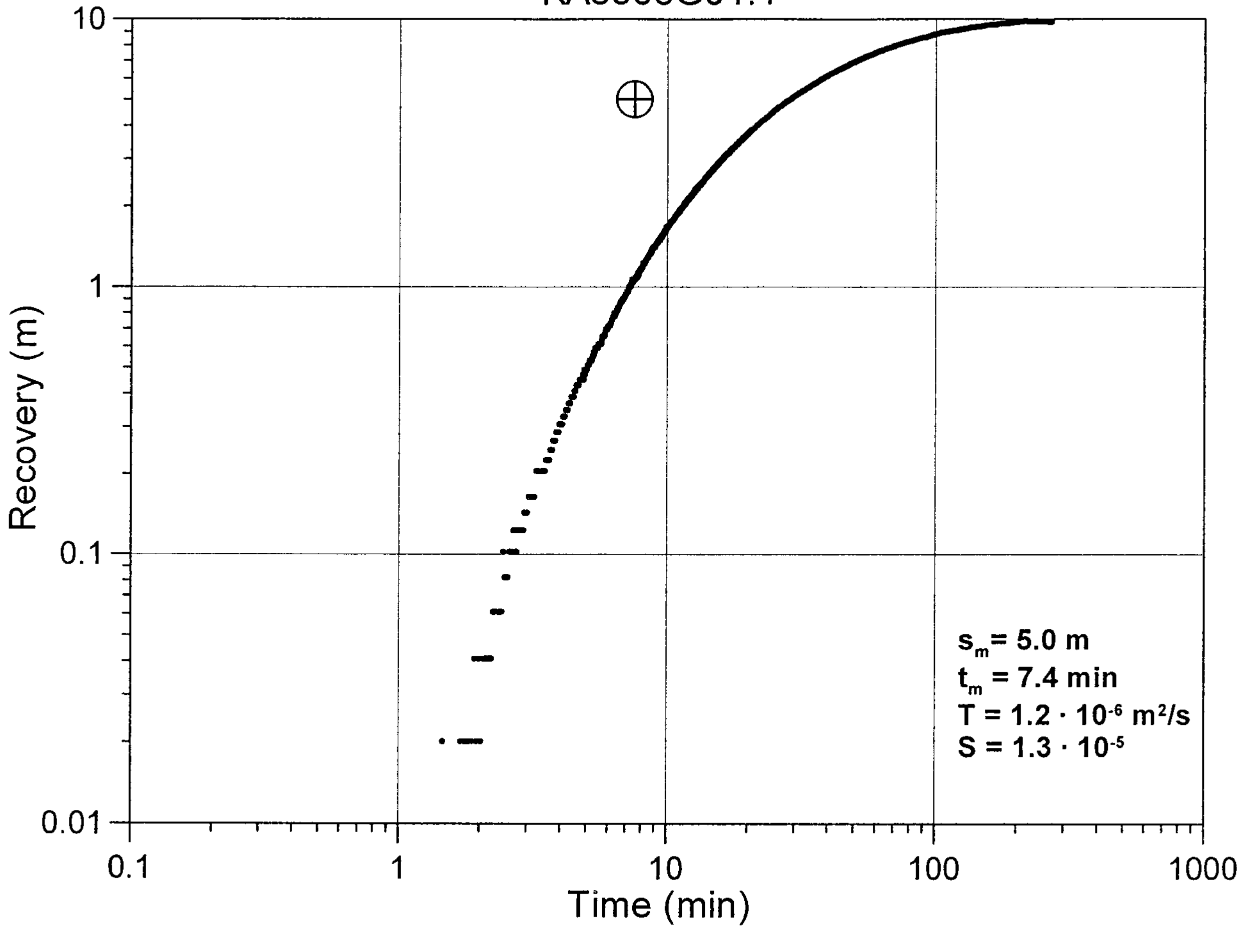

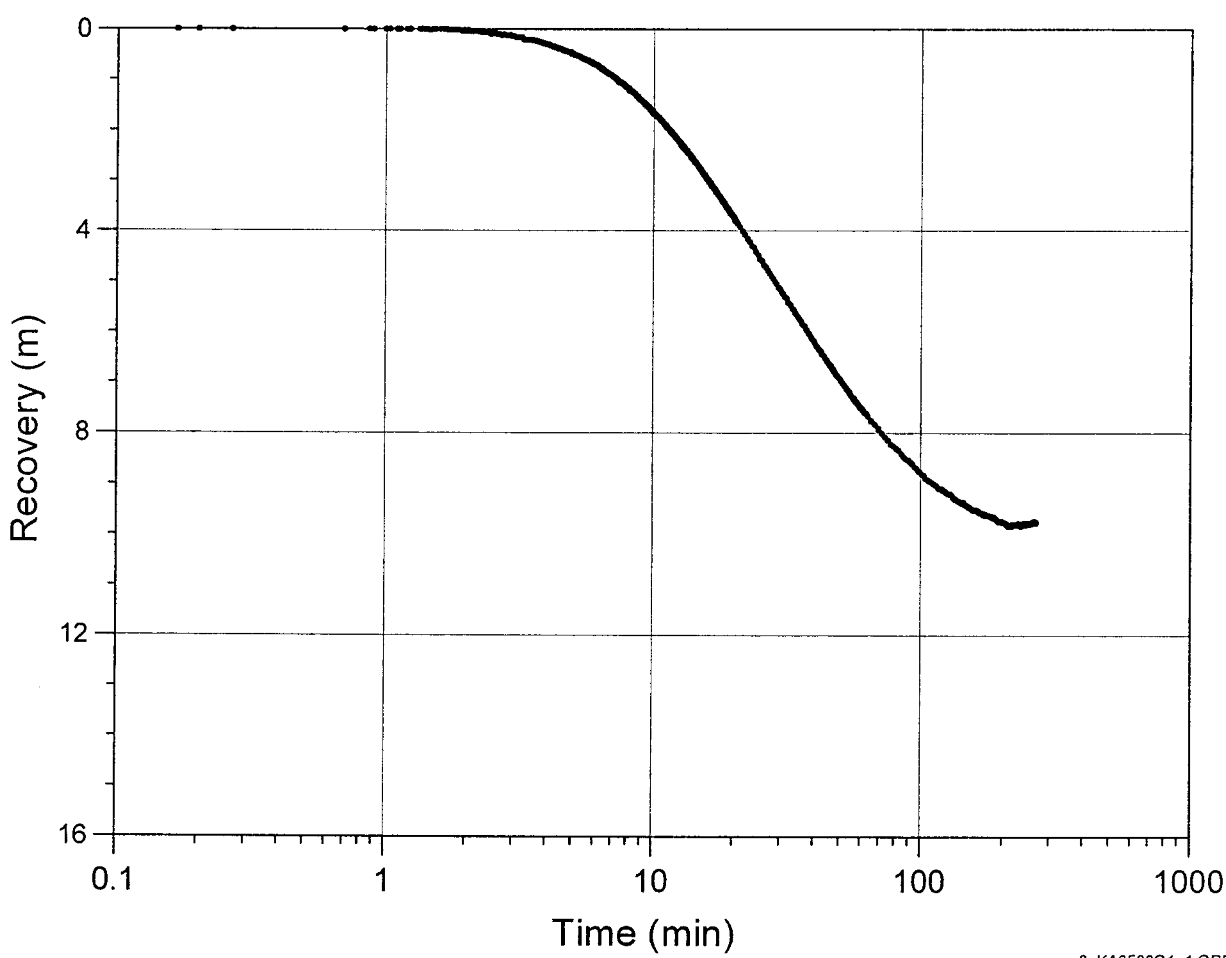

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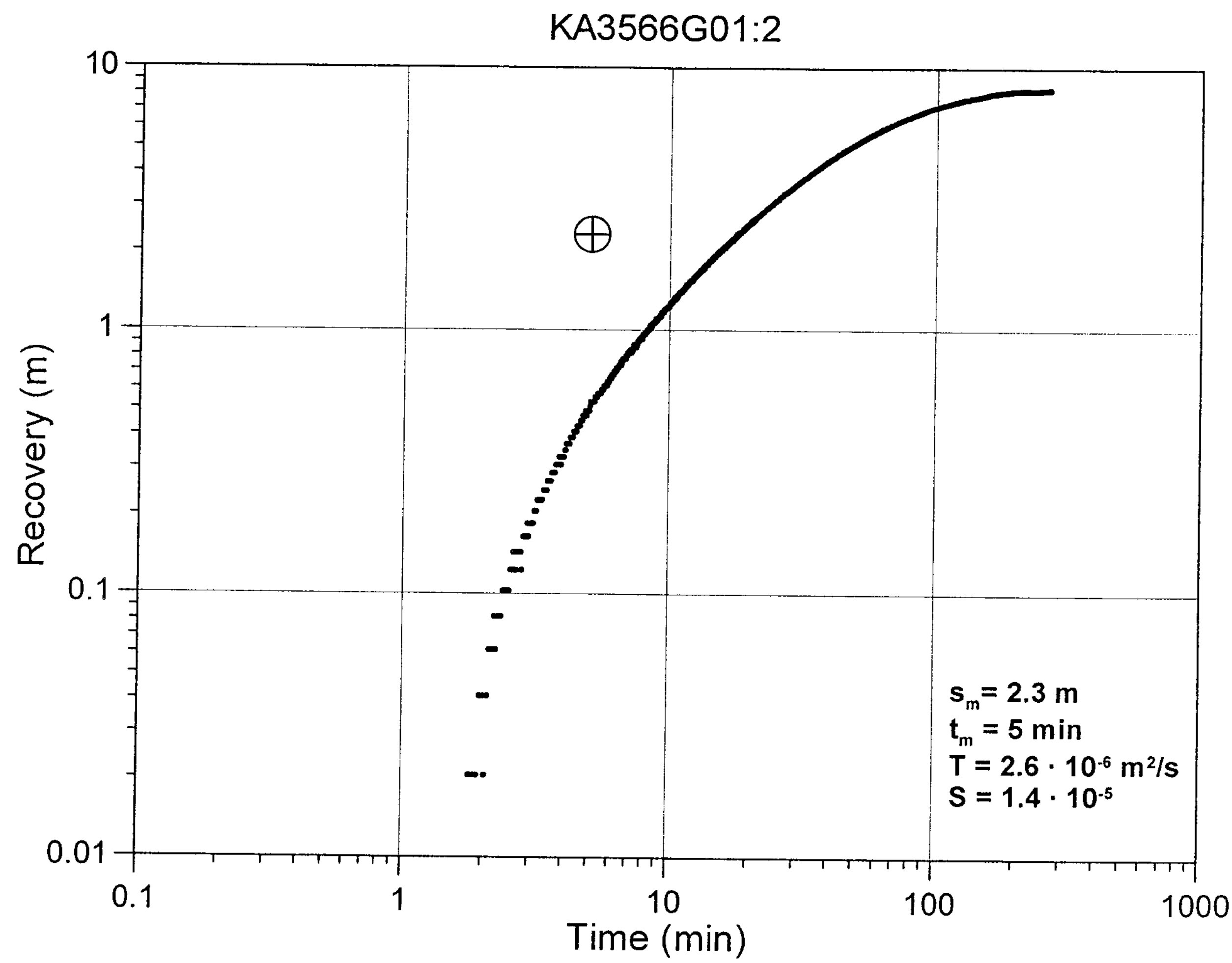

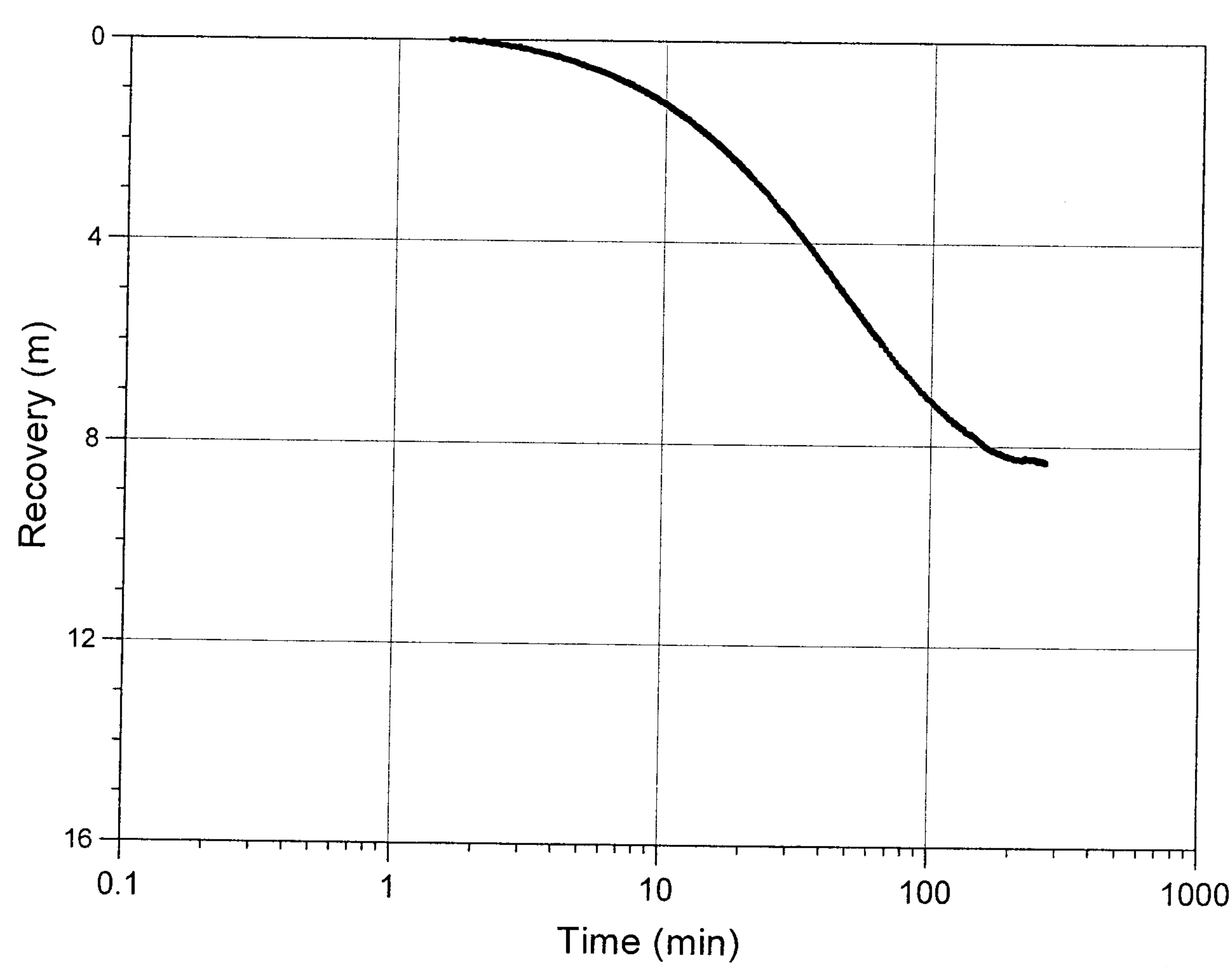

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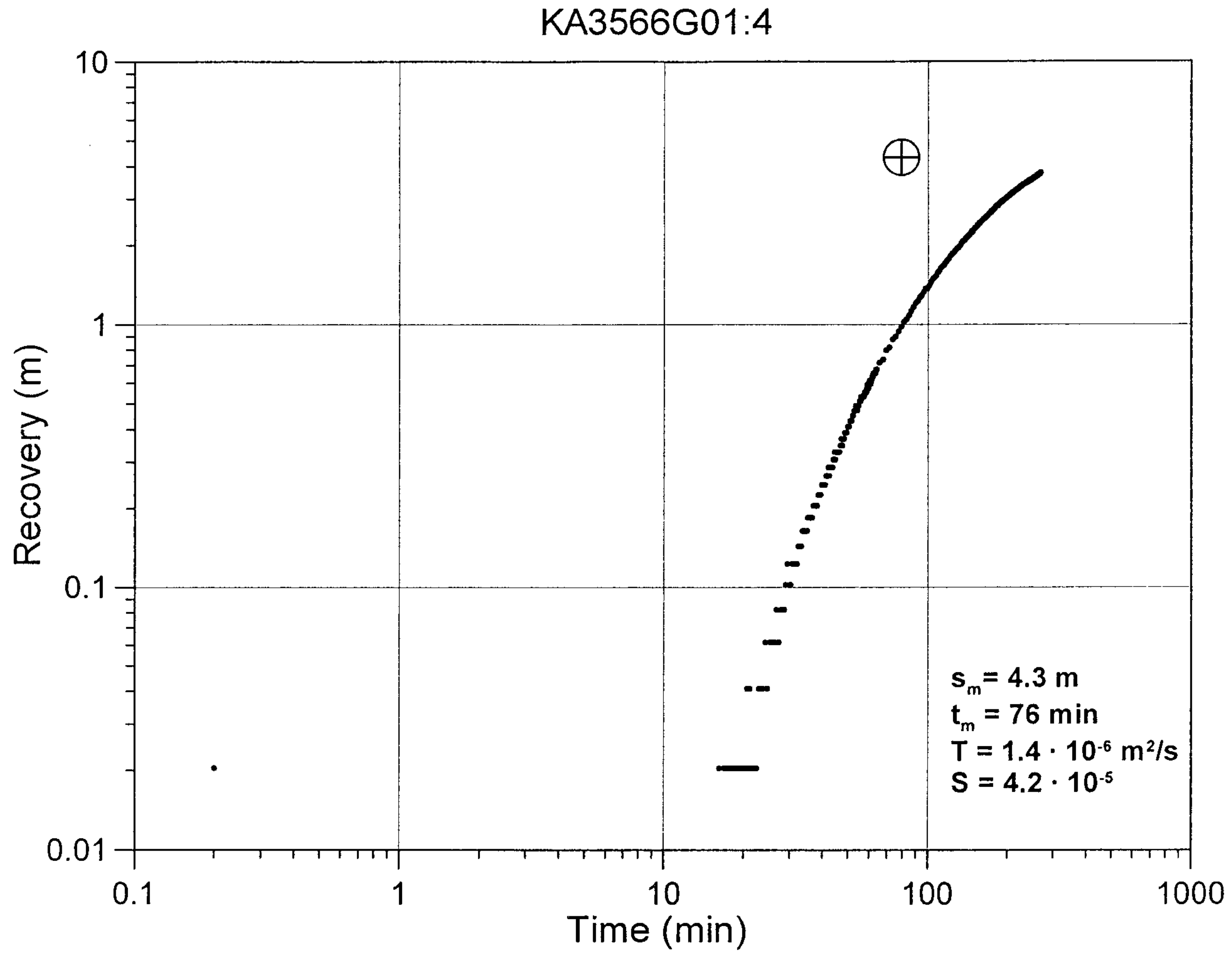

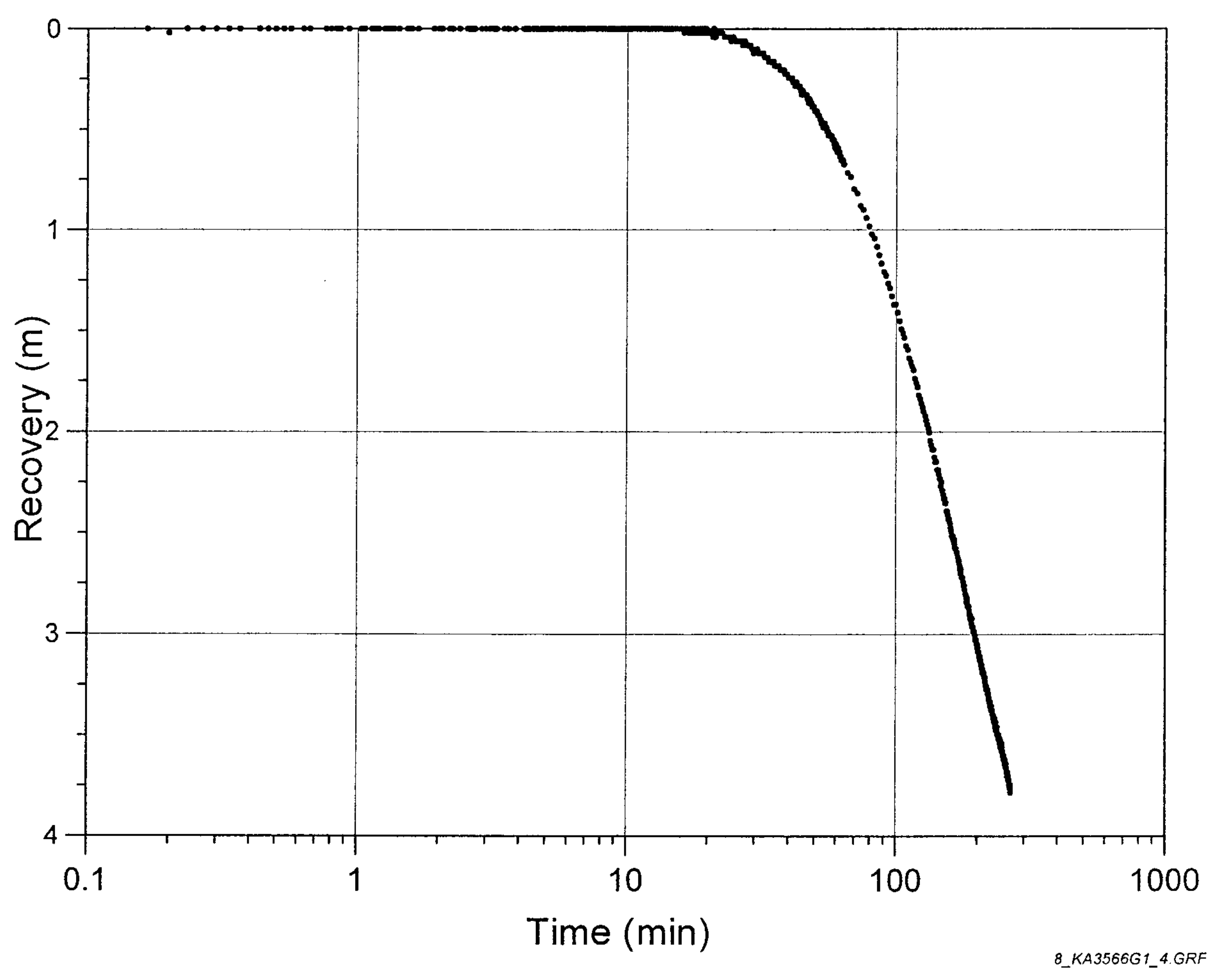

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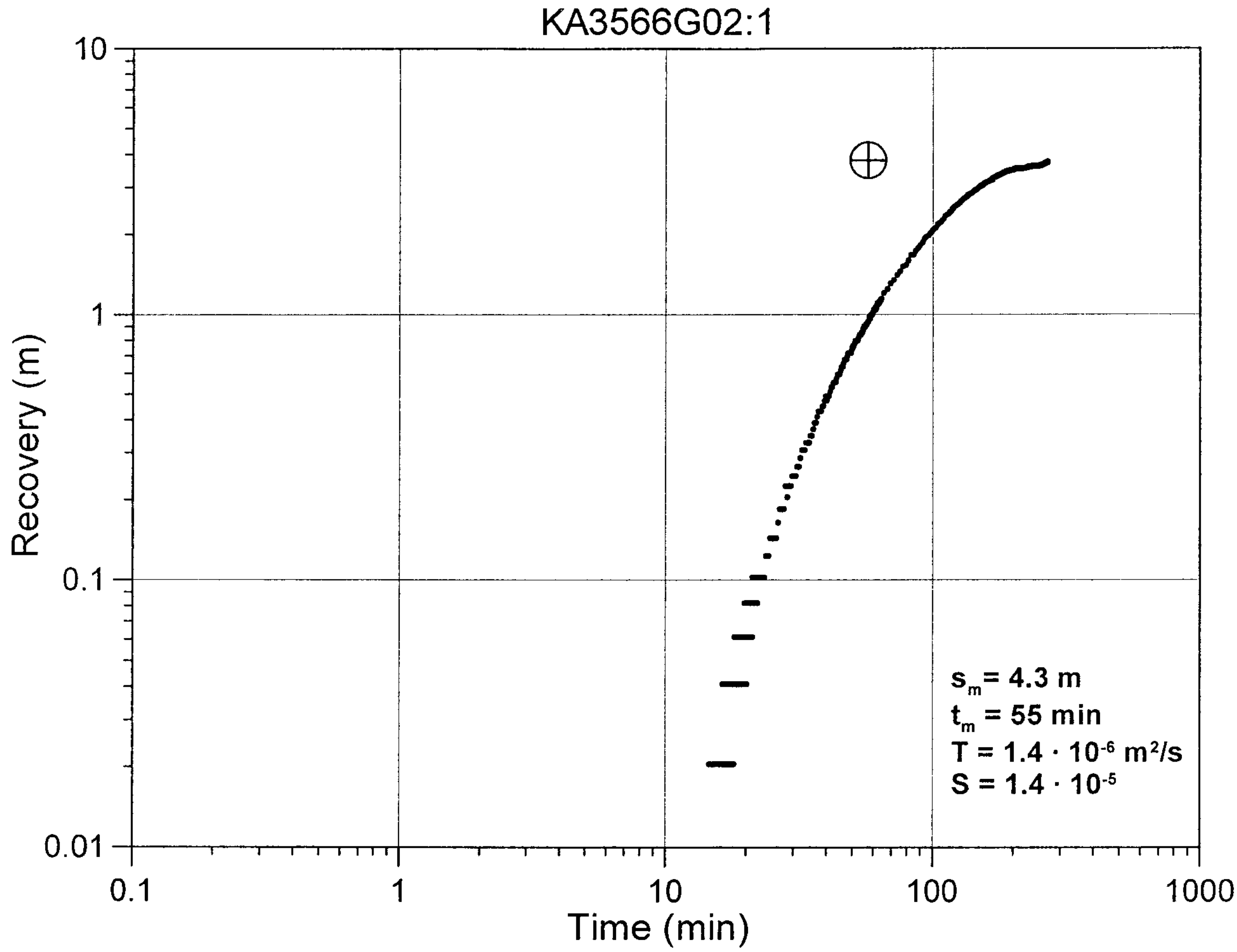

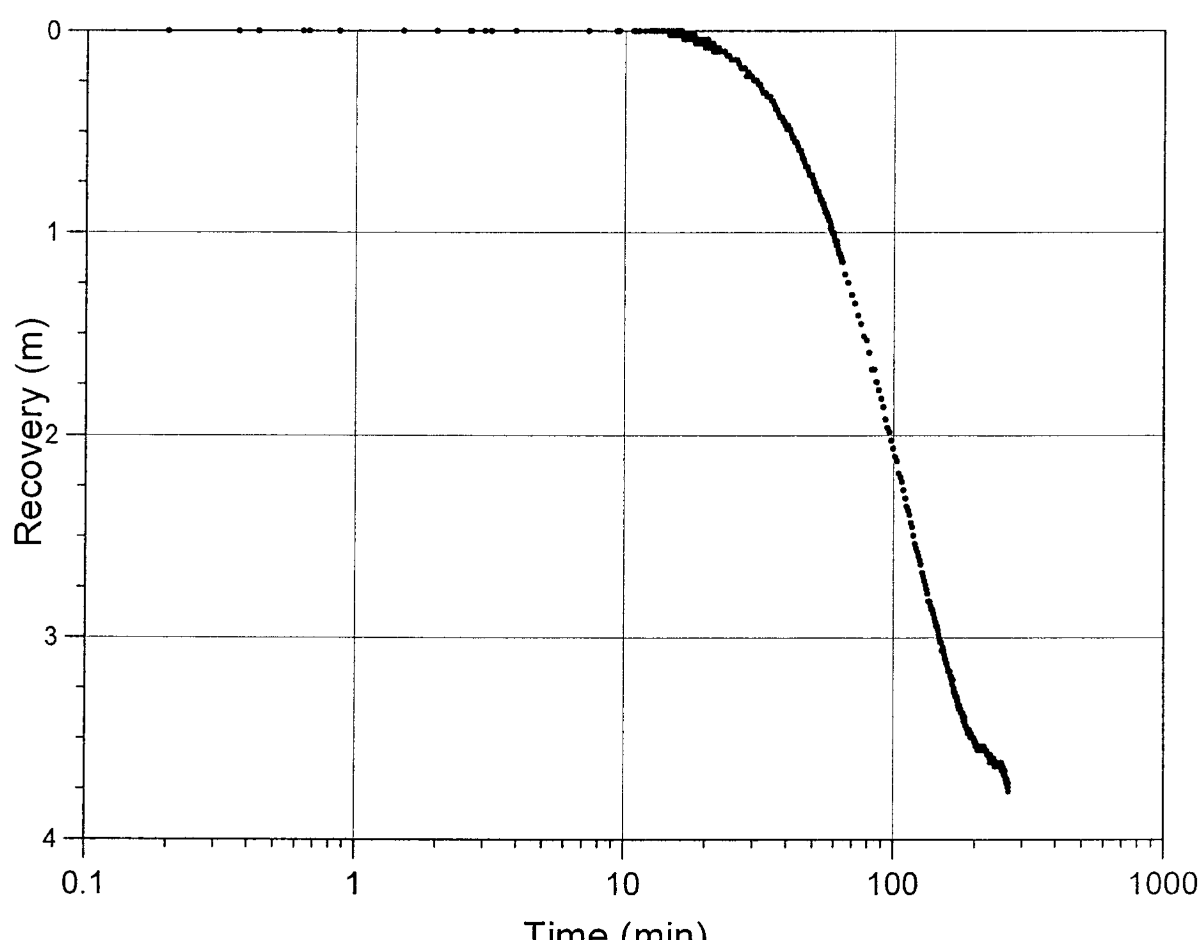

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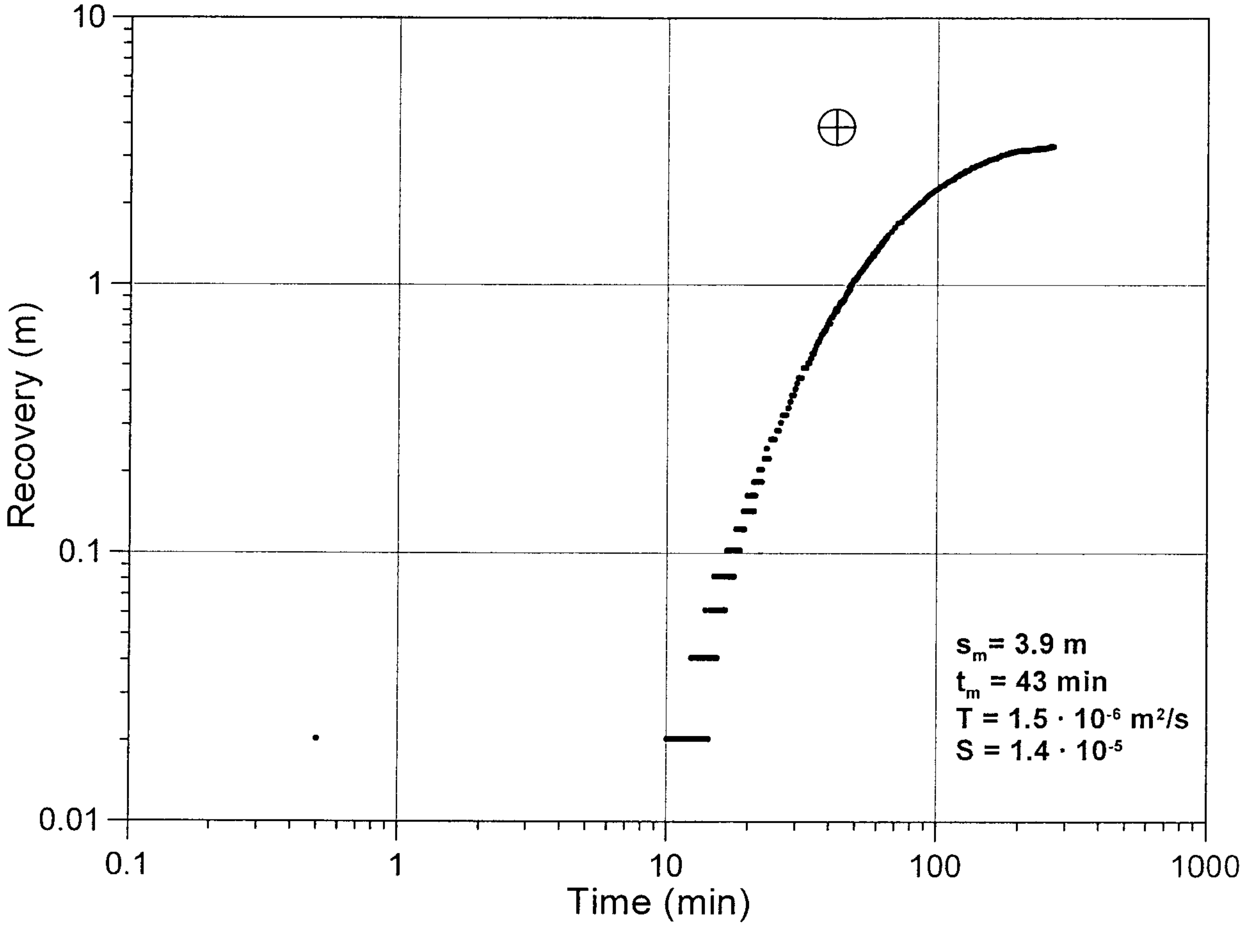

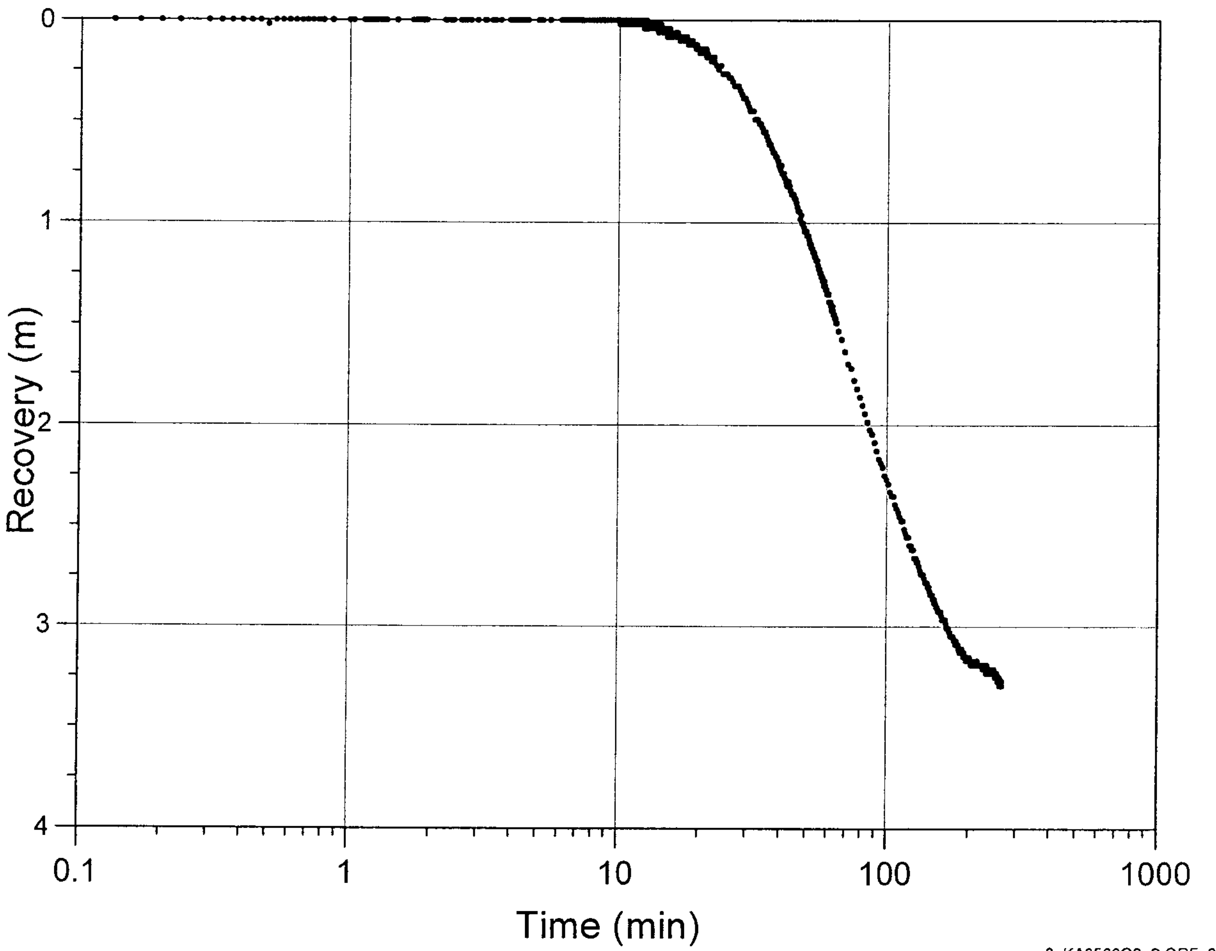

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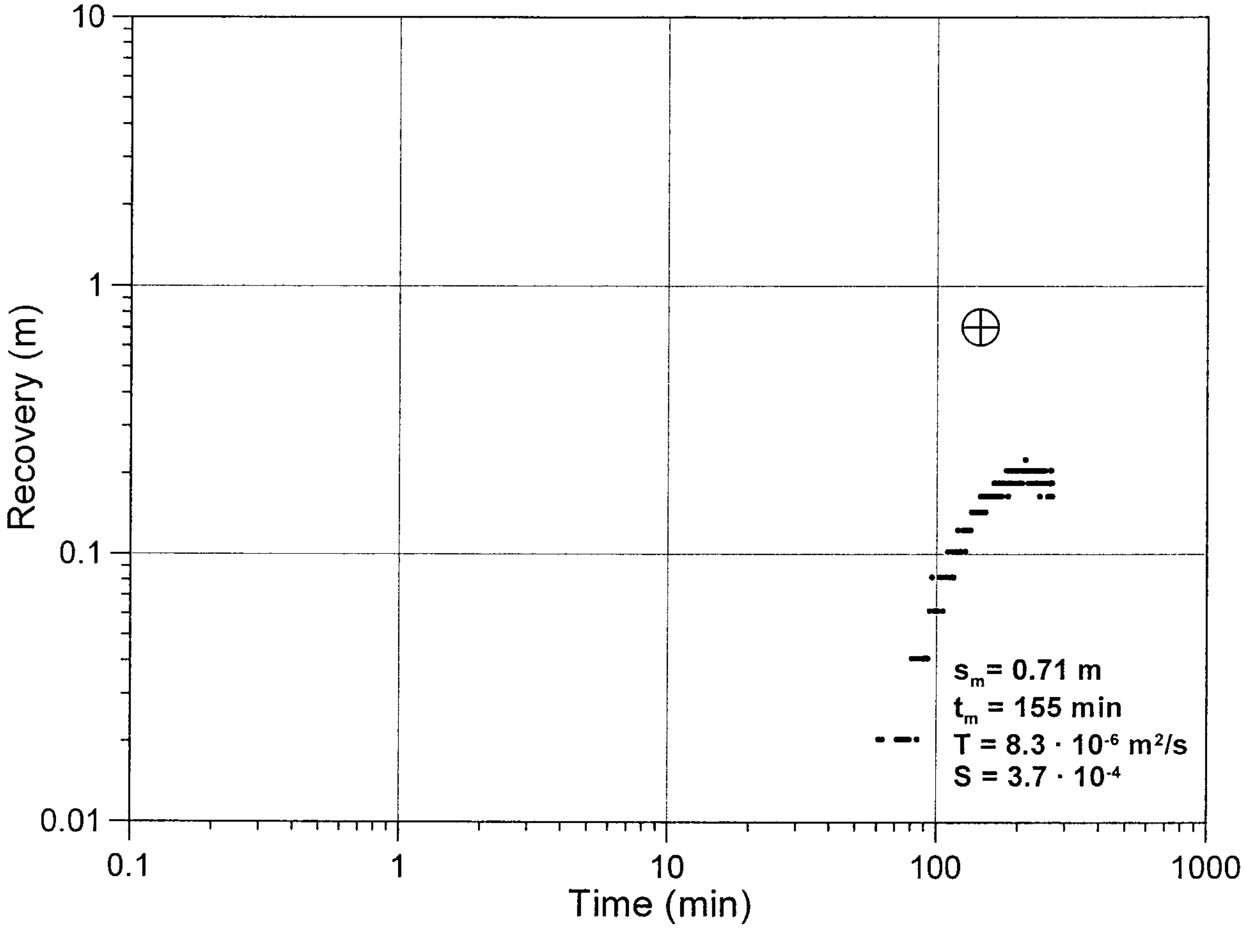

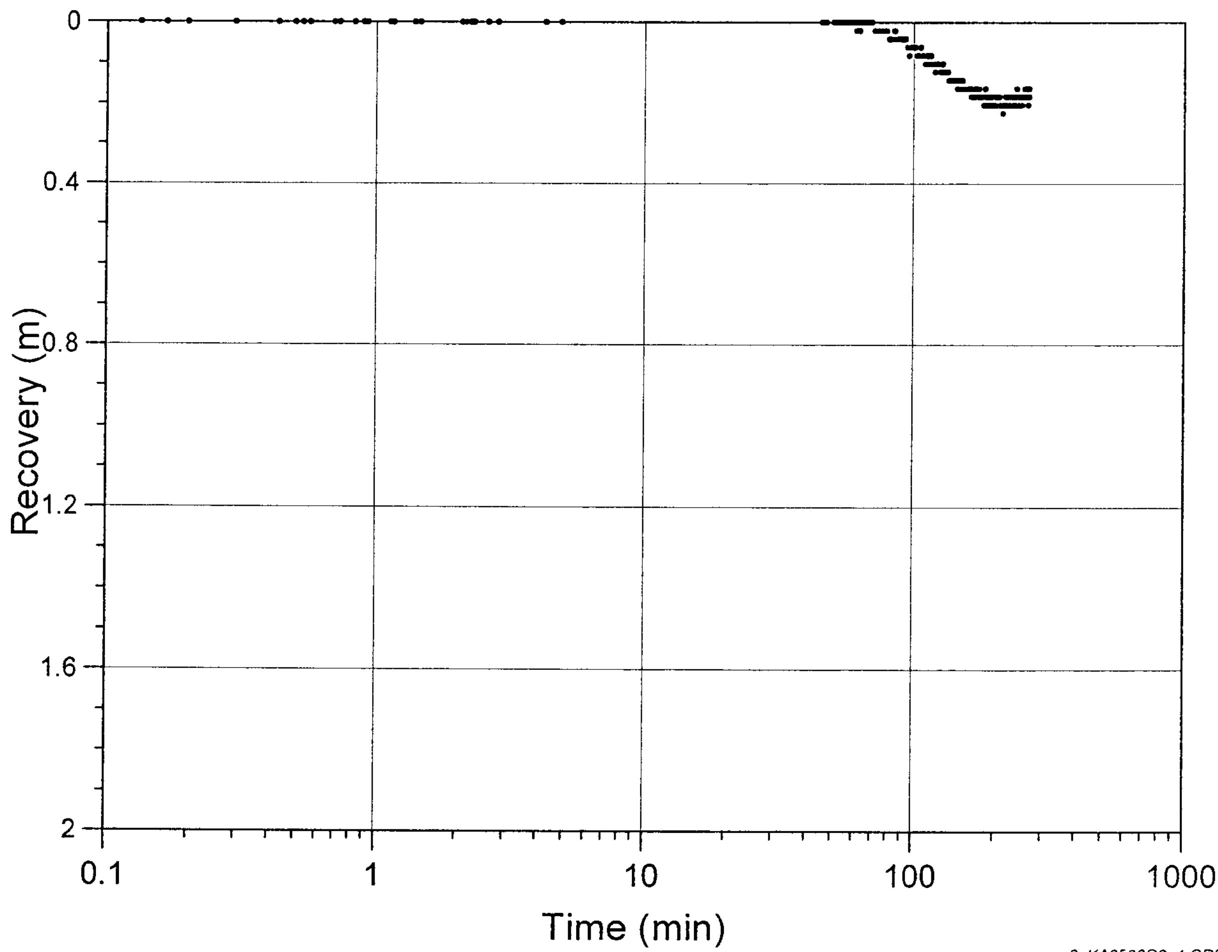

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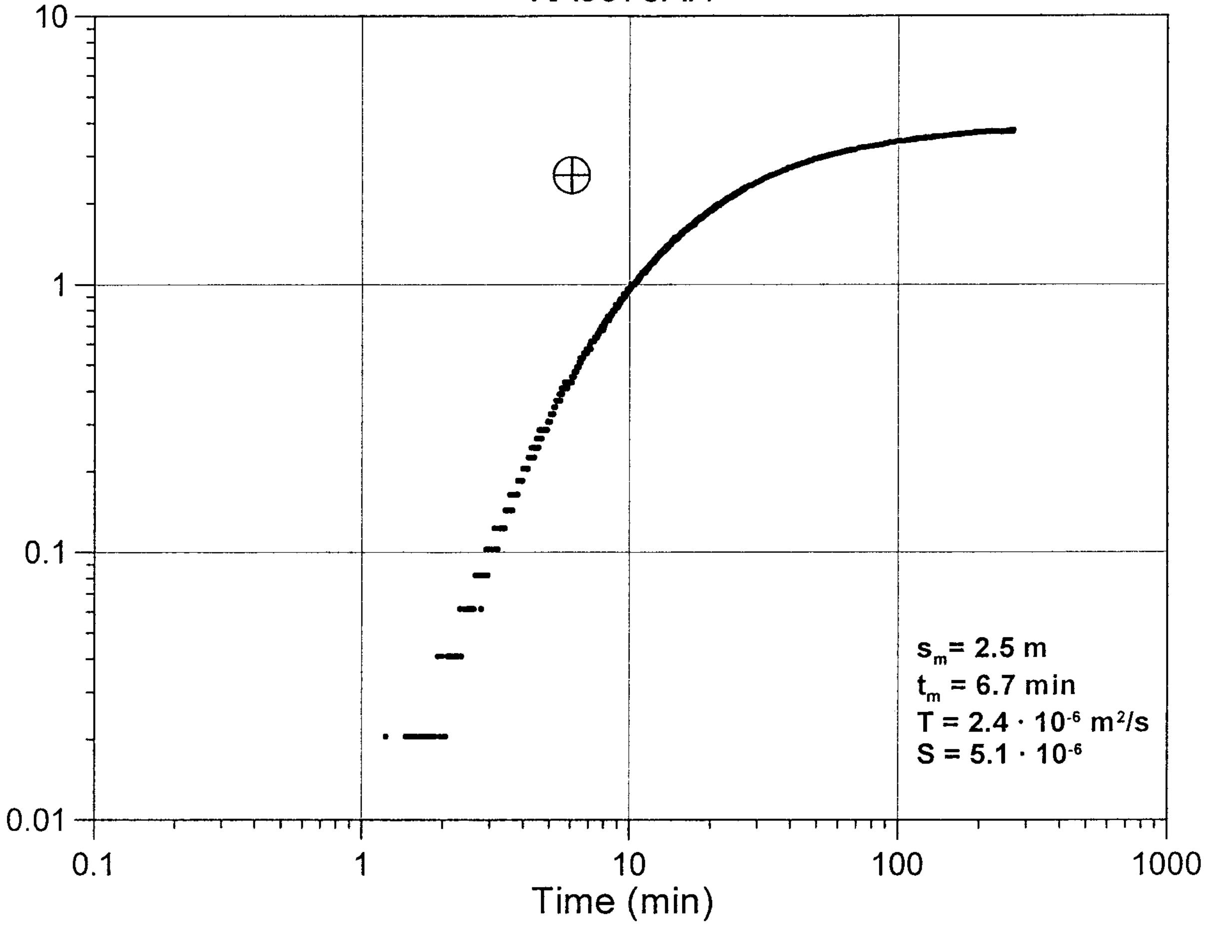

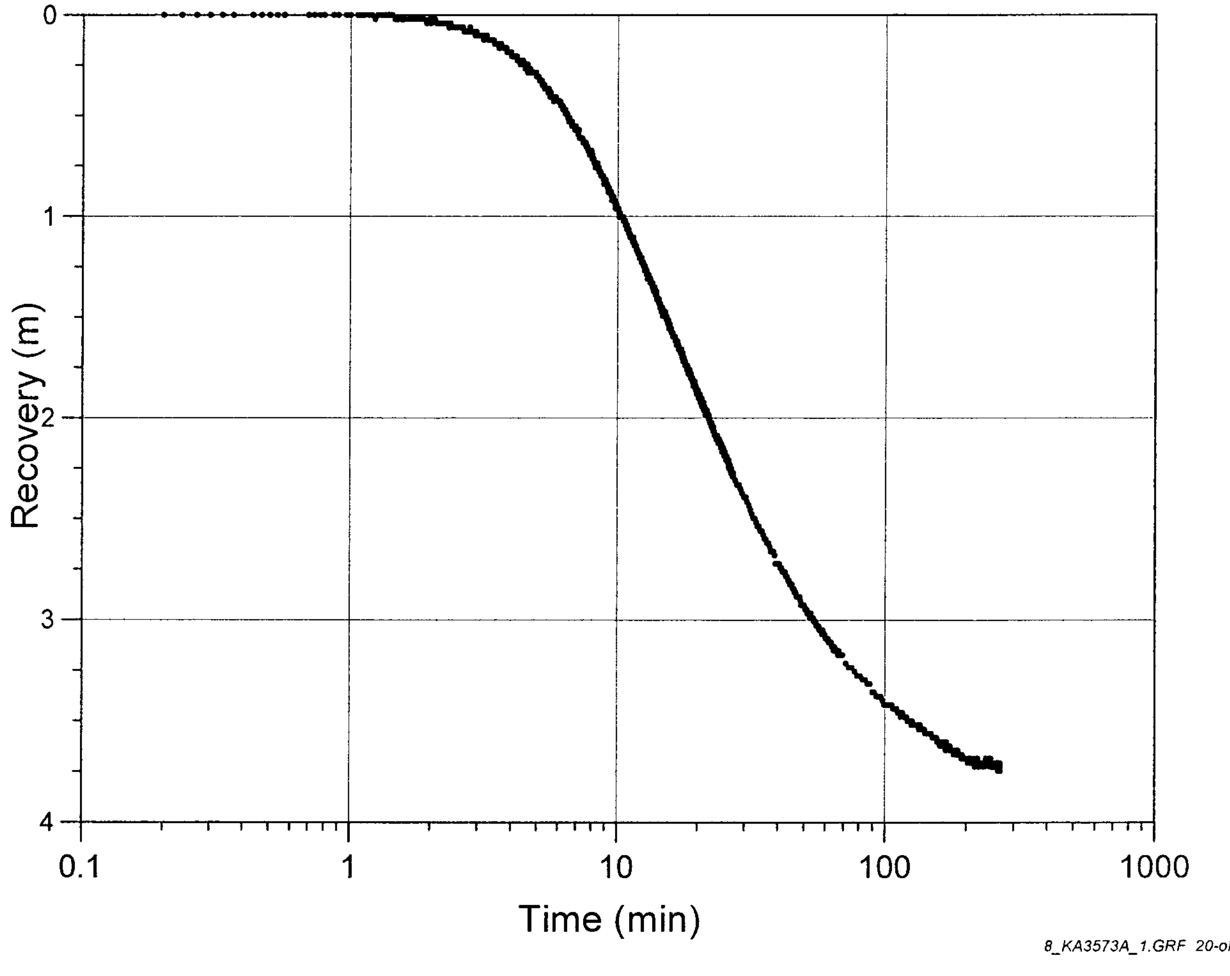

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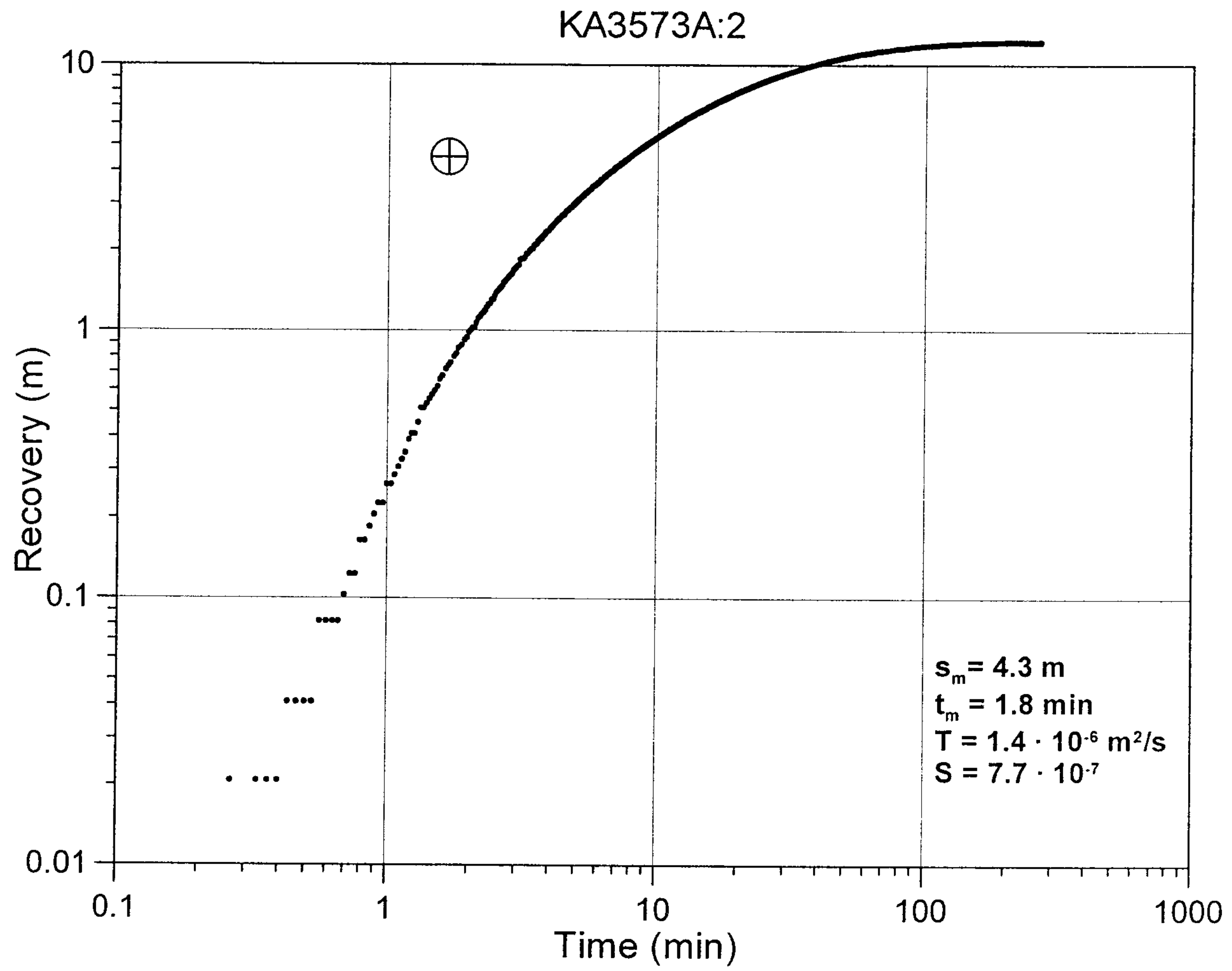

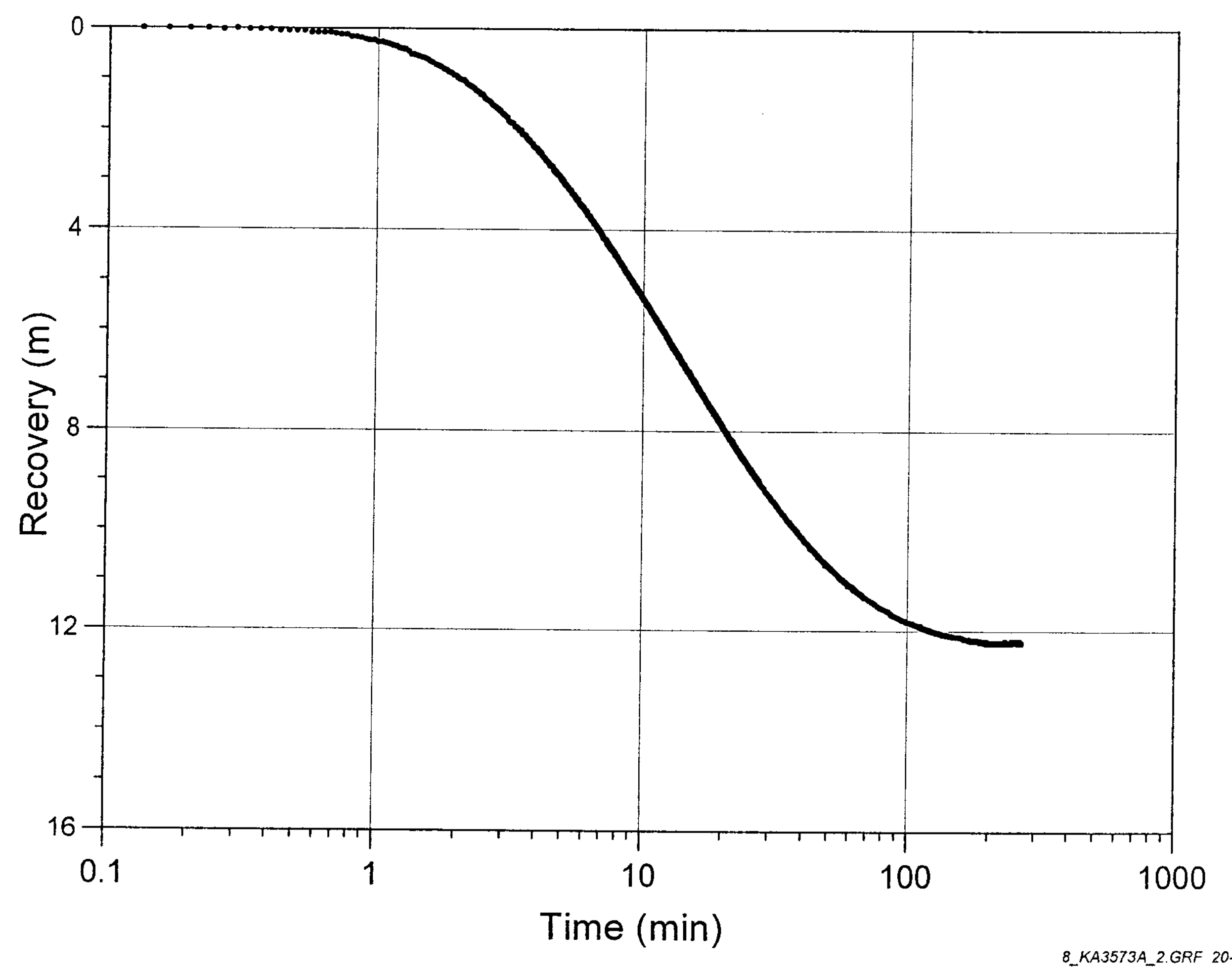

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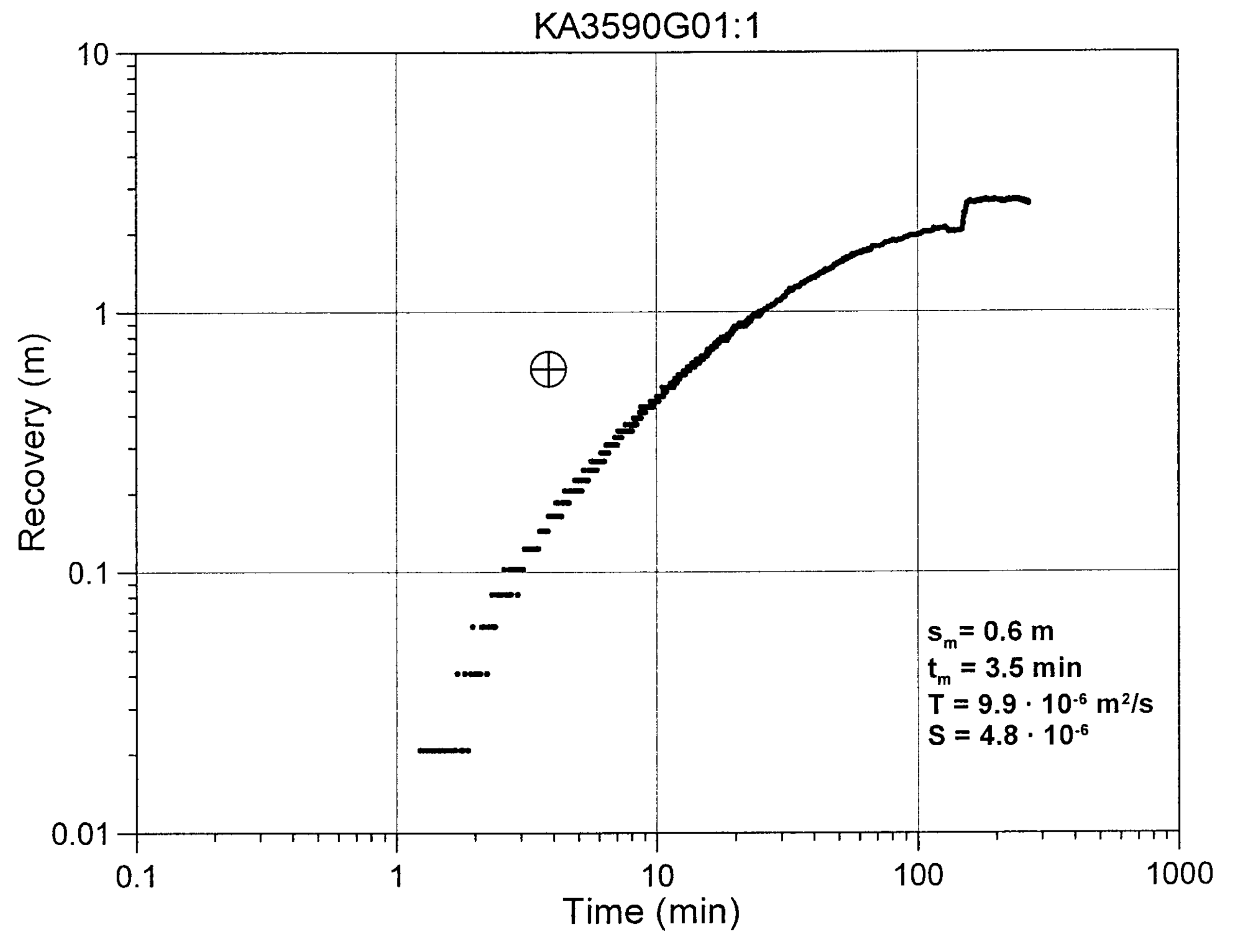

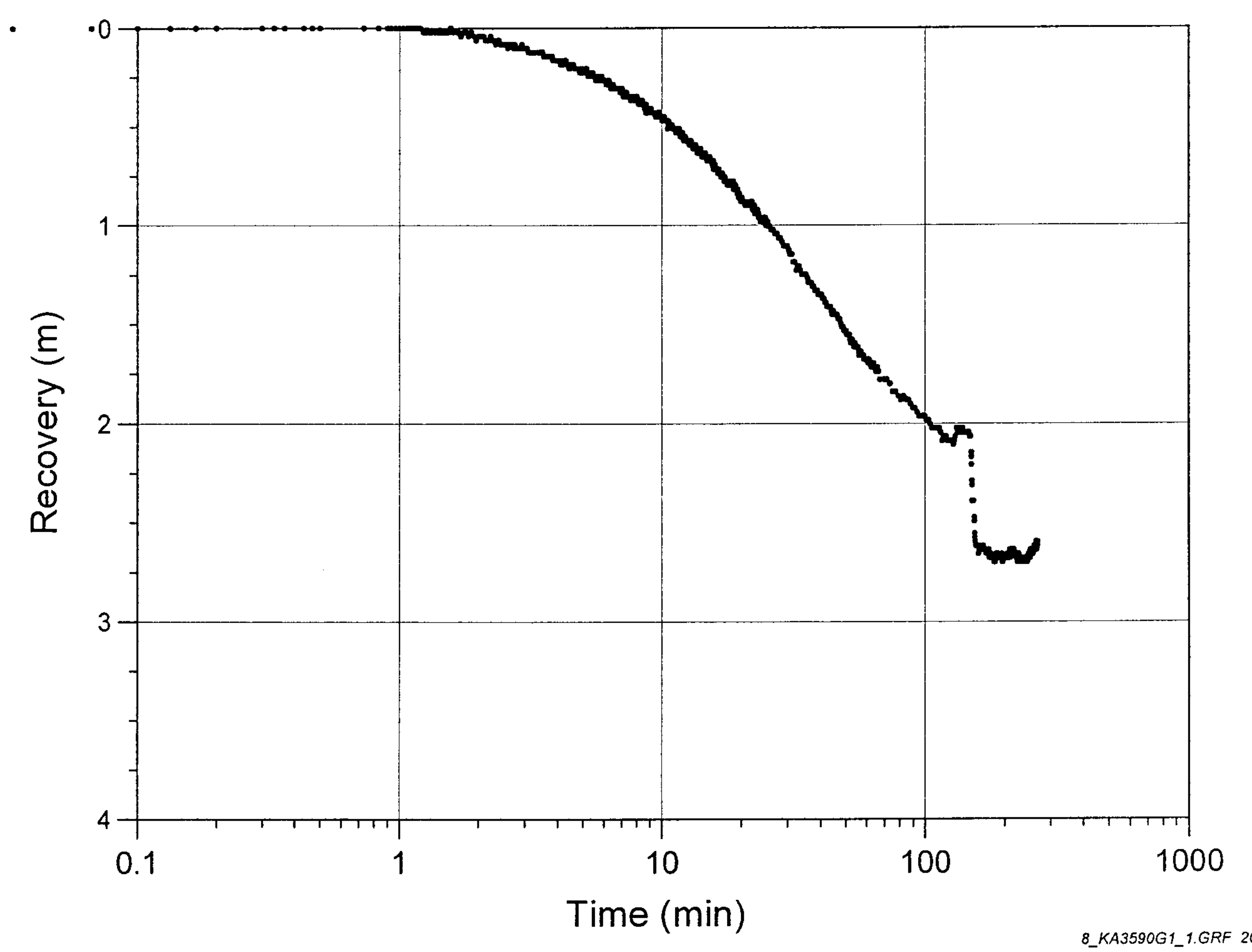

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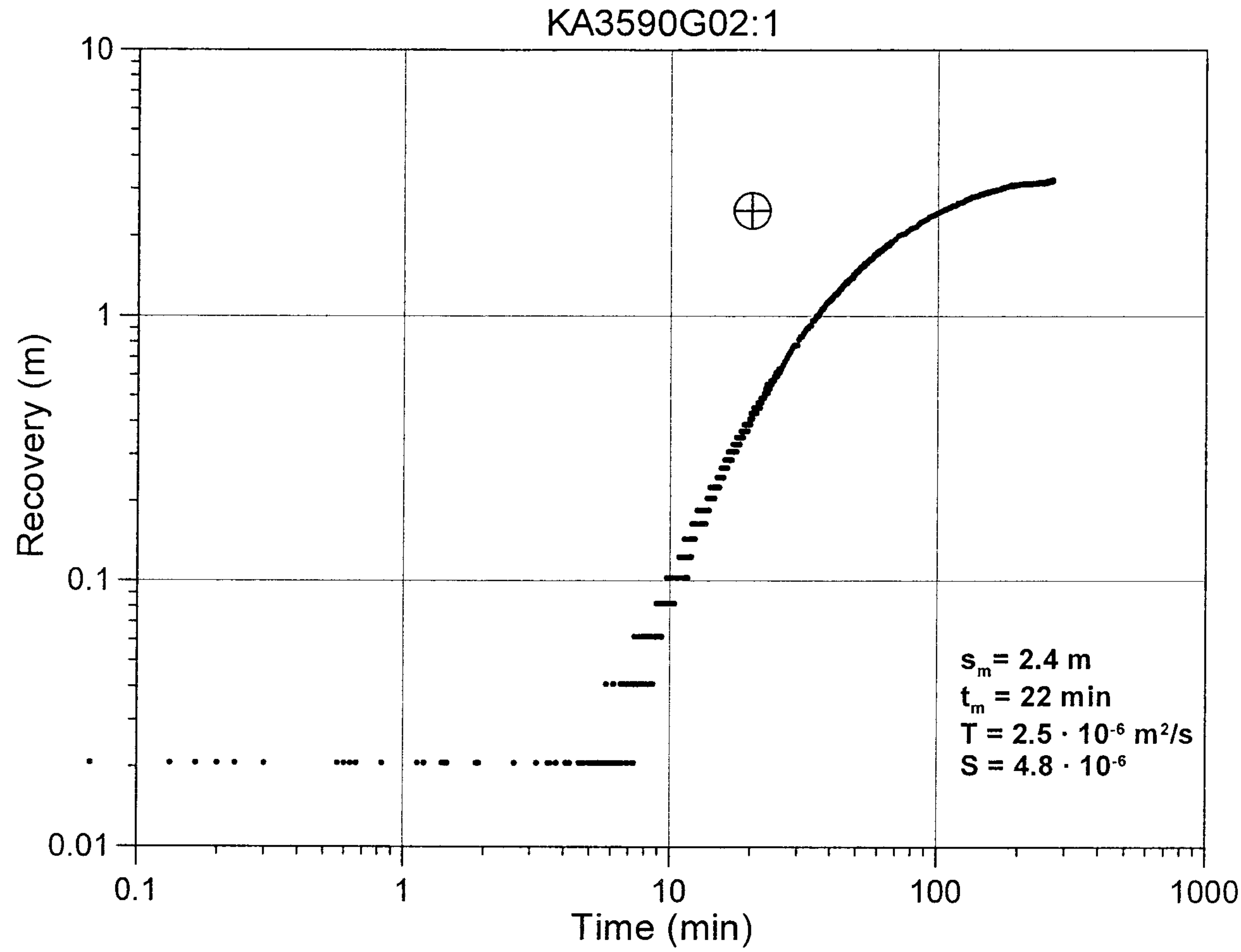

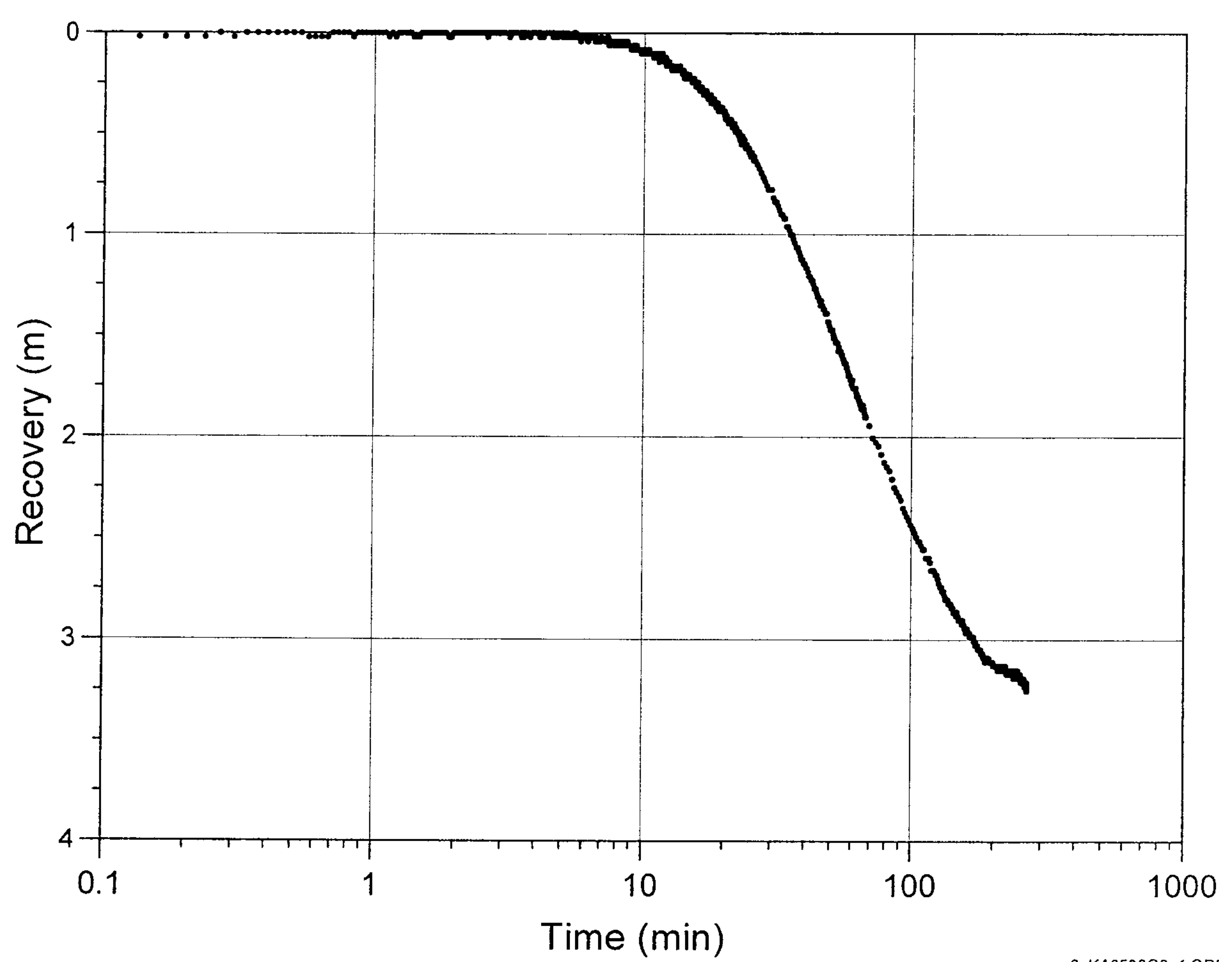

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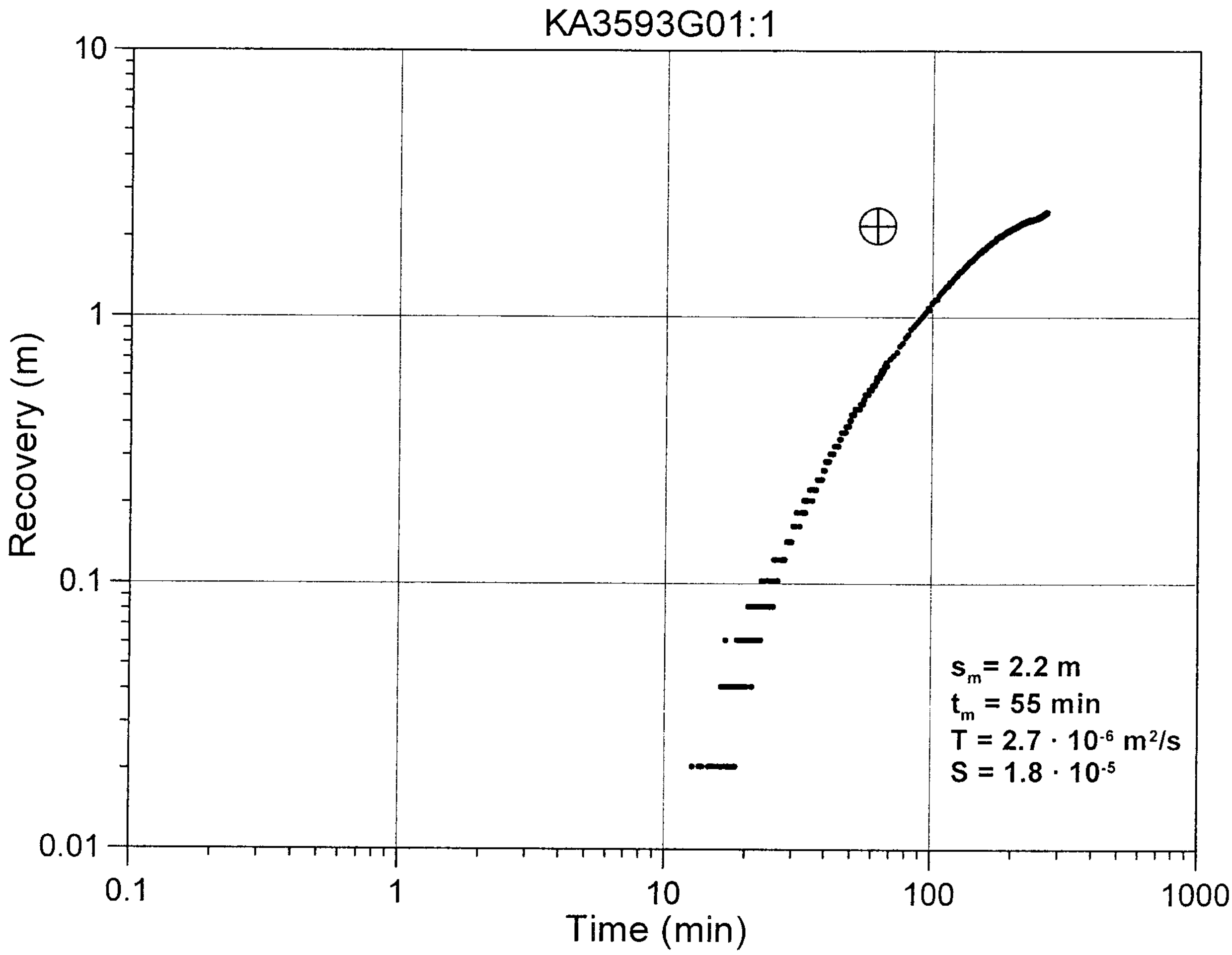

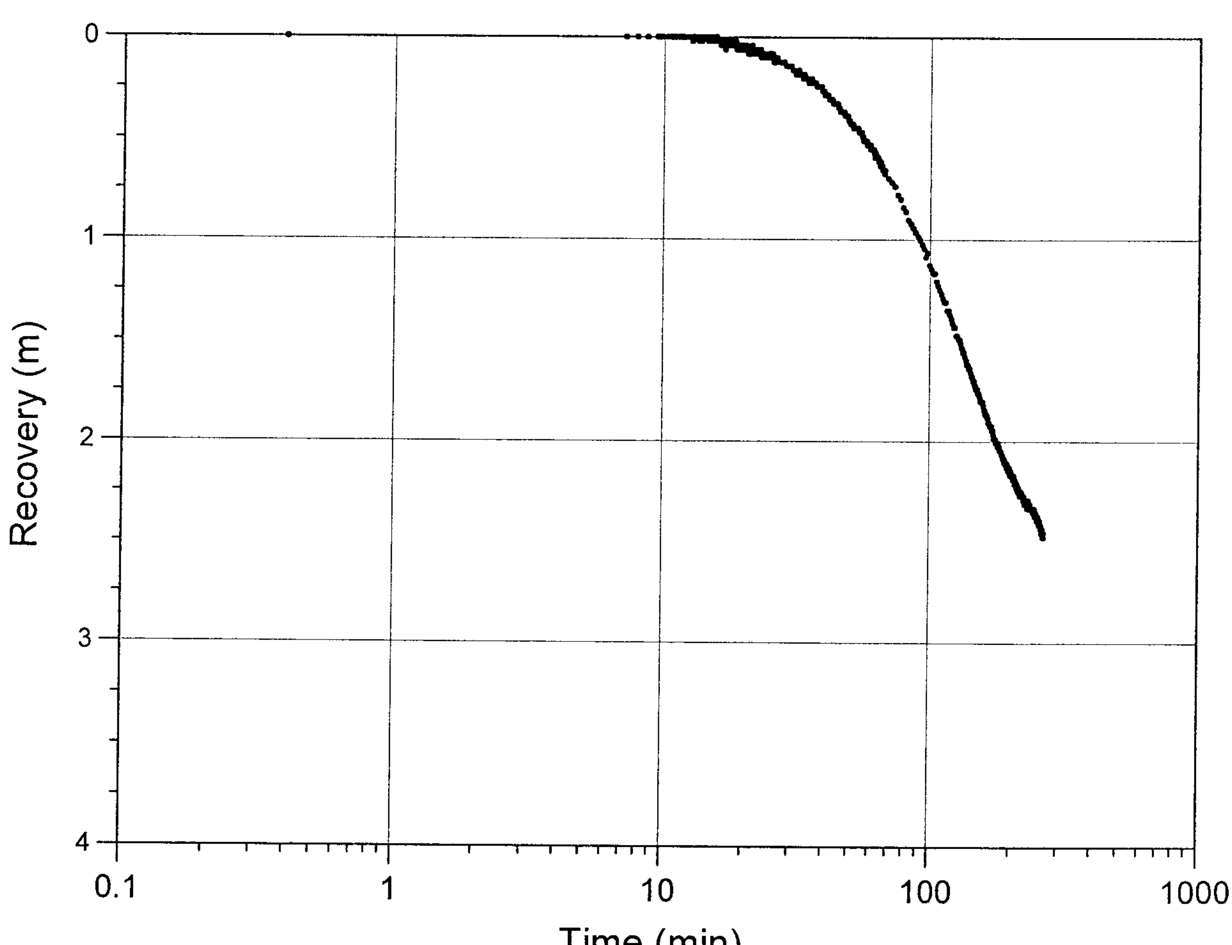

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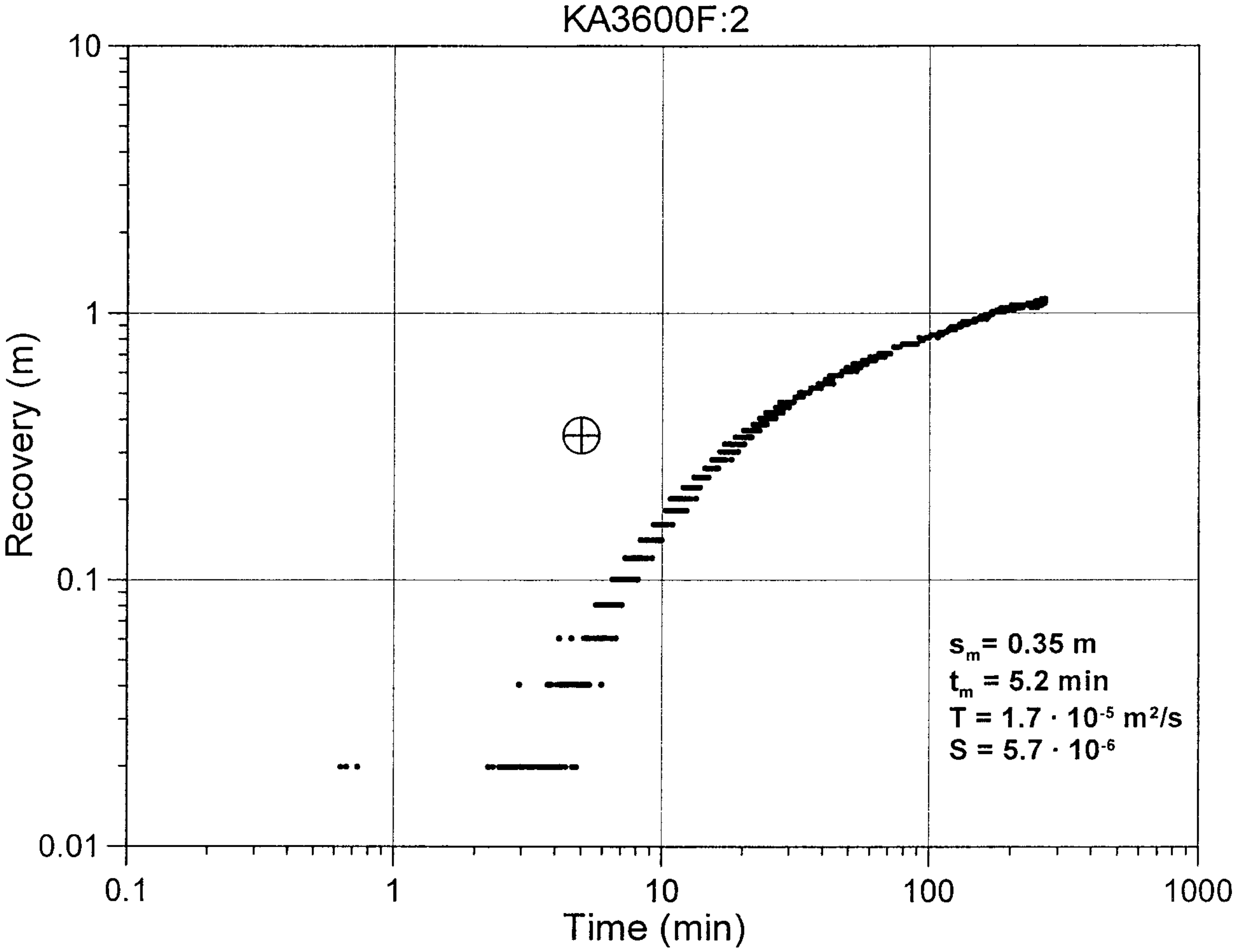

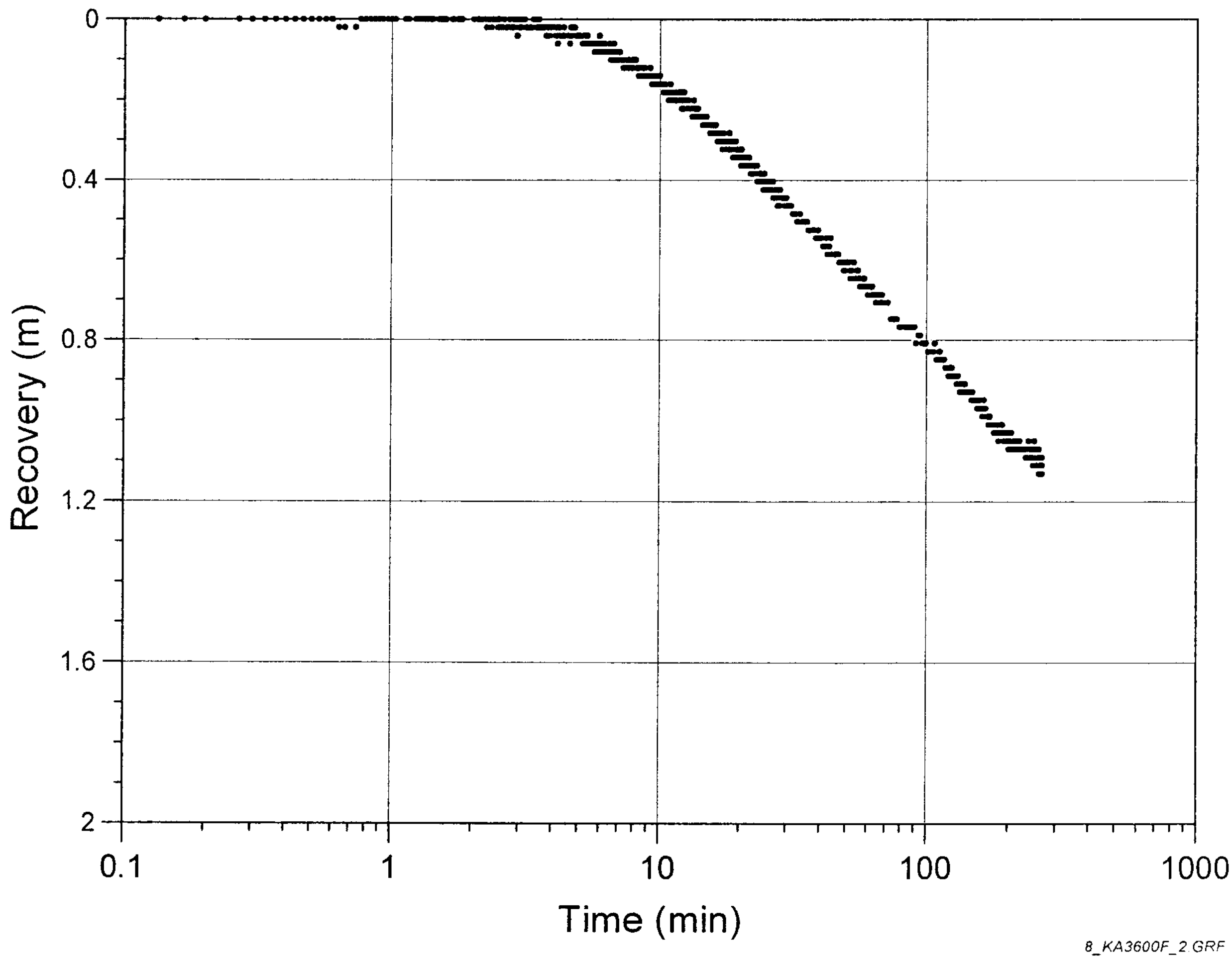

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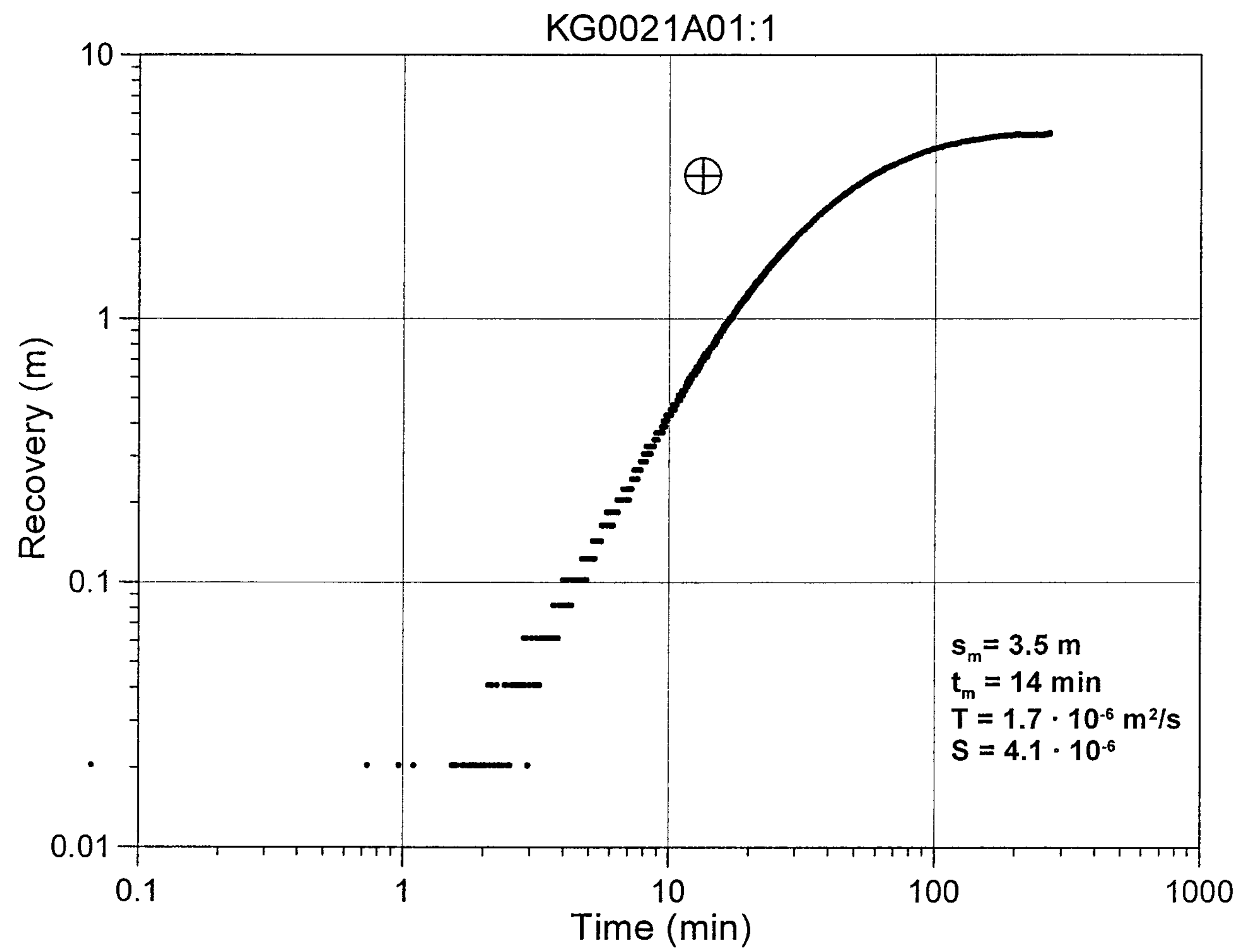
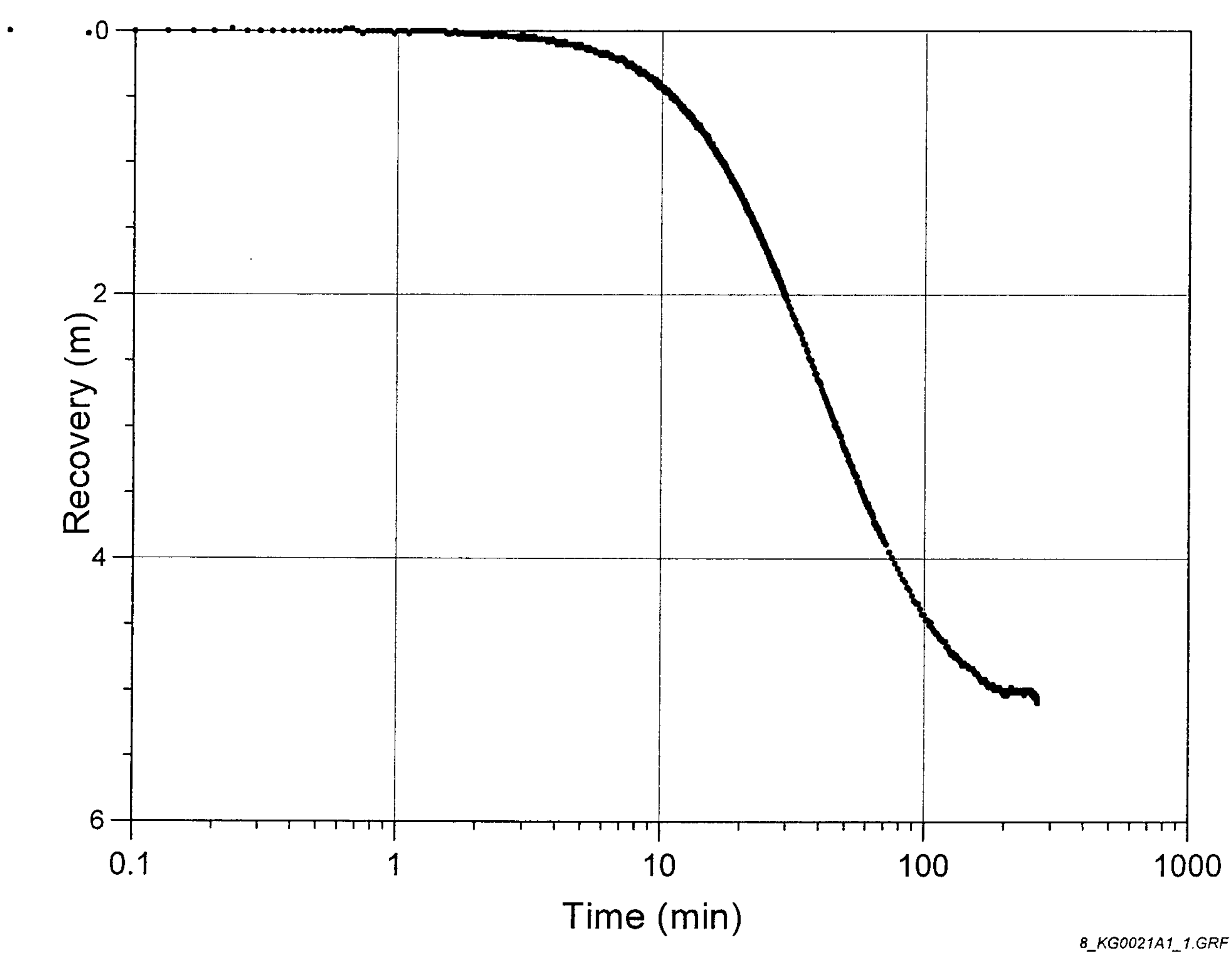
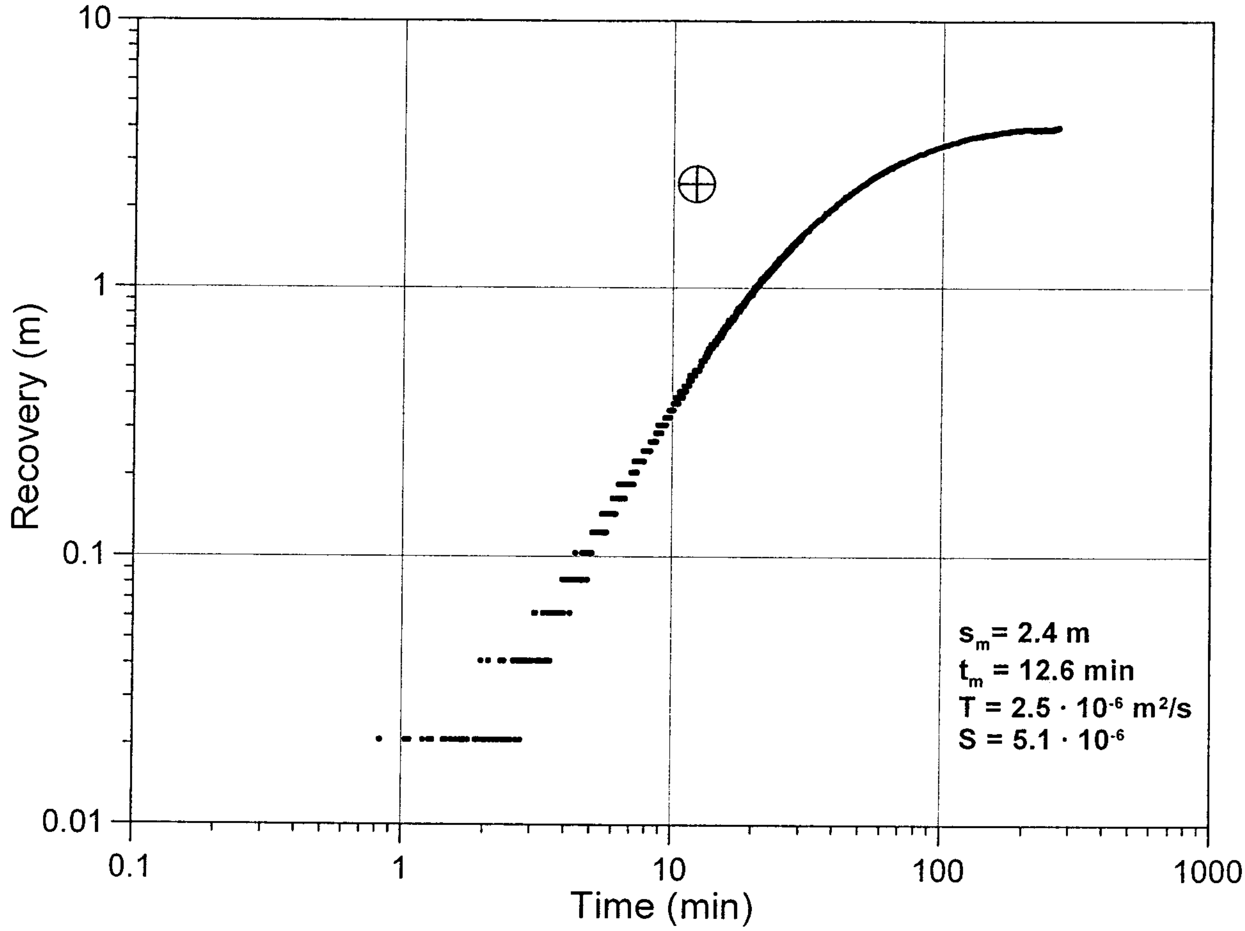
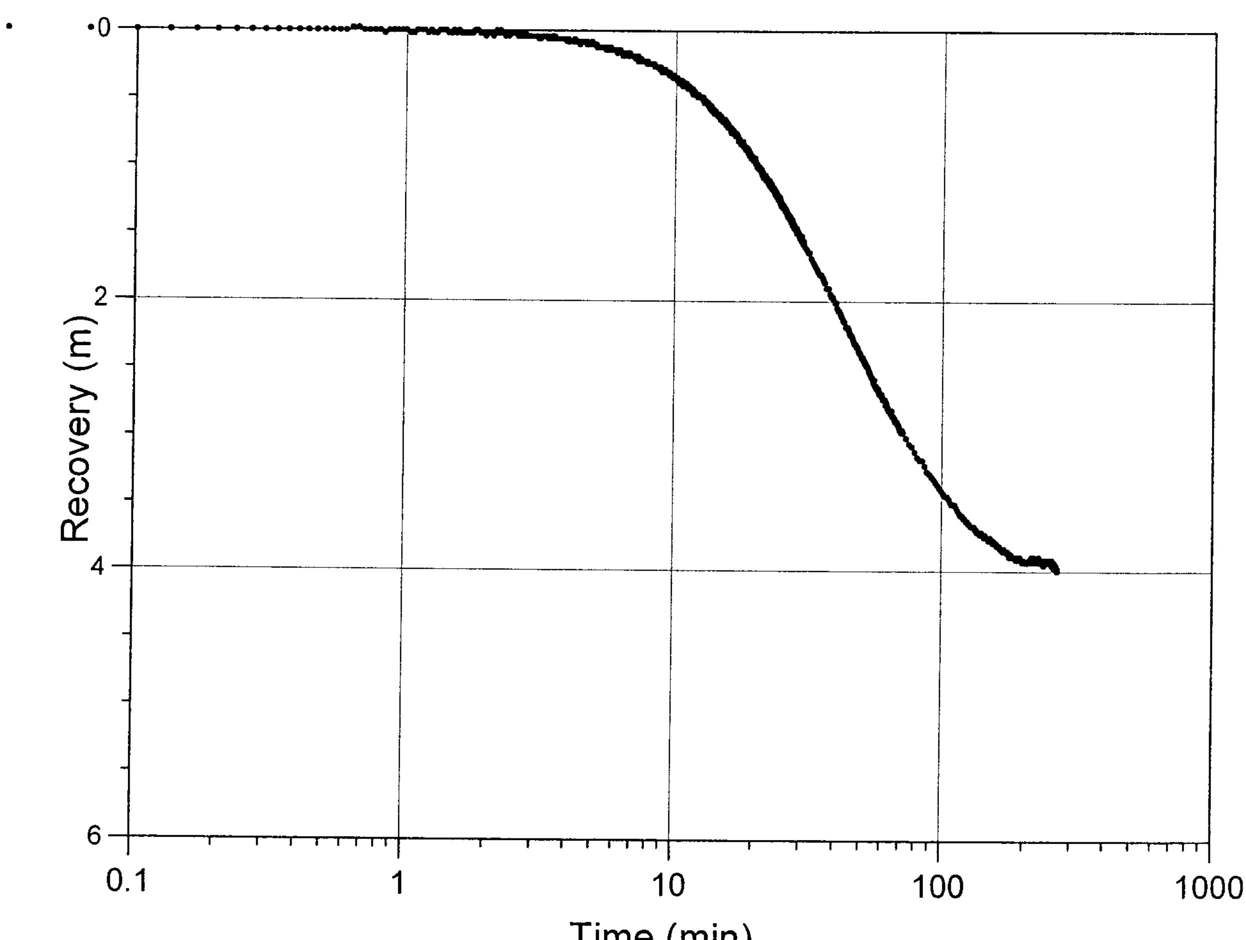

KG0021A01:1
Recovery (m)
Time (min)
s_m= 3.5 m
t_m = 14 min
T = 1.7 · 10^{-6} m²/s
S = 4.1 · 10^{-6}


Recovery (m)
Time (min)

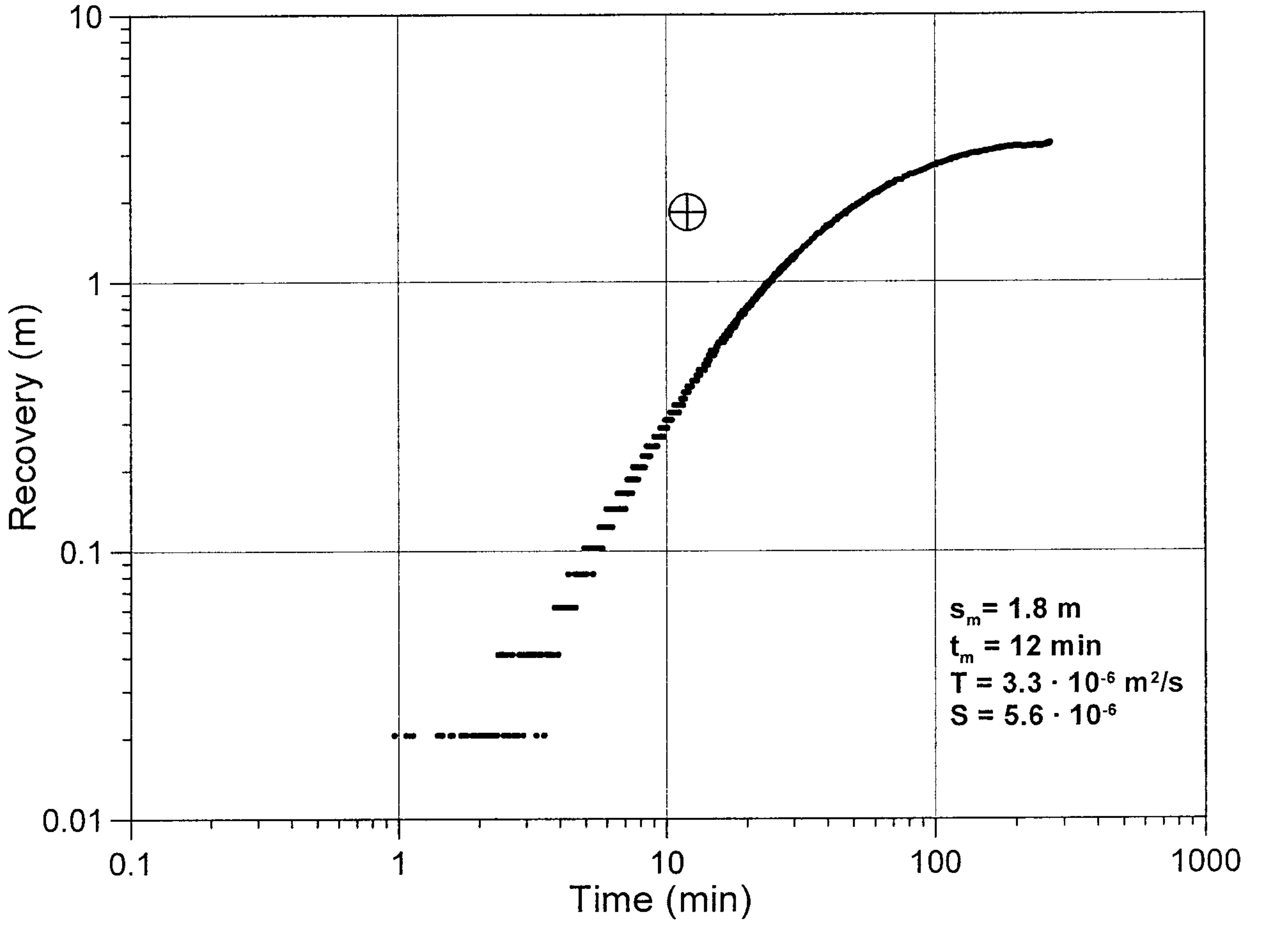
KG0021A01:2

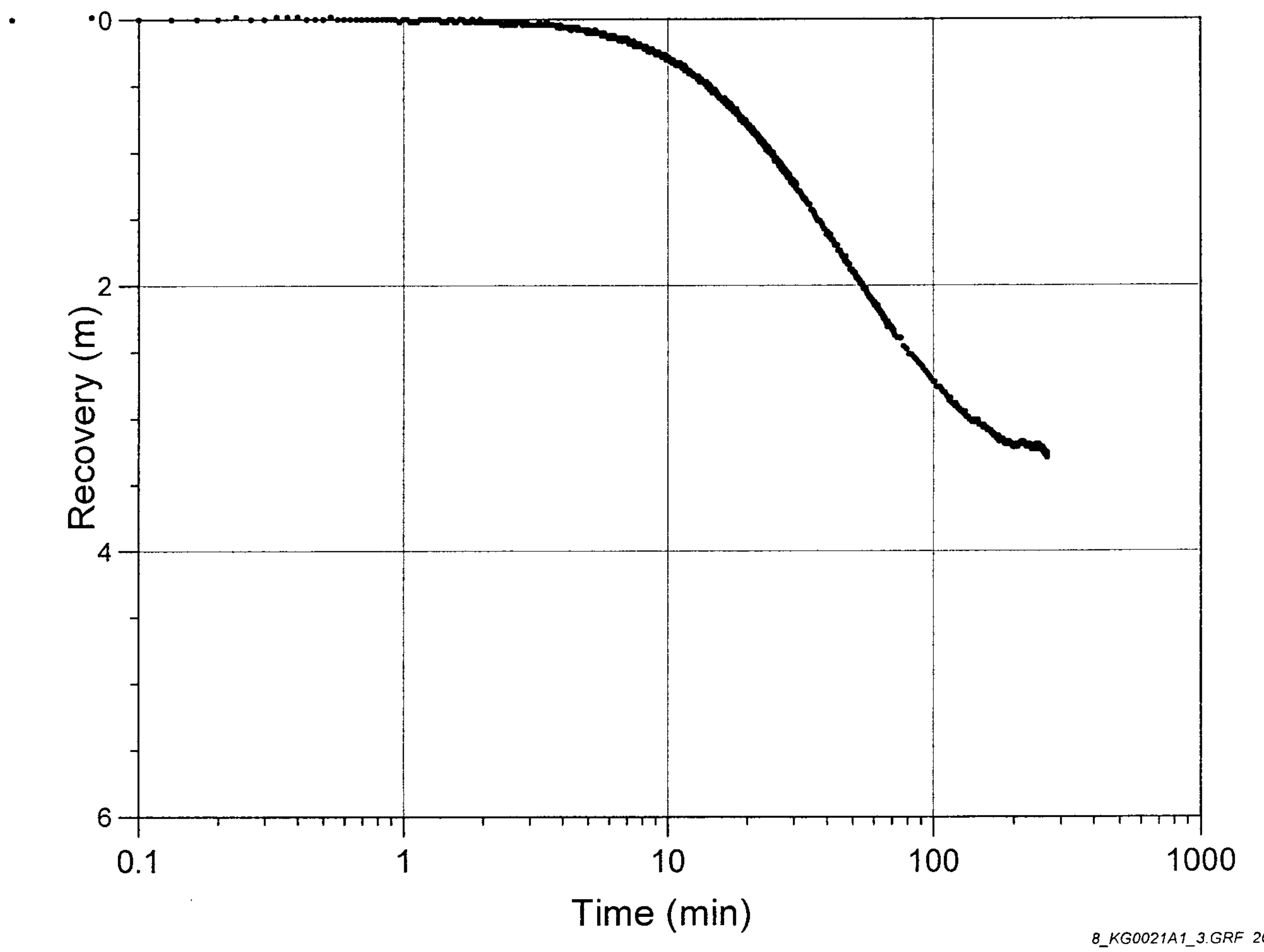




8_KG0021A1_2.GRF 20-okt-99

KG0021A01:3





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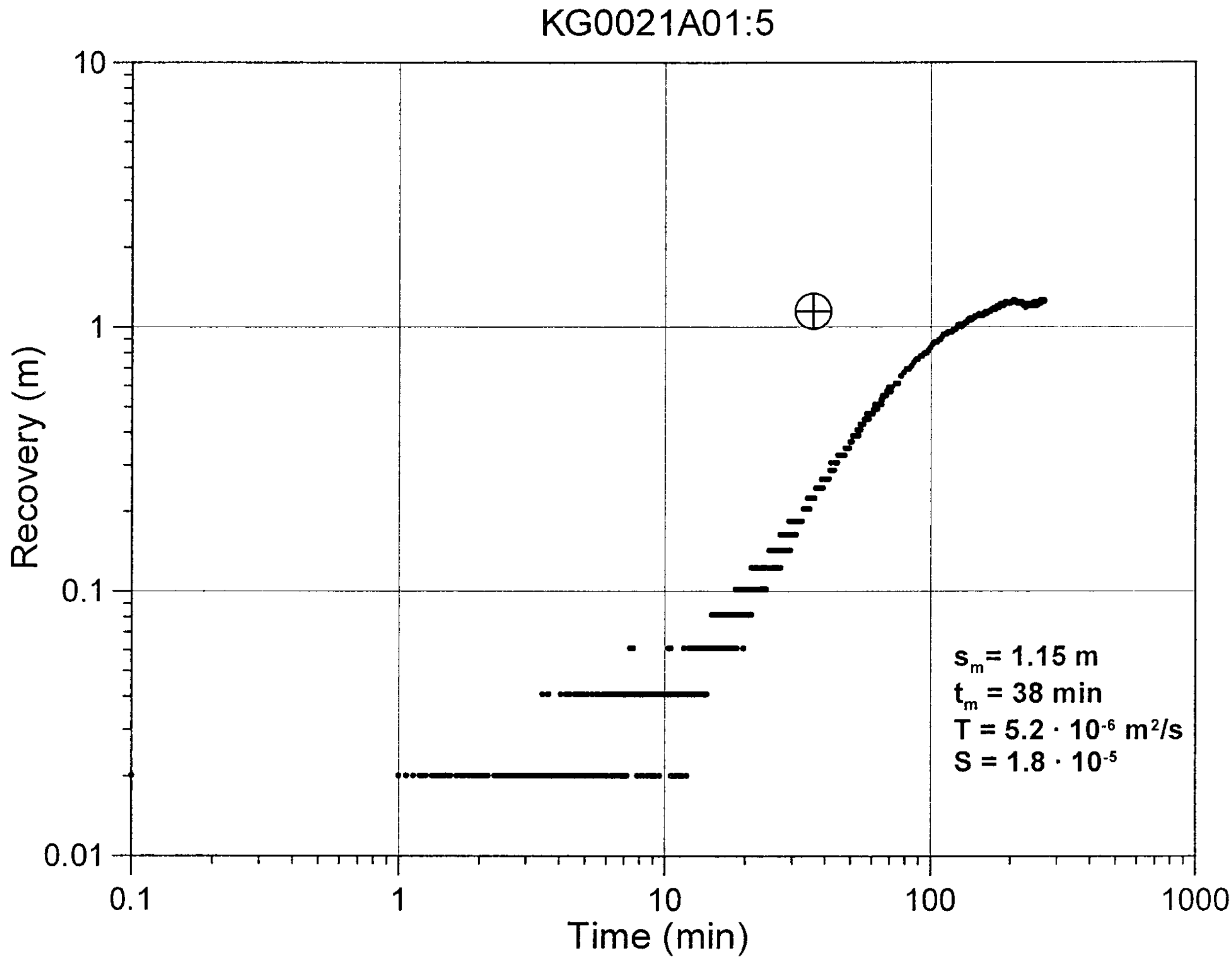

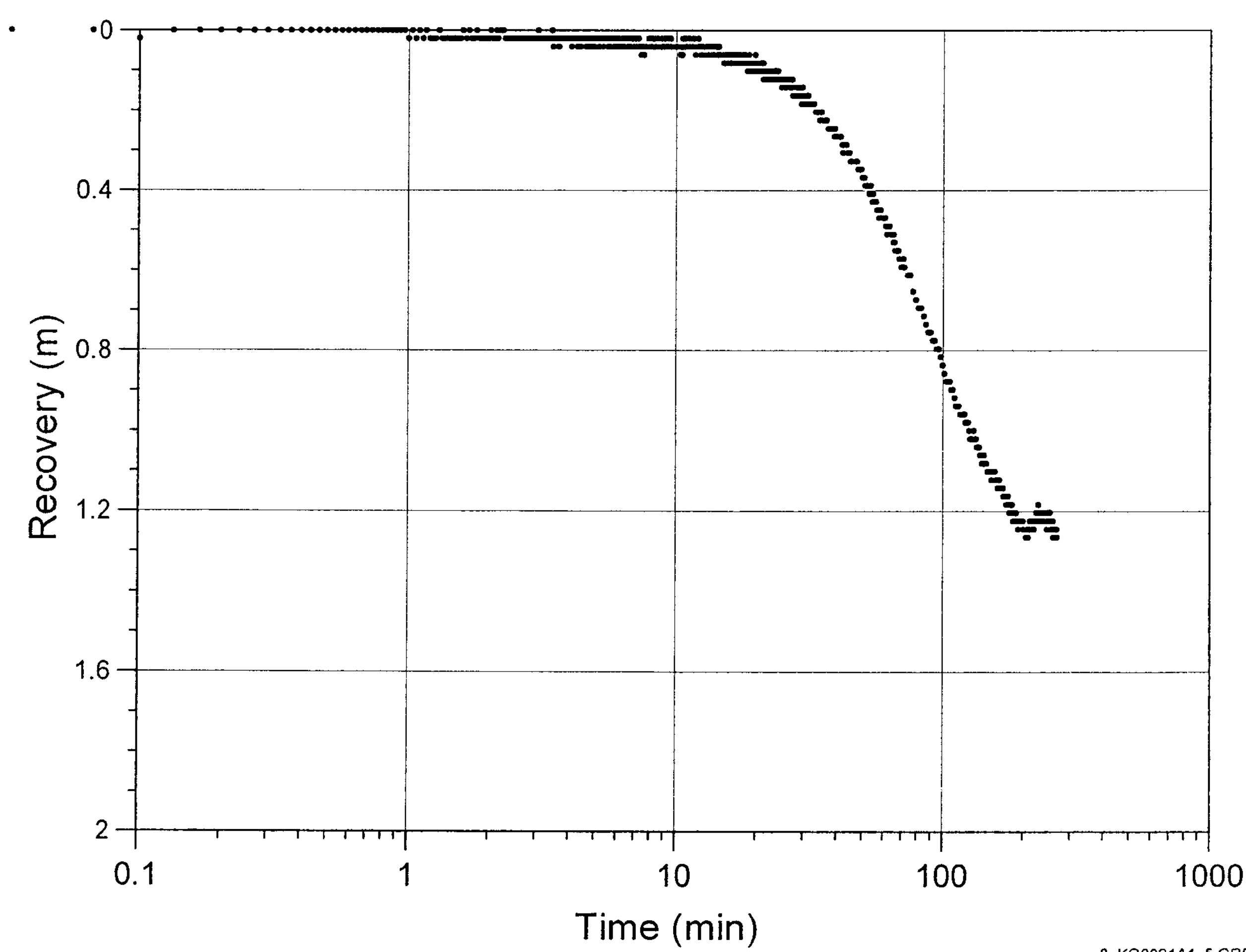

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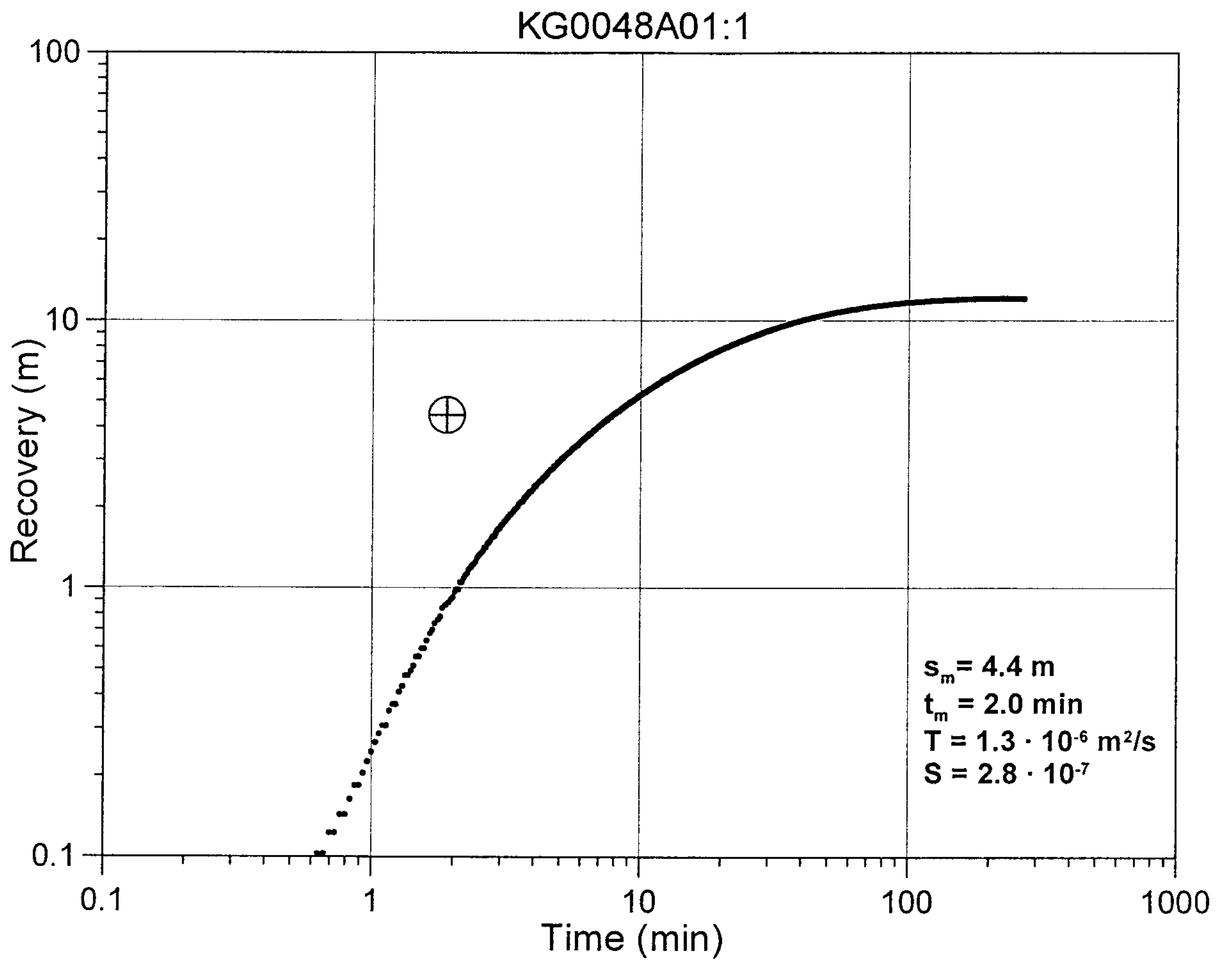

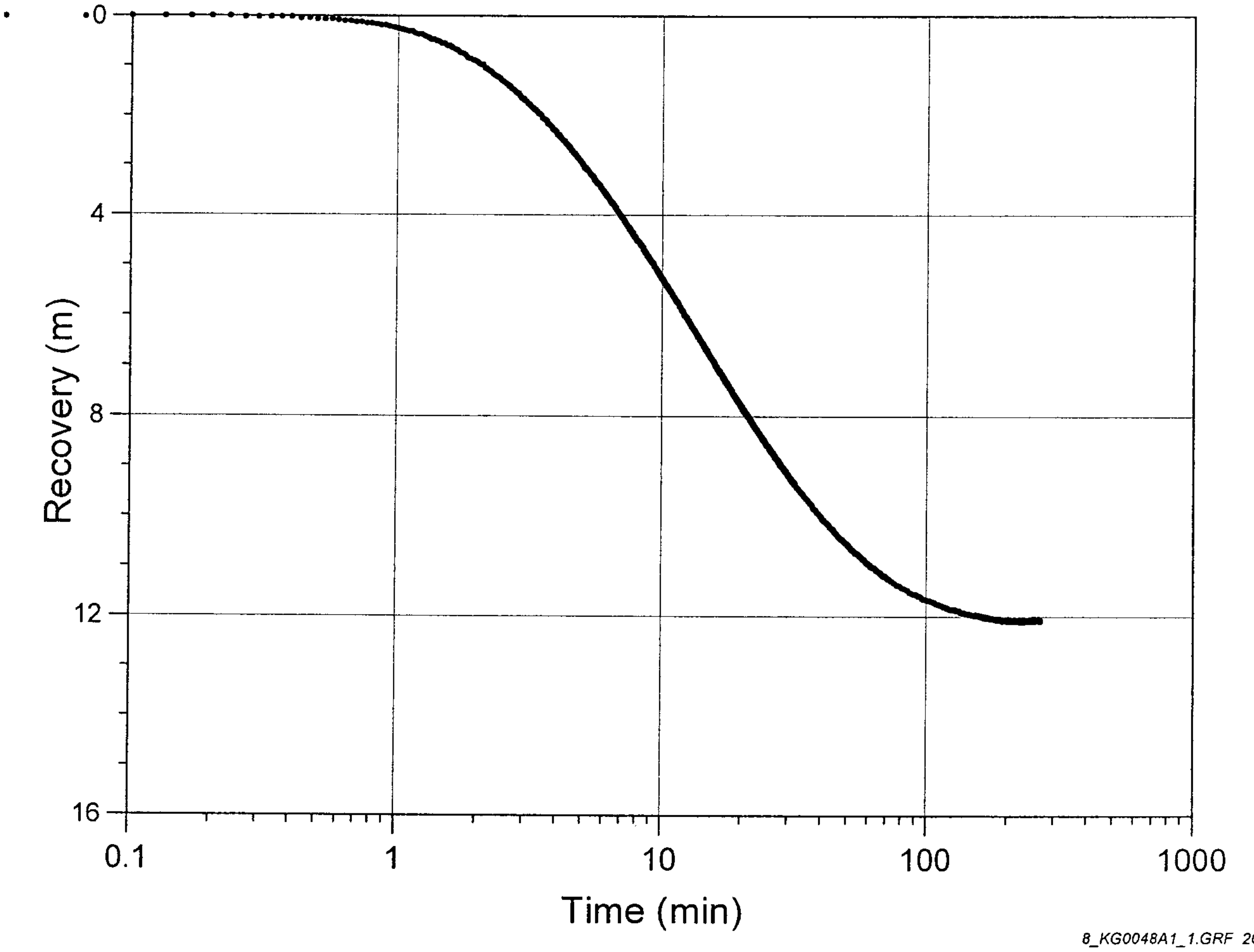

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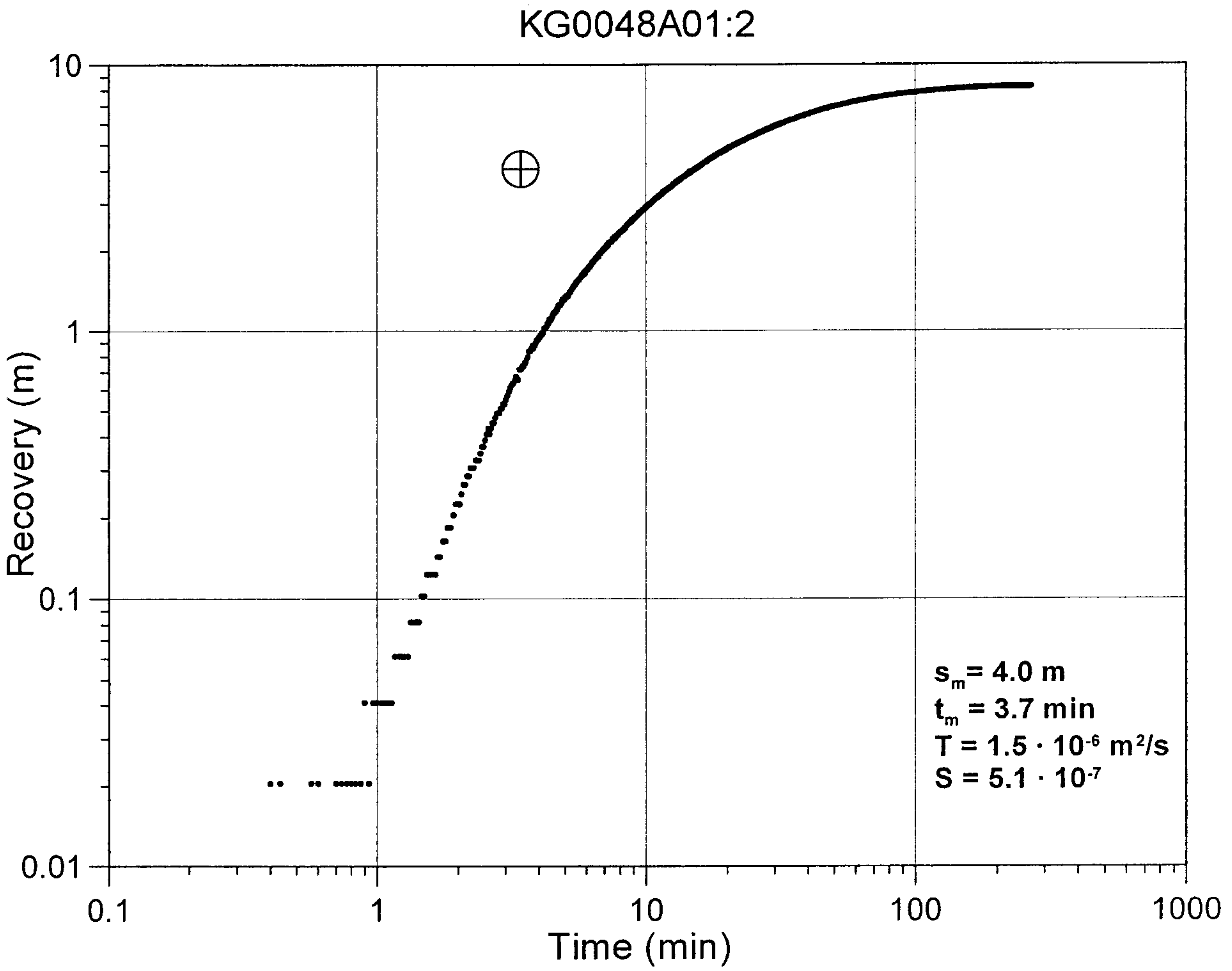

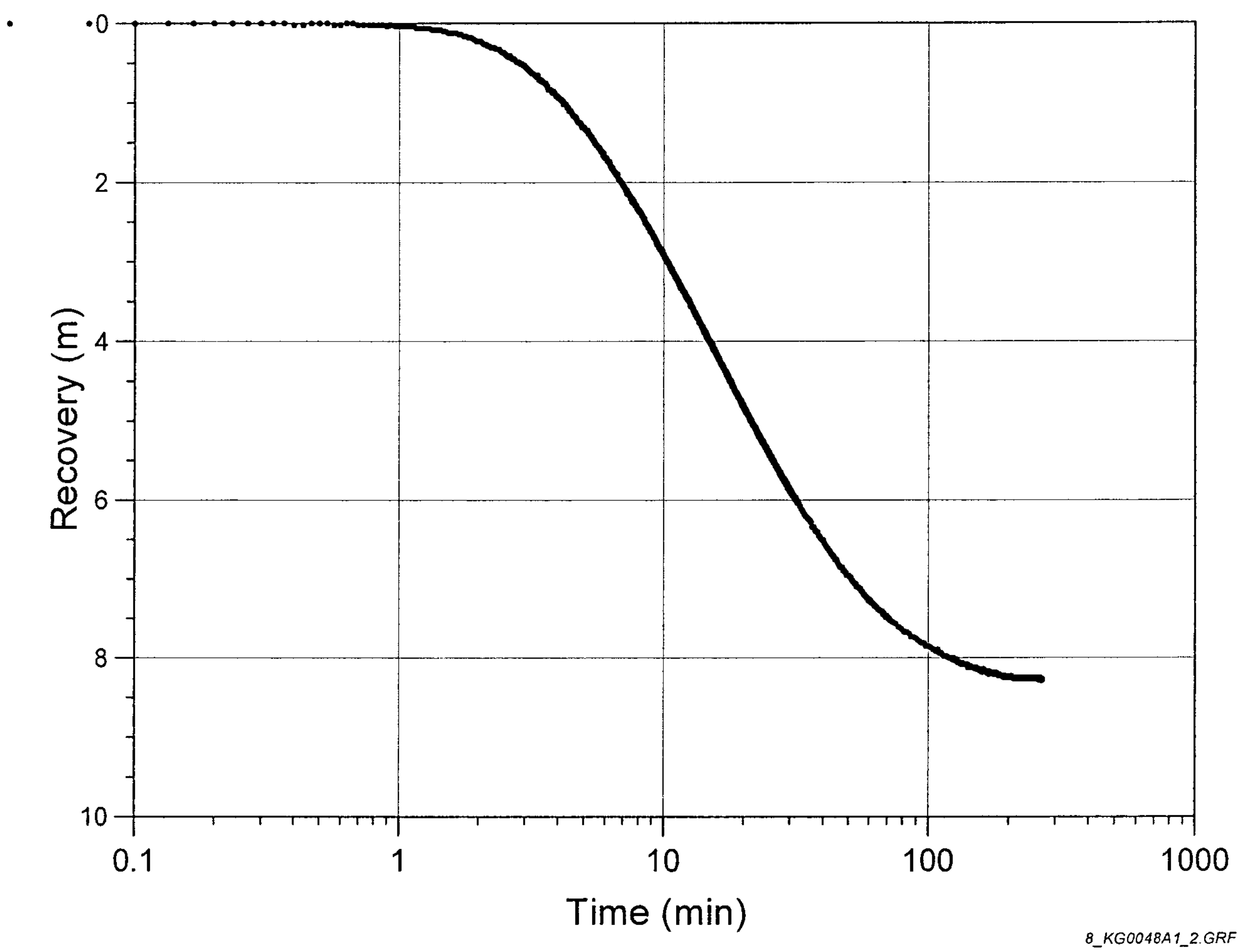

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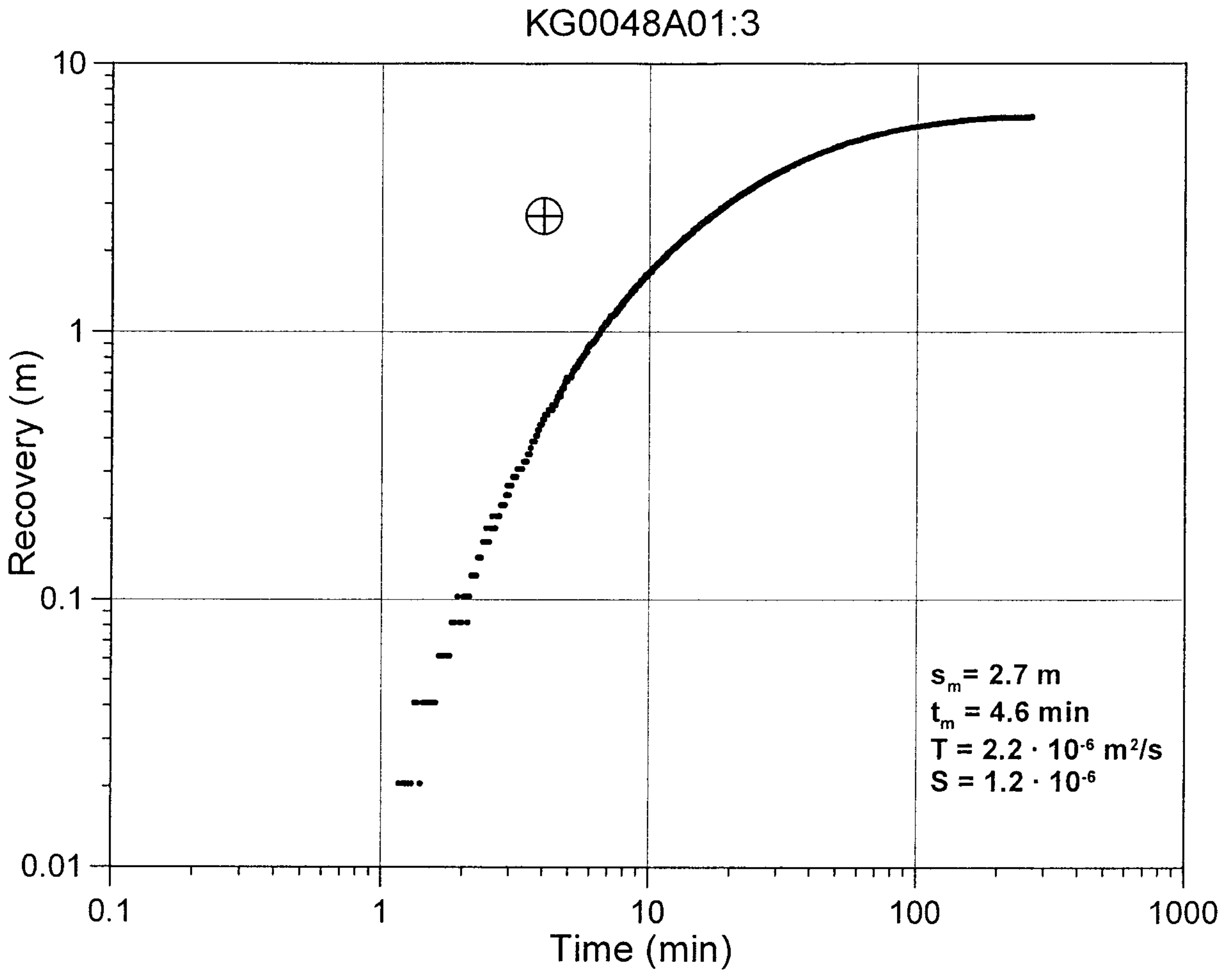

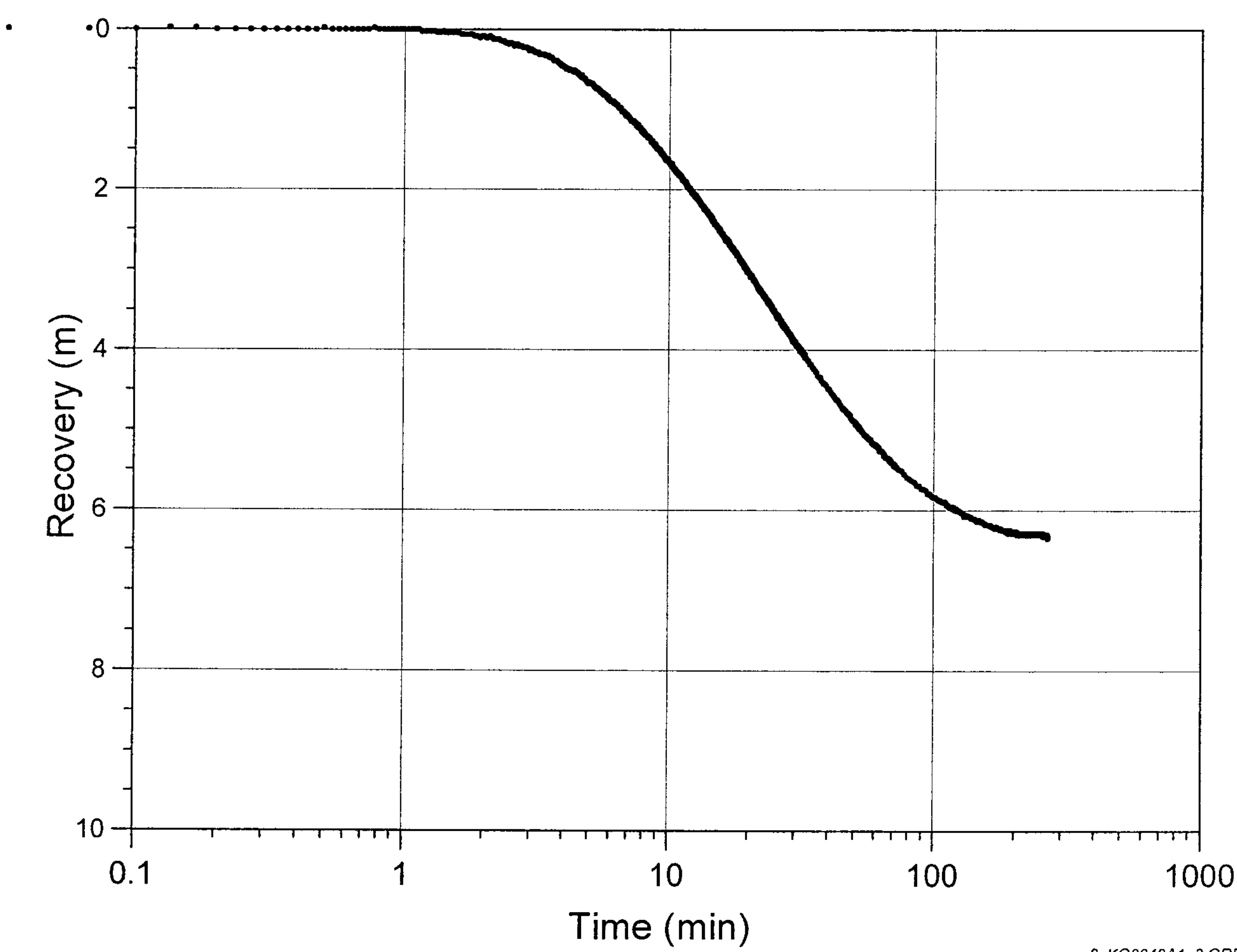

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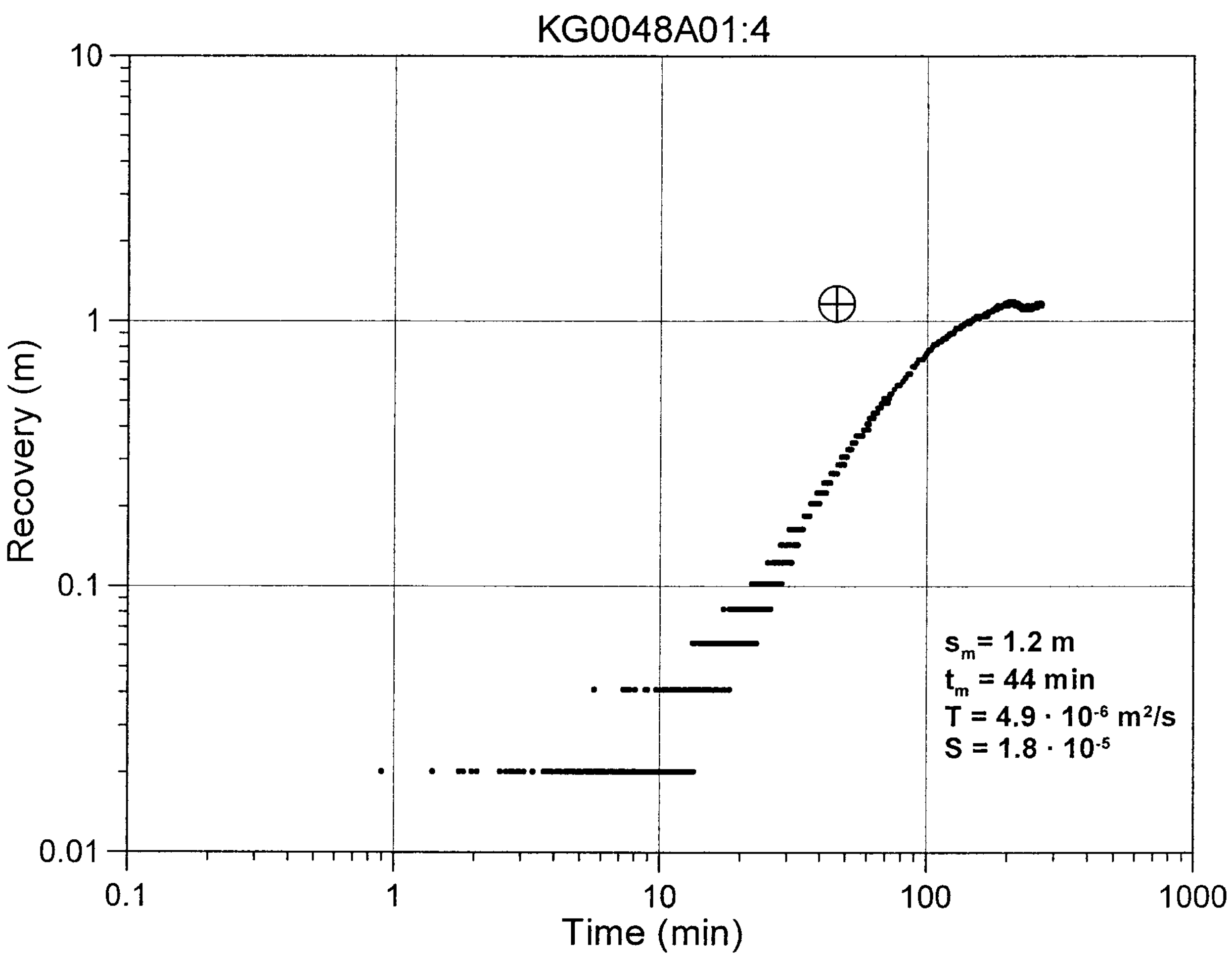
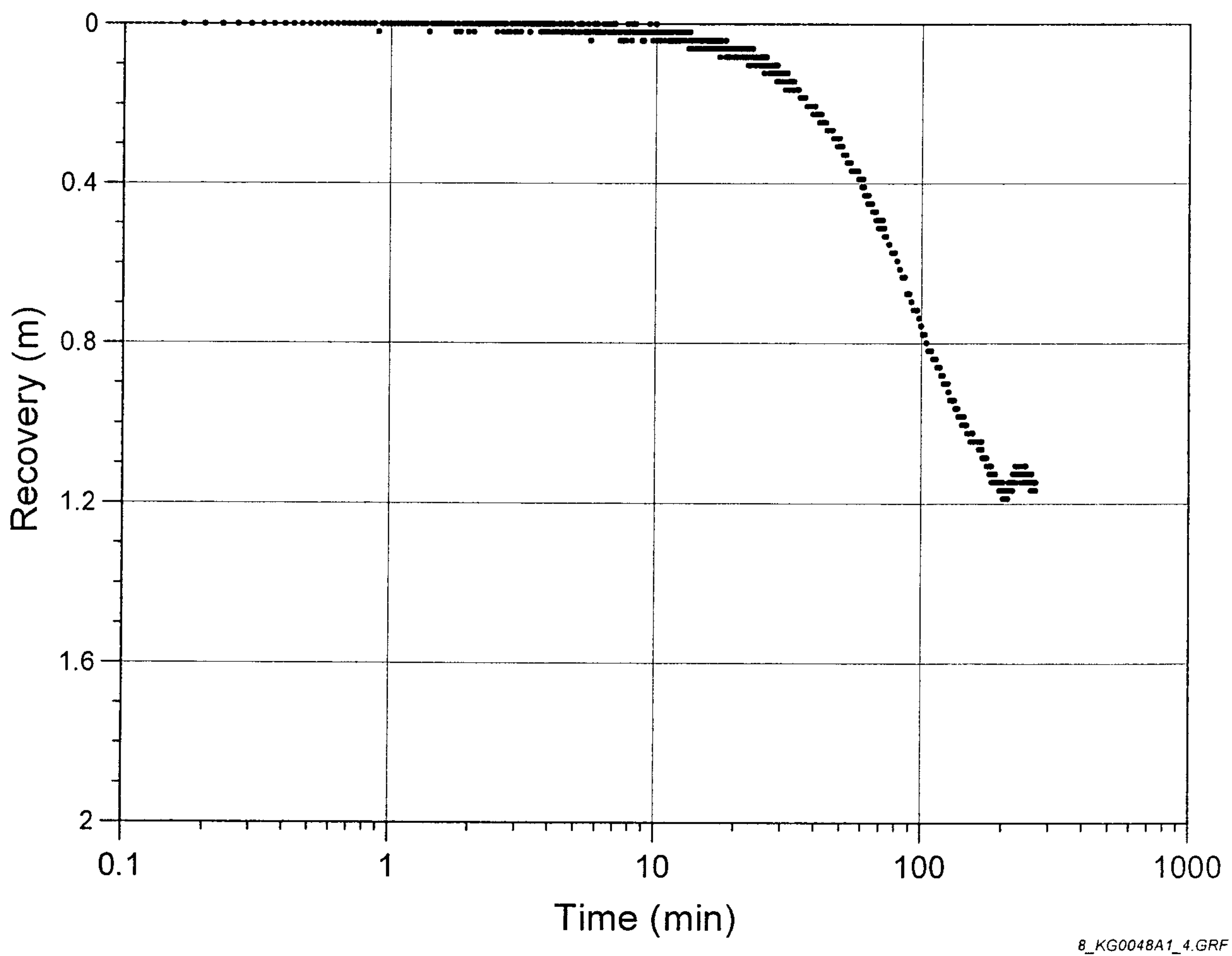




8_KG0048A1_4.GRF 20-okt-99

APPENDIX 4

Interference test 2:9 in borehole KA3554G02, section 10.30 m – 21.30 m

Date: 99-08-16
Borehole length: 30.01 m

Field Crew: Bengt Gentzschein
Borehole diameter: 76 mm

Flowing borehole: KA3554G02, section #2: 10.30 – 21.30 m

Valve opened: 990816 11:02.07
End of Test: 990817 09:20
Total flowing time : 364 min

Valve closed: 990816 17:06.05
Tot. Pr. Build-up time 974 min.

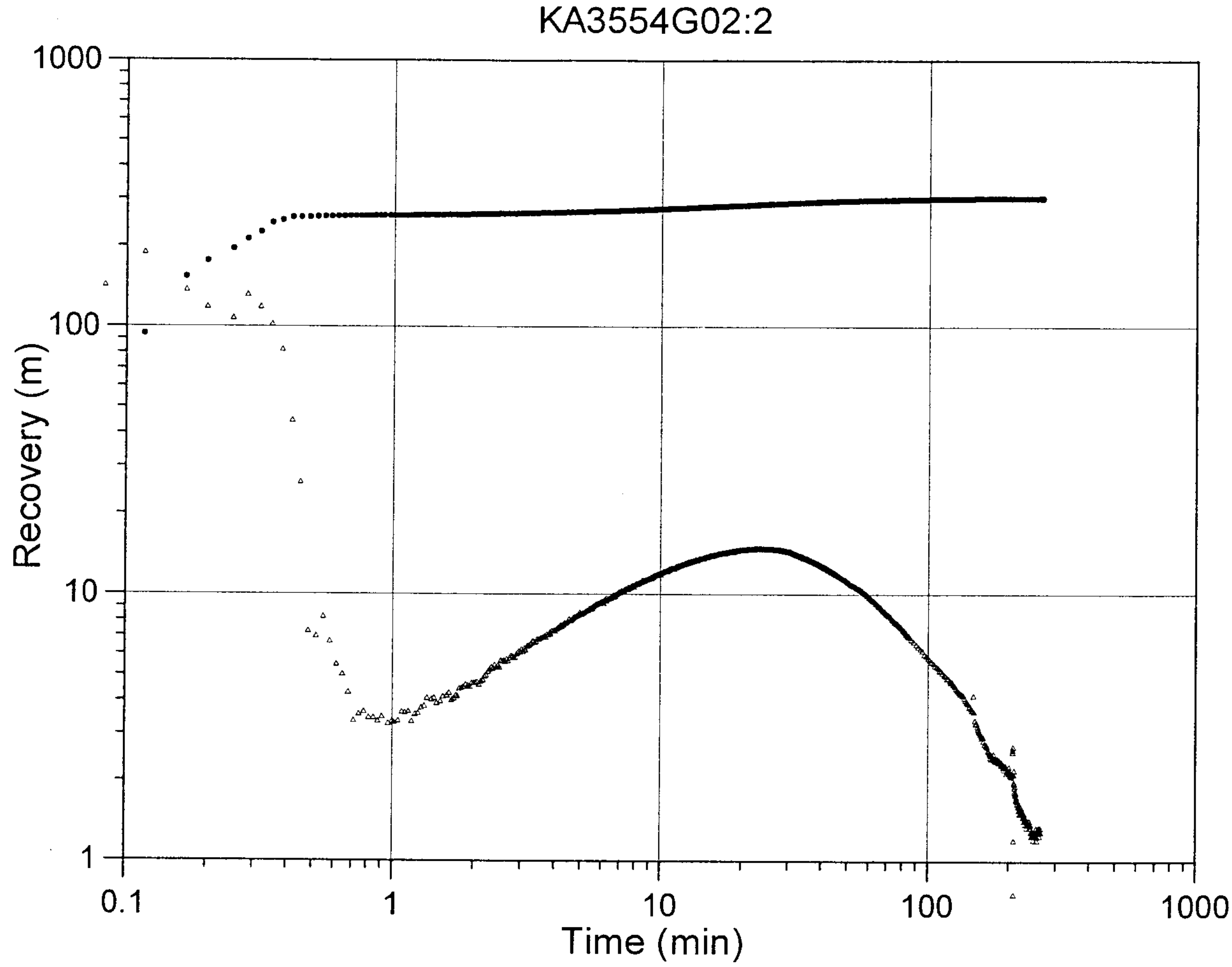
The test was performed as an Interference test. Pressure responses were monitored in 62 borehole sections.

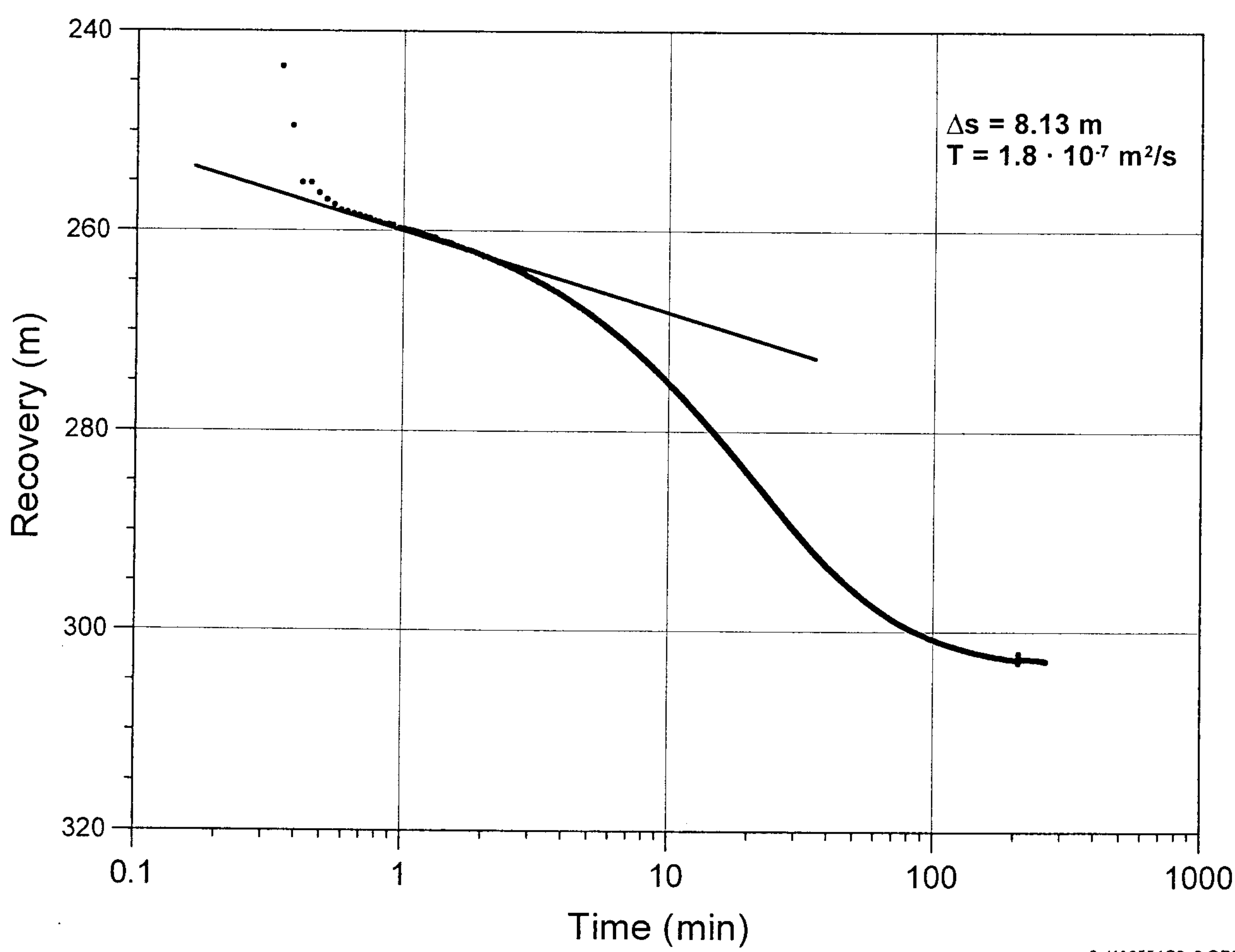
Flow data

Manually measured flow rates of KA3554G02, section 10.30 – 21.30 m are presented in the table below:

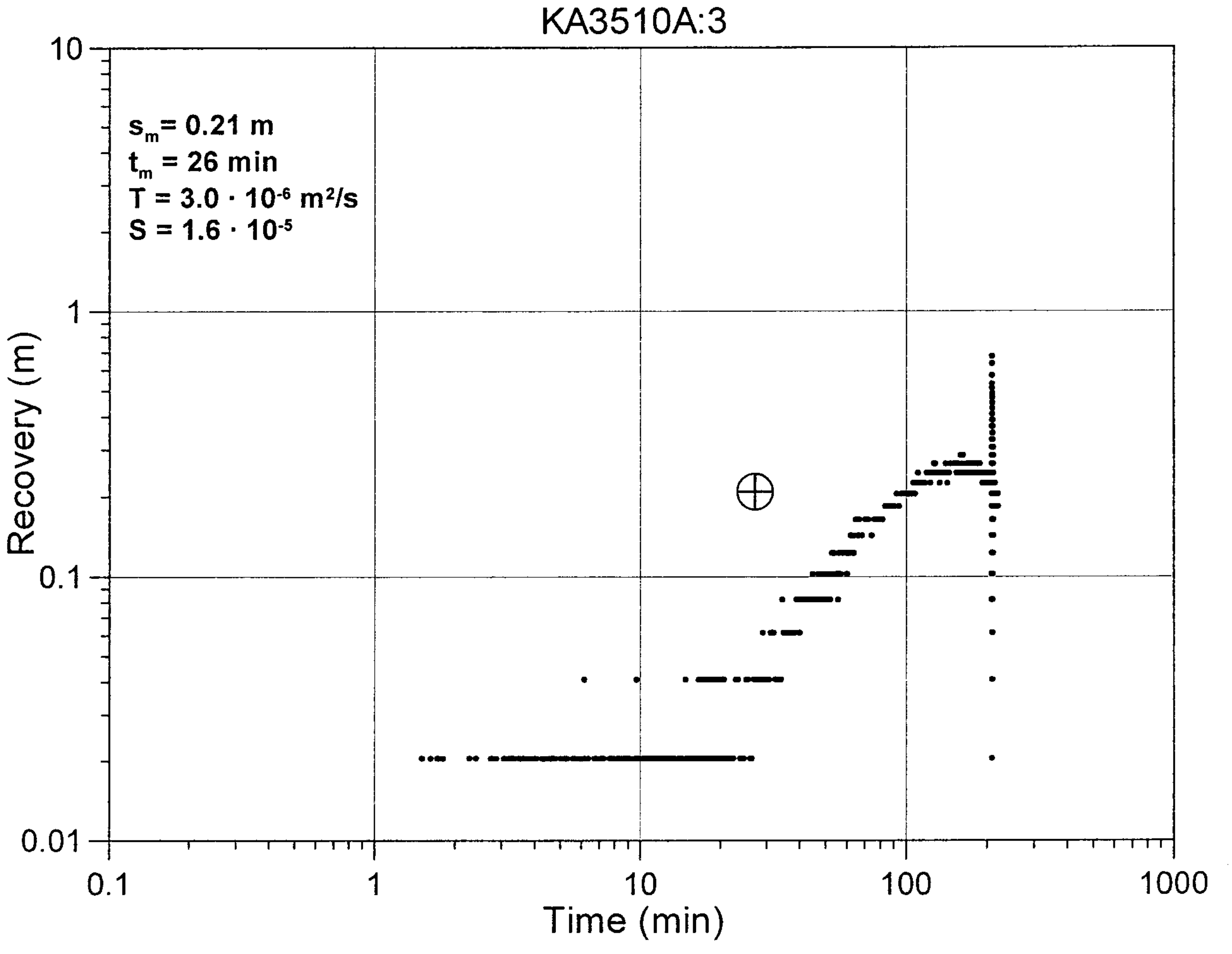
Table Manually measured flow rates, Interference test in KA3554G02, section 10.30 – 21.30 m (test #09). Prototype repository, August 1999.

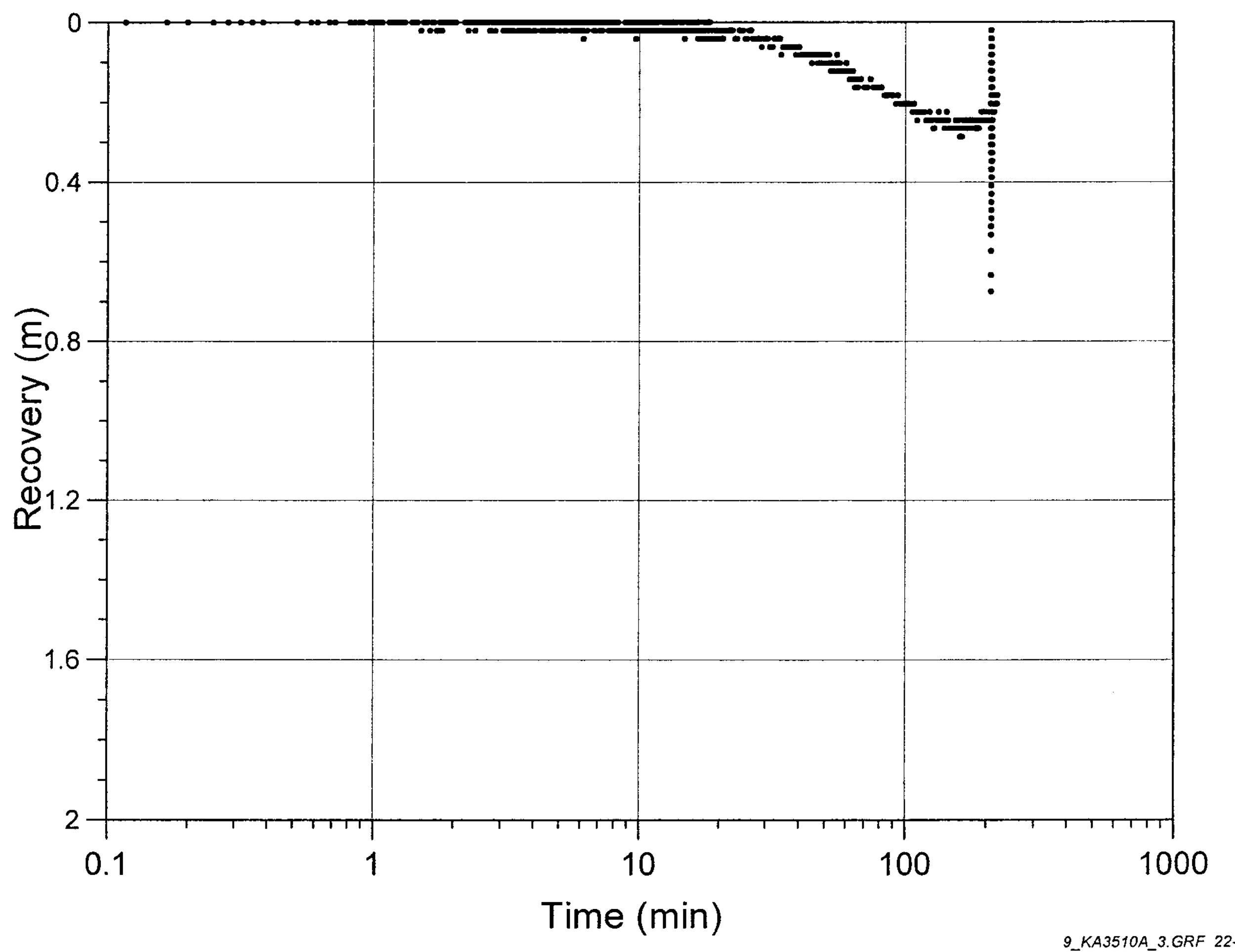
Time	Flow rate (l/min)
11:02.37	0.652
11:04.07	0.549
11:07.37	0.528
11:15	0.519
11:30	0.509
11:45	0.501
12:05	0.499
16:52	0.482
16:57	0.484
17:03	0.482





9_KA3554G2_2.GRF 27-okt-99





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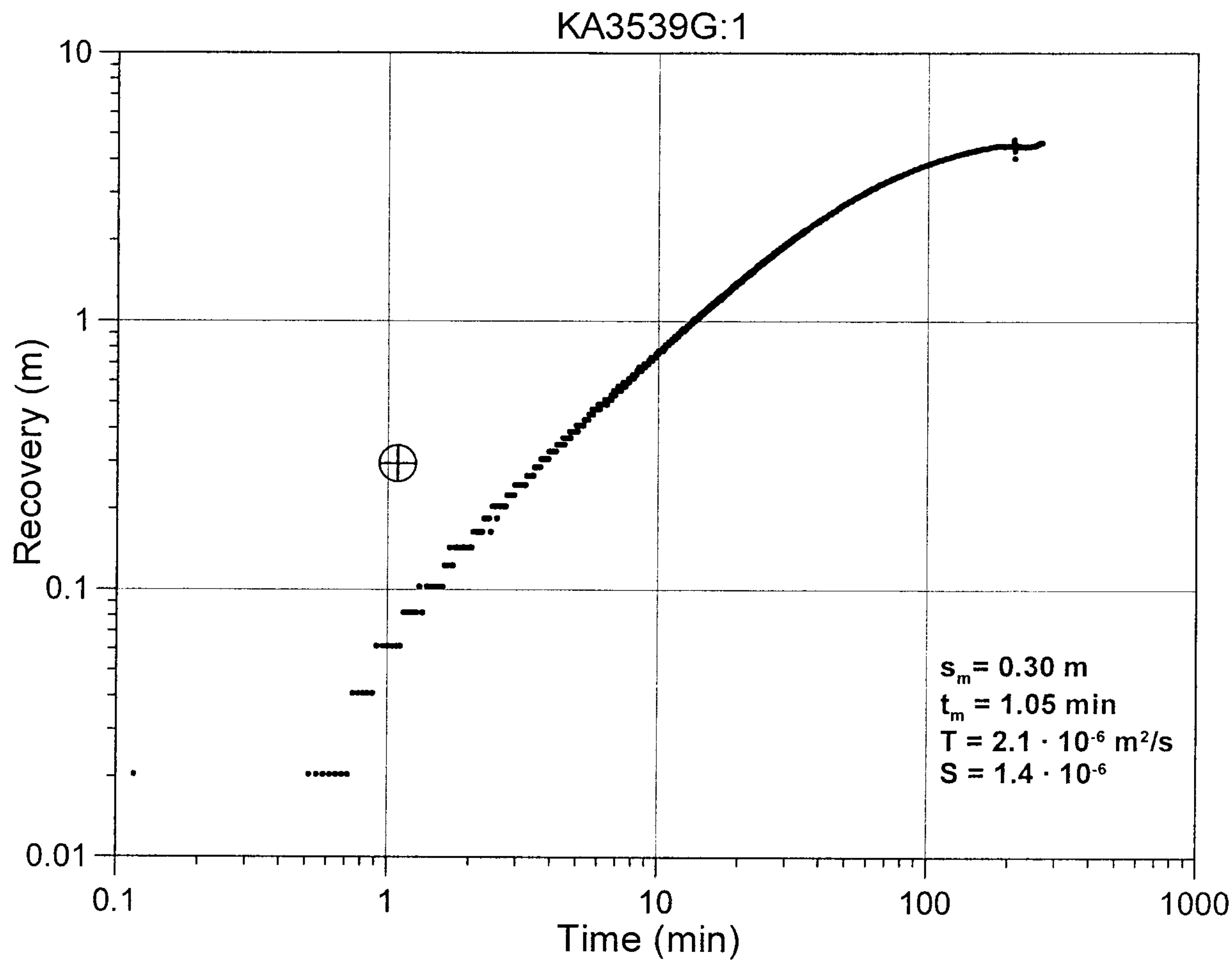

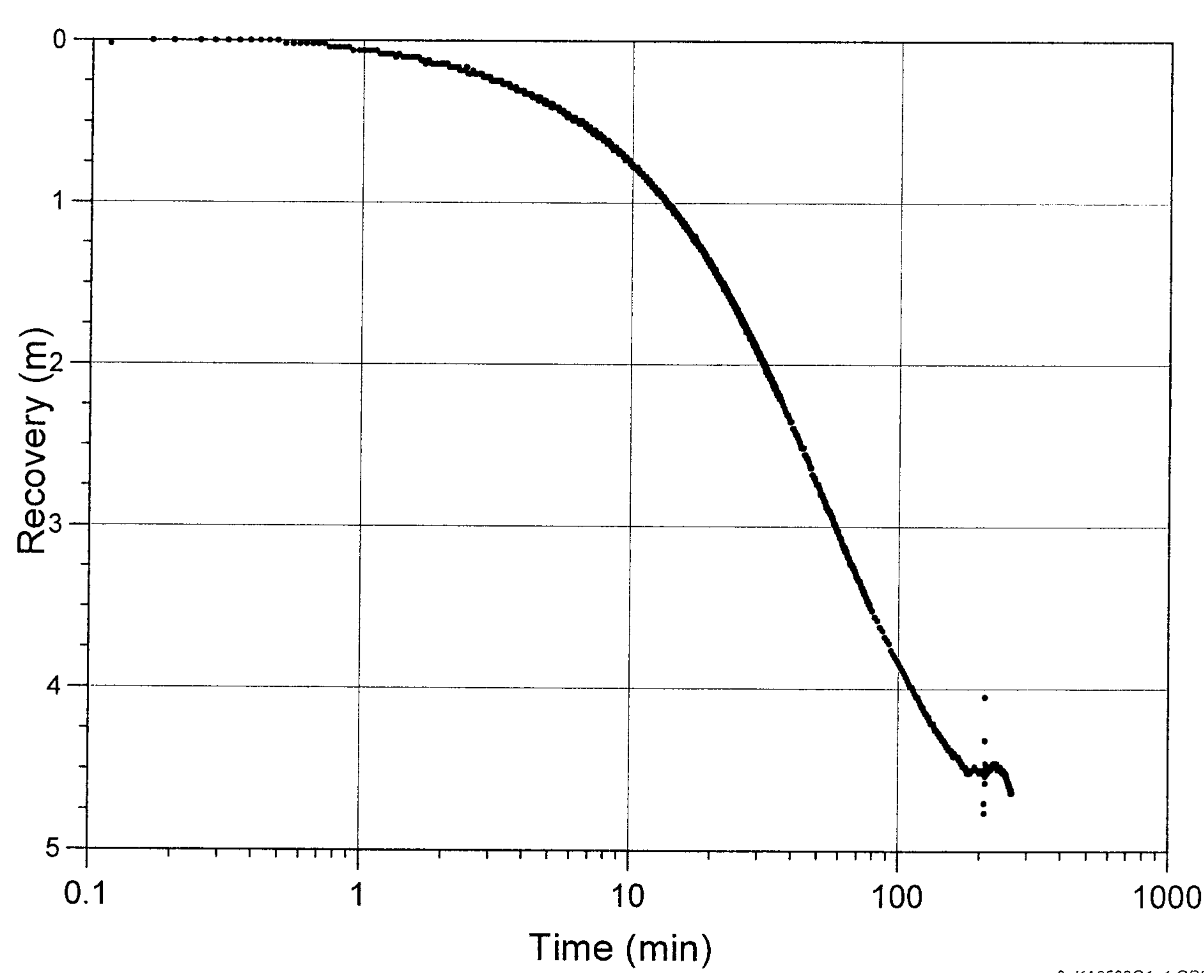

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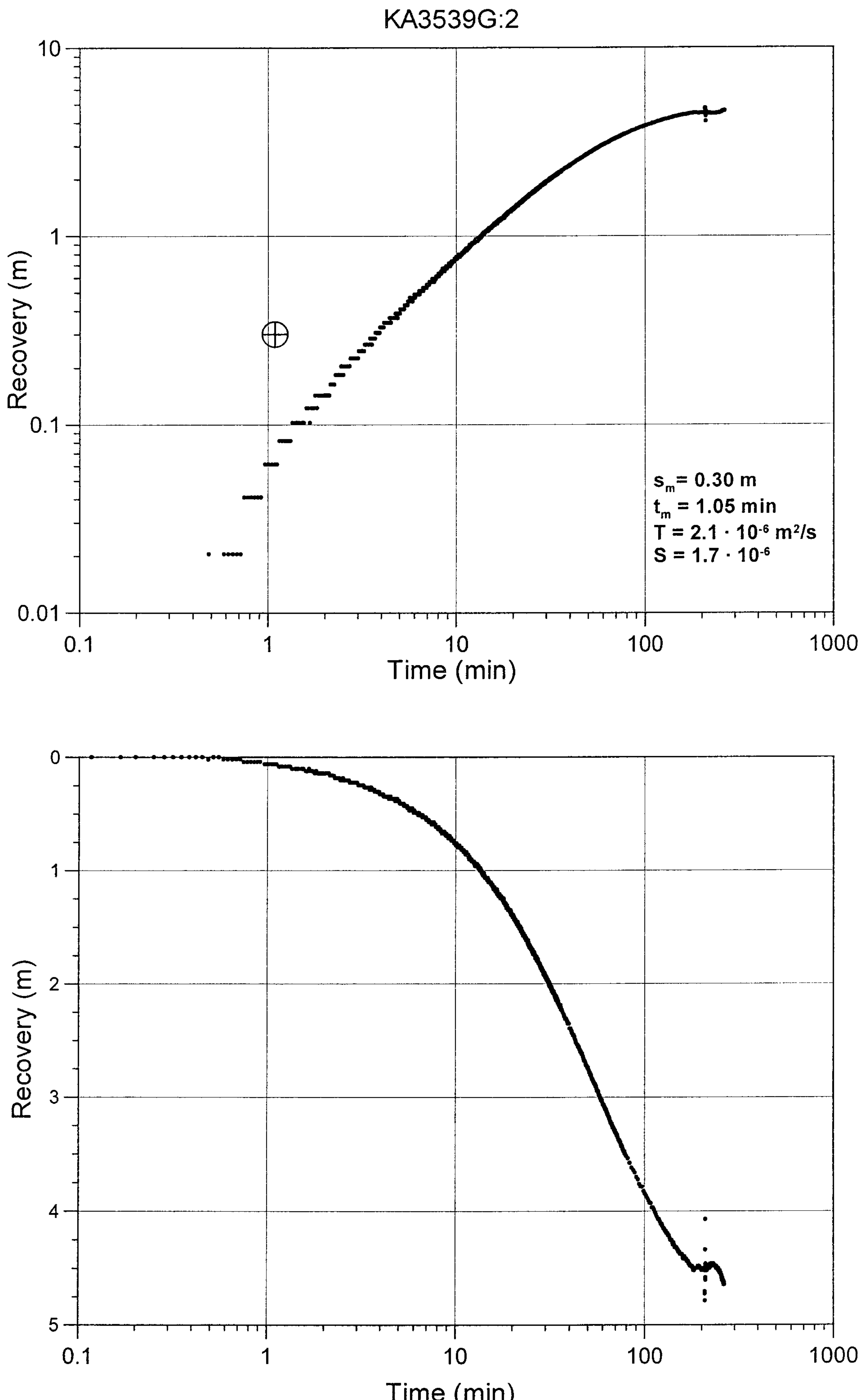

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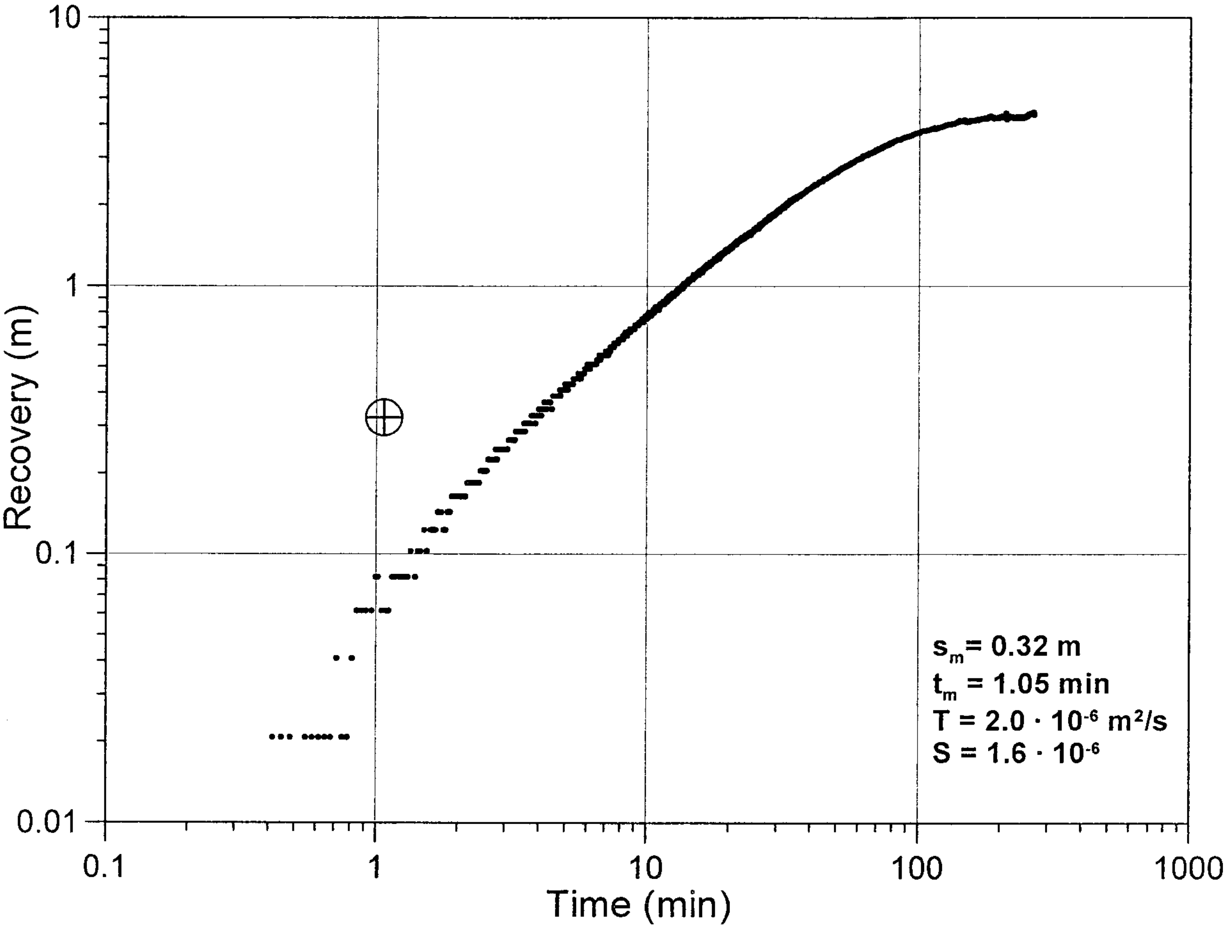

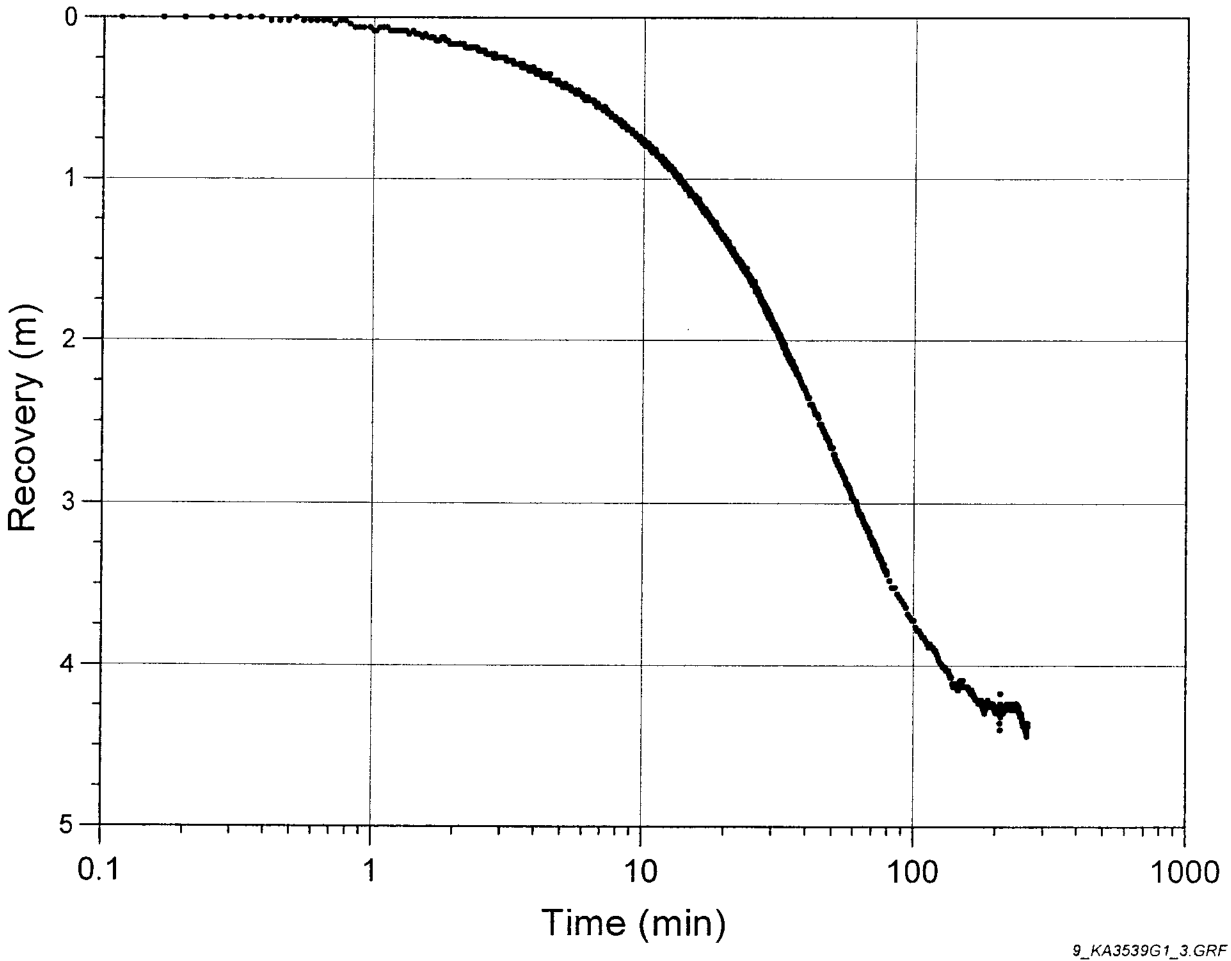

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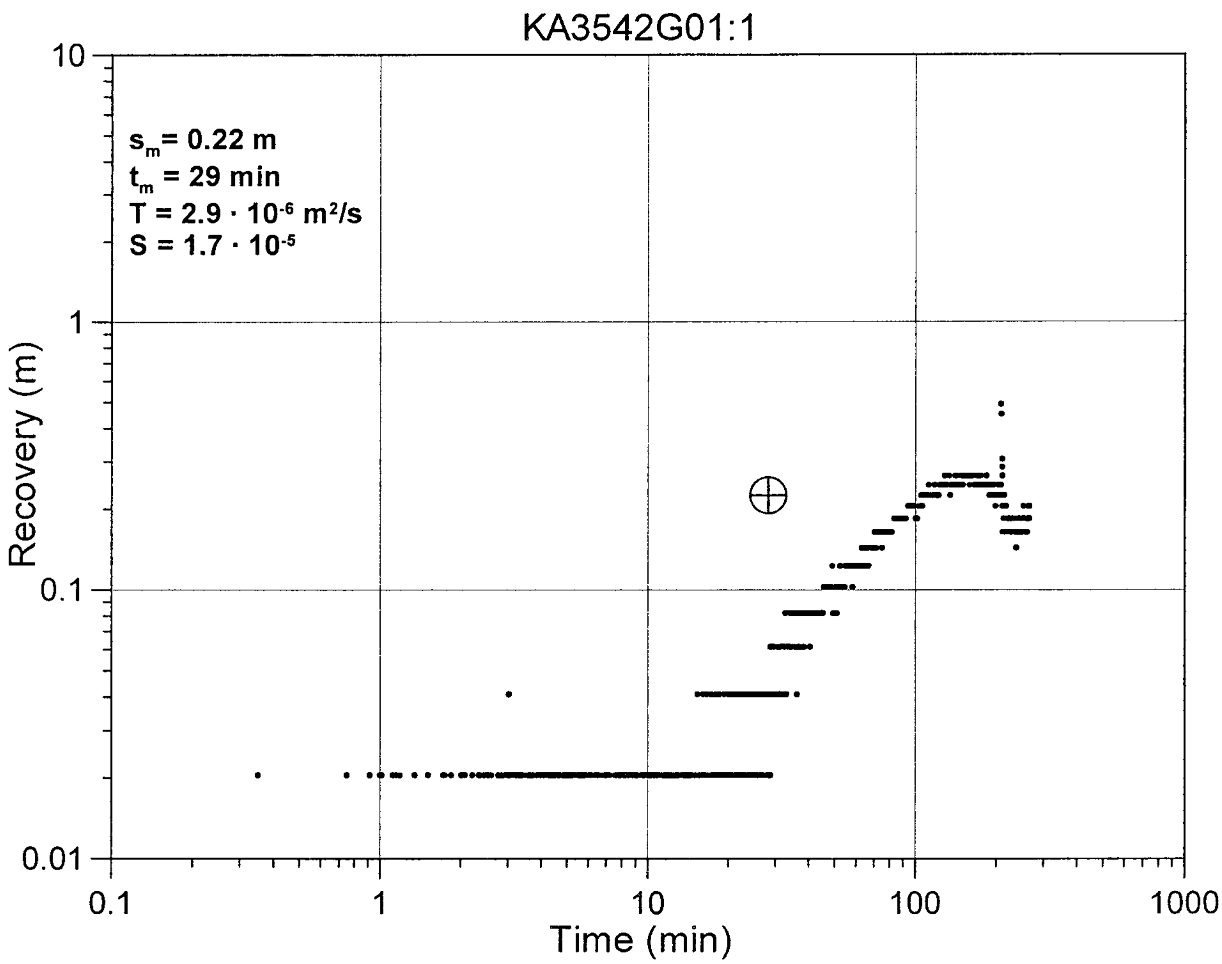

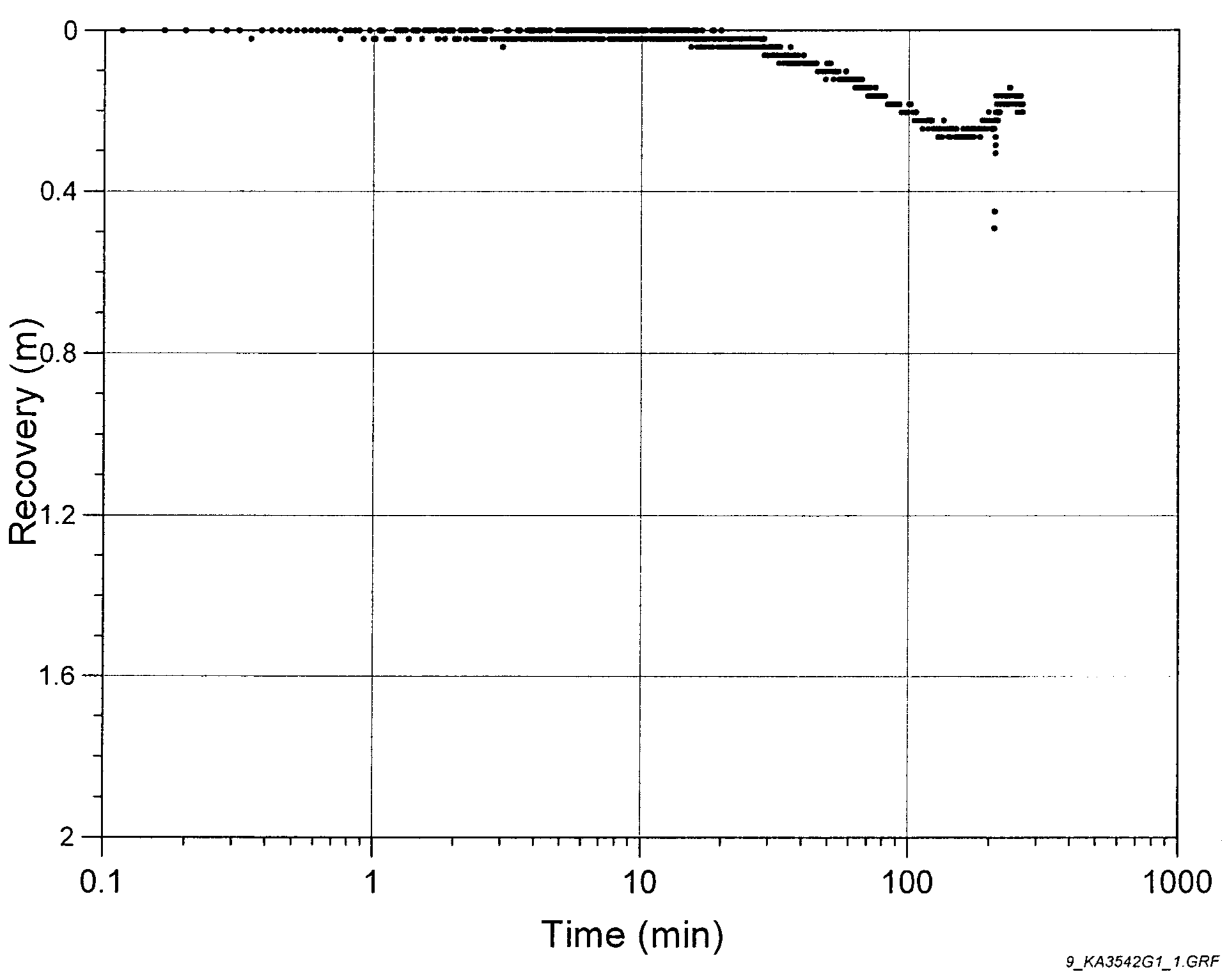

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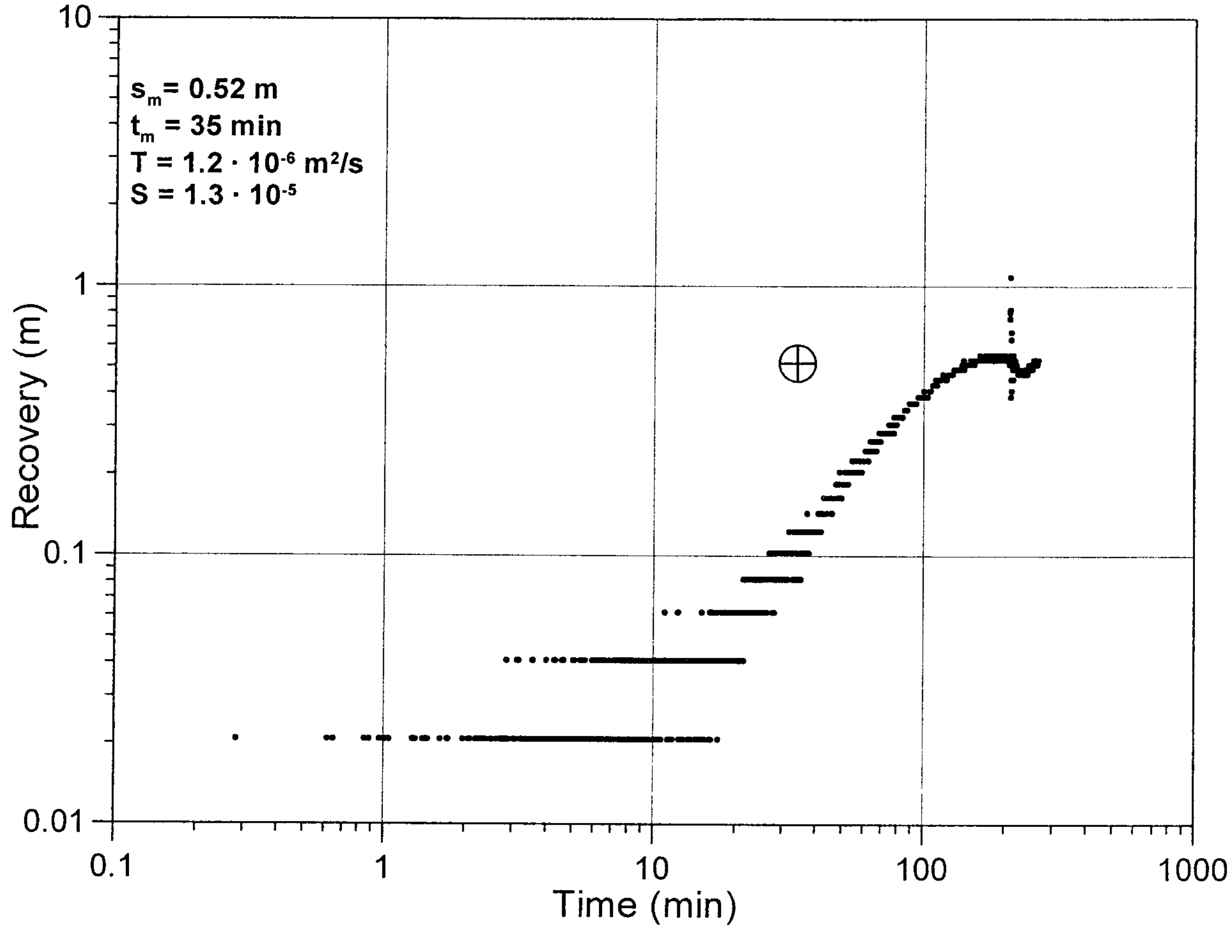

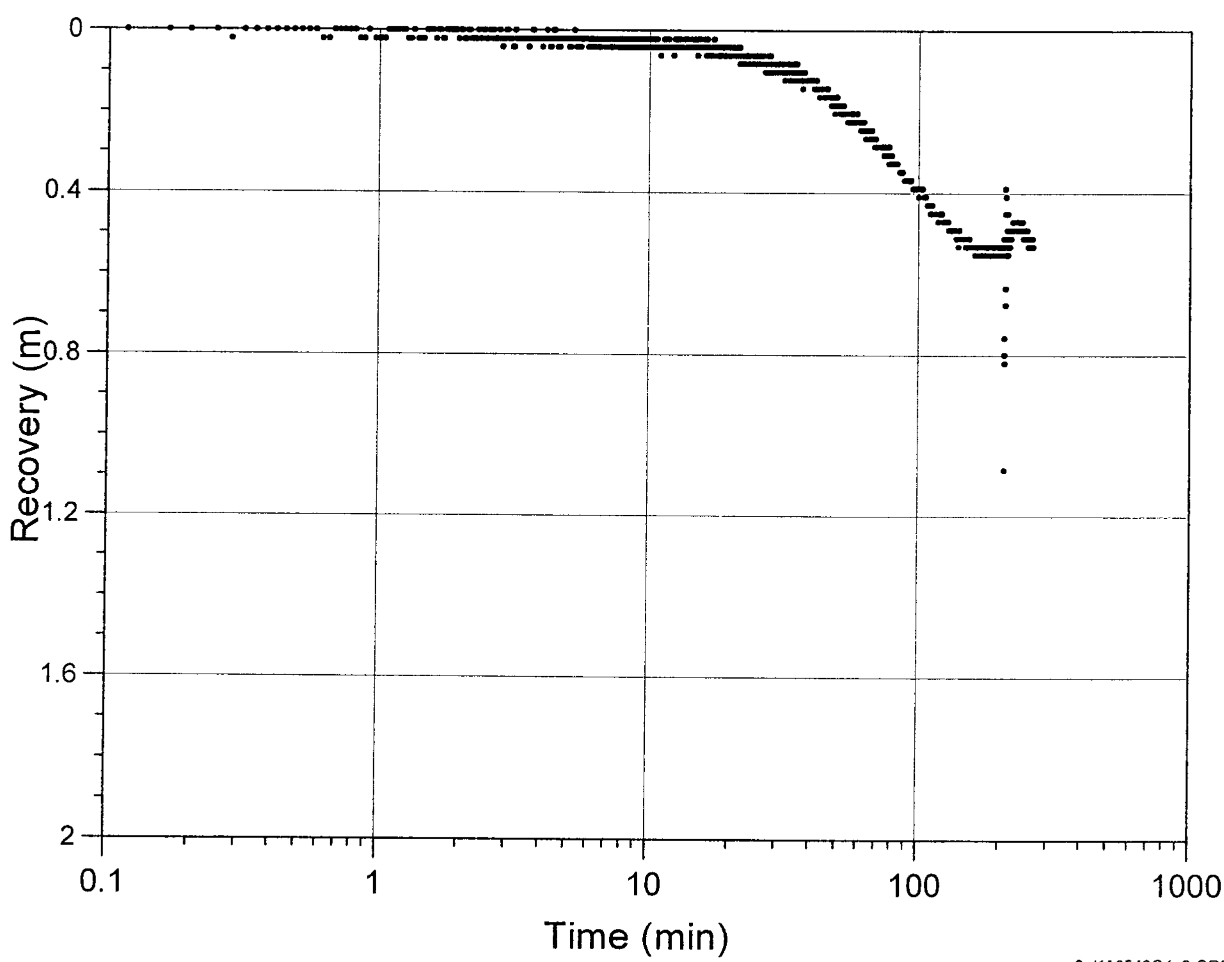

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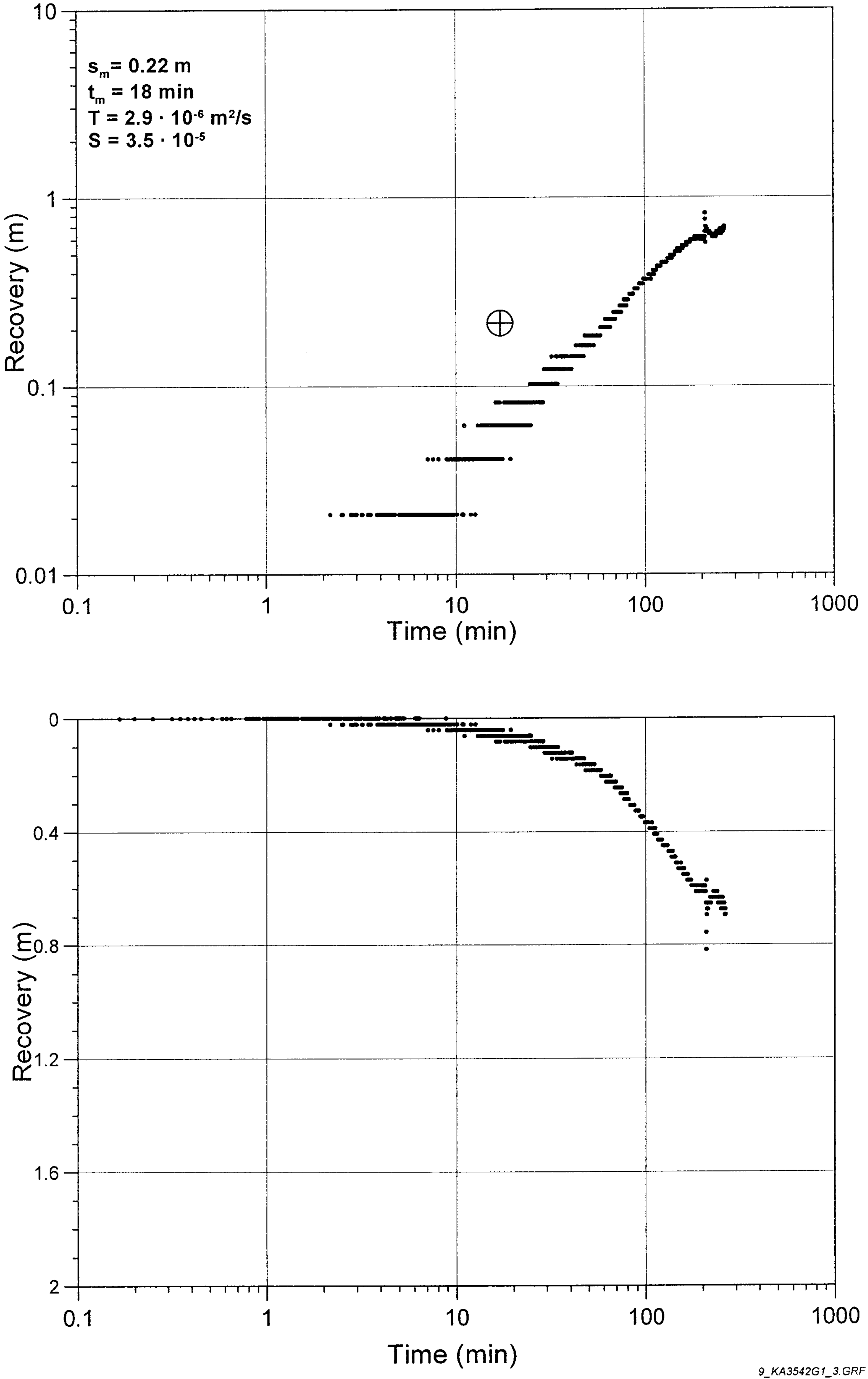

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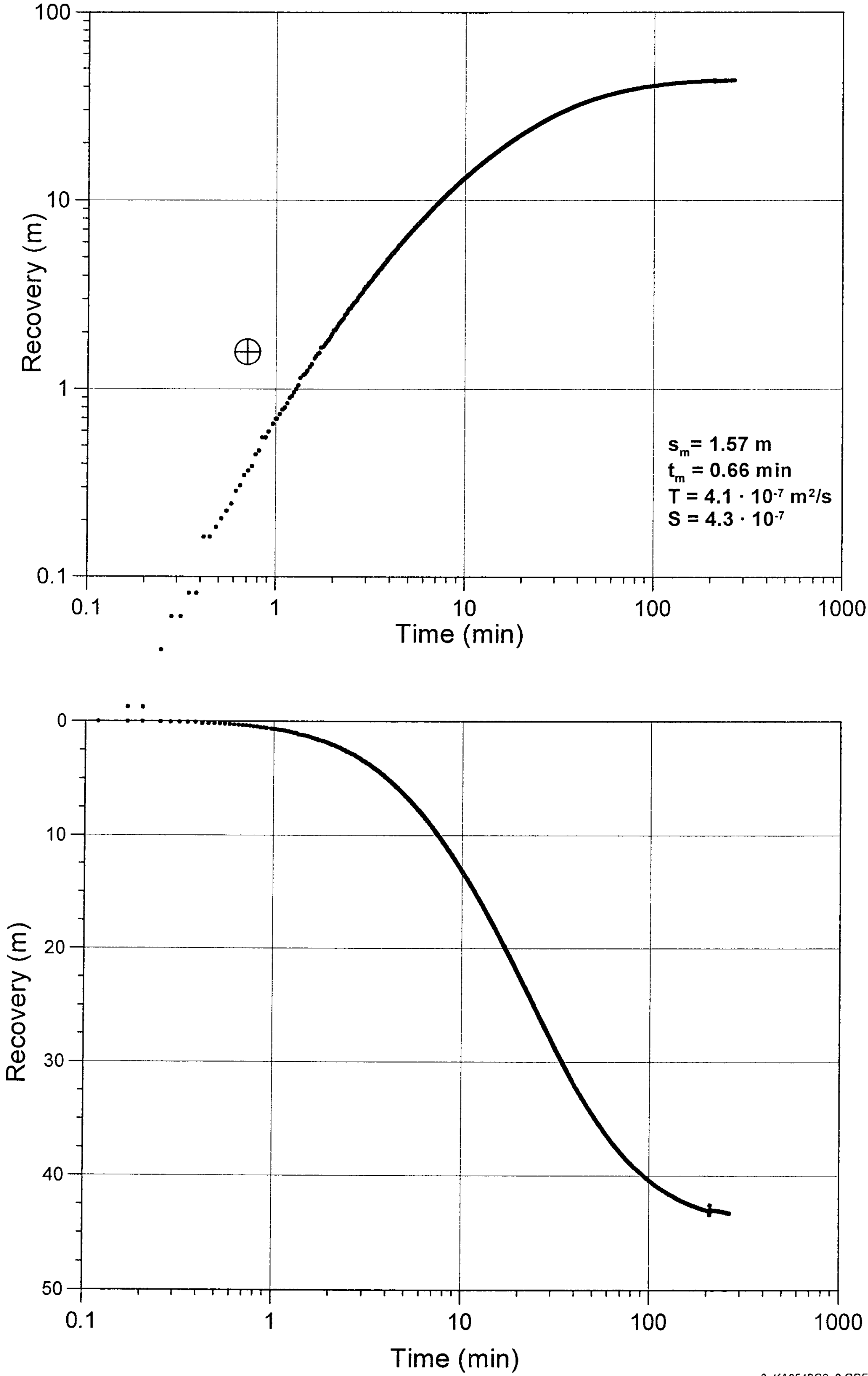

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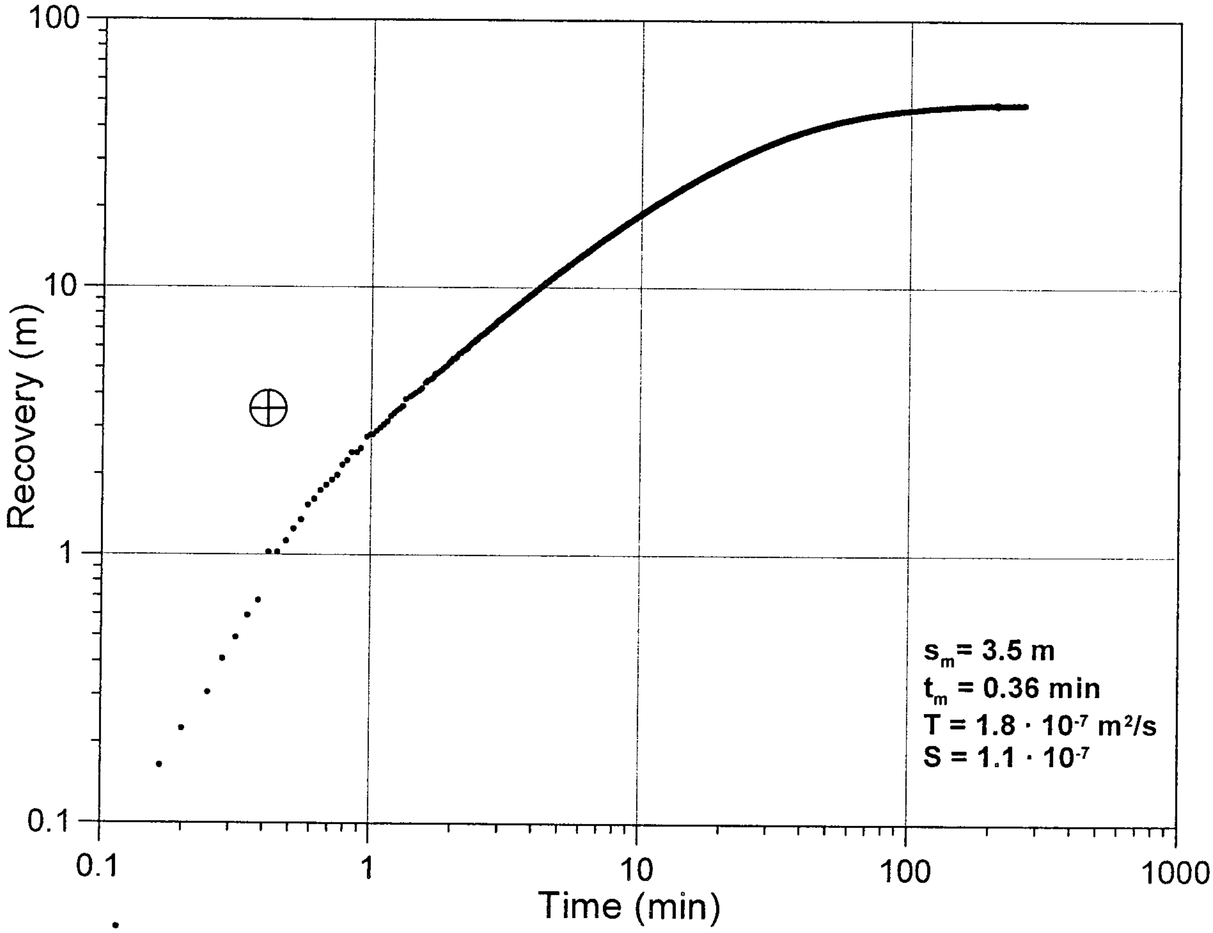

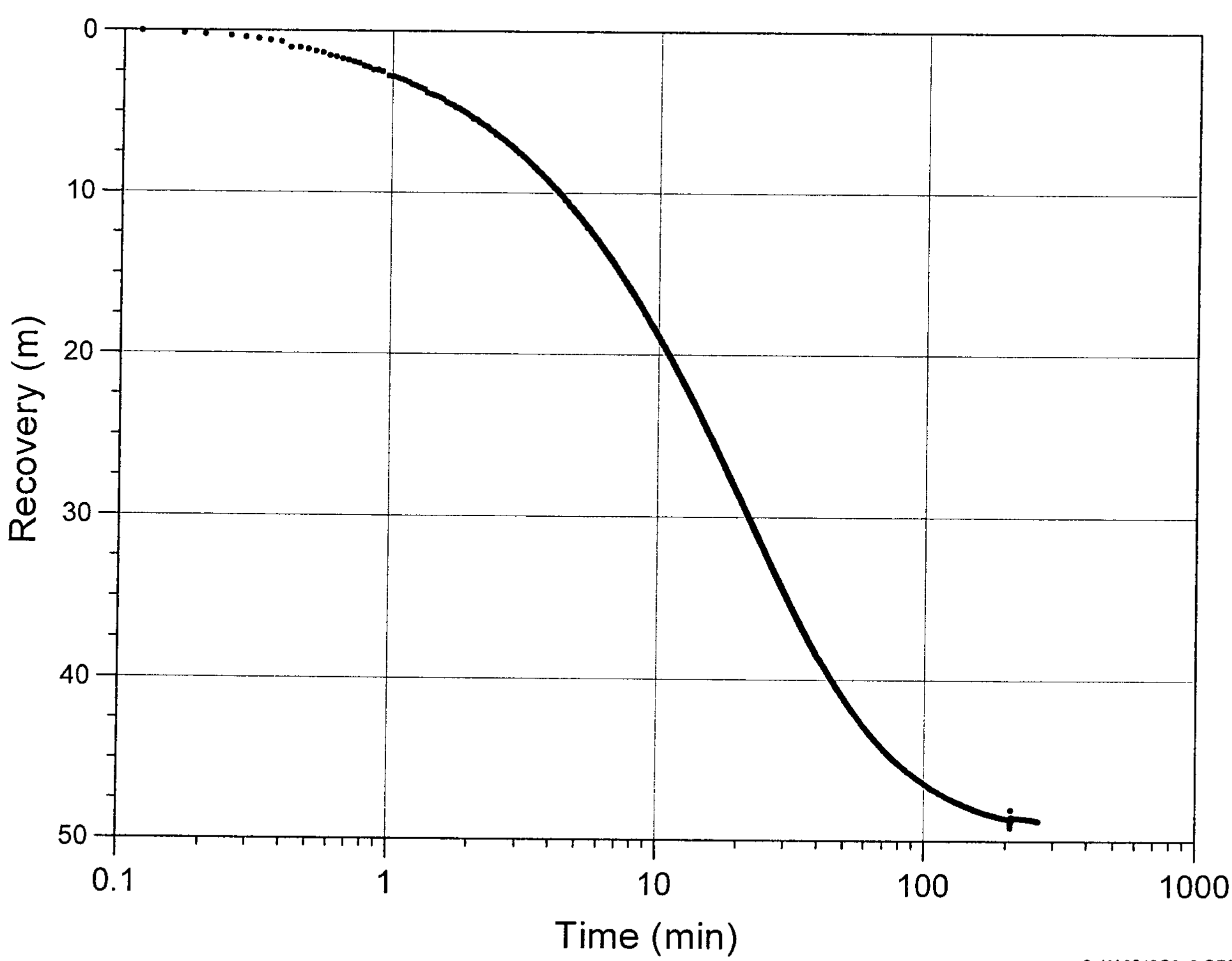

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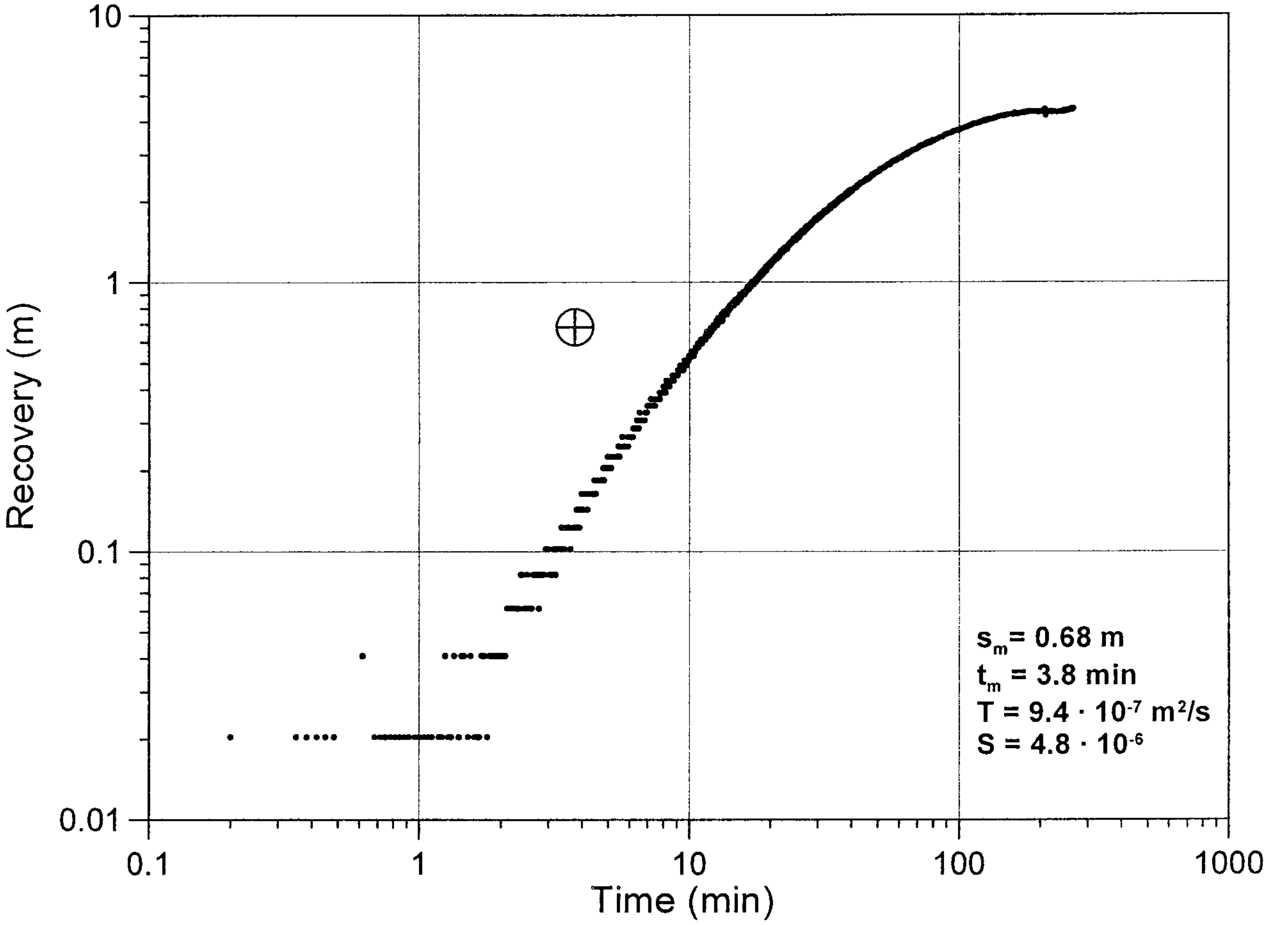

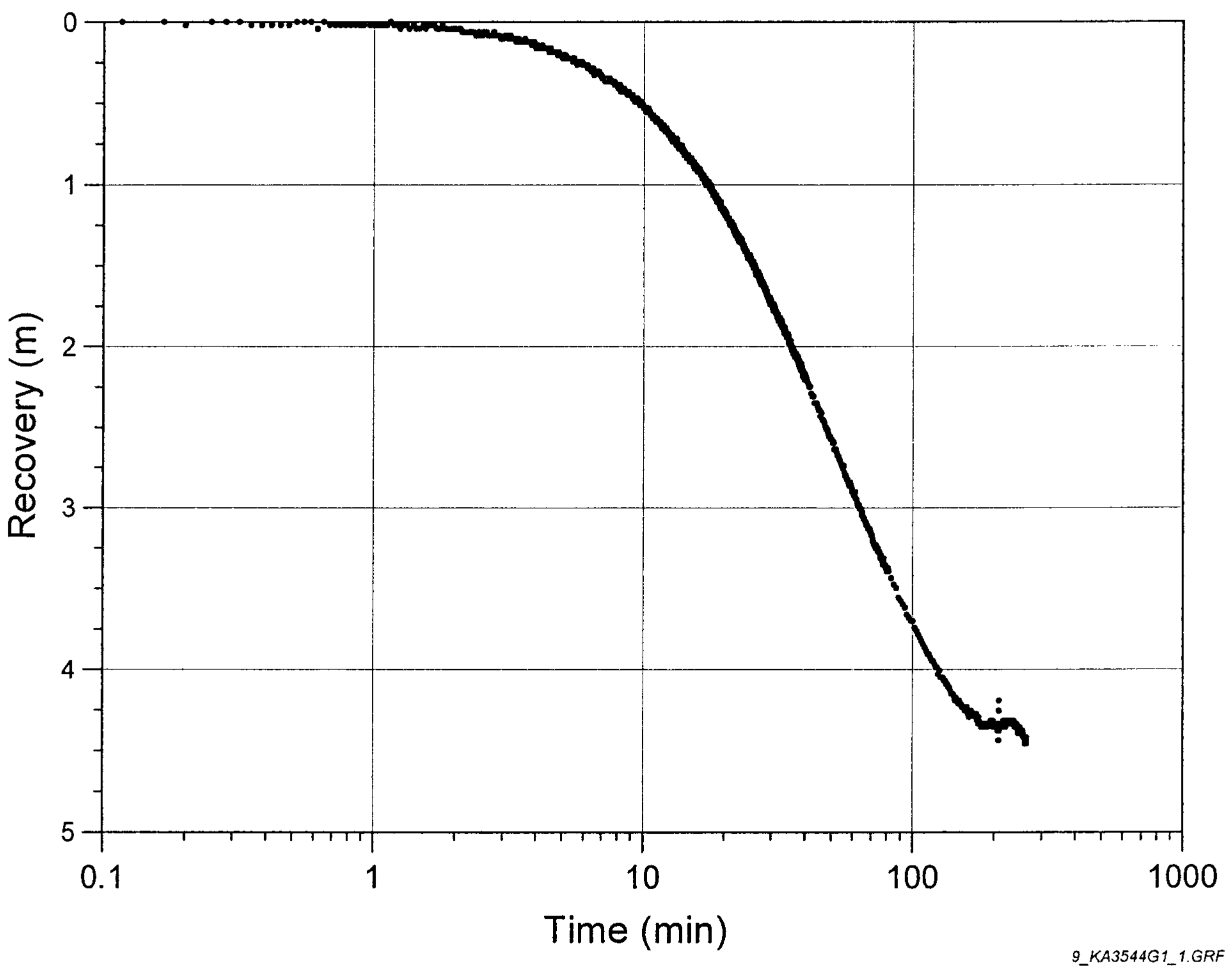

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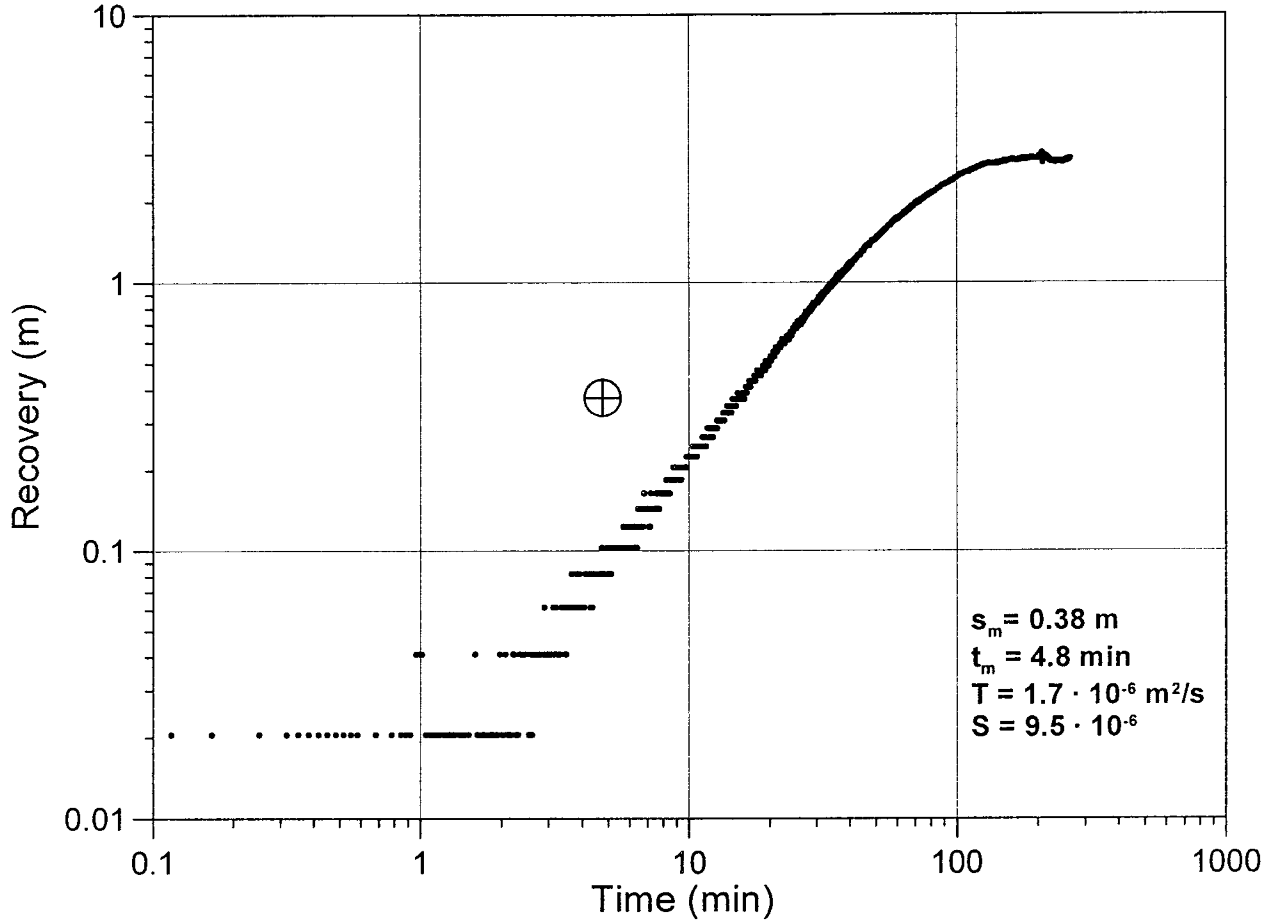

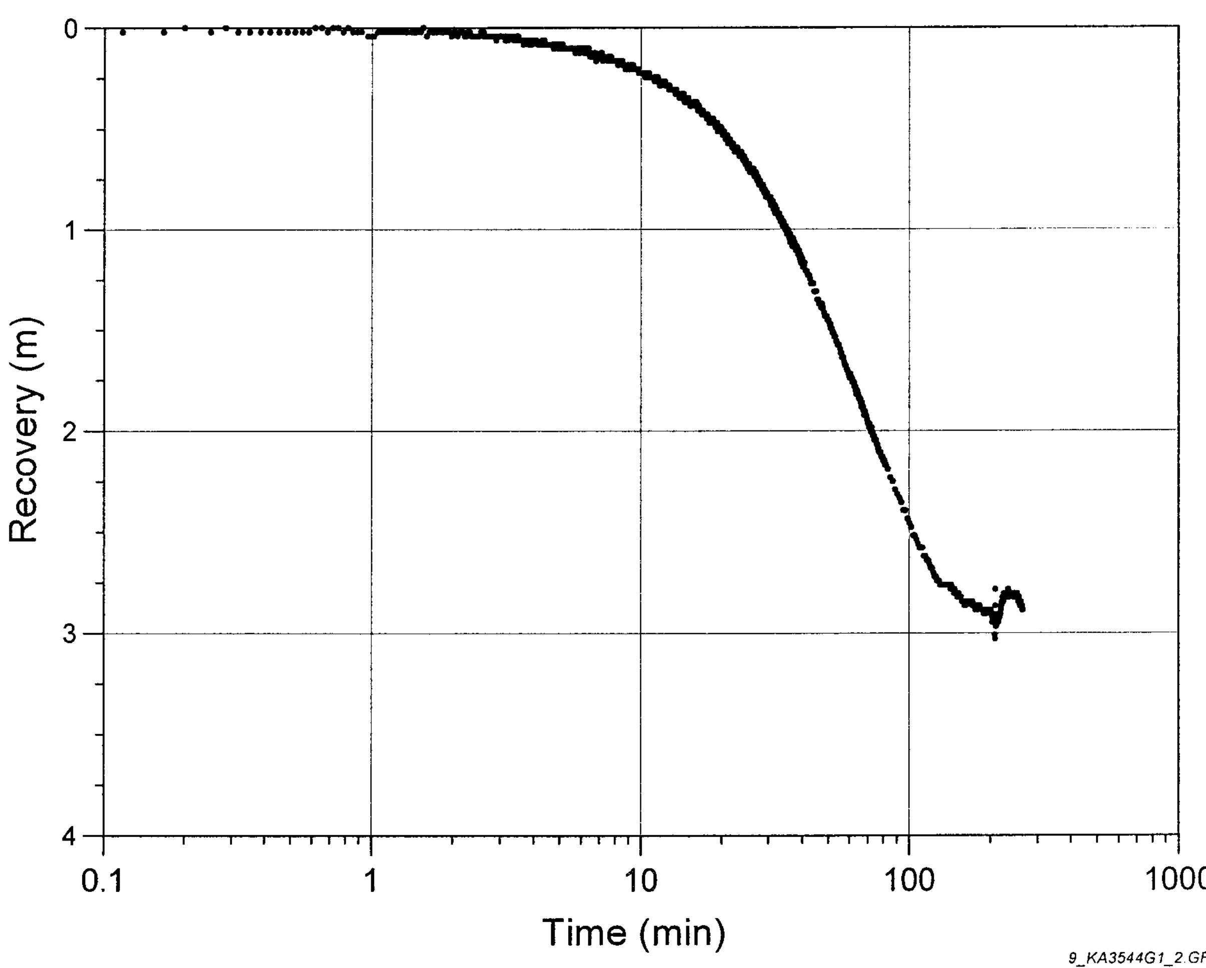

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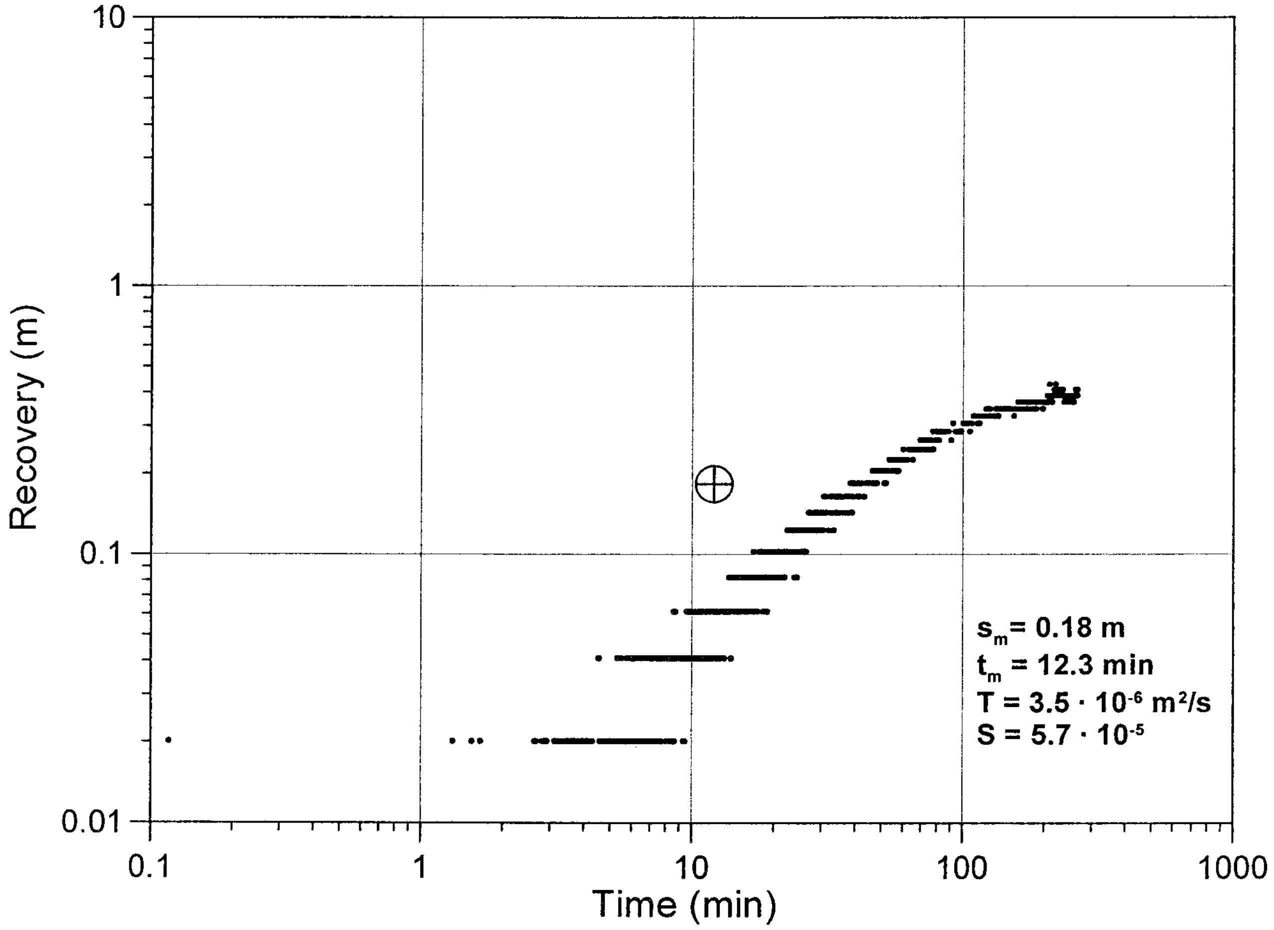

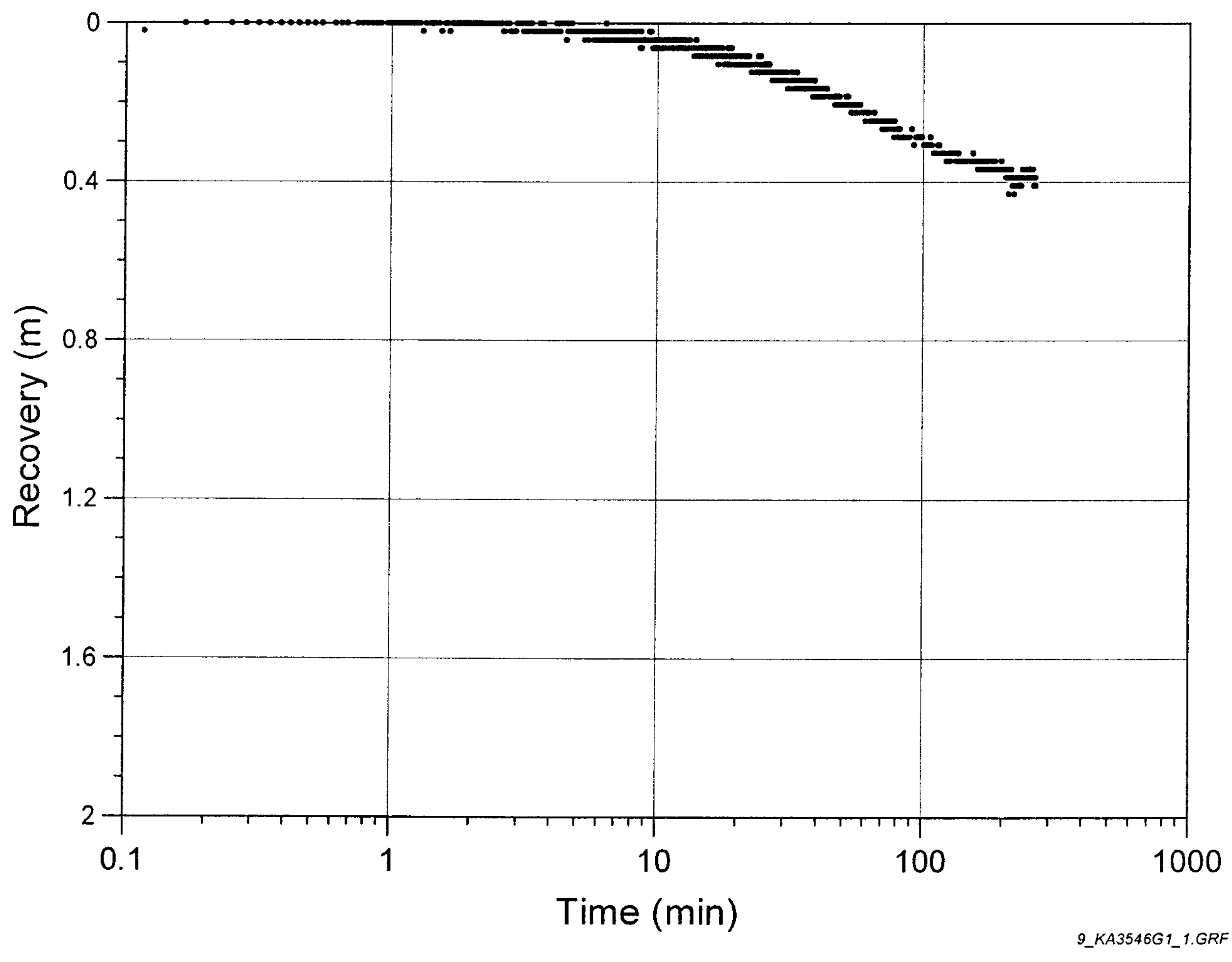

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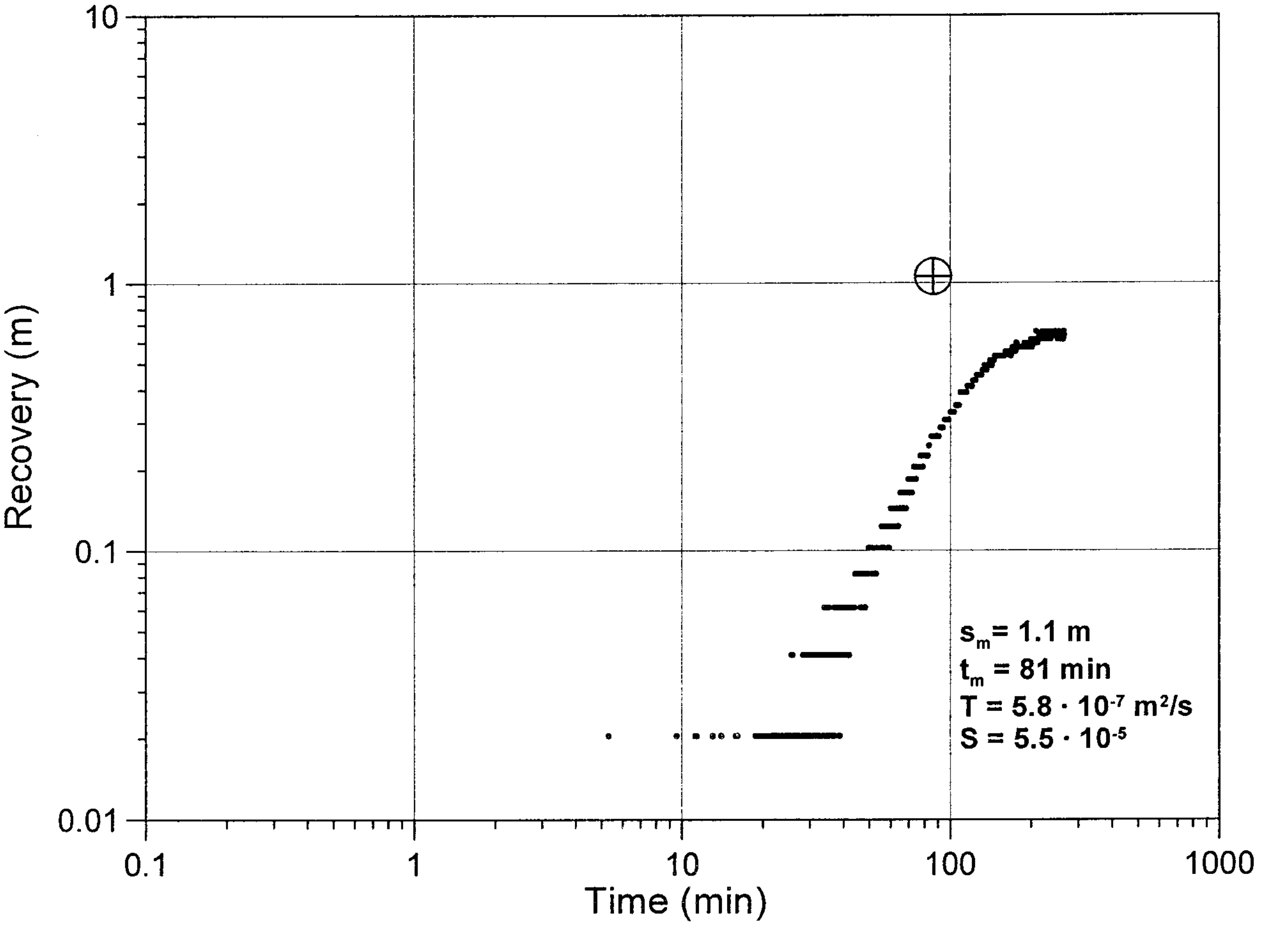

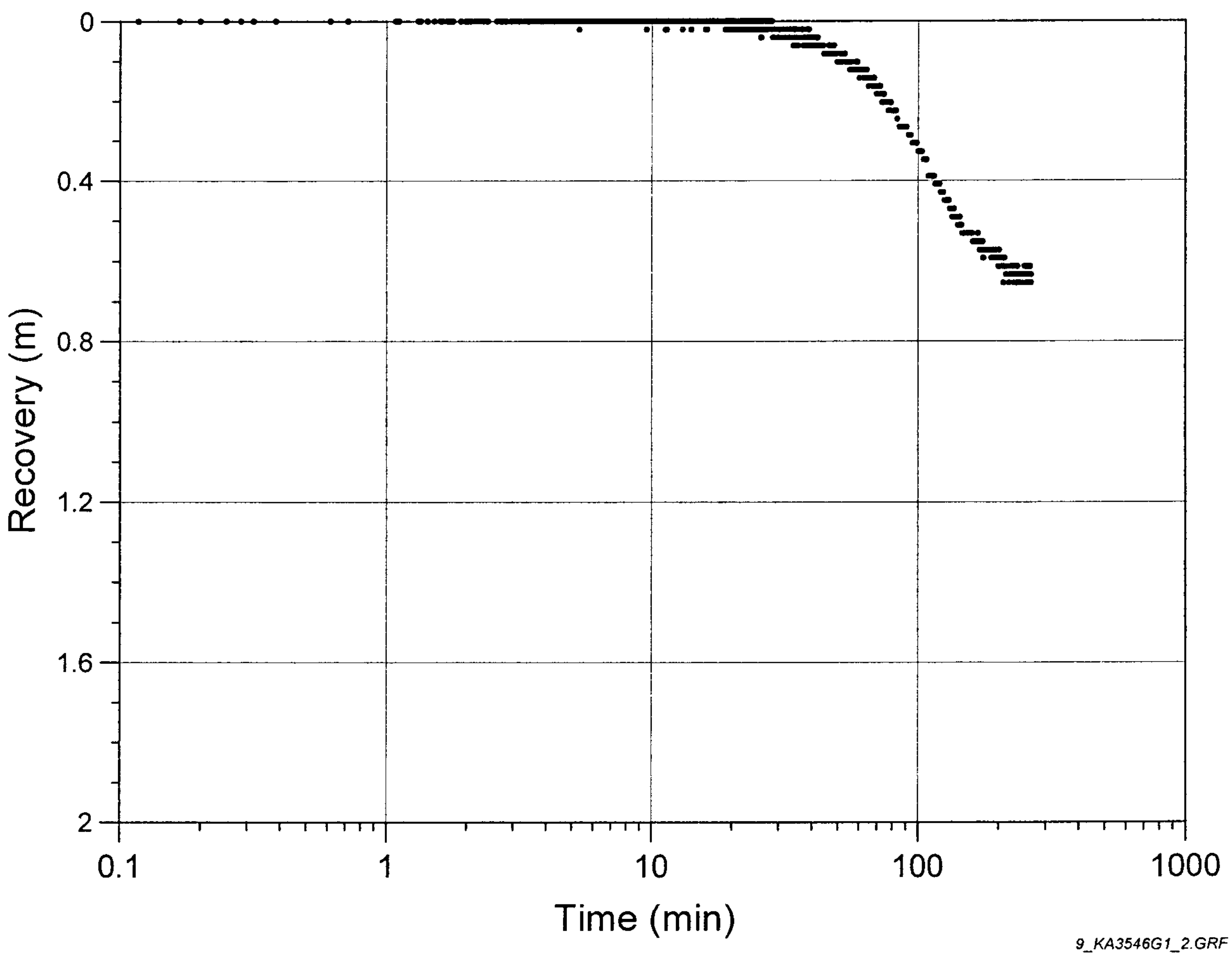

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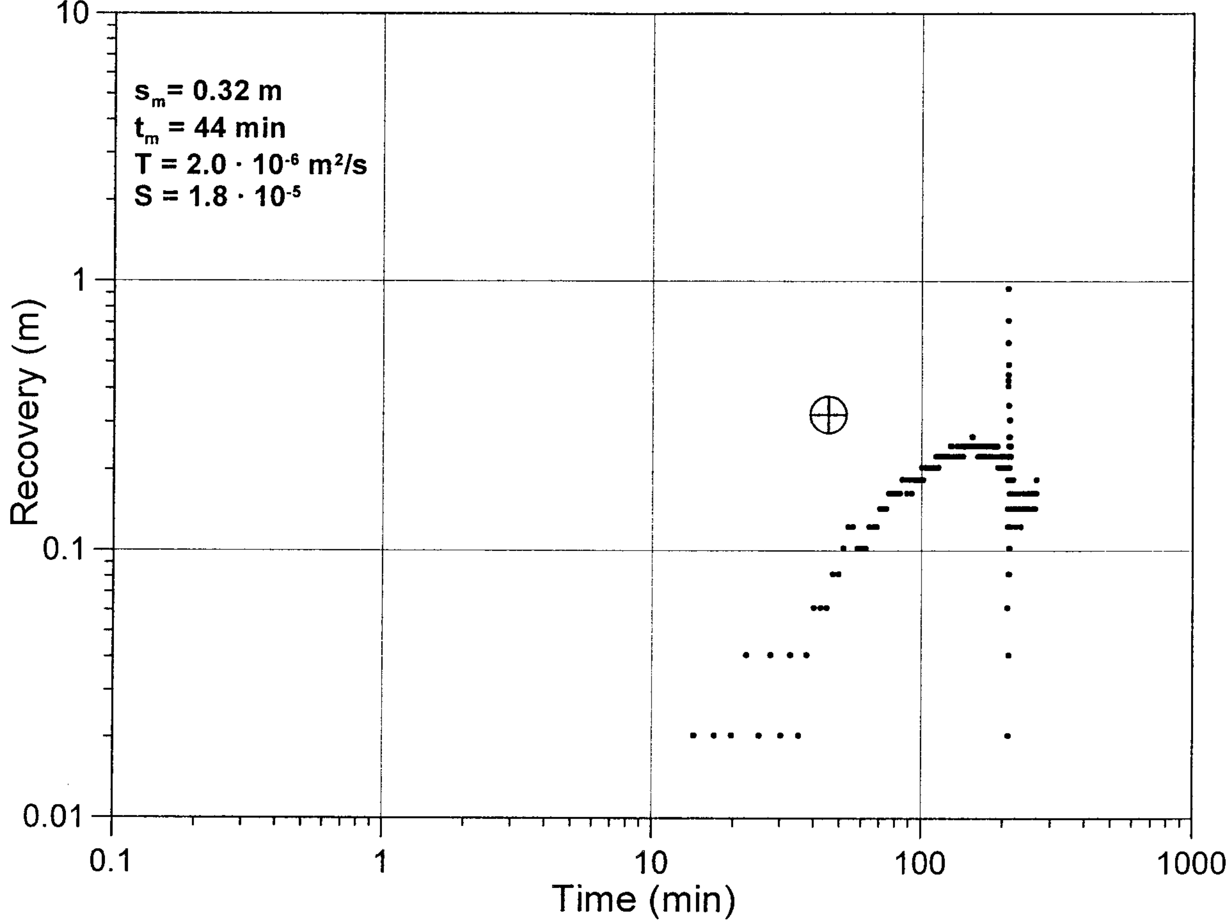

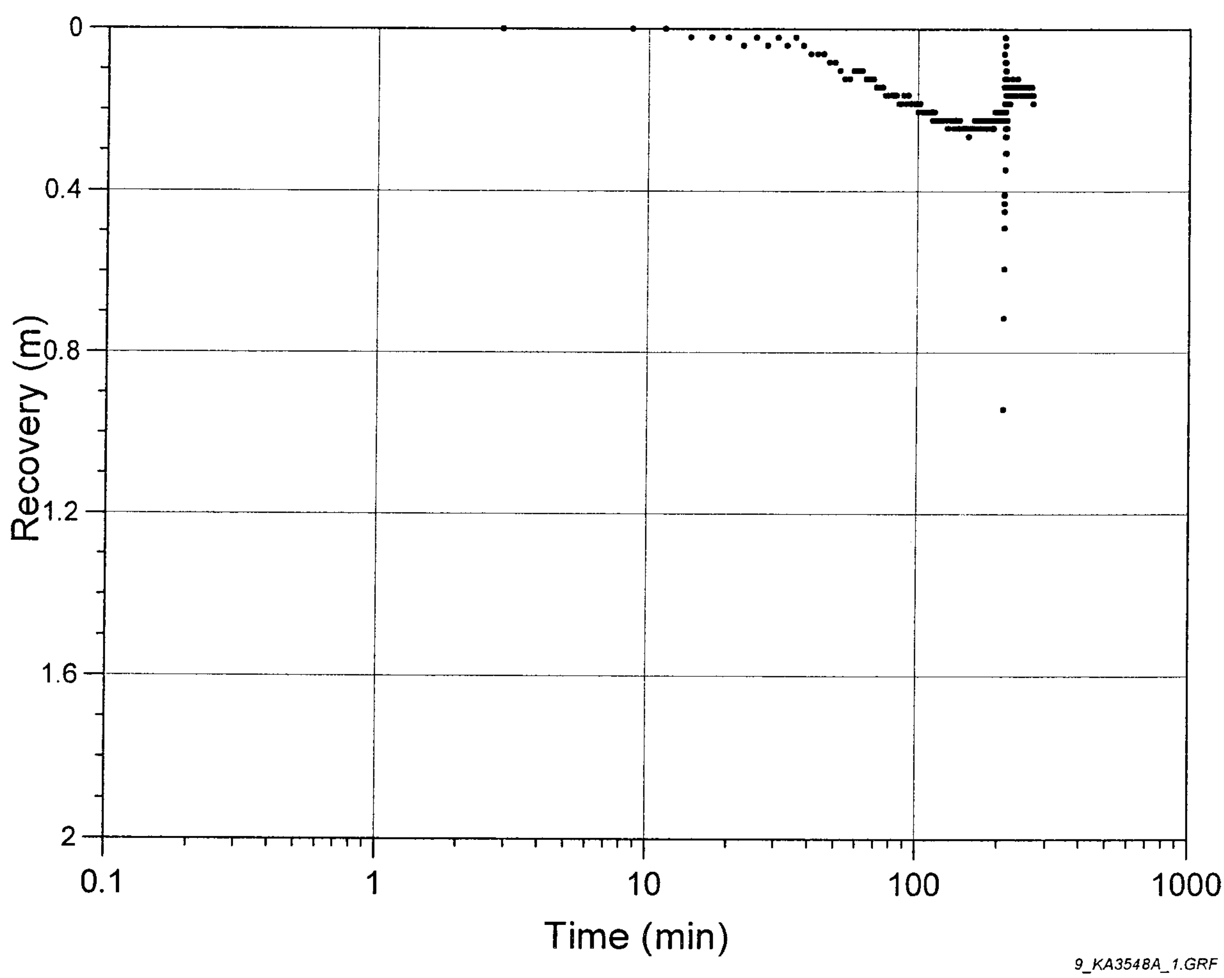

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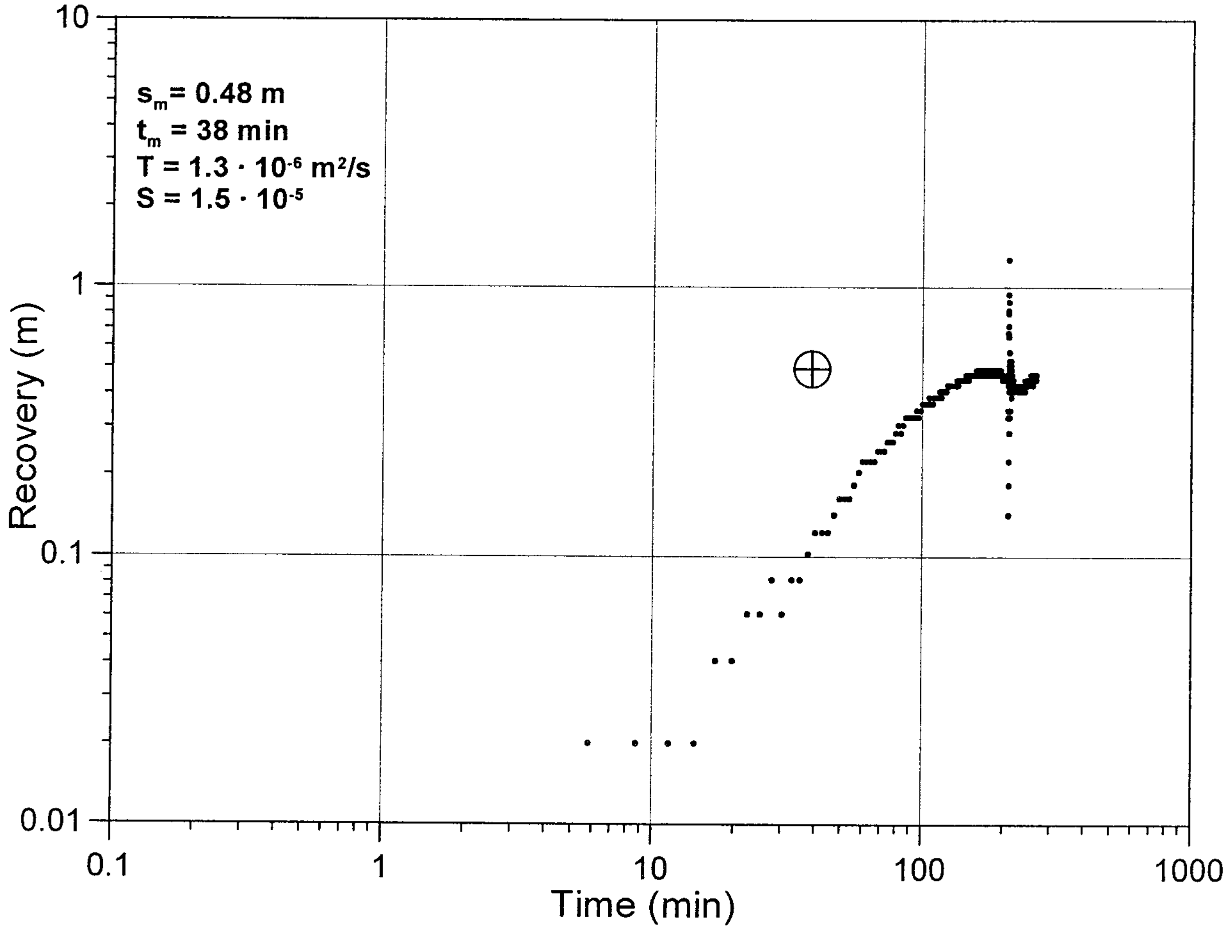

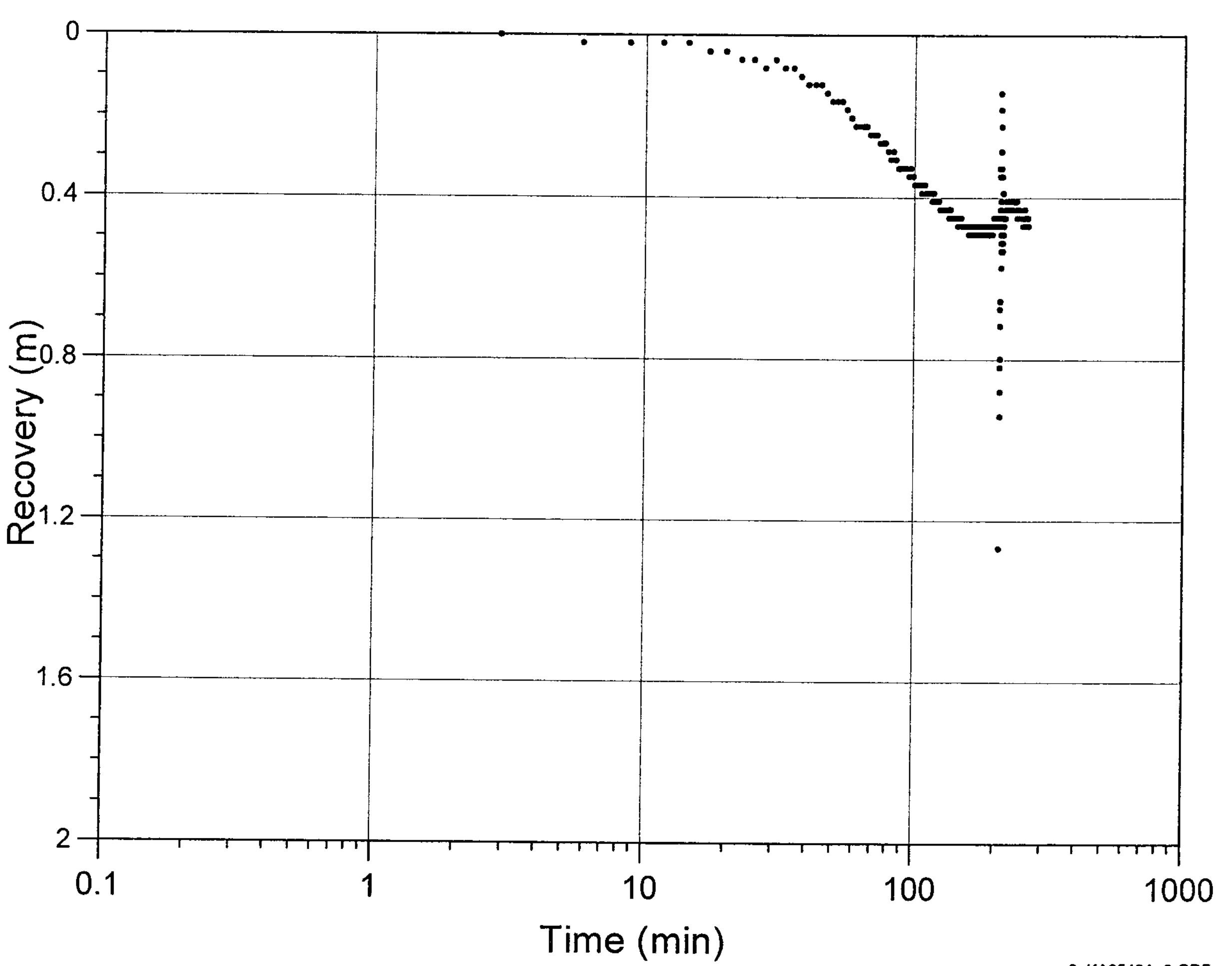

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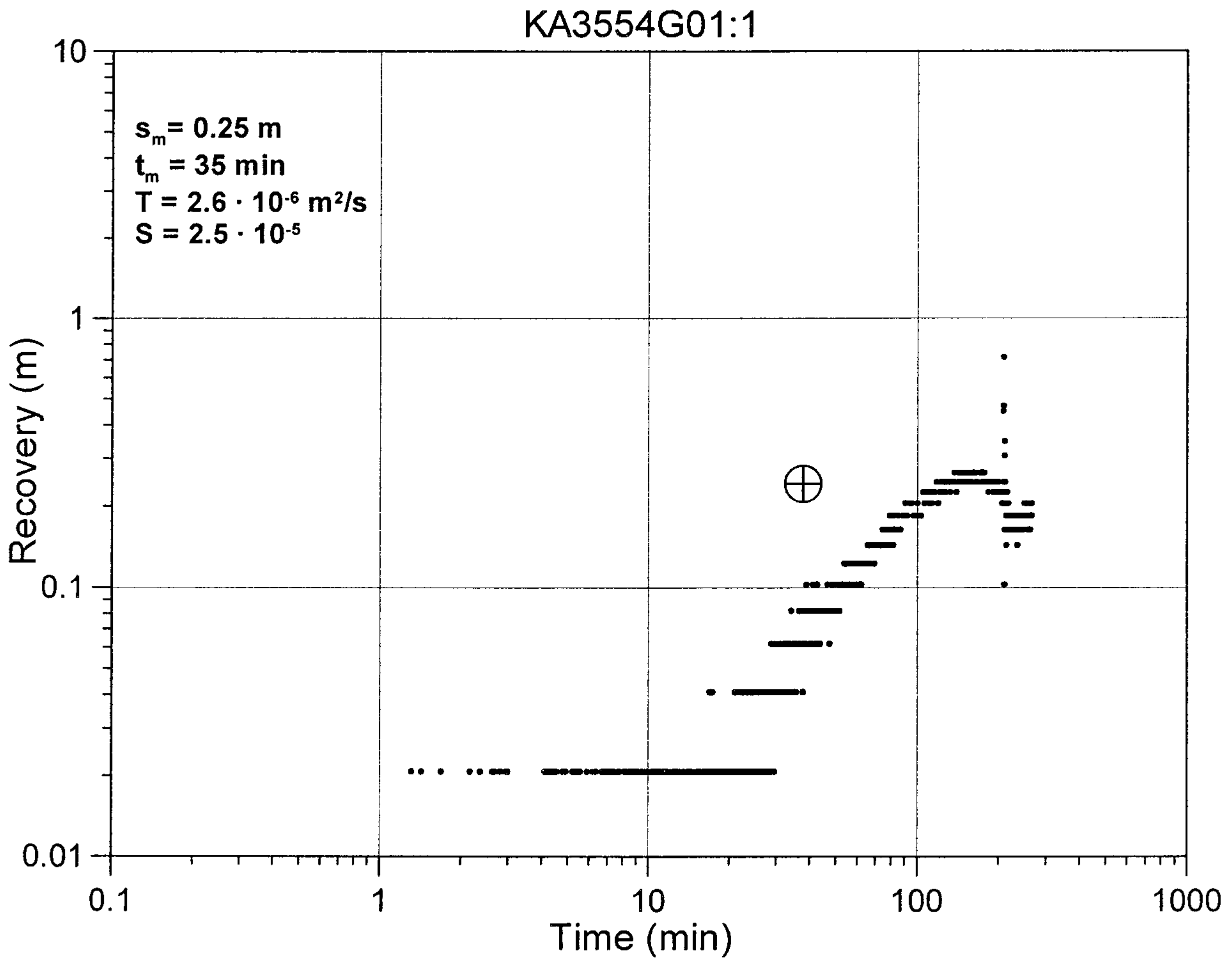

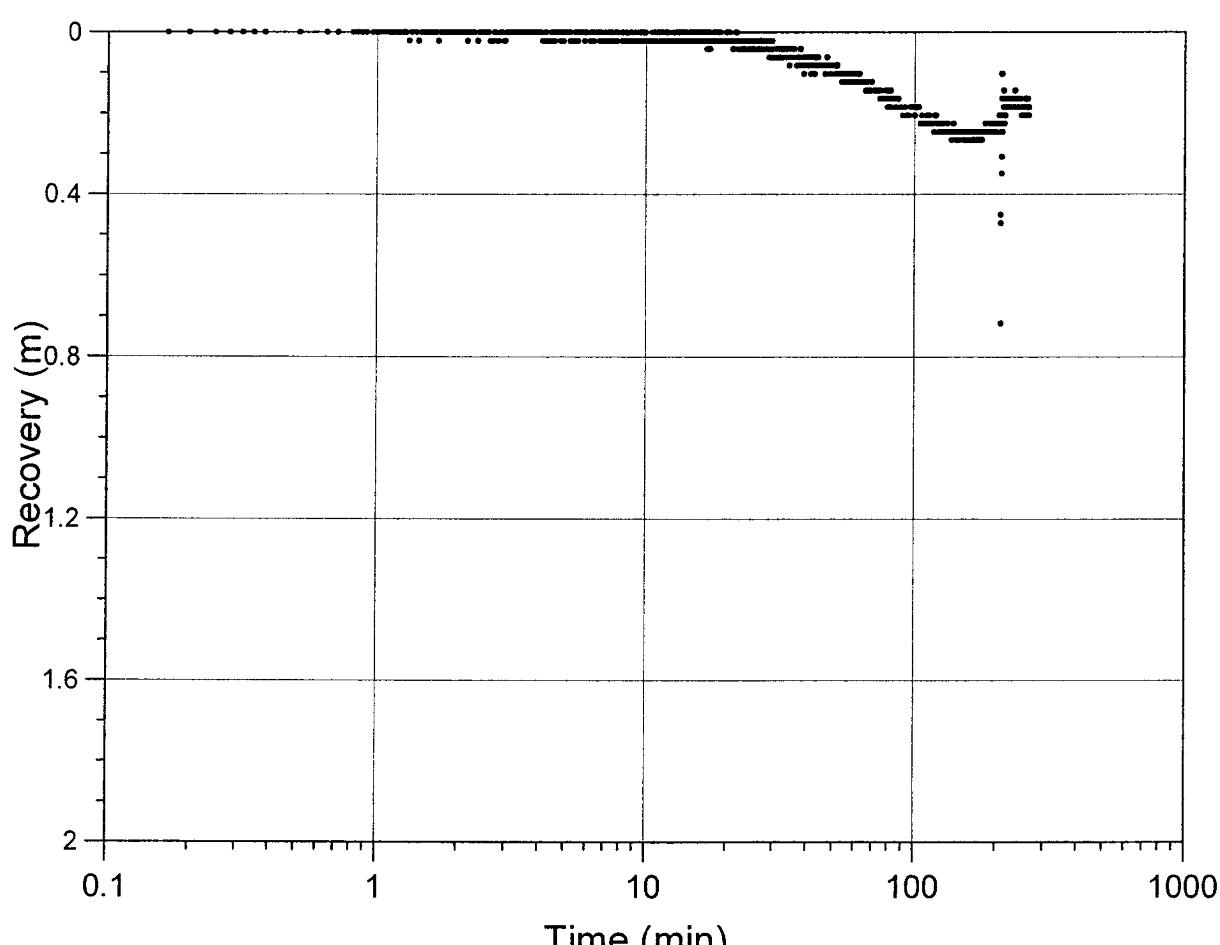

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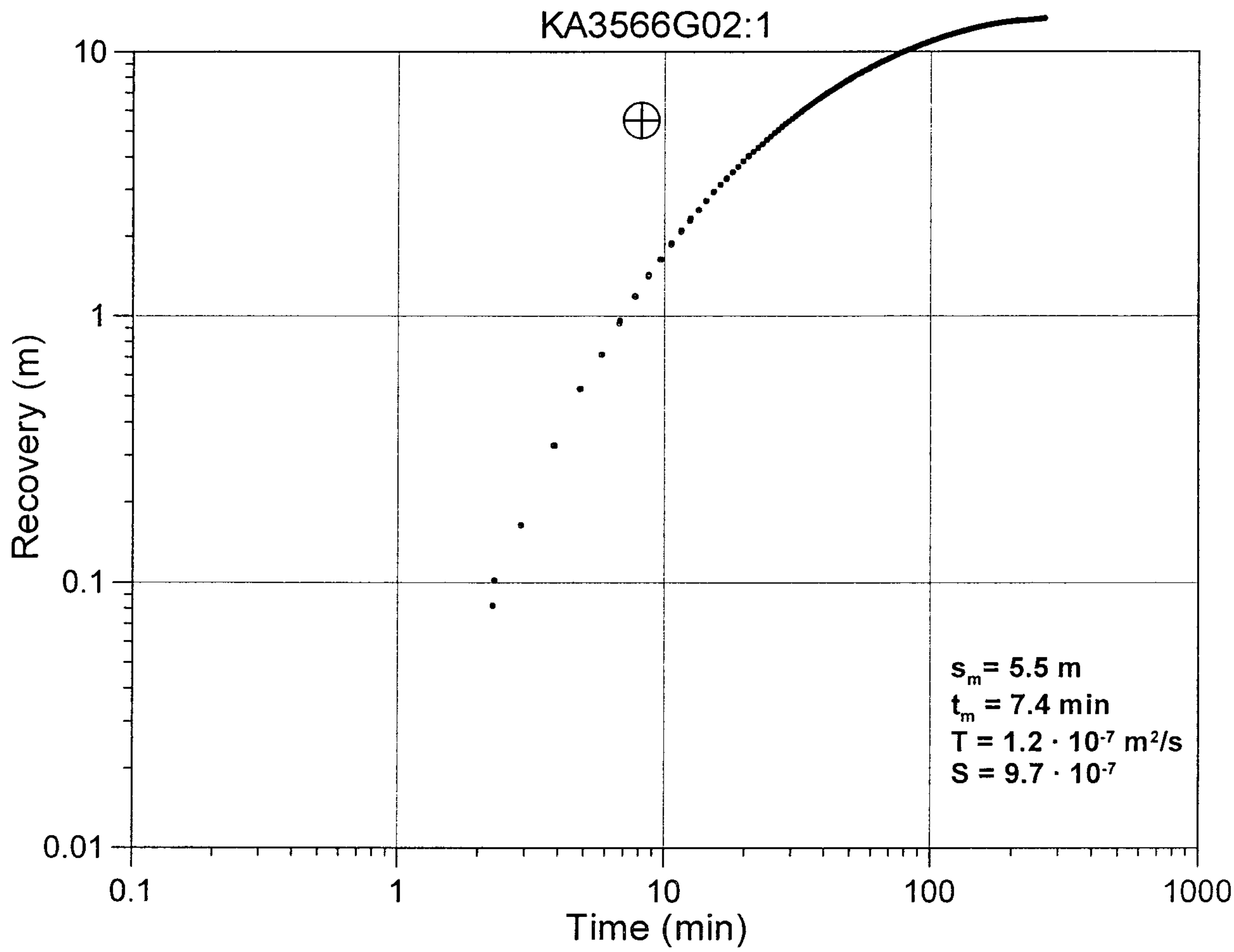

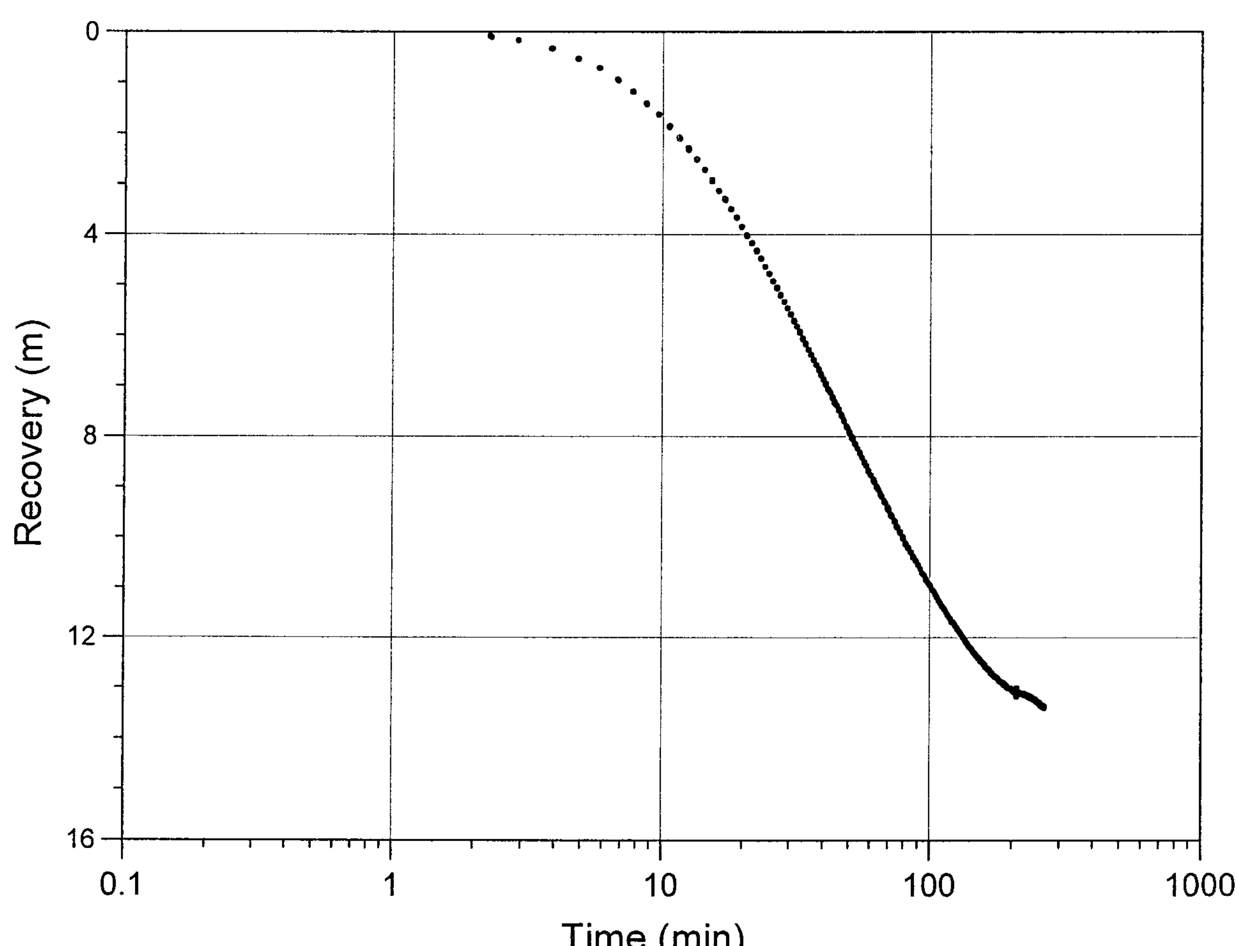

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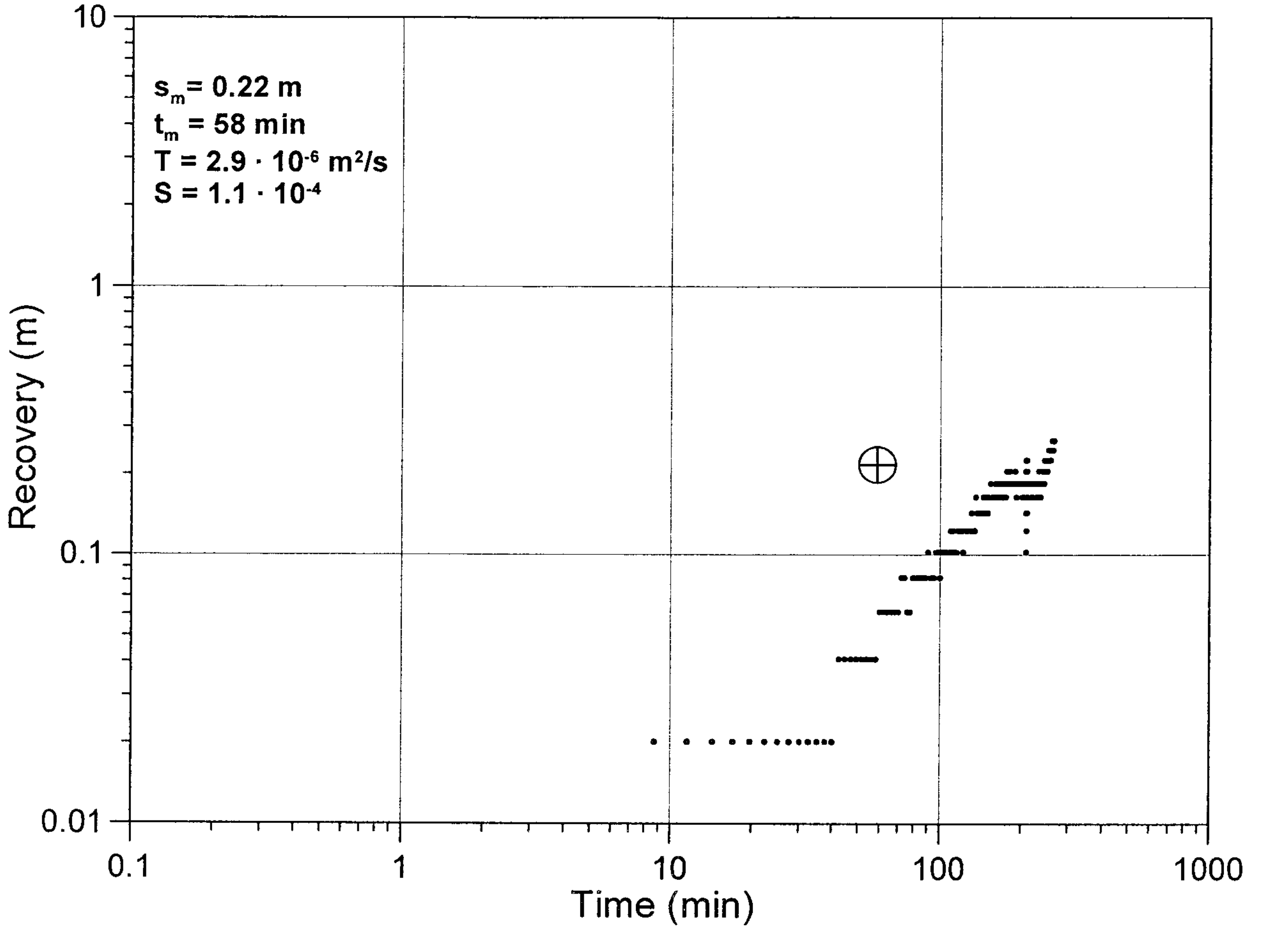

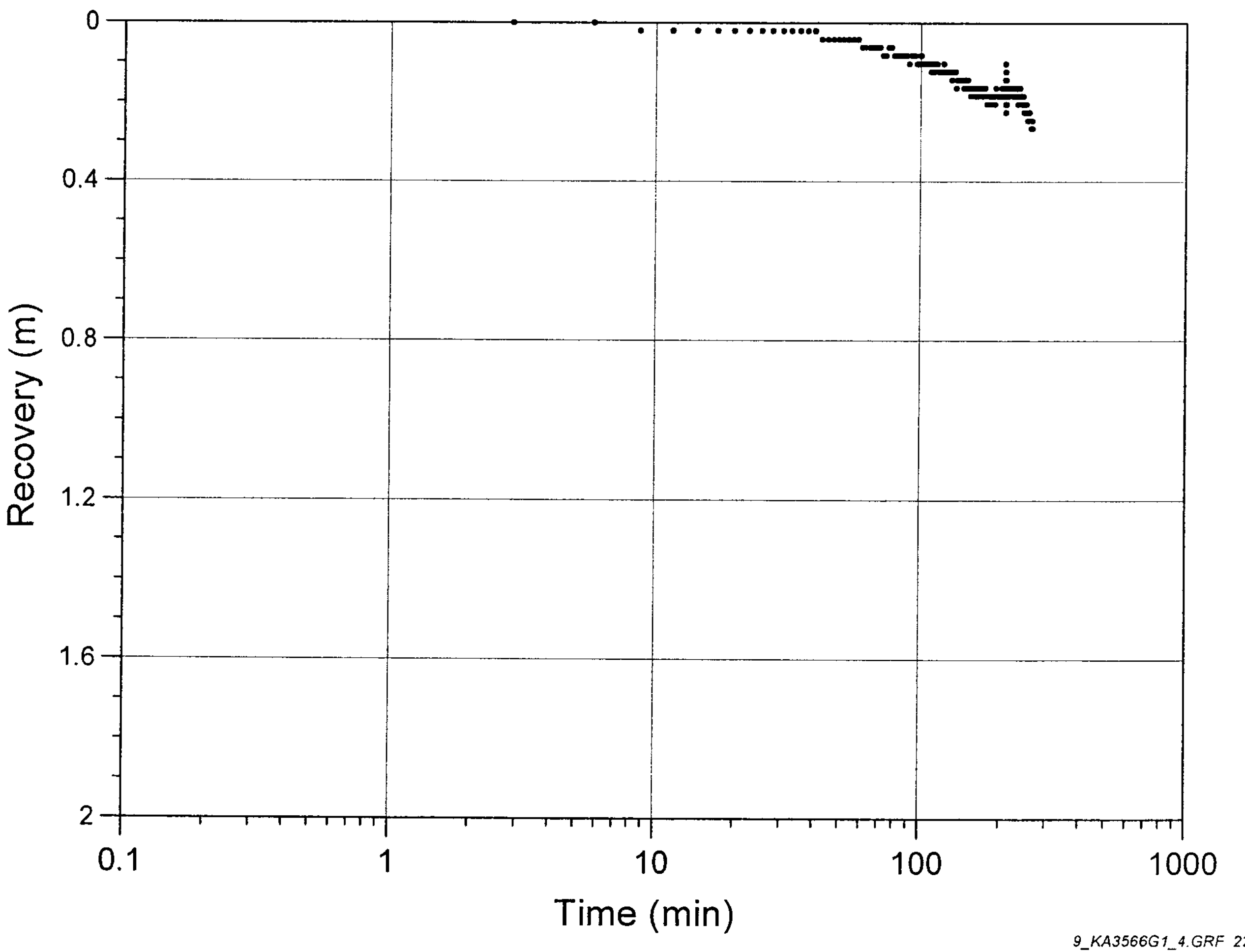

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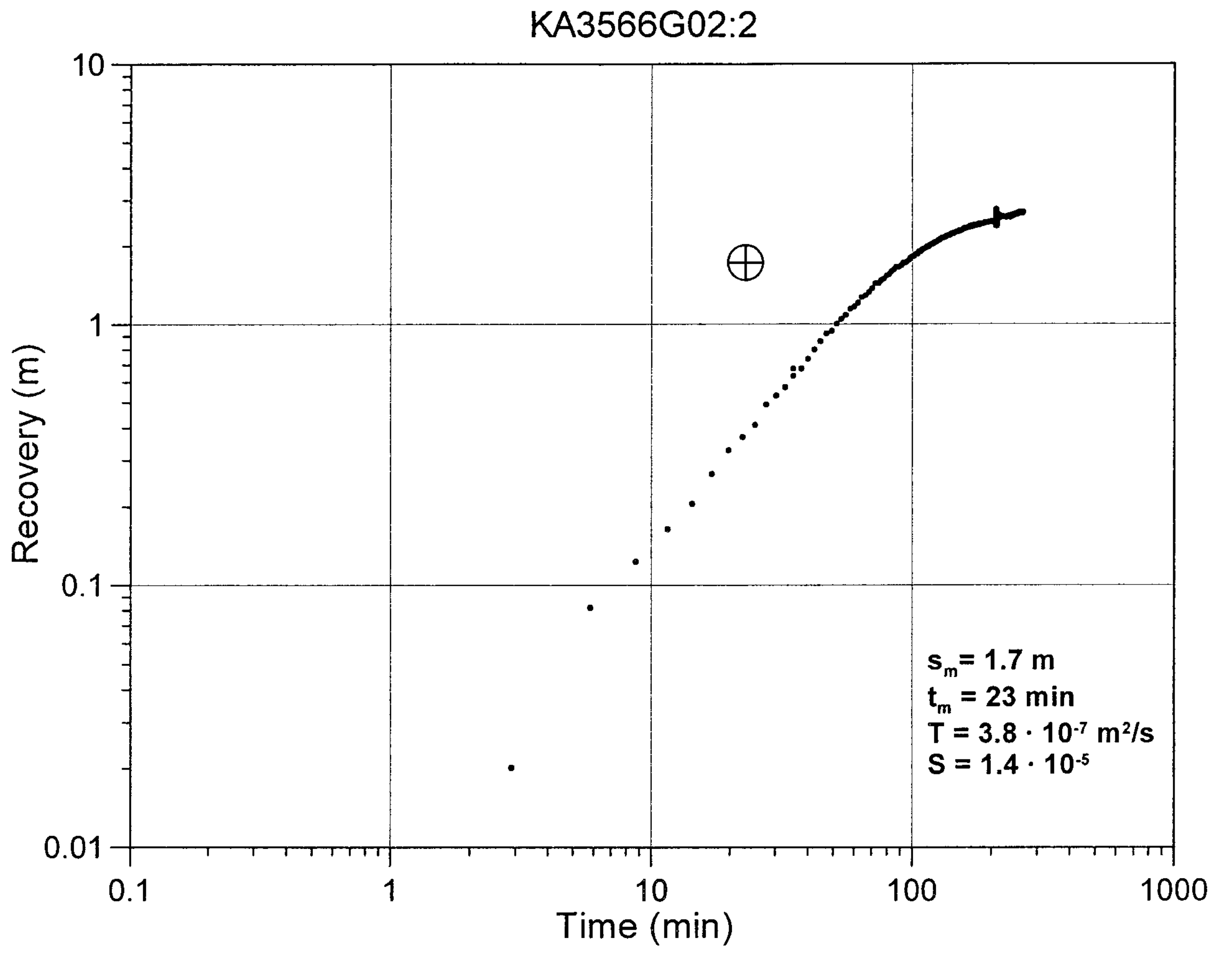

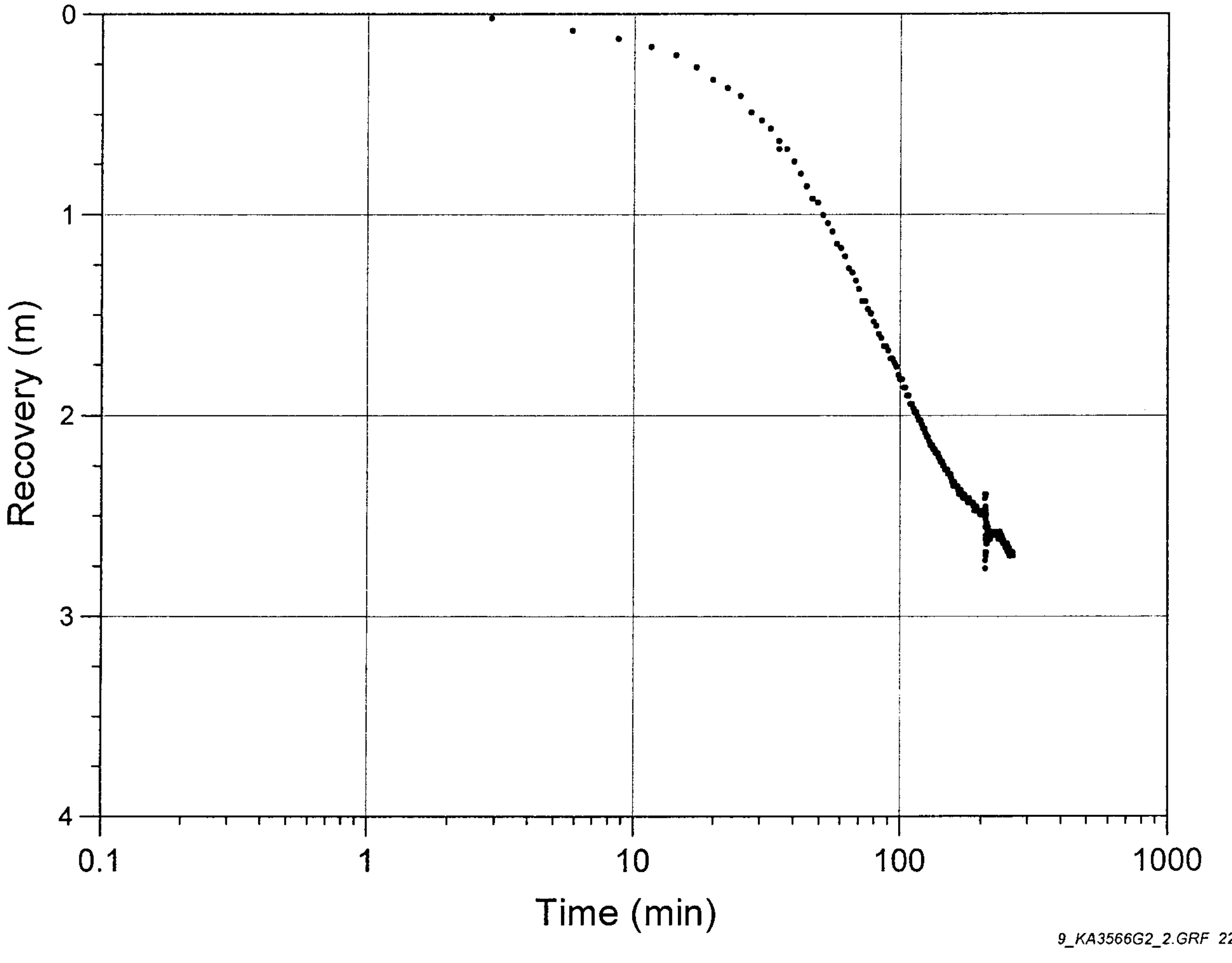

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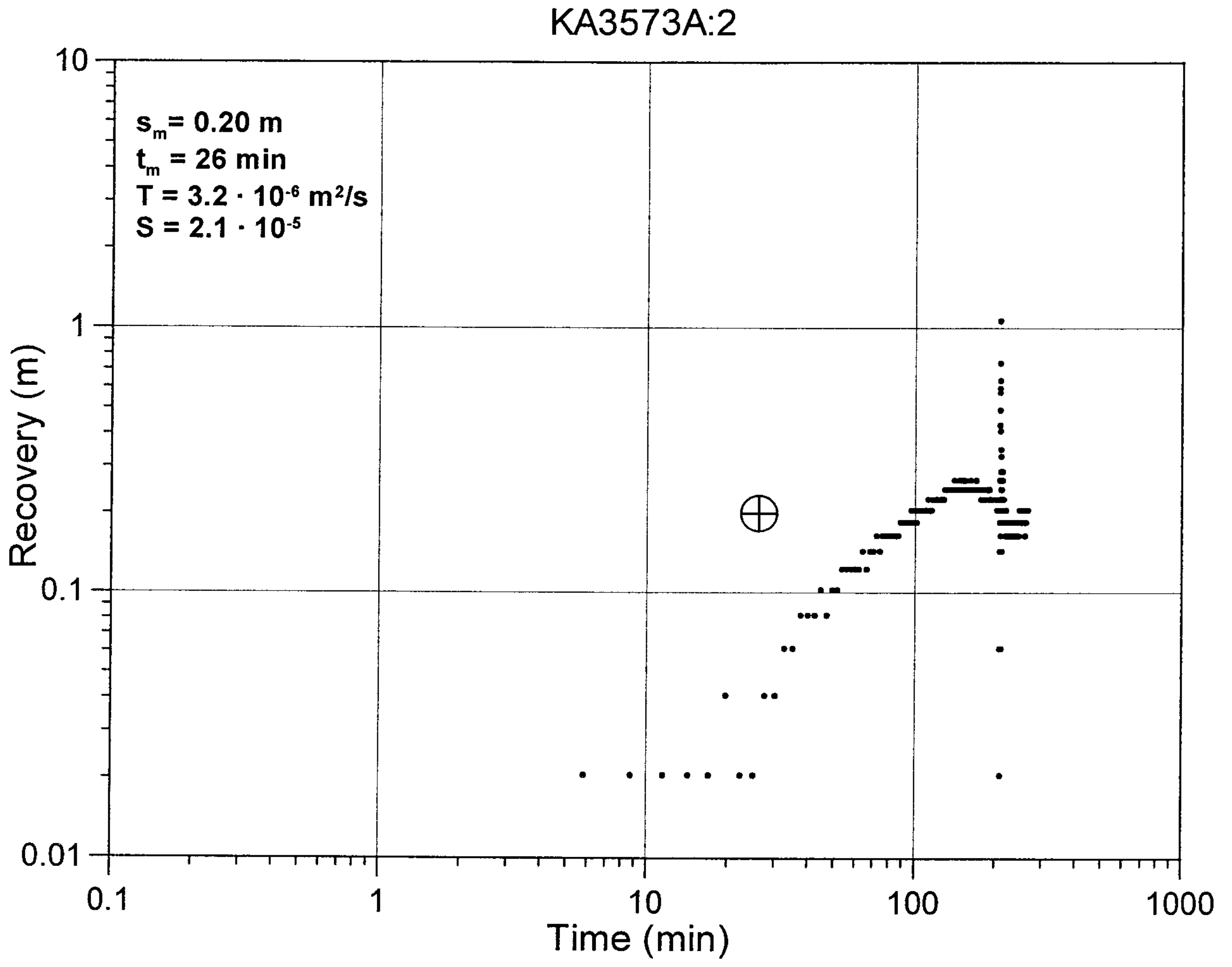

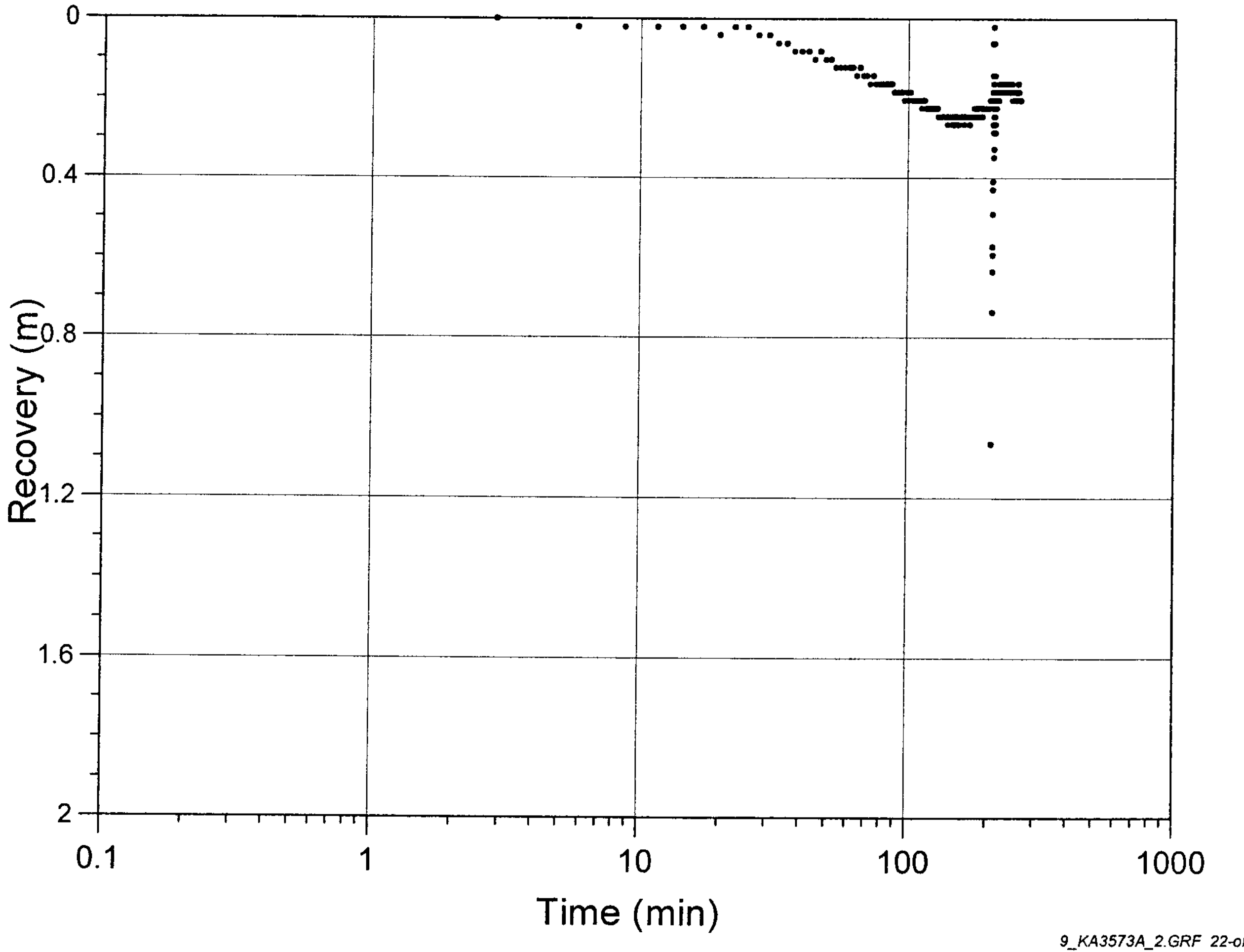

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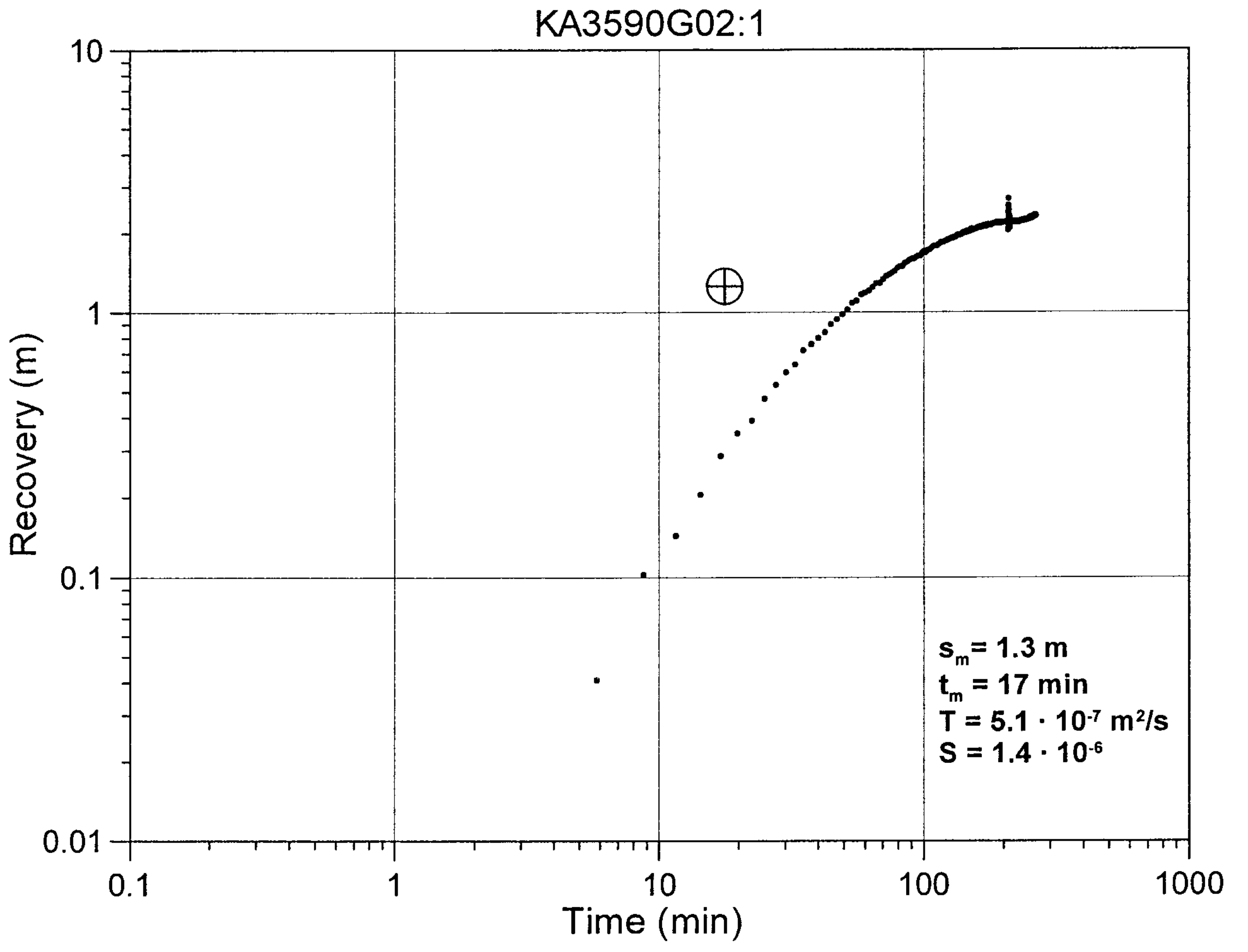

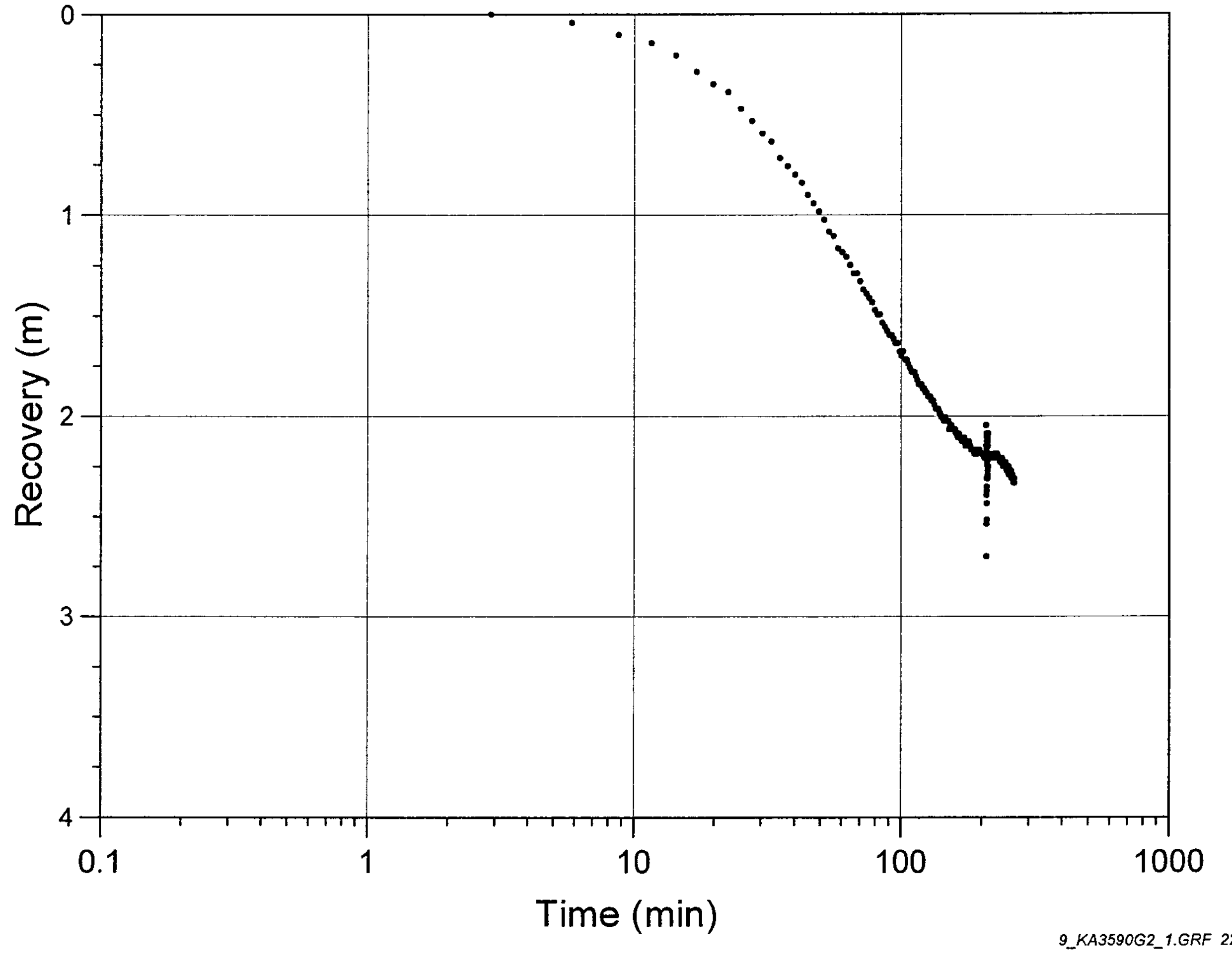

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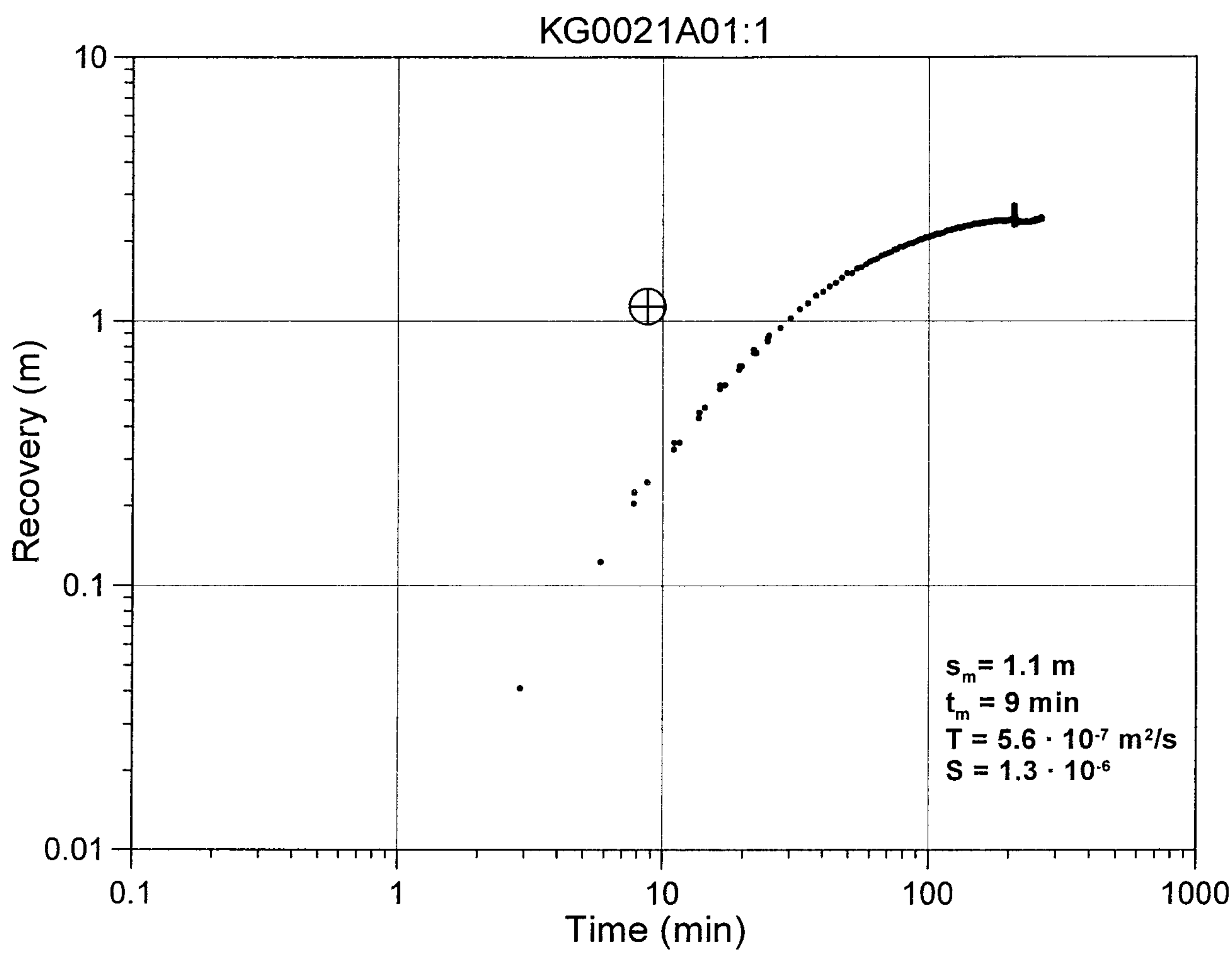

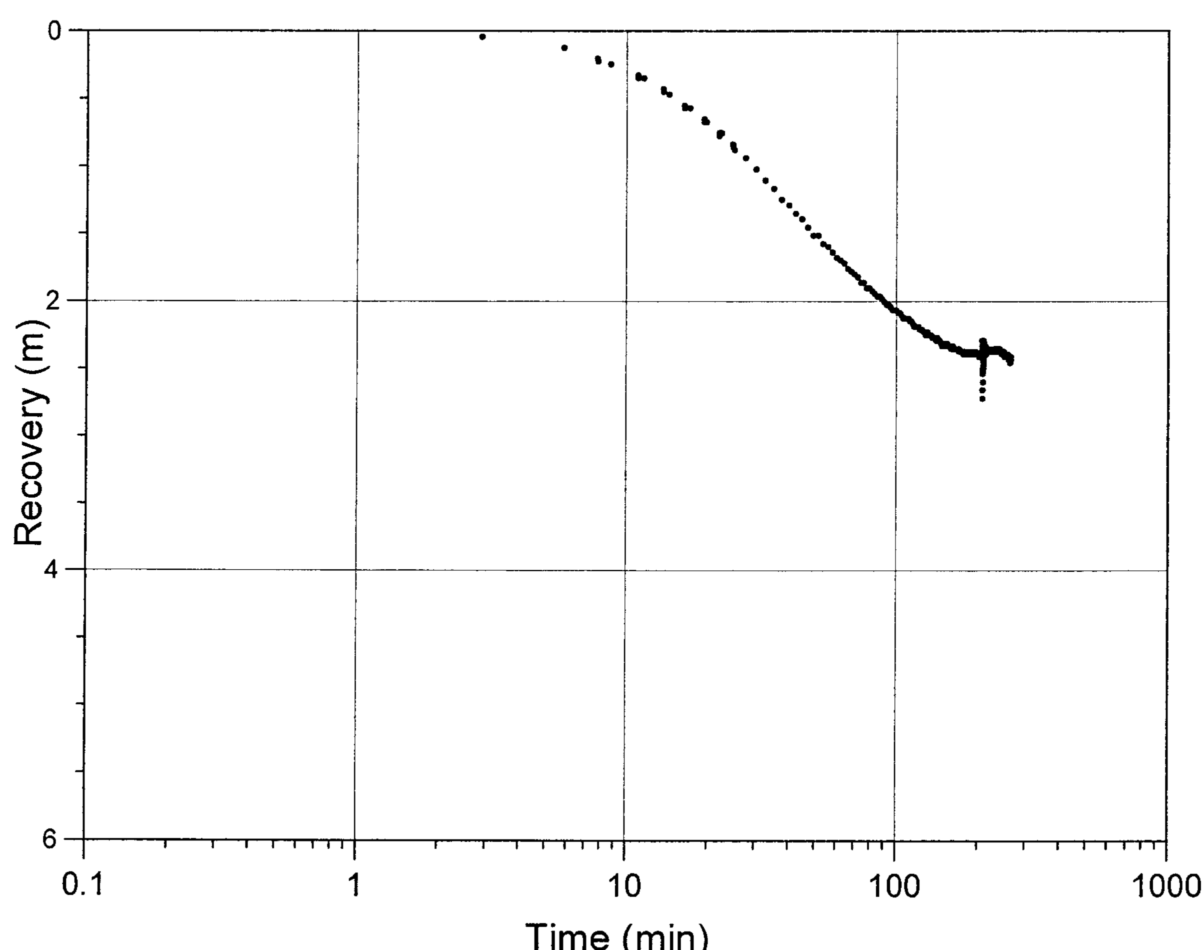

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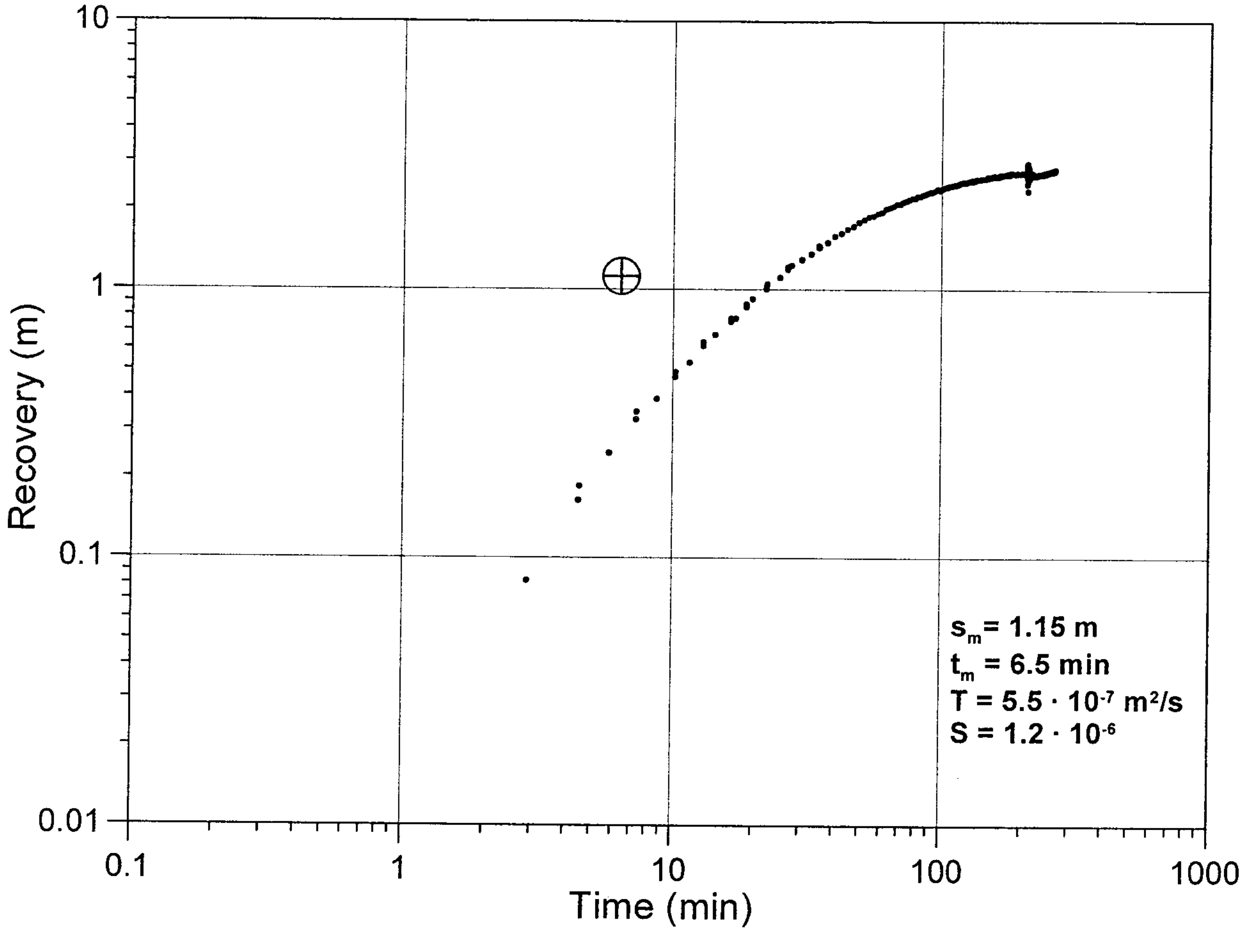

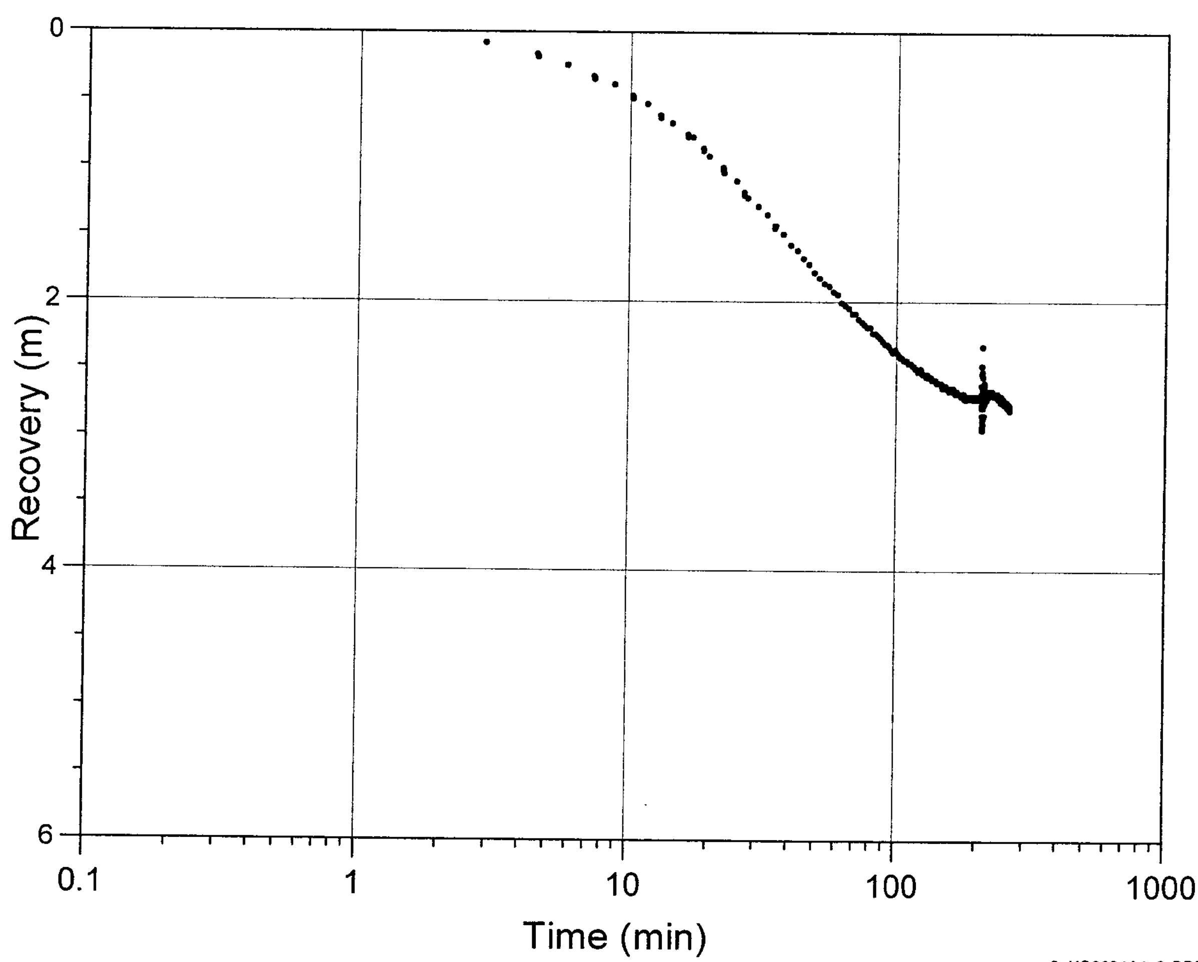

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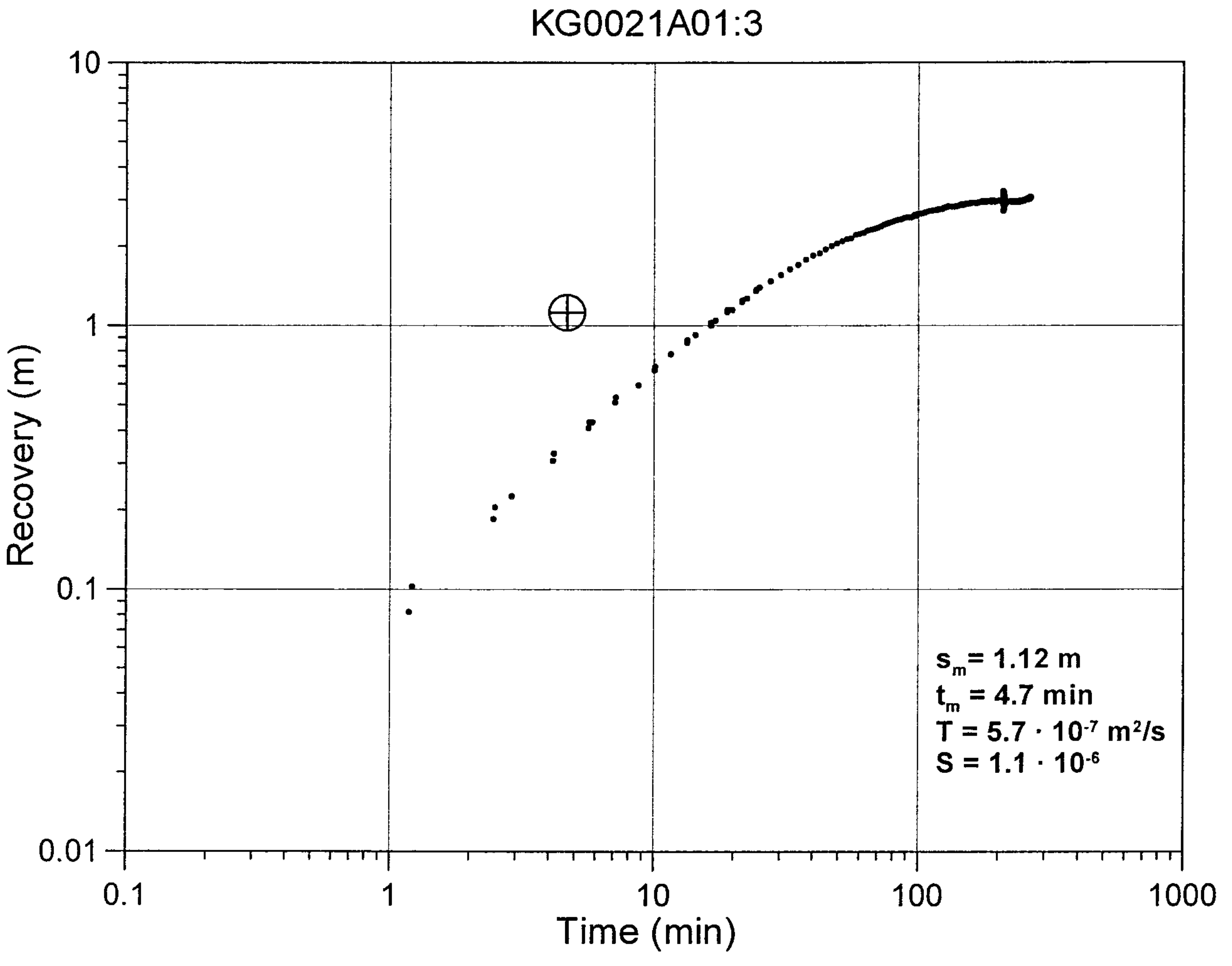

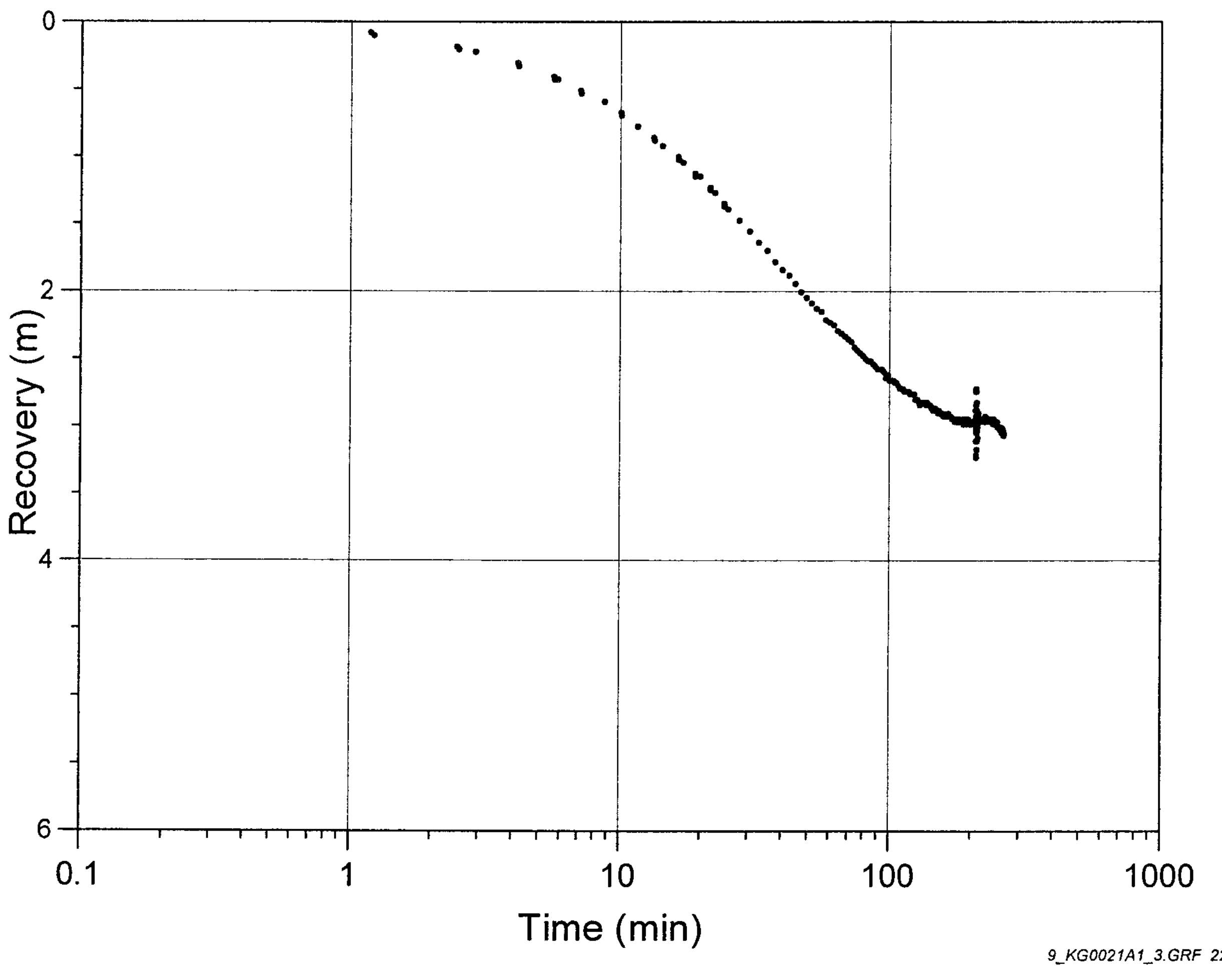

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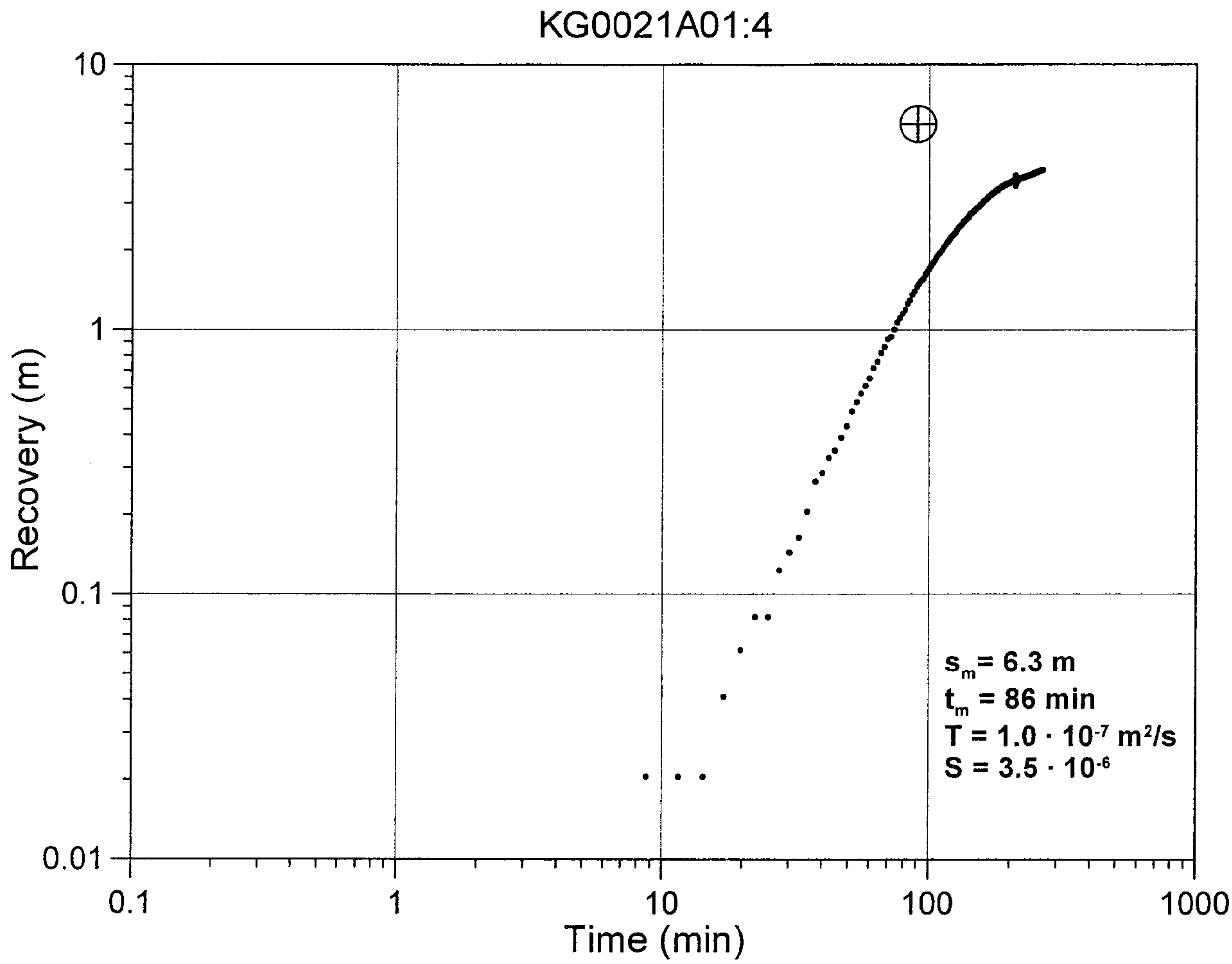

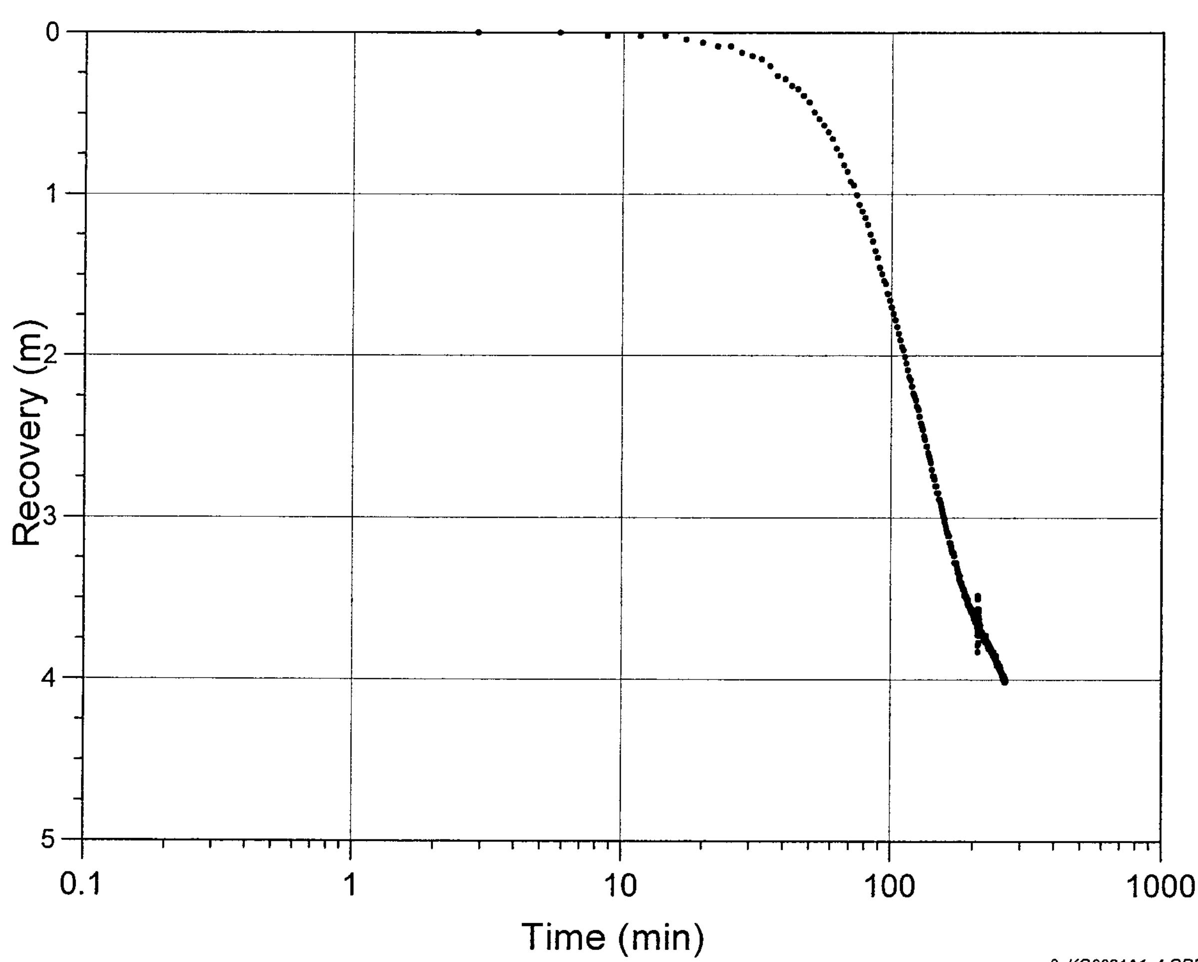

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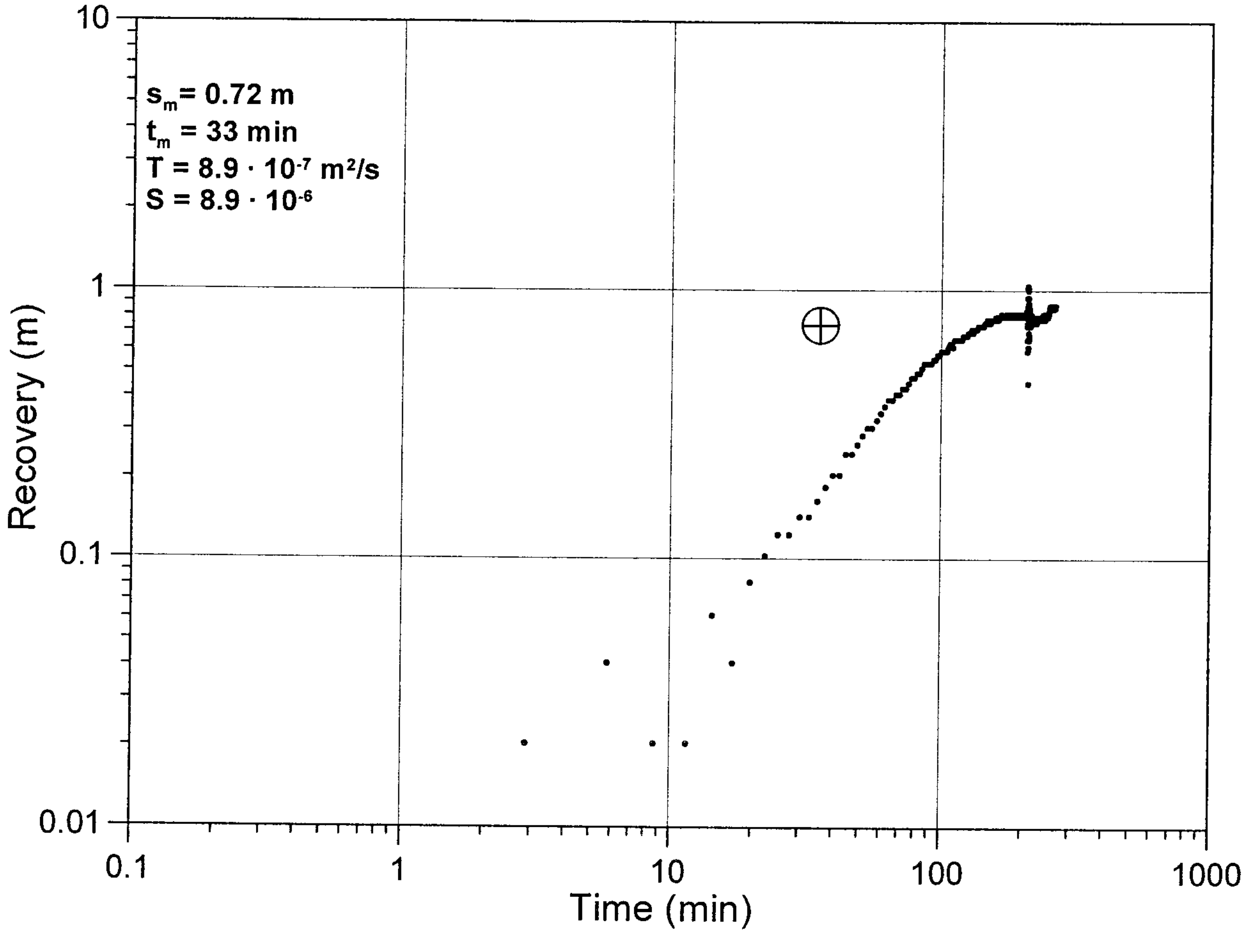

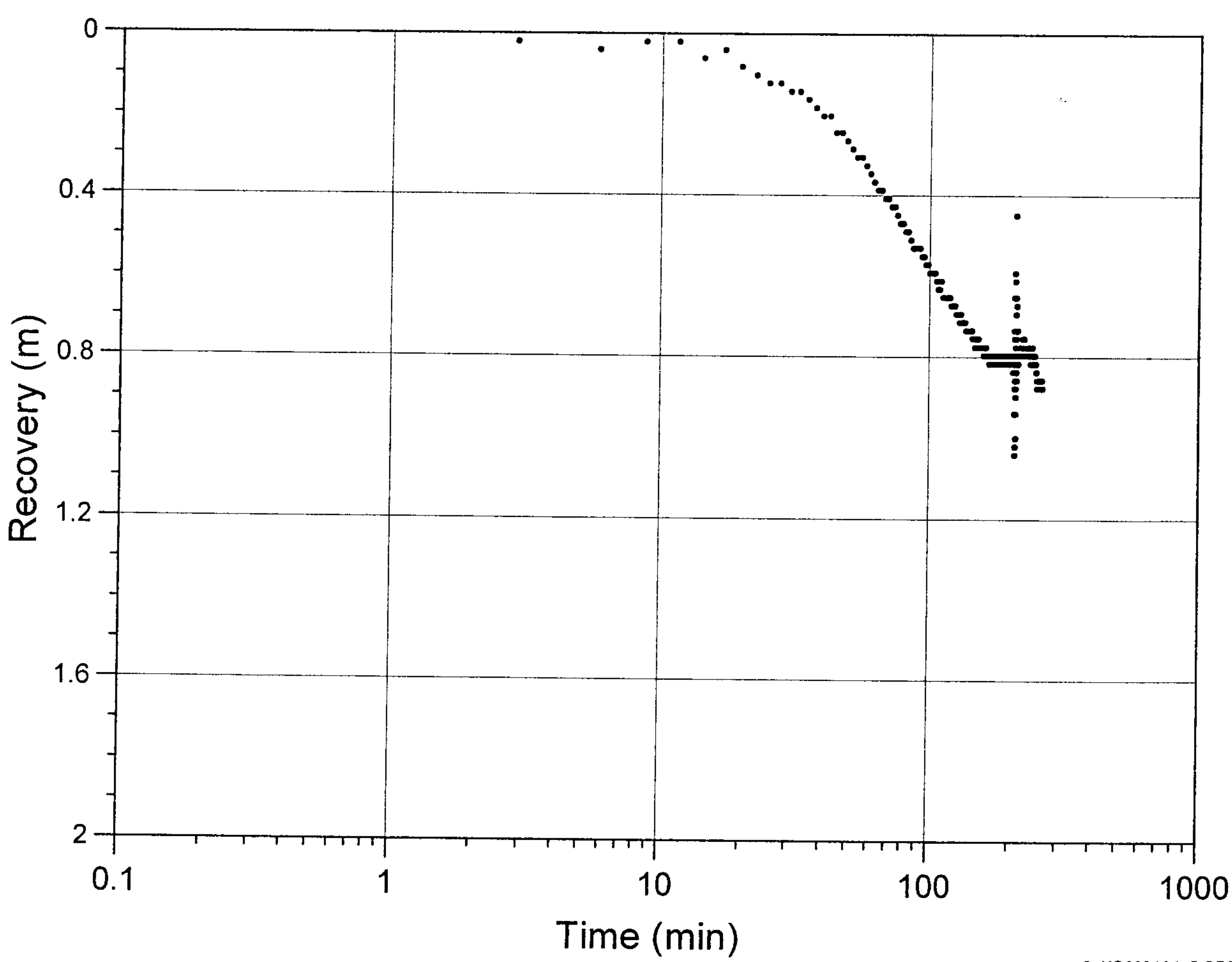

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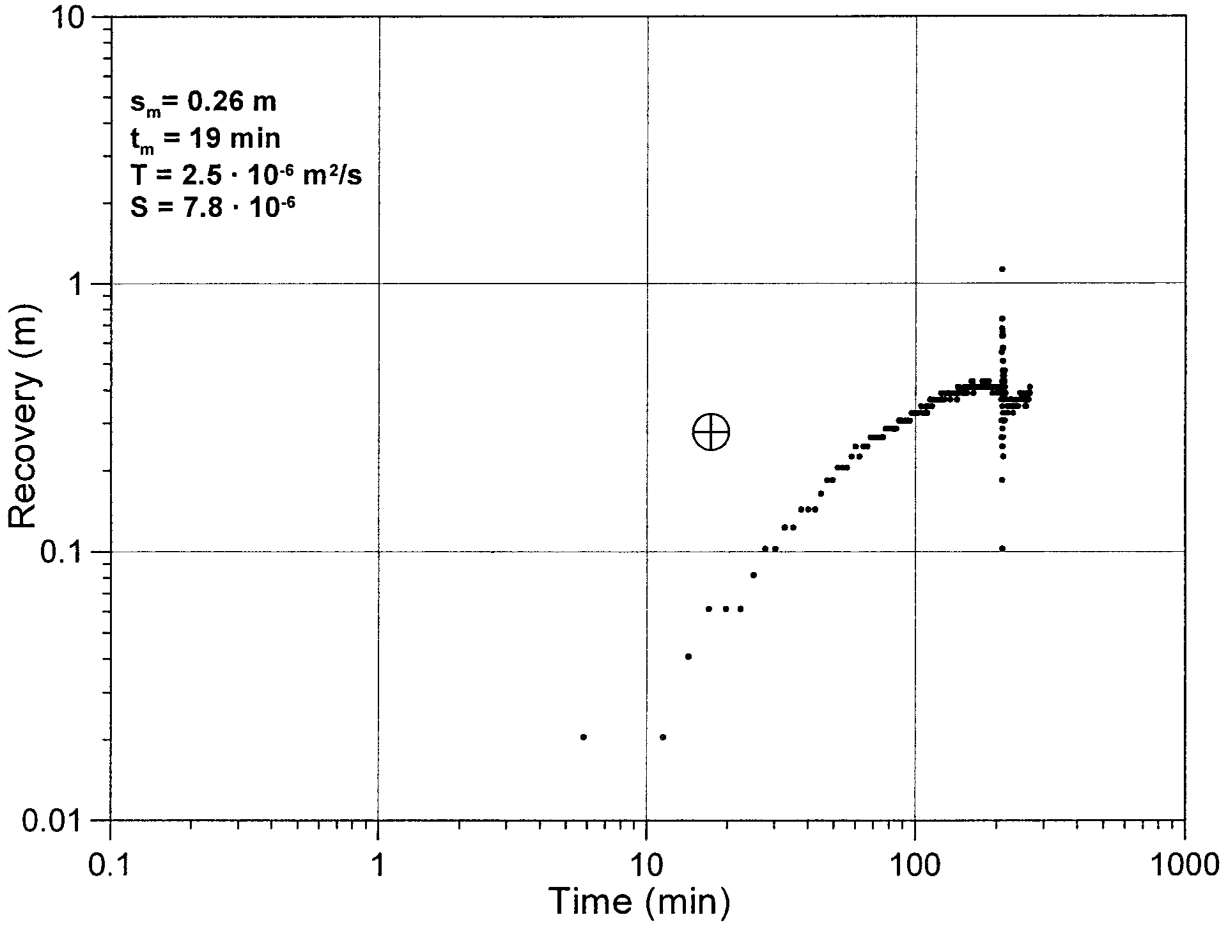

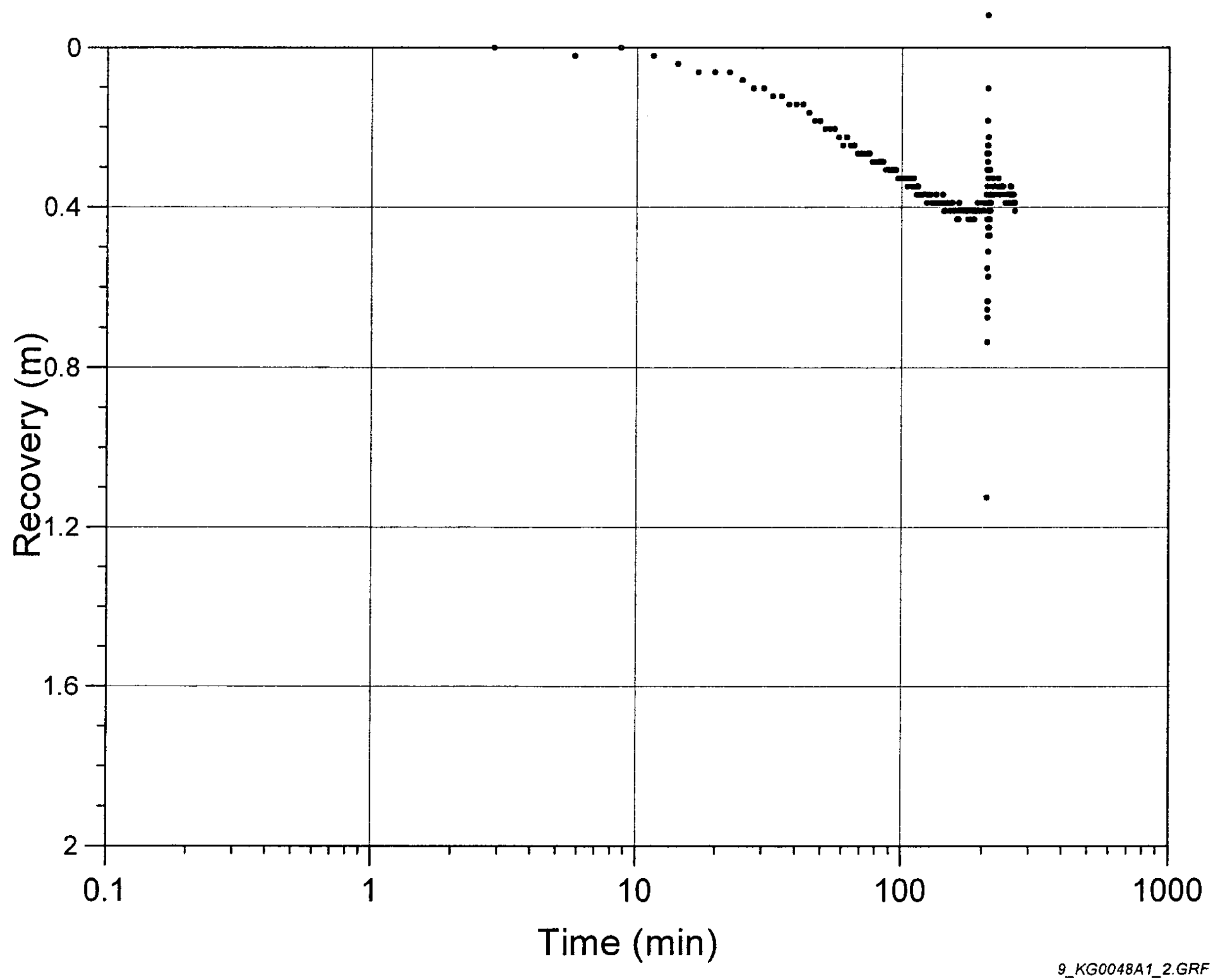

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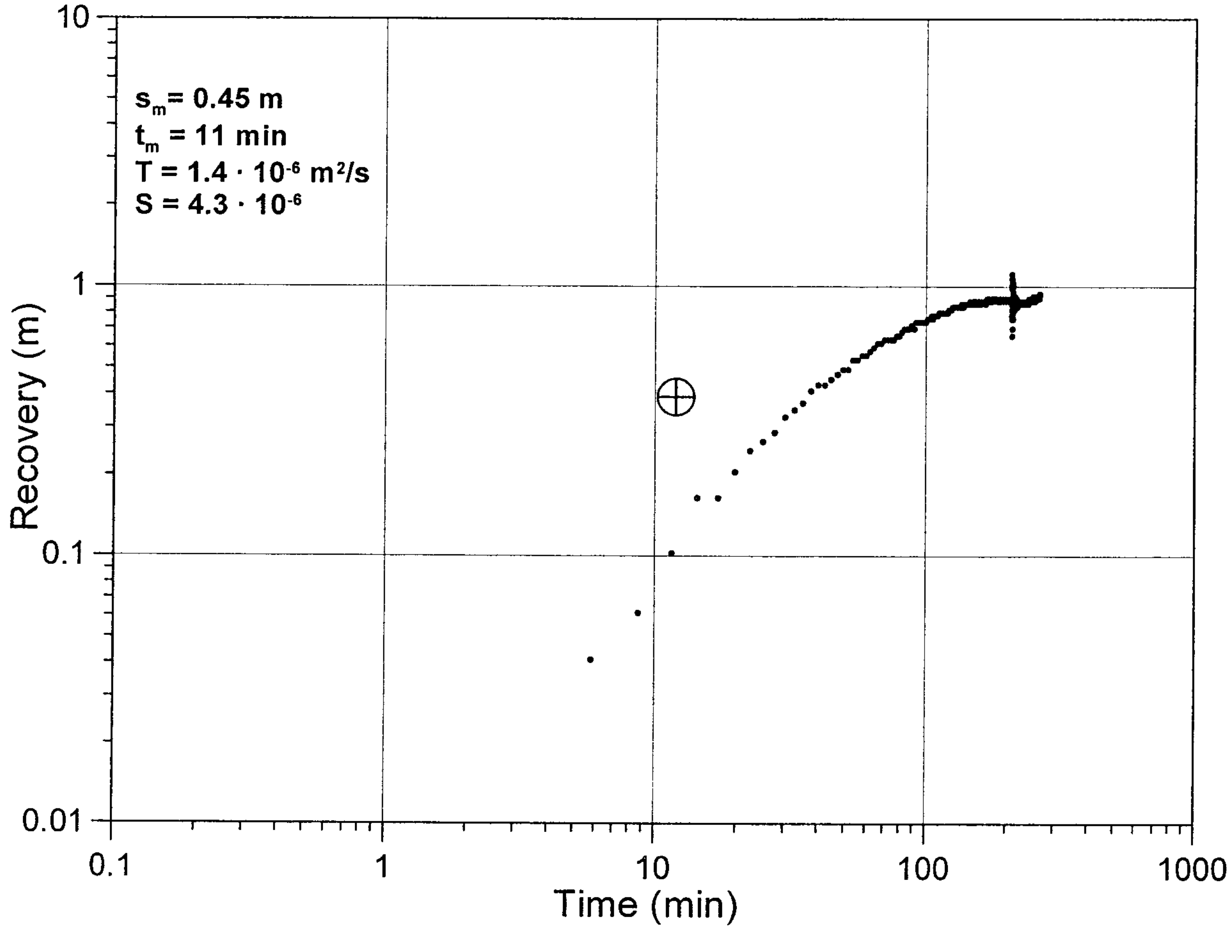

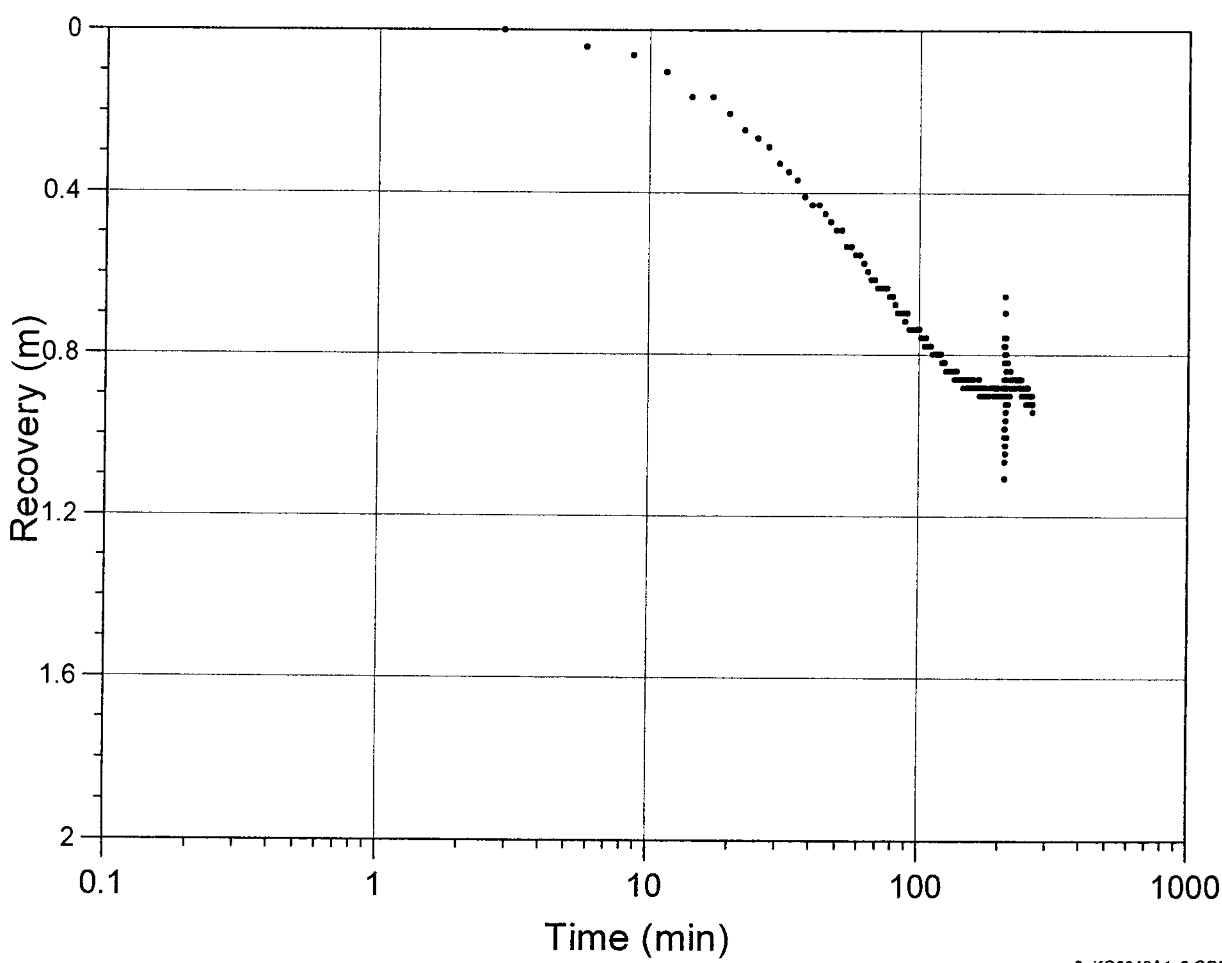

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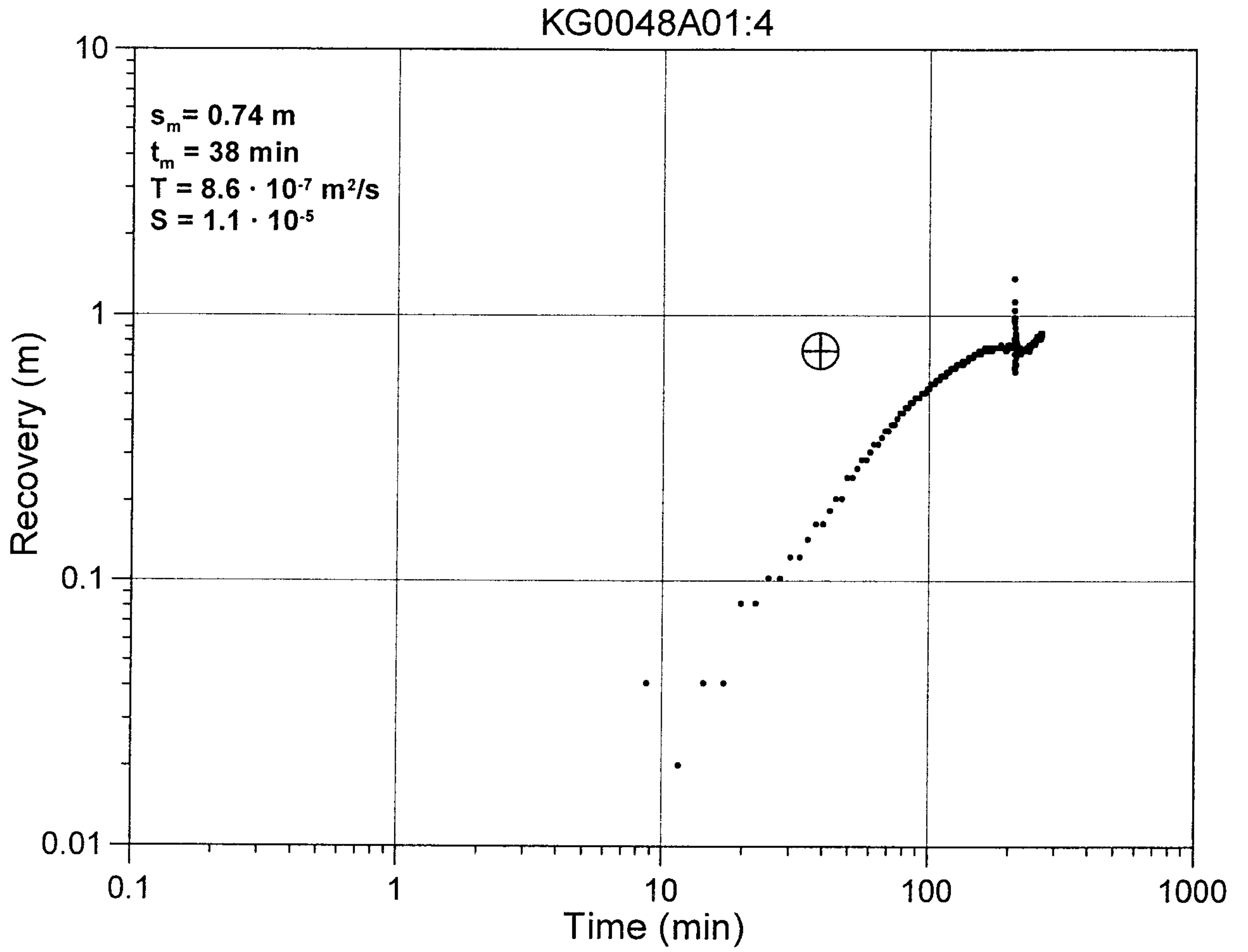
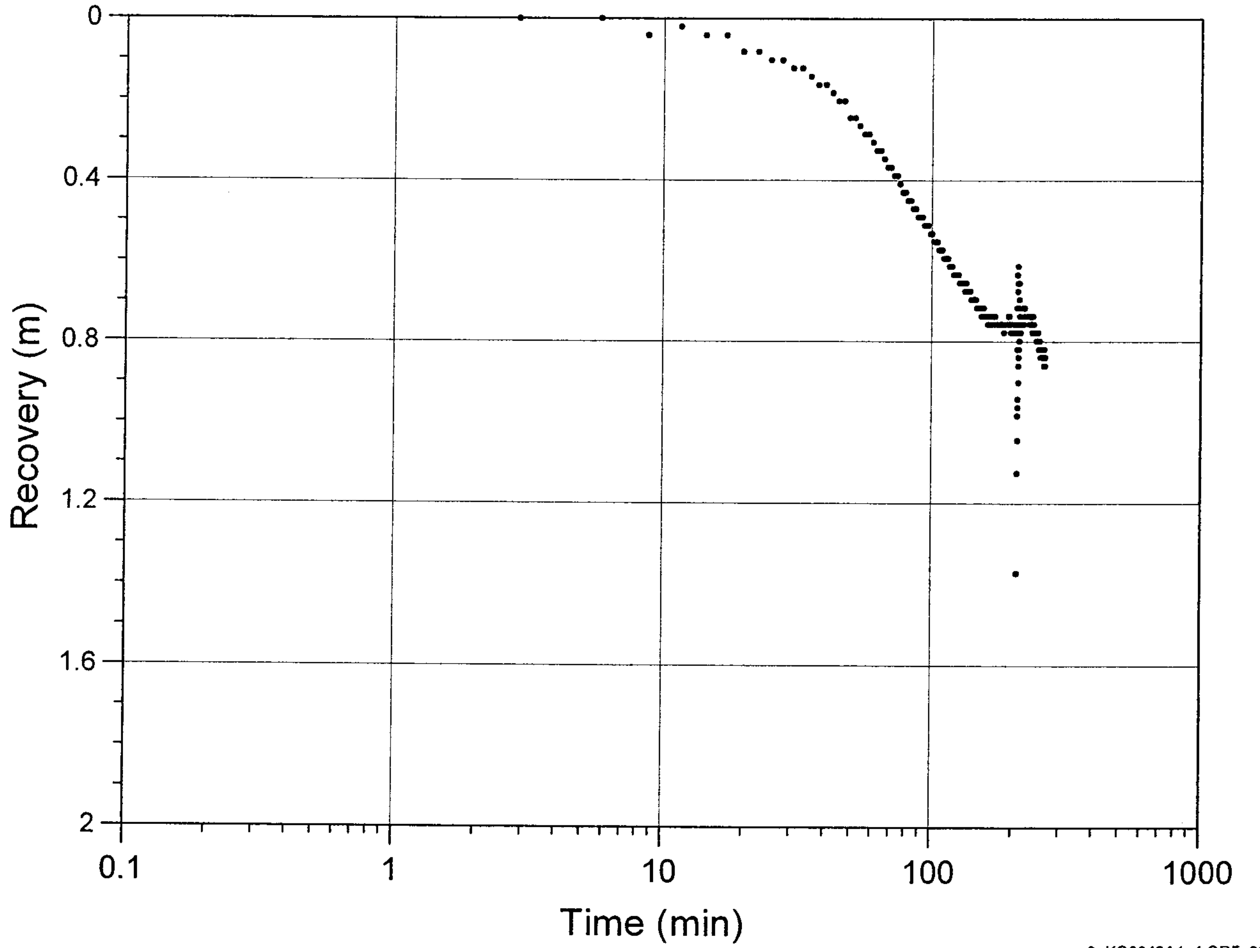




9_KG0048A1_4.GRF 22-okt-99

APPENDIX 5

Interference test 2:10 in borehole KA3542G01, section 8.80 m –24.80 m

Date: 99-08- 17 Field Crew: Bengt Gentzschein
Borehole length: 30.04 m Borehole diameter: 76 mm

Flowing borehole: KA3542G01, section #2: 8.80 – 24.80 m

Valve opened: 990817 11:00.03 Valve closed: 990817 17:05.03
End of Test: 990818 09:55
Total flowing time : 365 min Tot. Pr. Build-up time 1010 min.

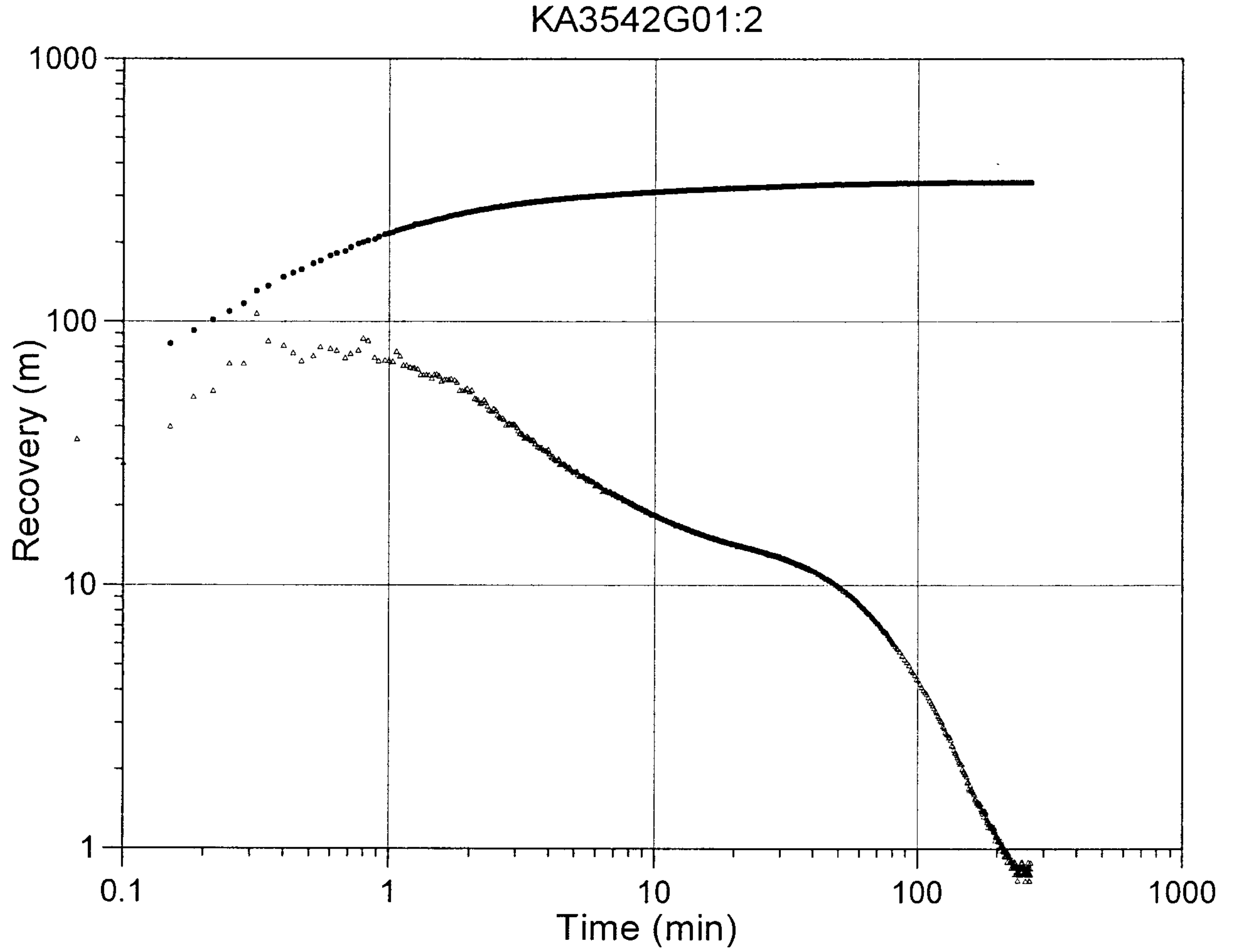
The test was performed as an Interference test. Pressure responses were monitored in 62 borehole sections.

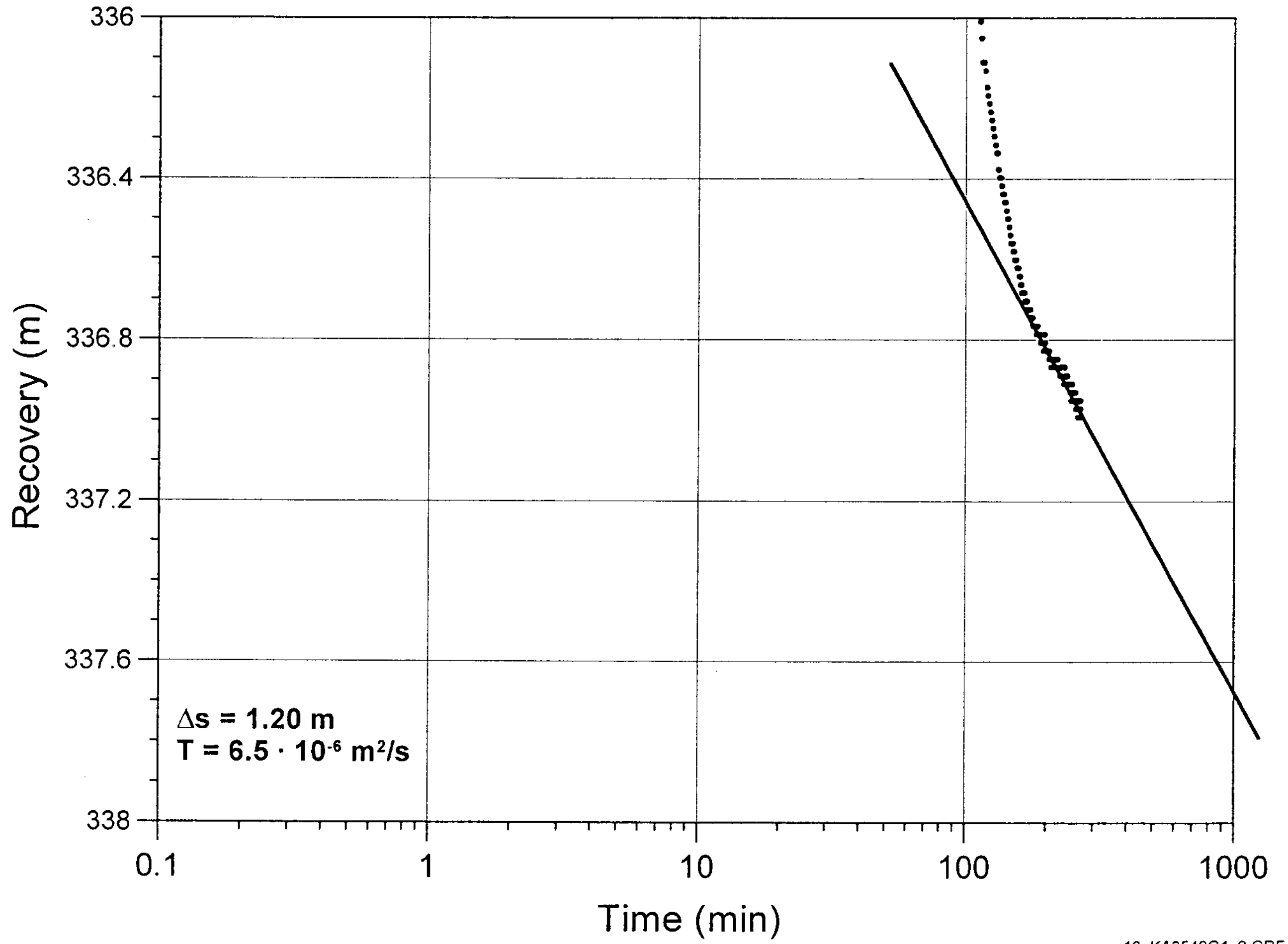
Flow data

Manually measured flow rates of KA3542G01, section 8.80 m –24.80 m, are presented in the table below:

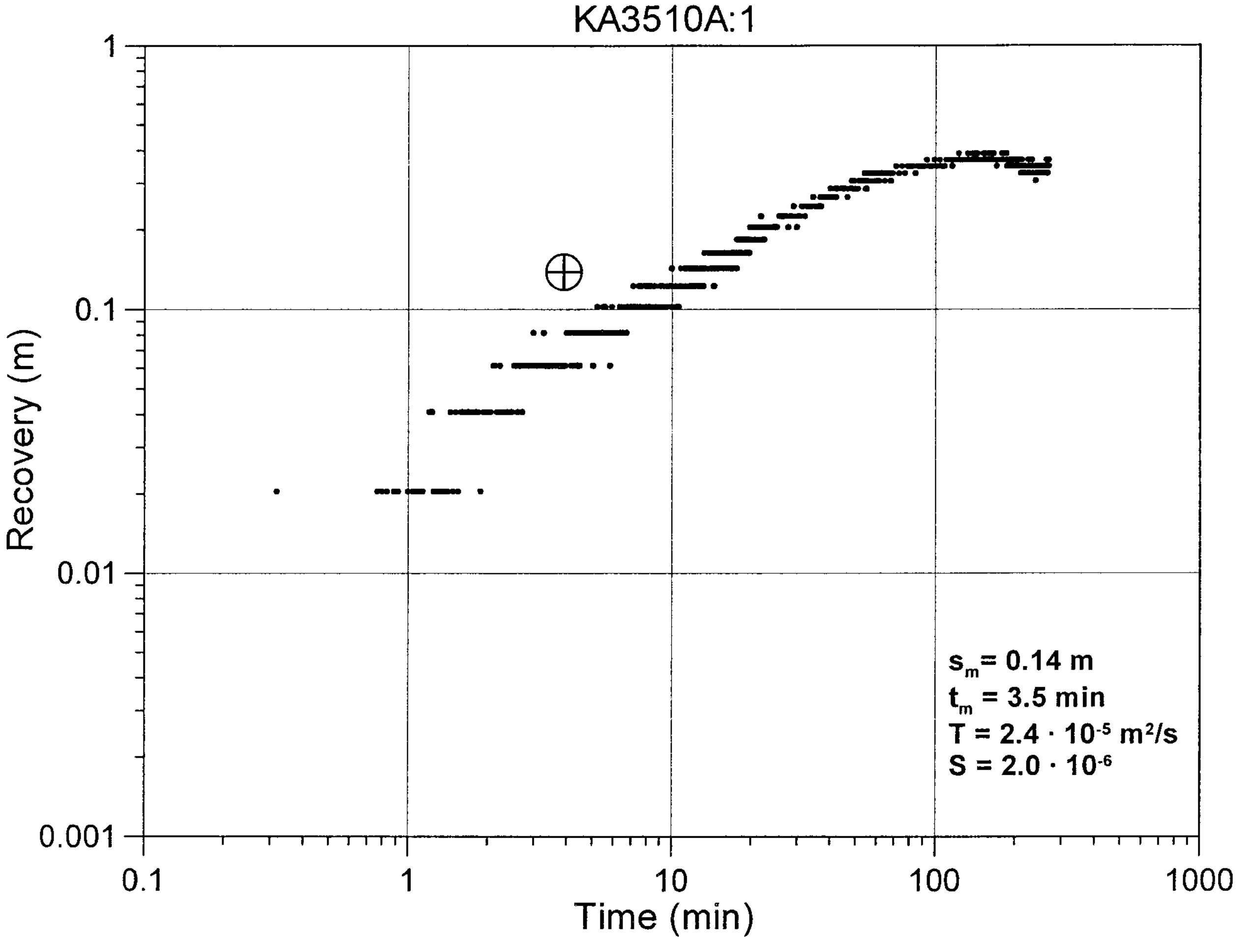
Table Manually measured flow rates, Interference test in KA3542G01, section 8.80 m – 24.80 m (test #10). Prototype repository, August 1999.

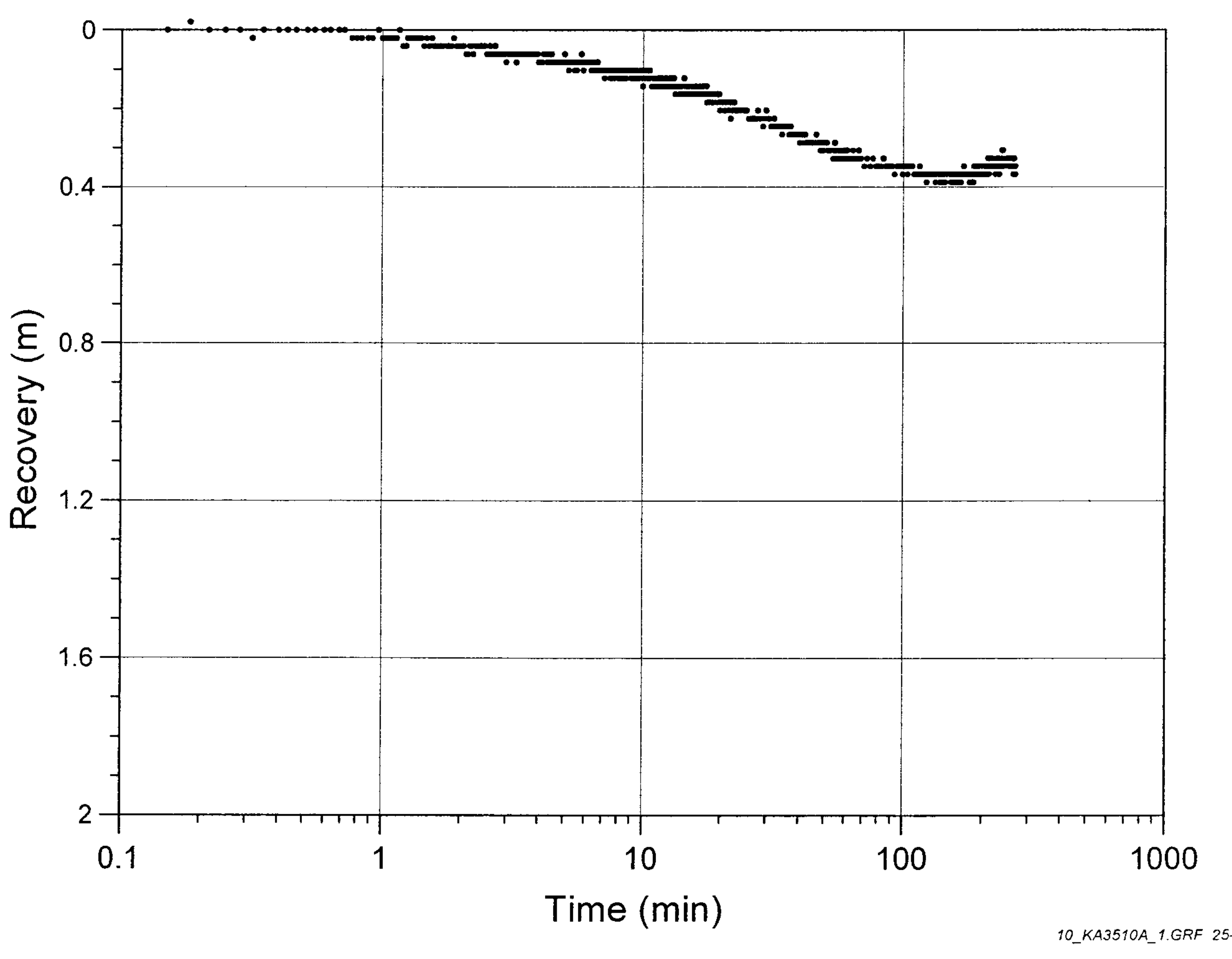
Time	Flow rate (l/min)
11:00.33	5.35
11:03.33	3.078
11:06.03	2.942
11:15	2.796
11:30	2.70
11:45	2.682
12:00	2.66
16:52	2.556
16:57	2.557
17:03	2.556





10_KA3542G1_2.GRF 27-okt-99





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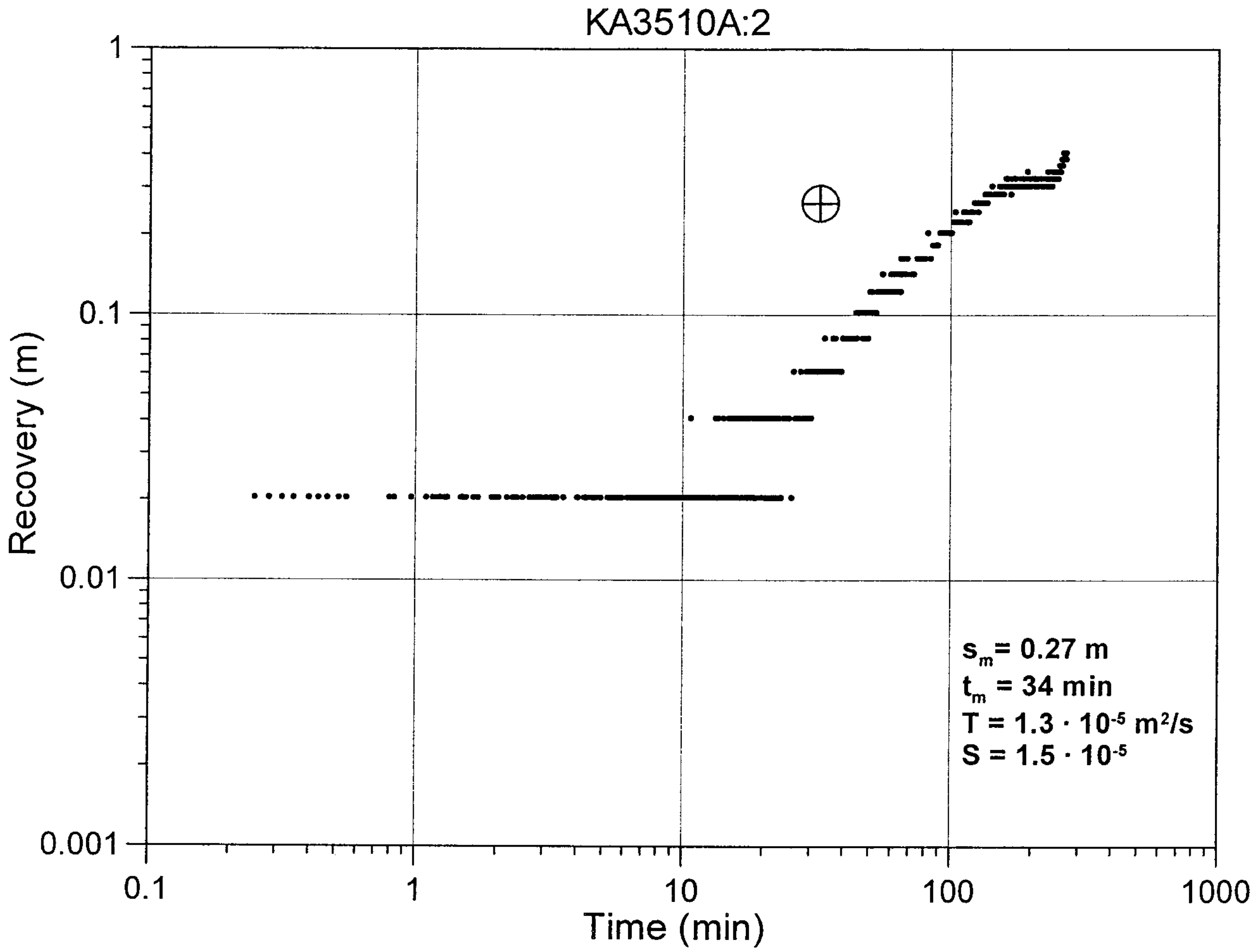

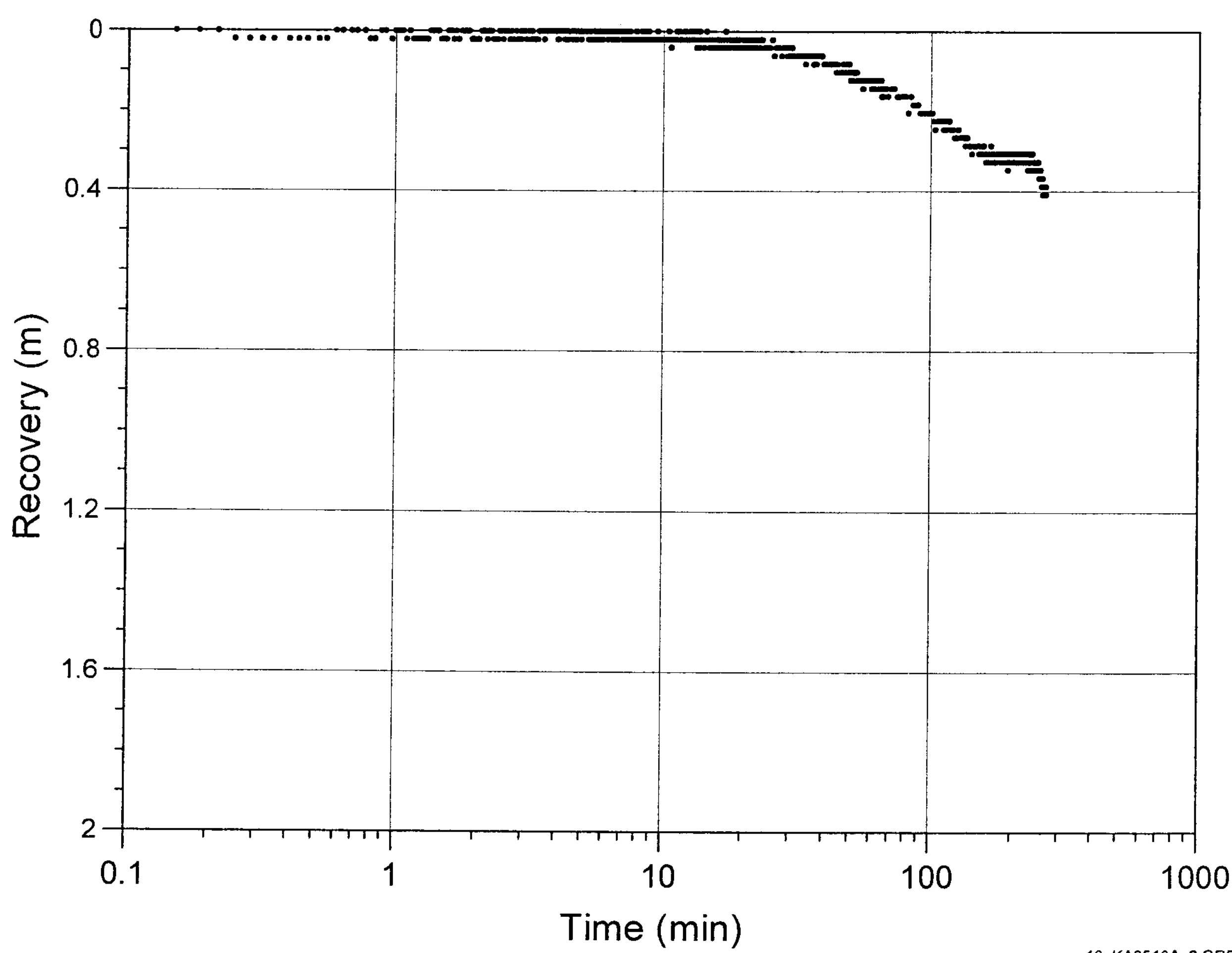

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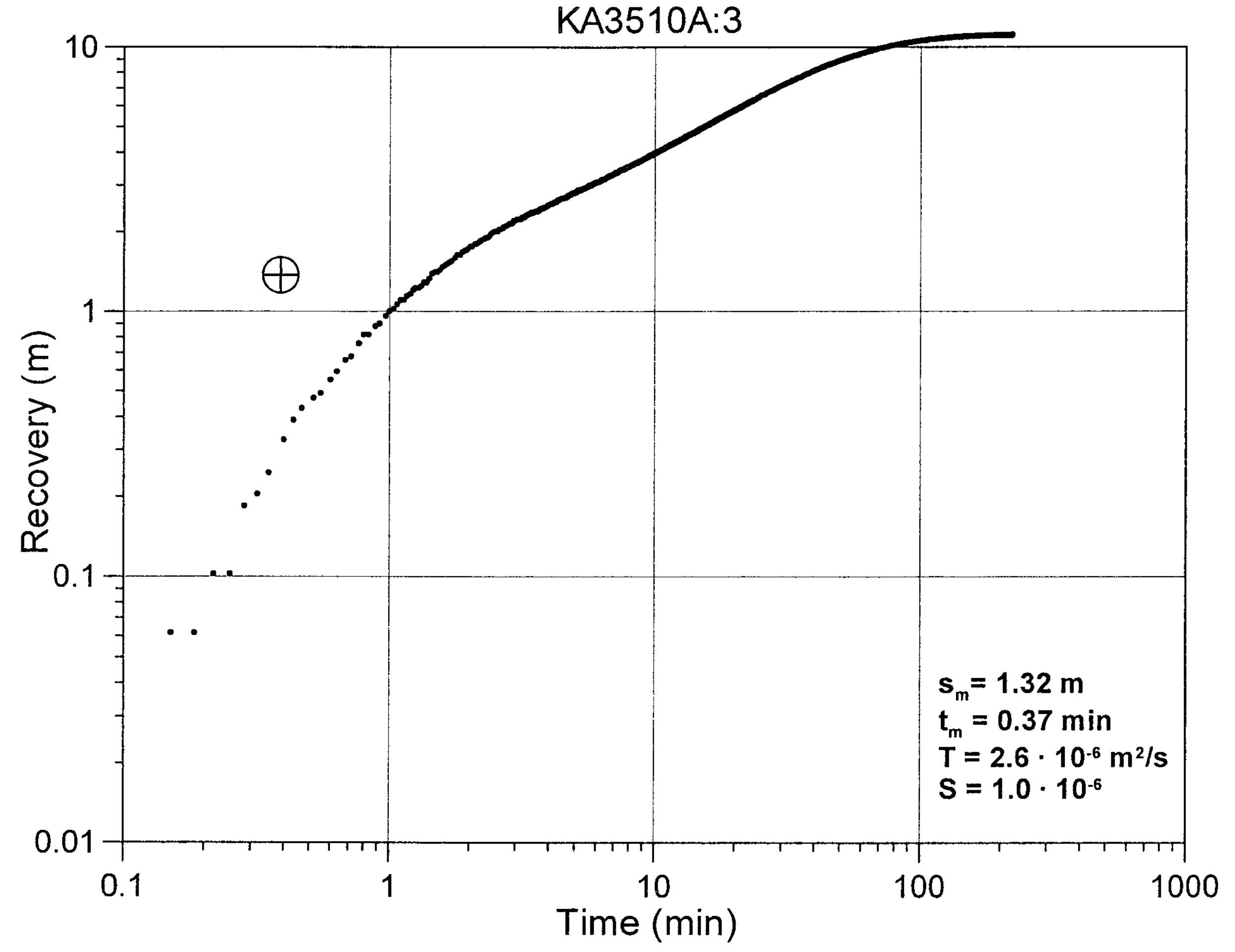

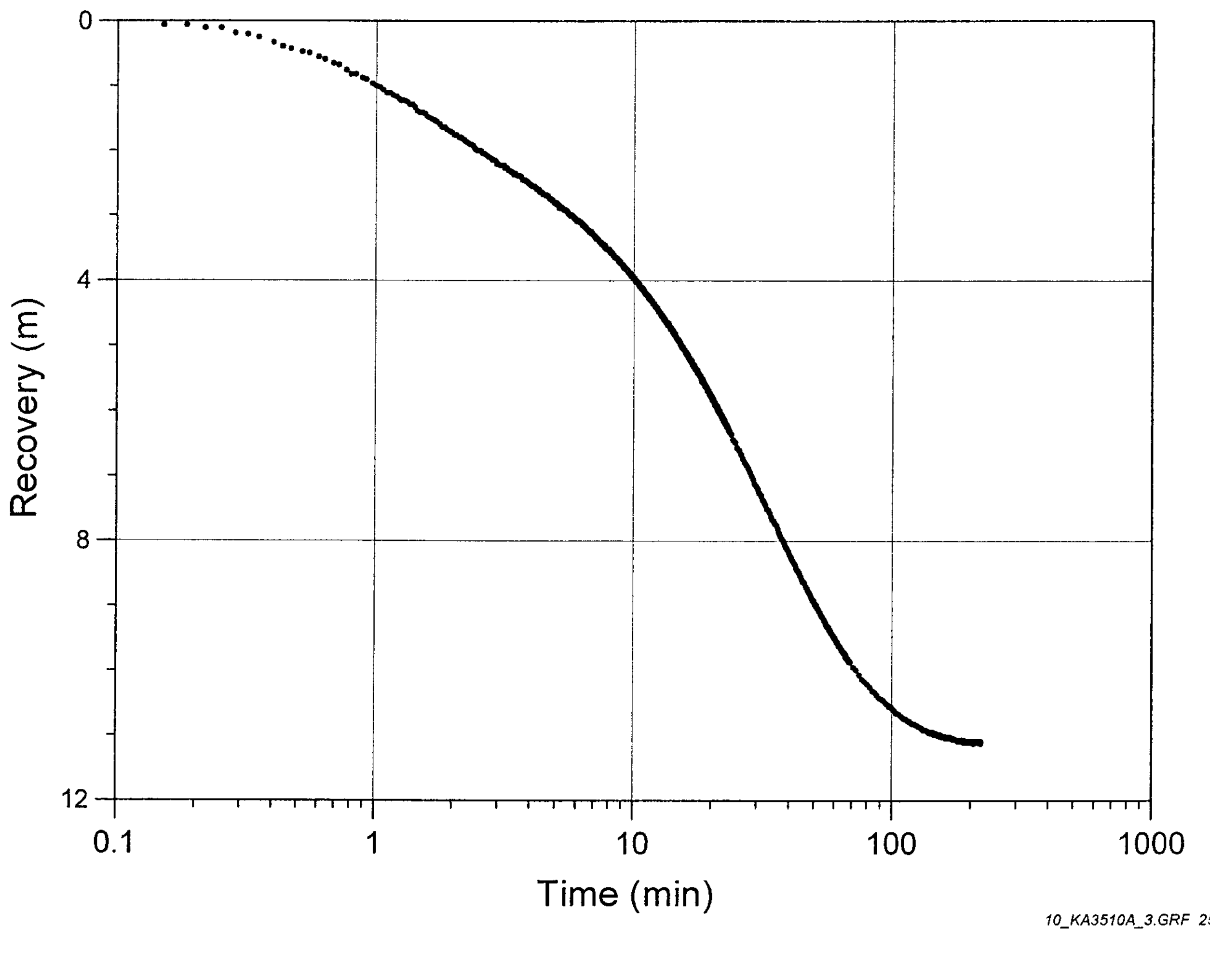

10_KA3510A_3.GRF 25-okt-99

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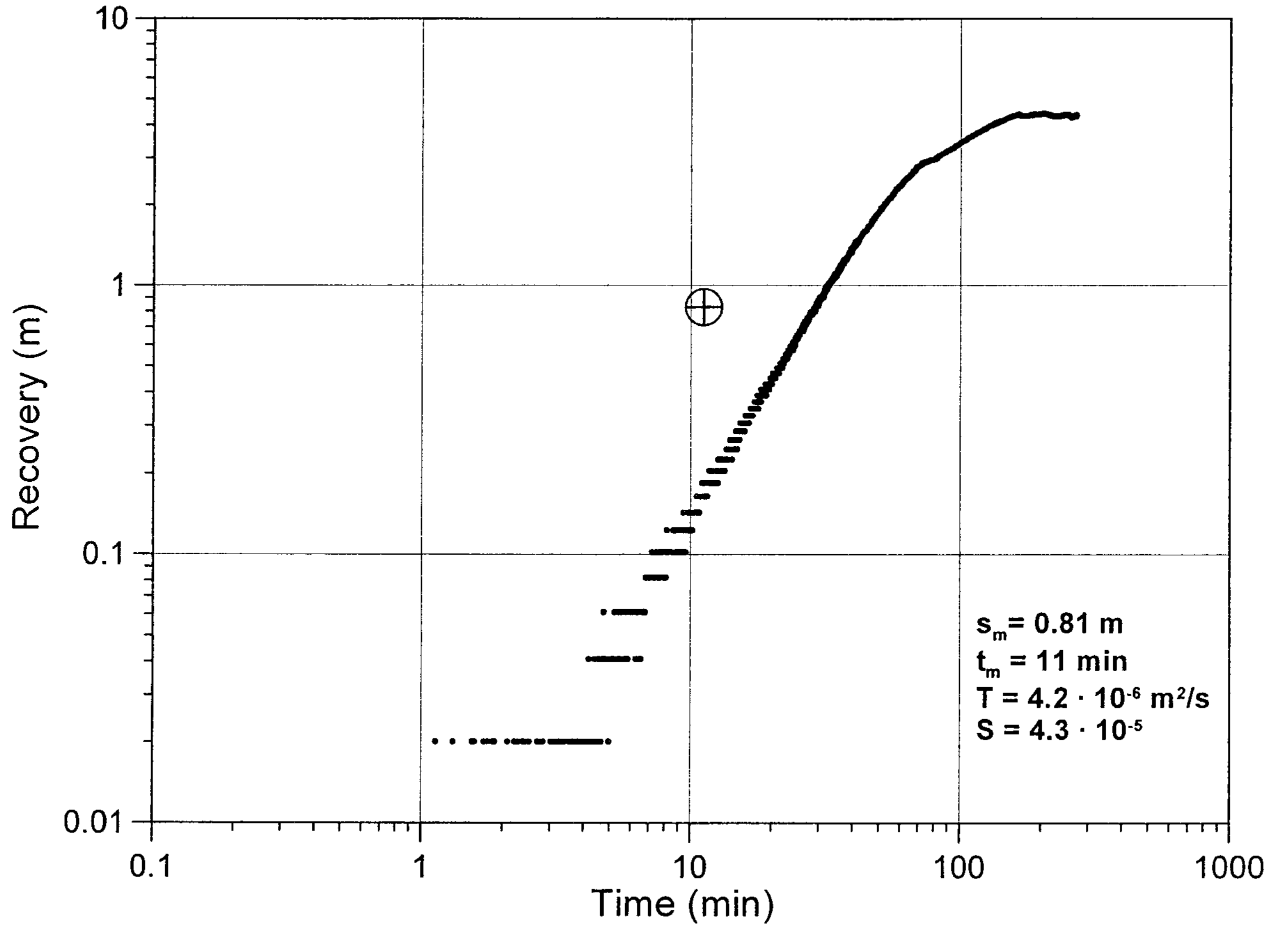

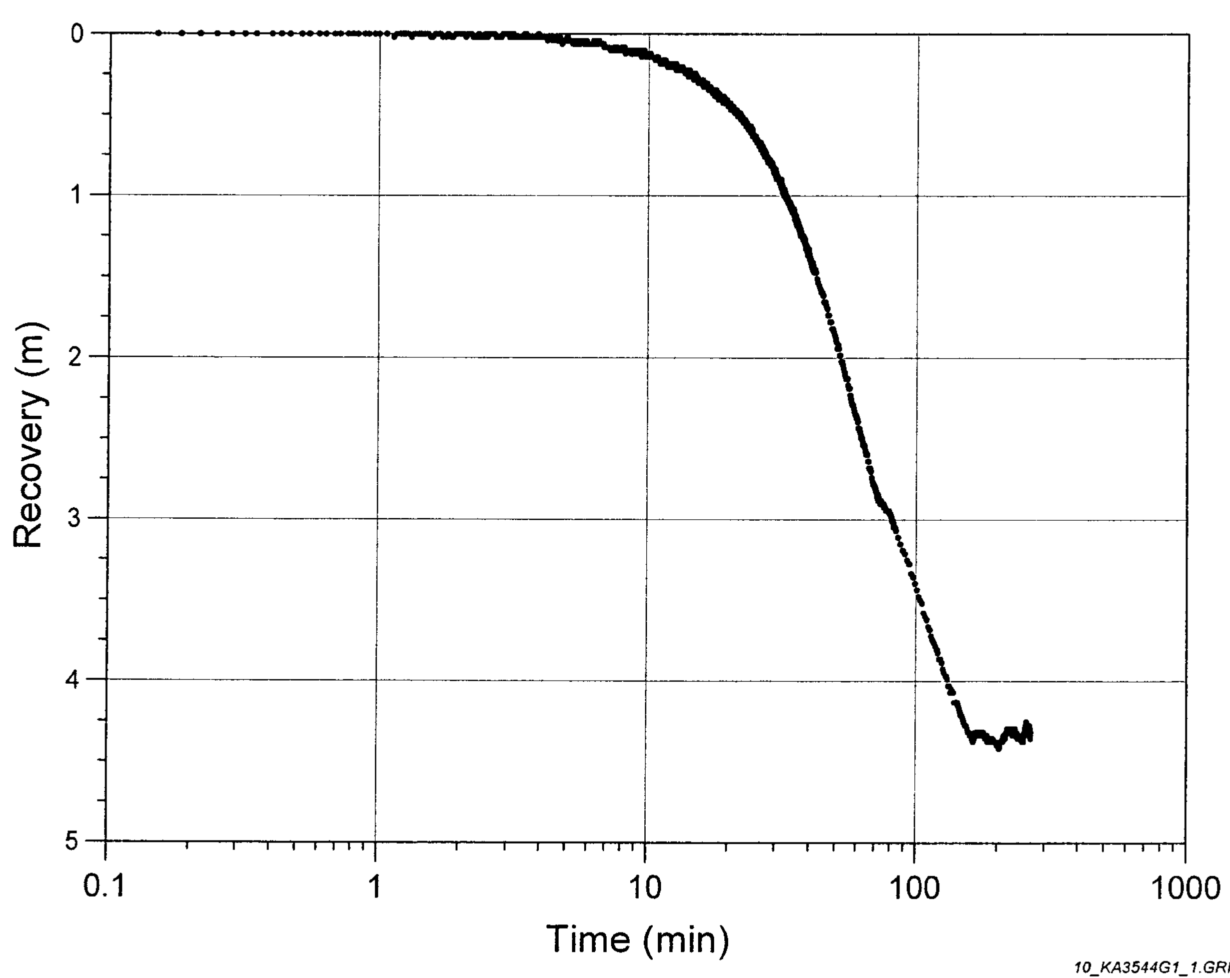

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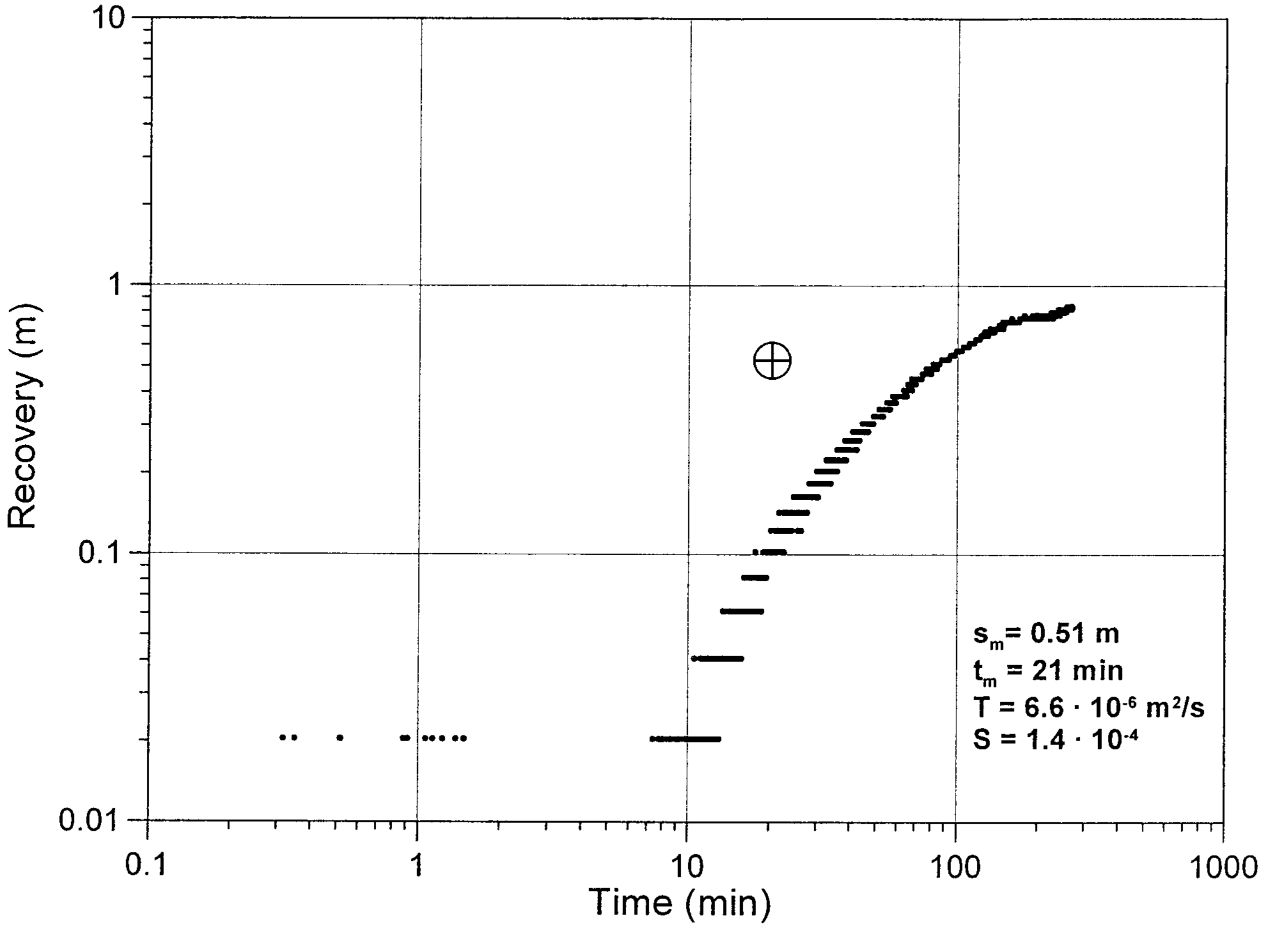

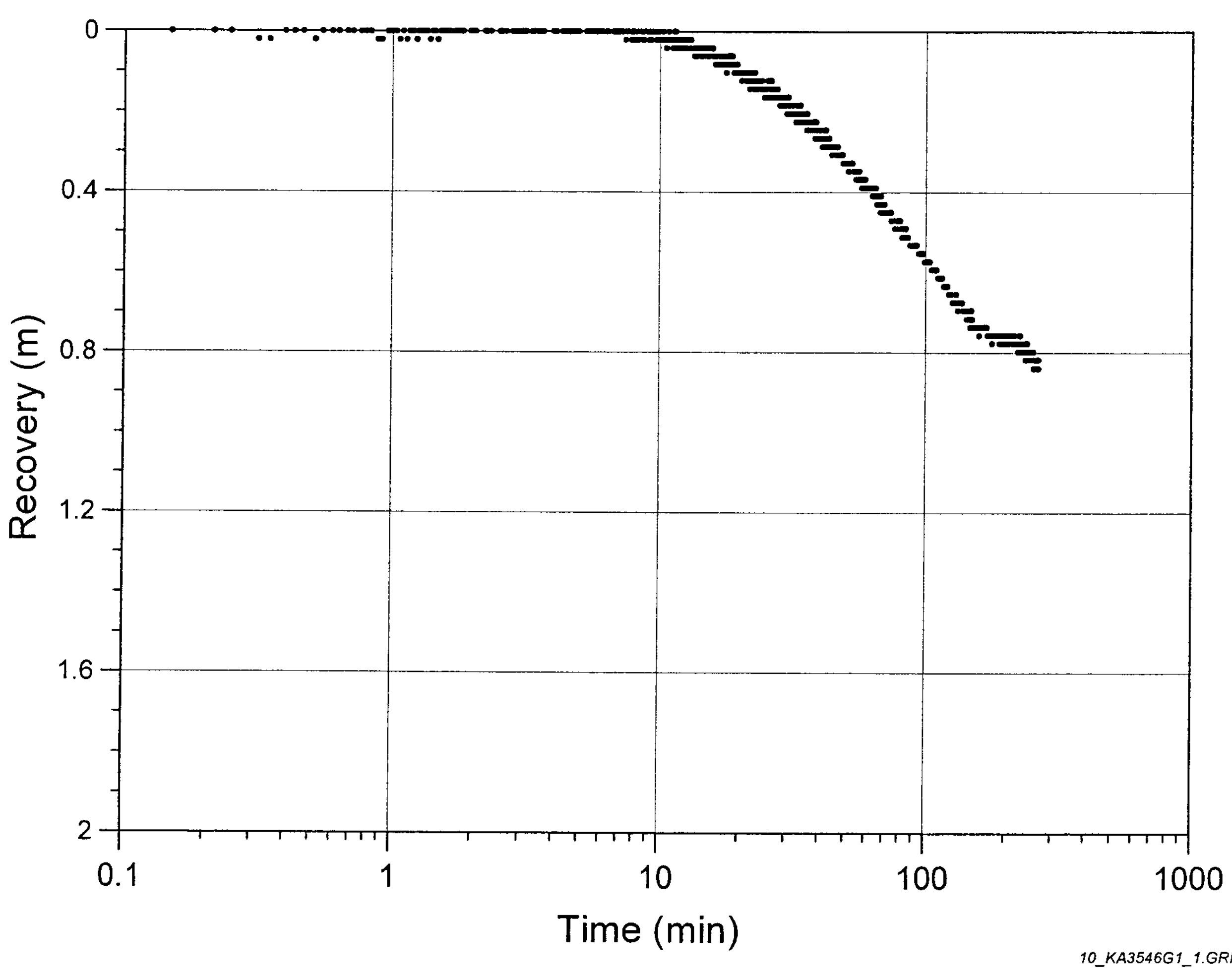

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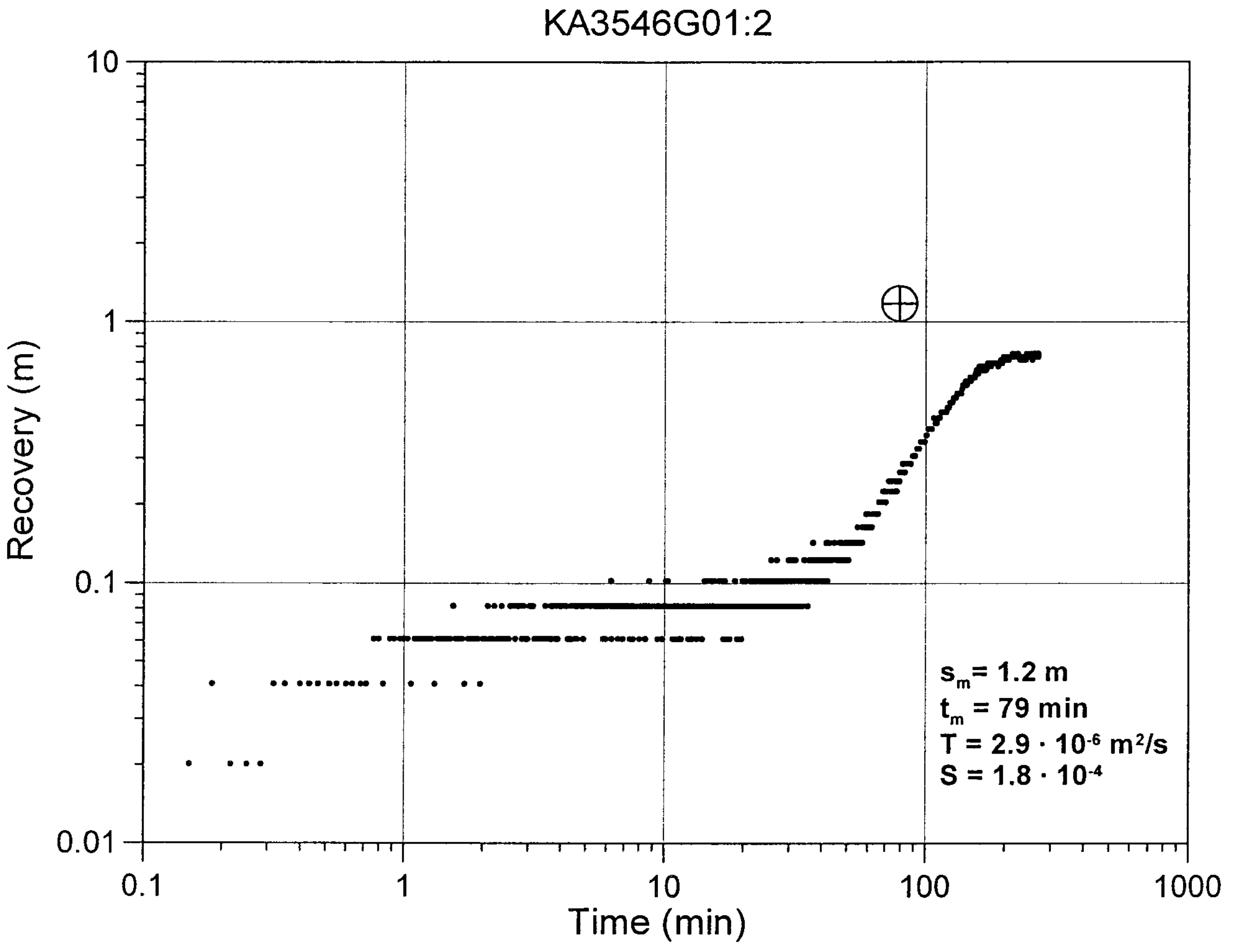

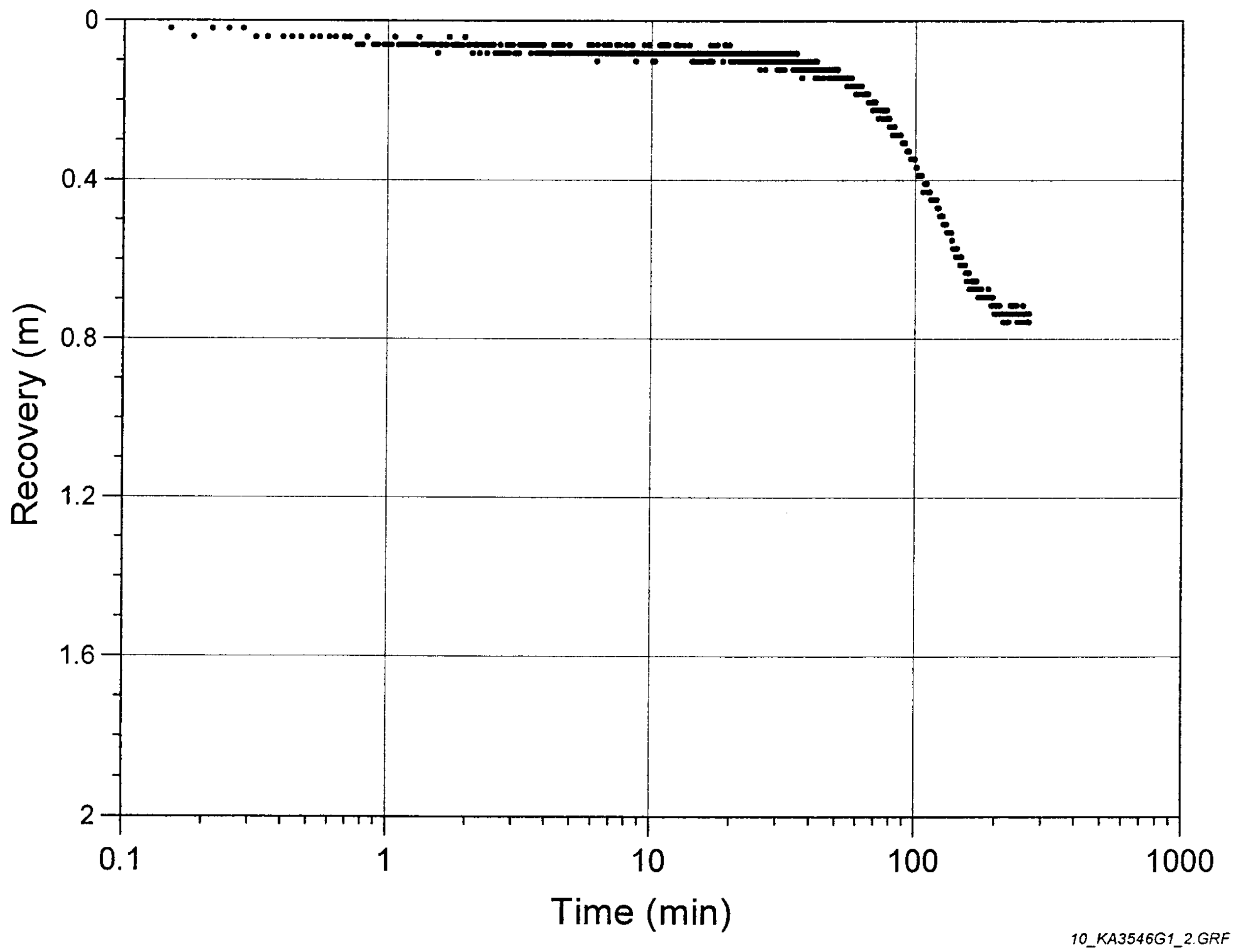

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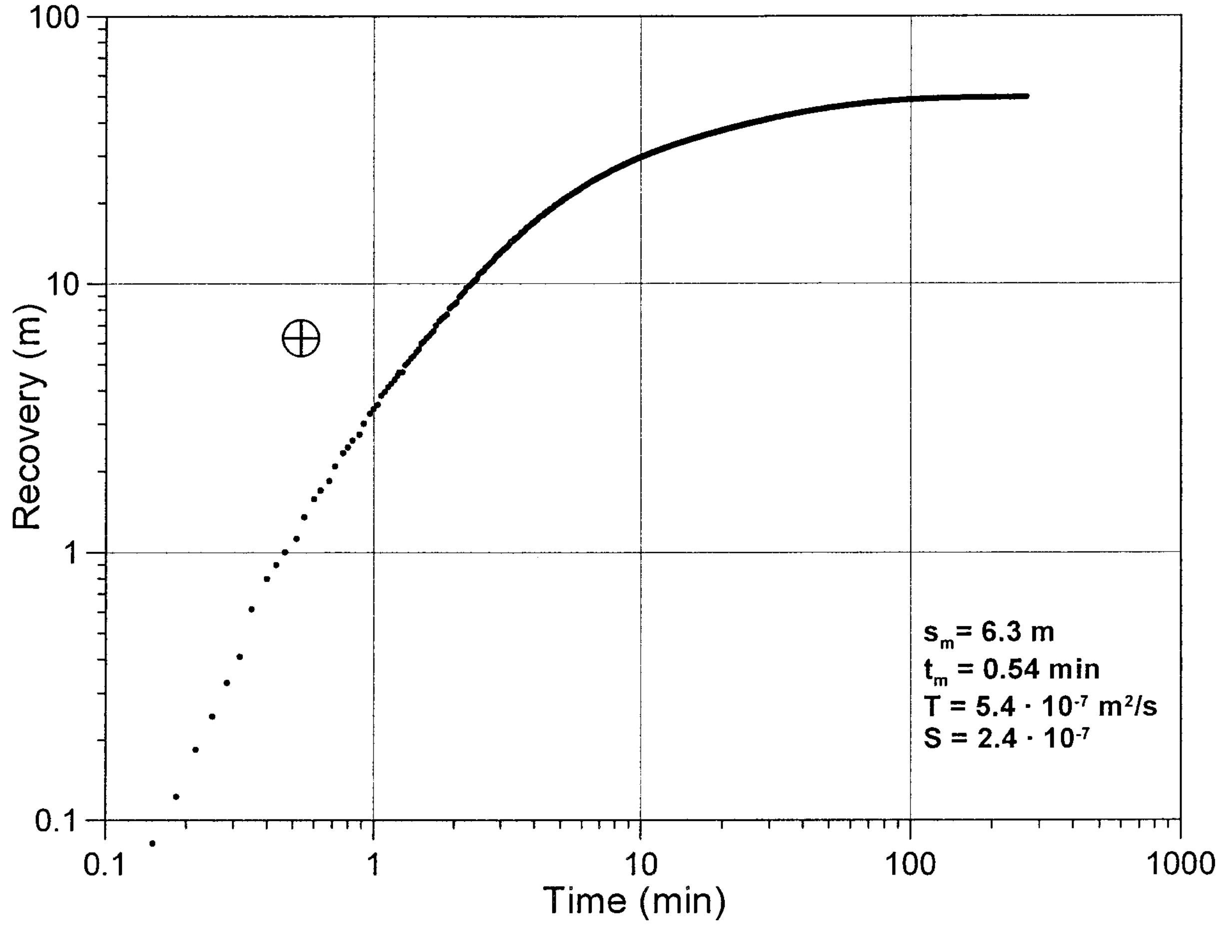

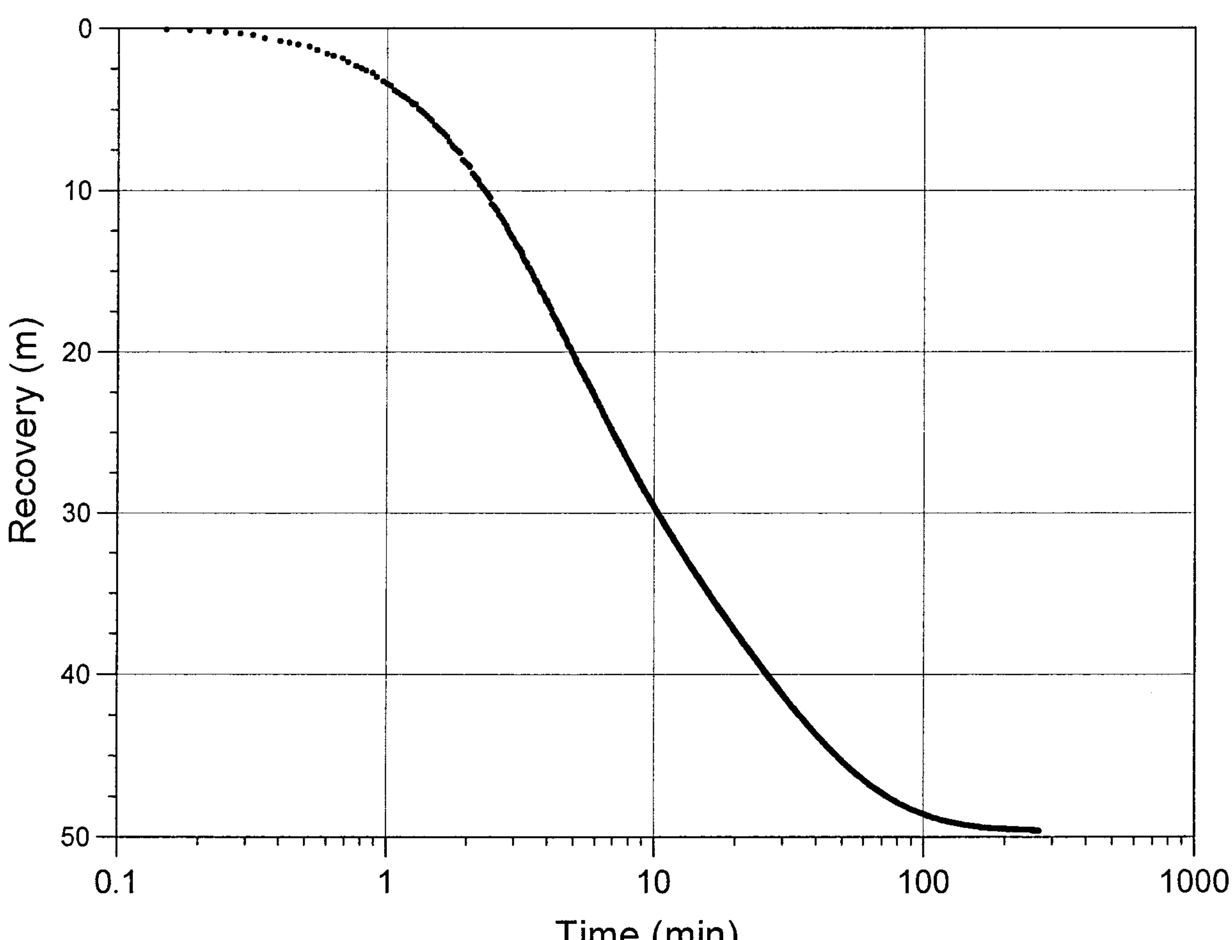

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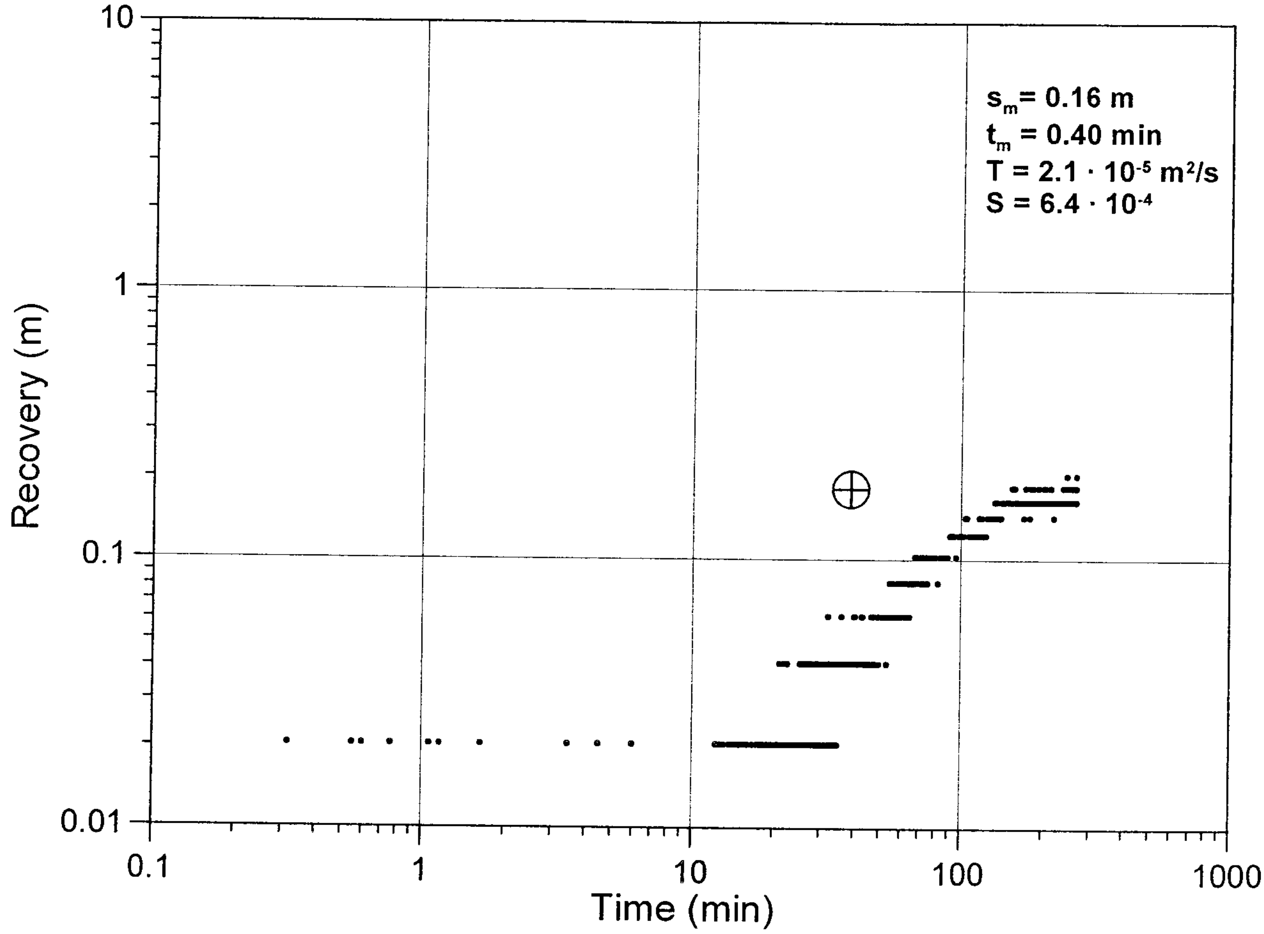

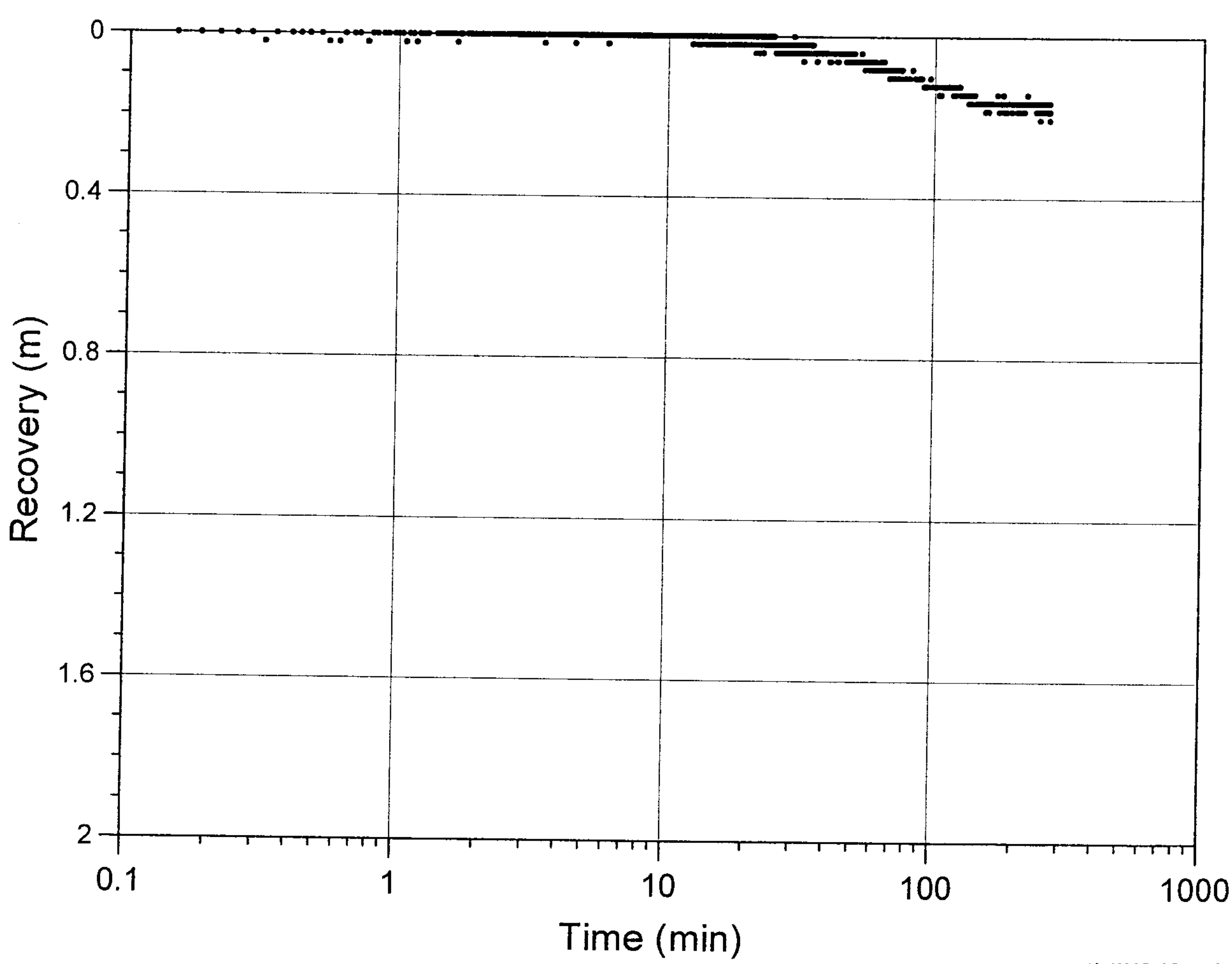

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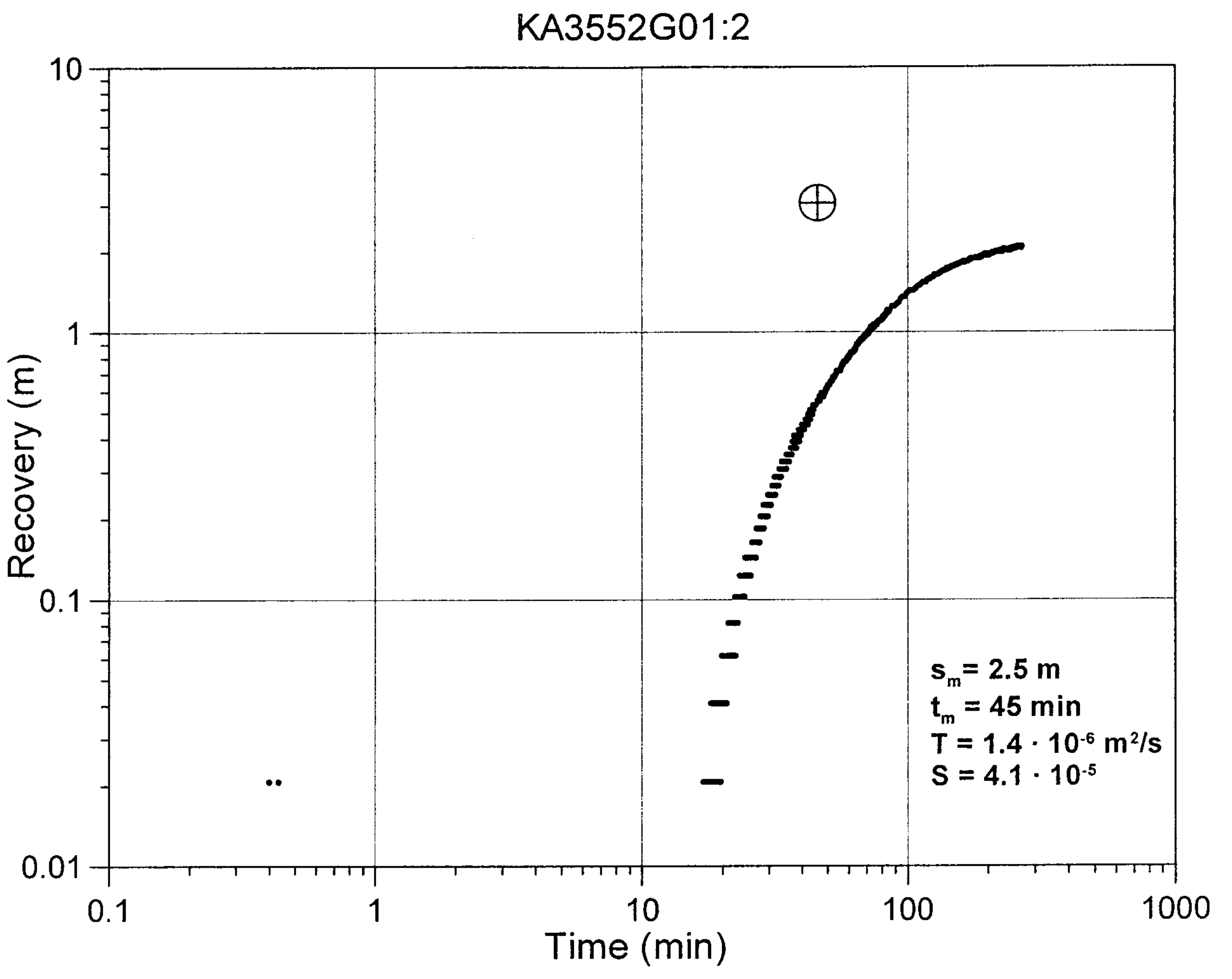

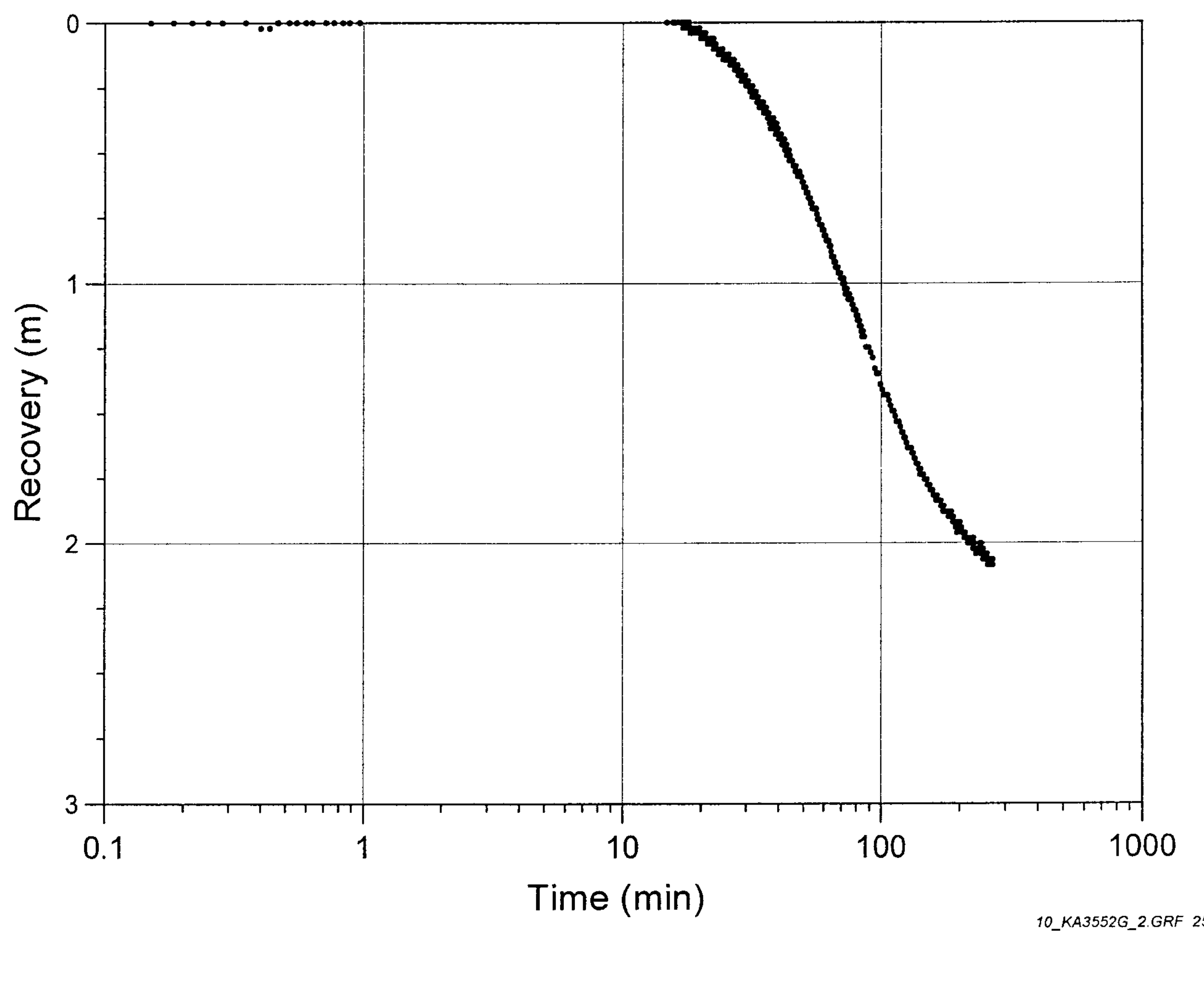

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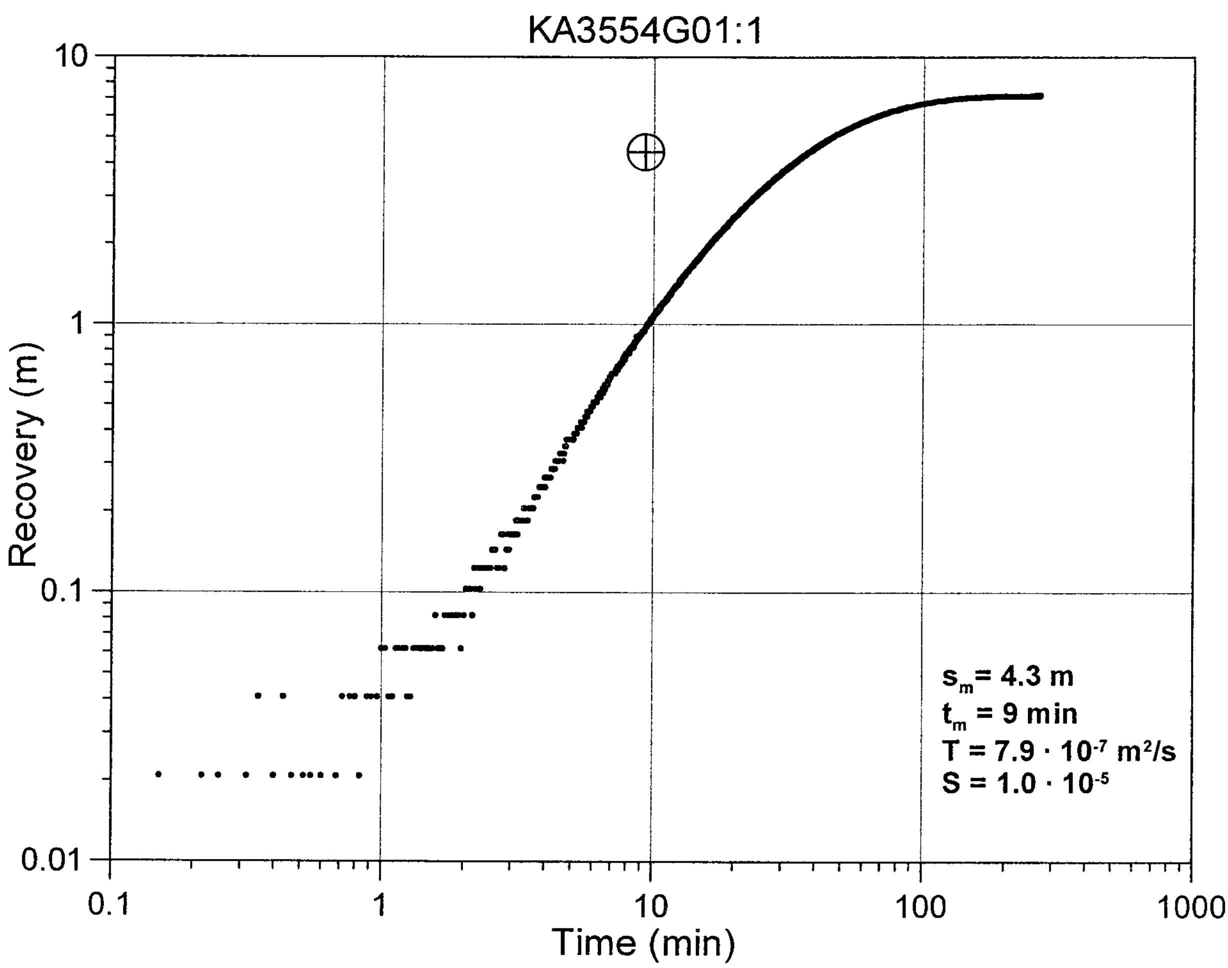

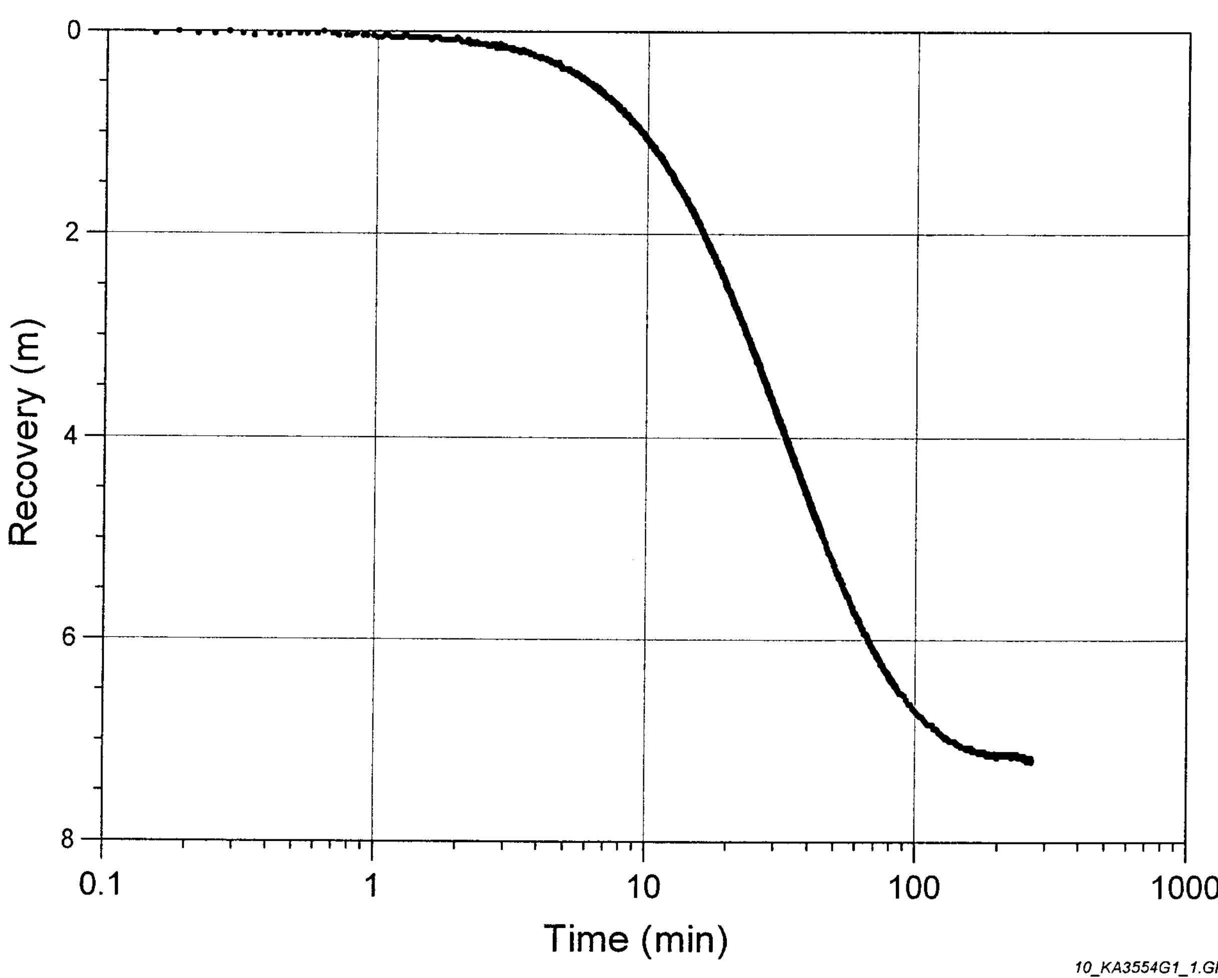

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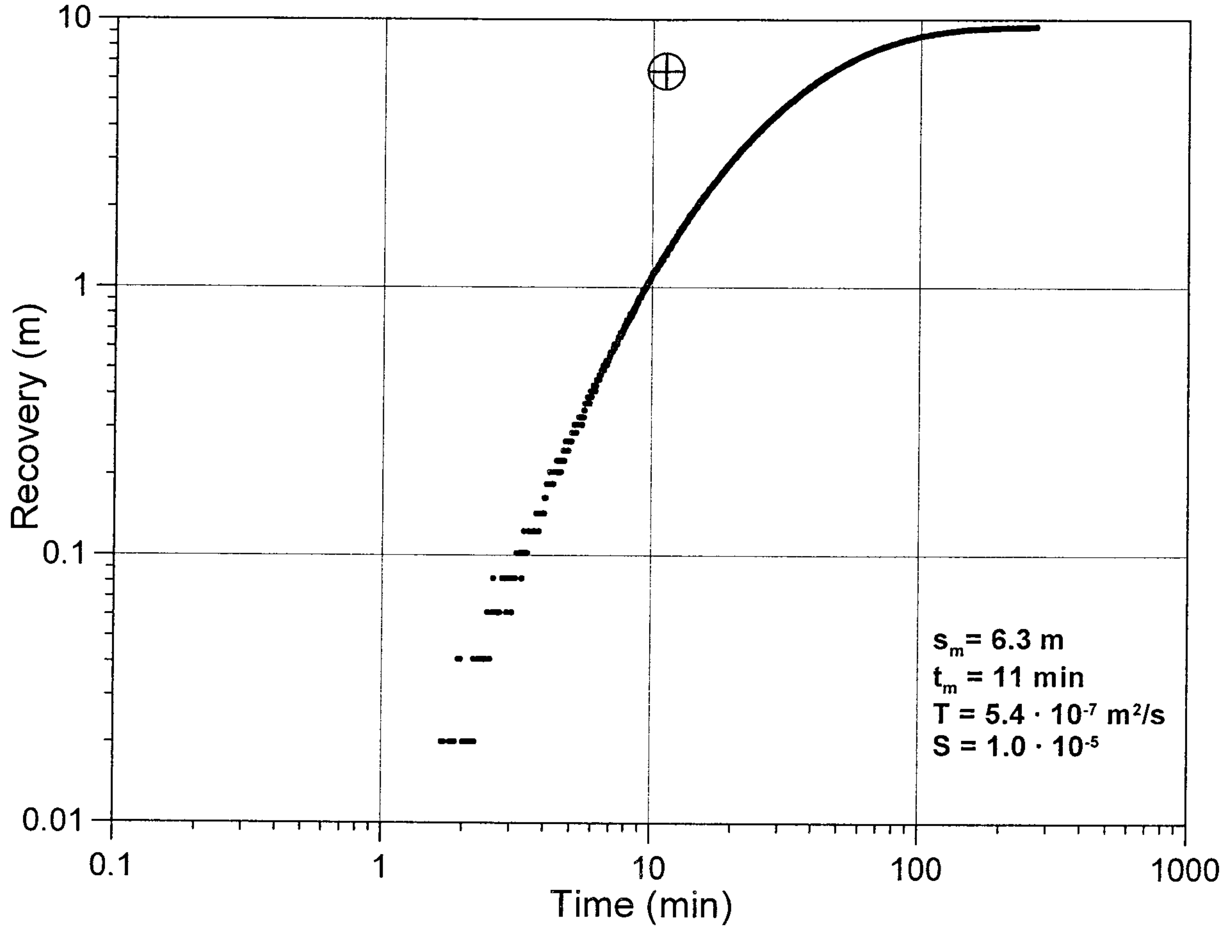

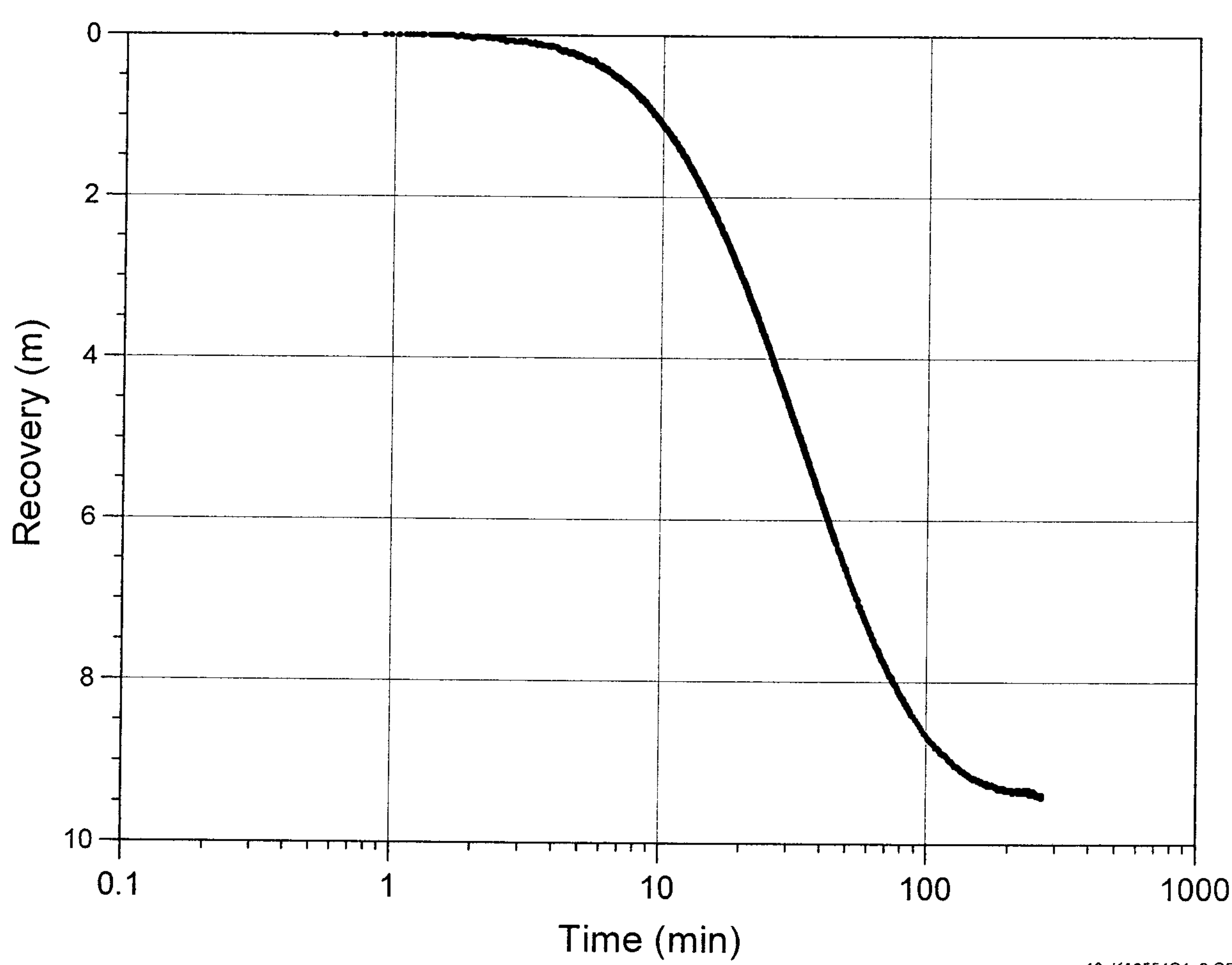

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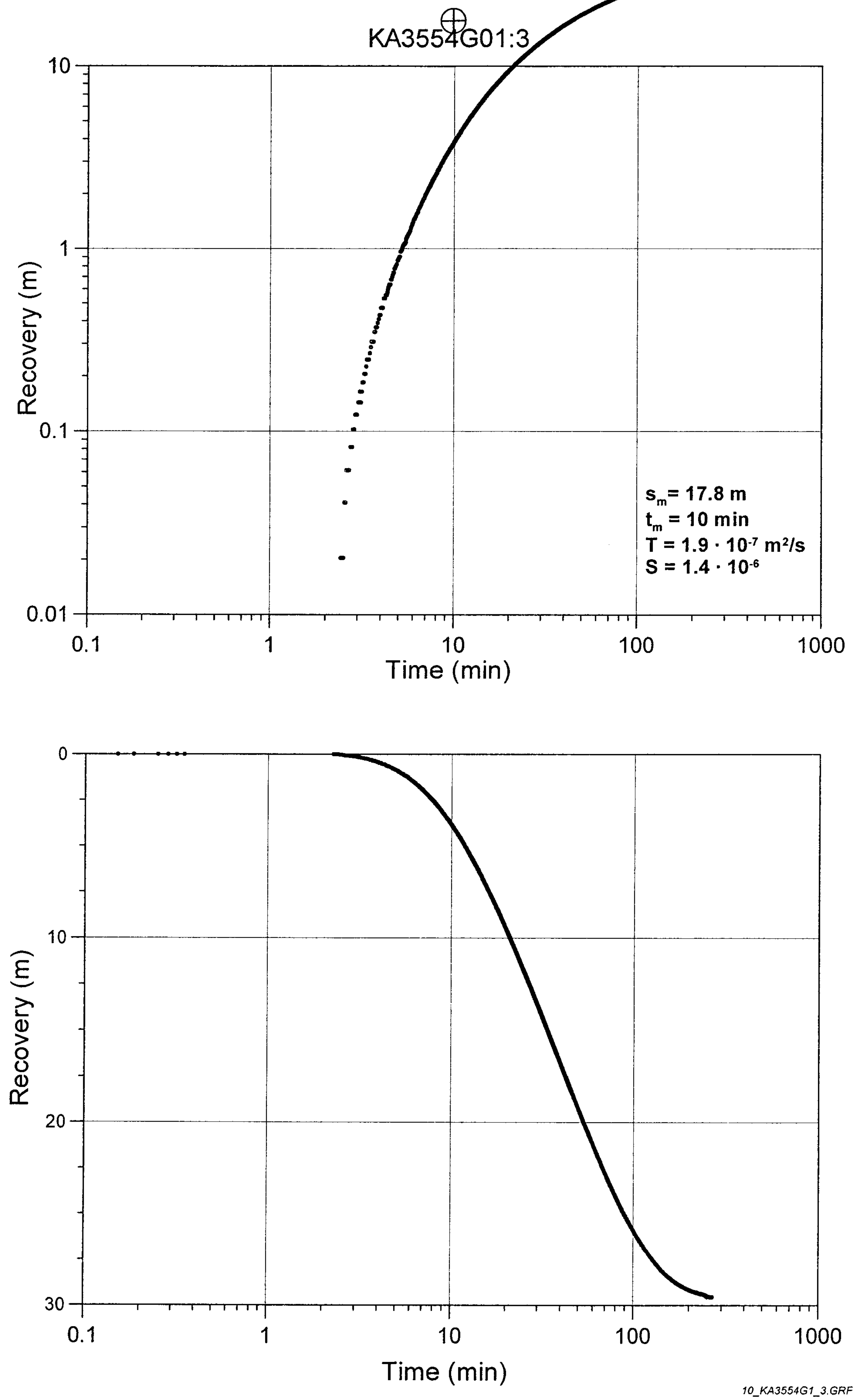

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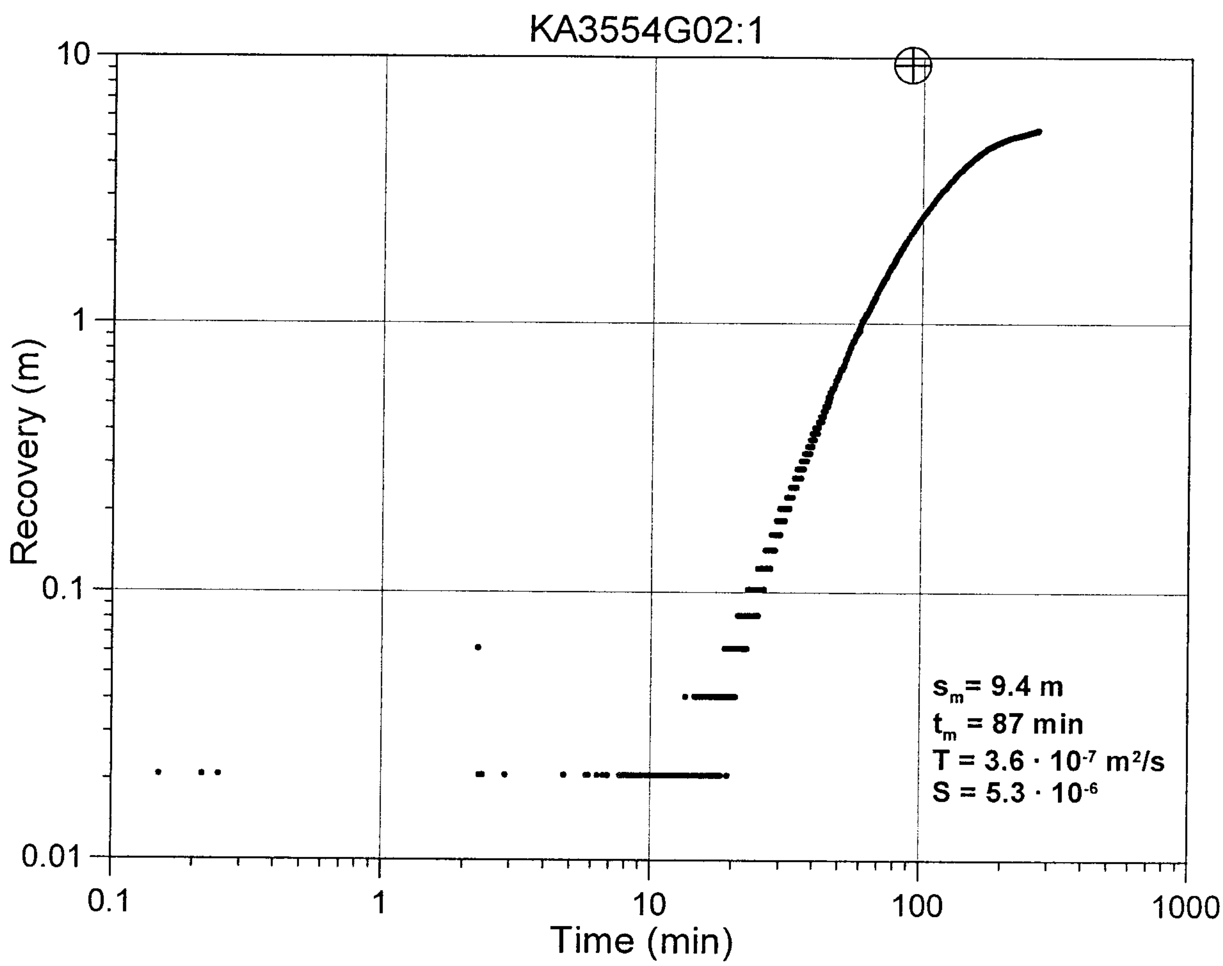

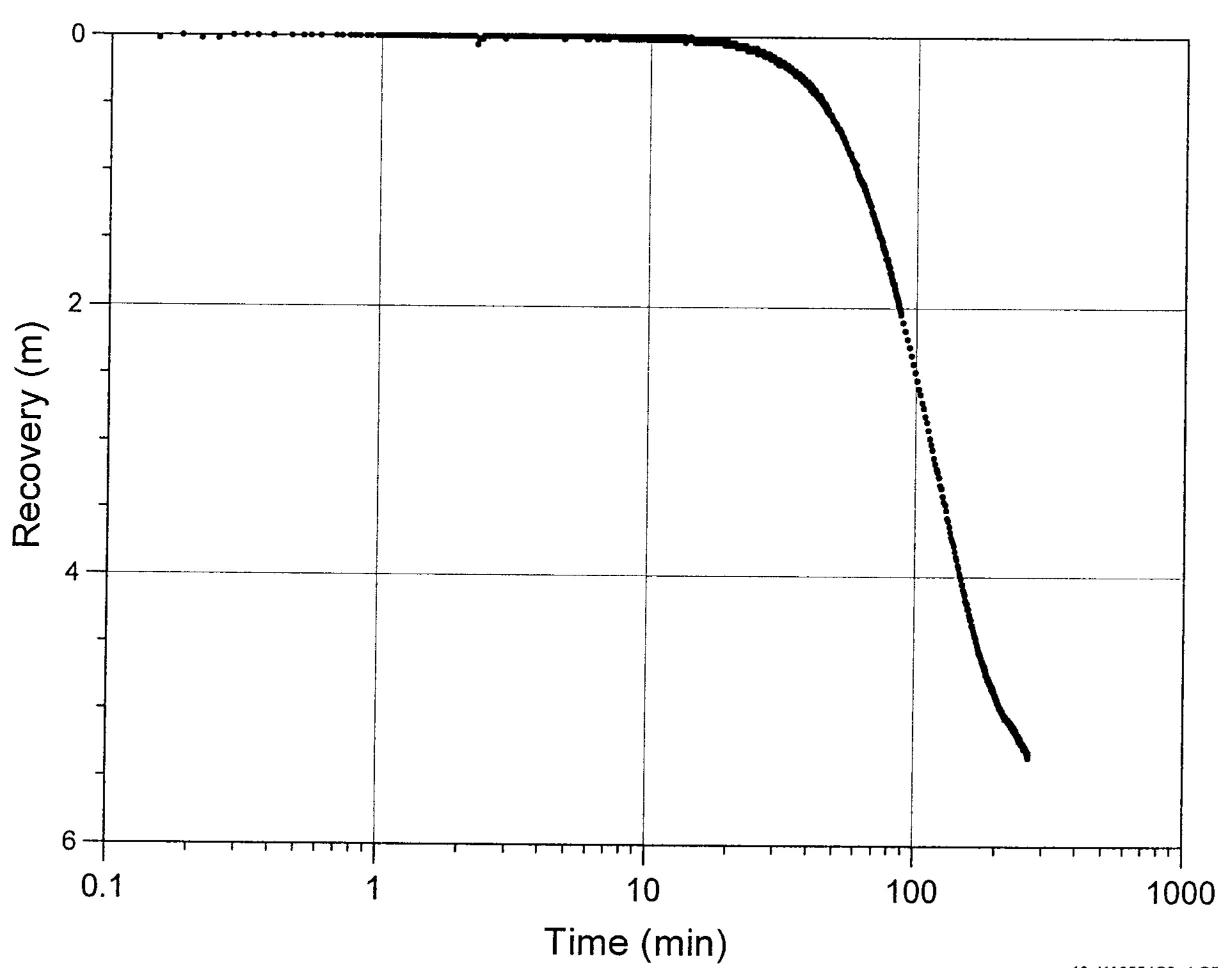

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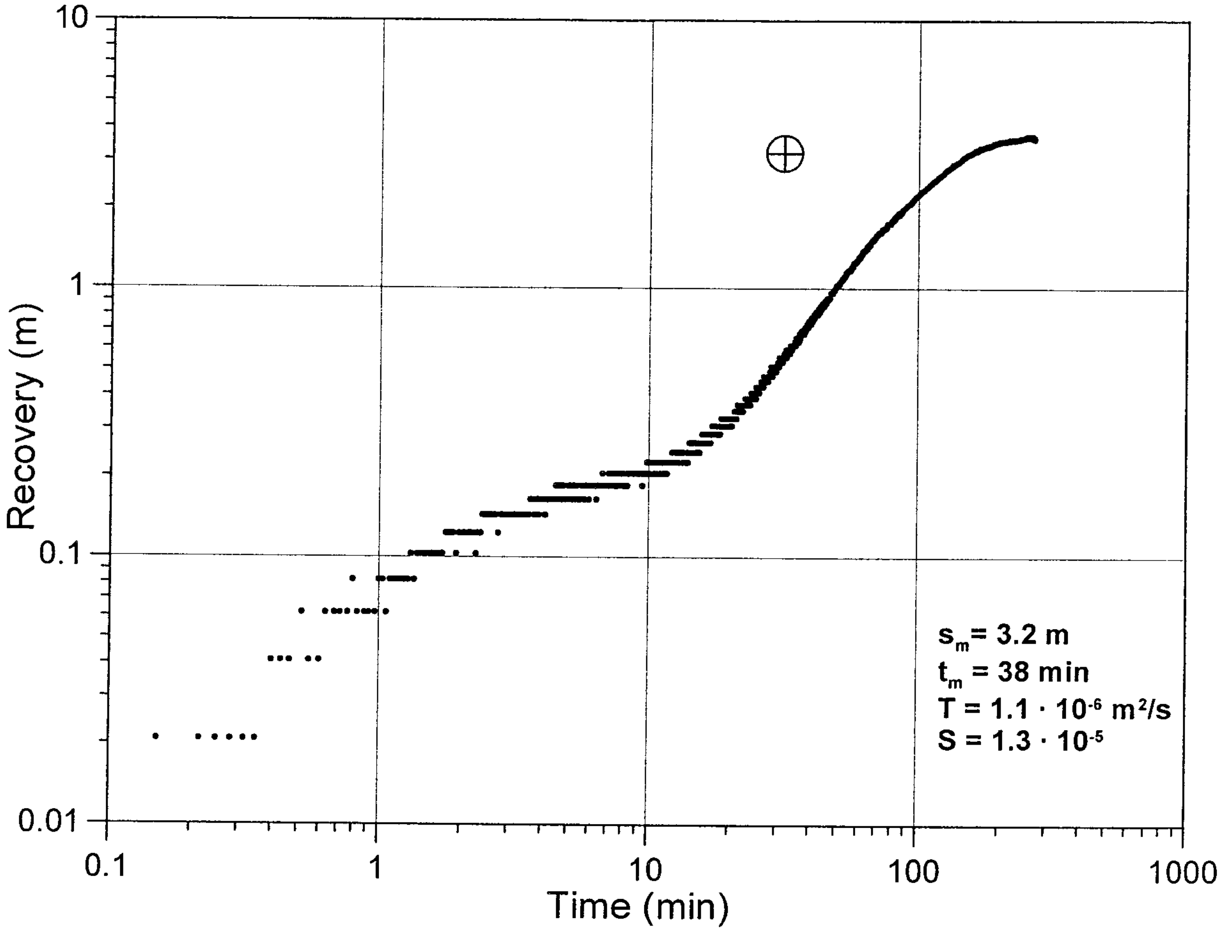

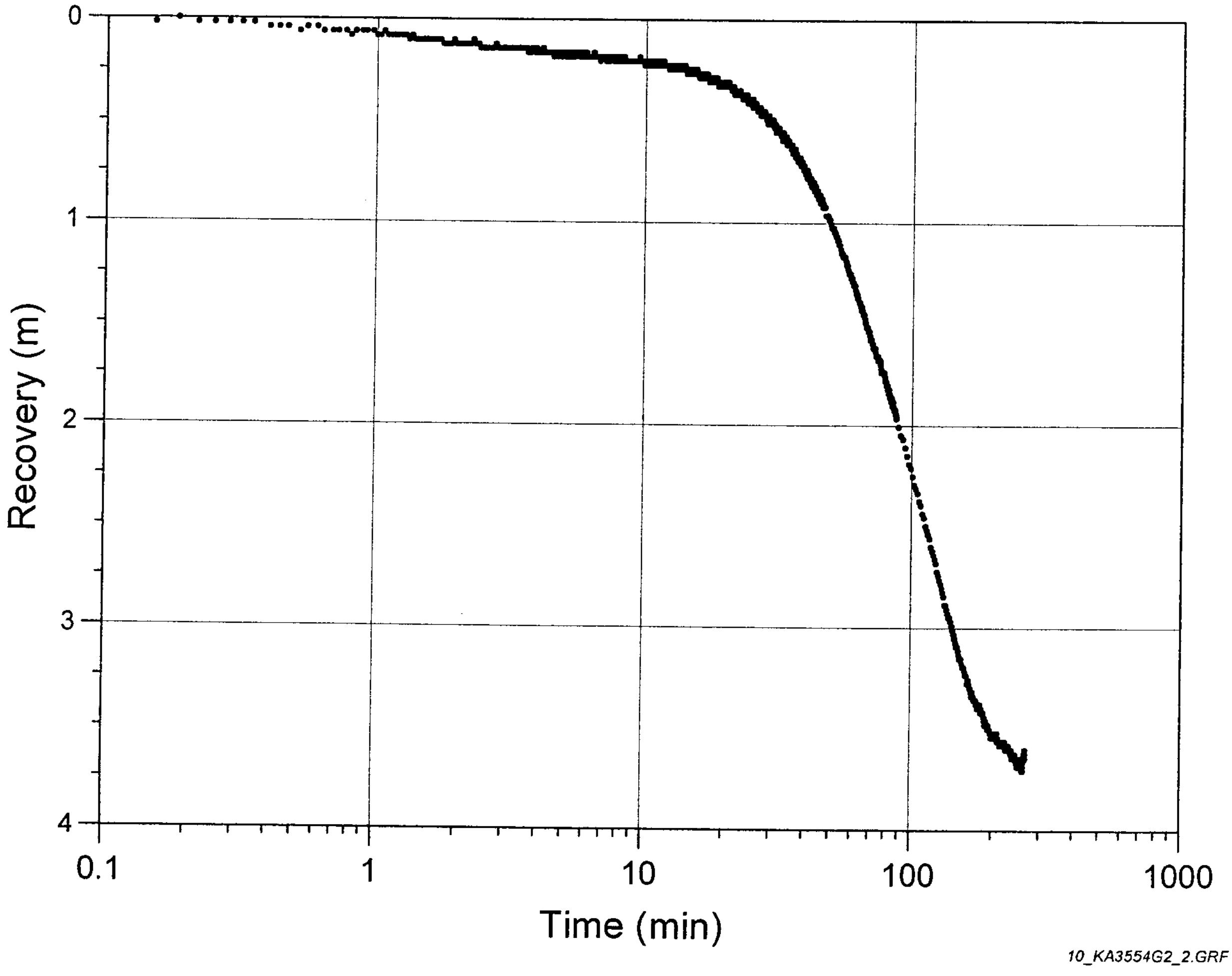

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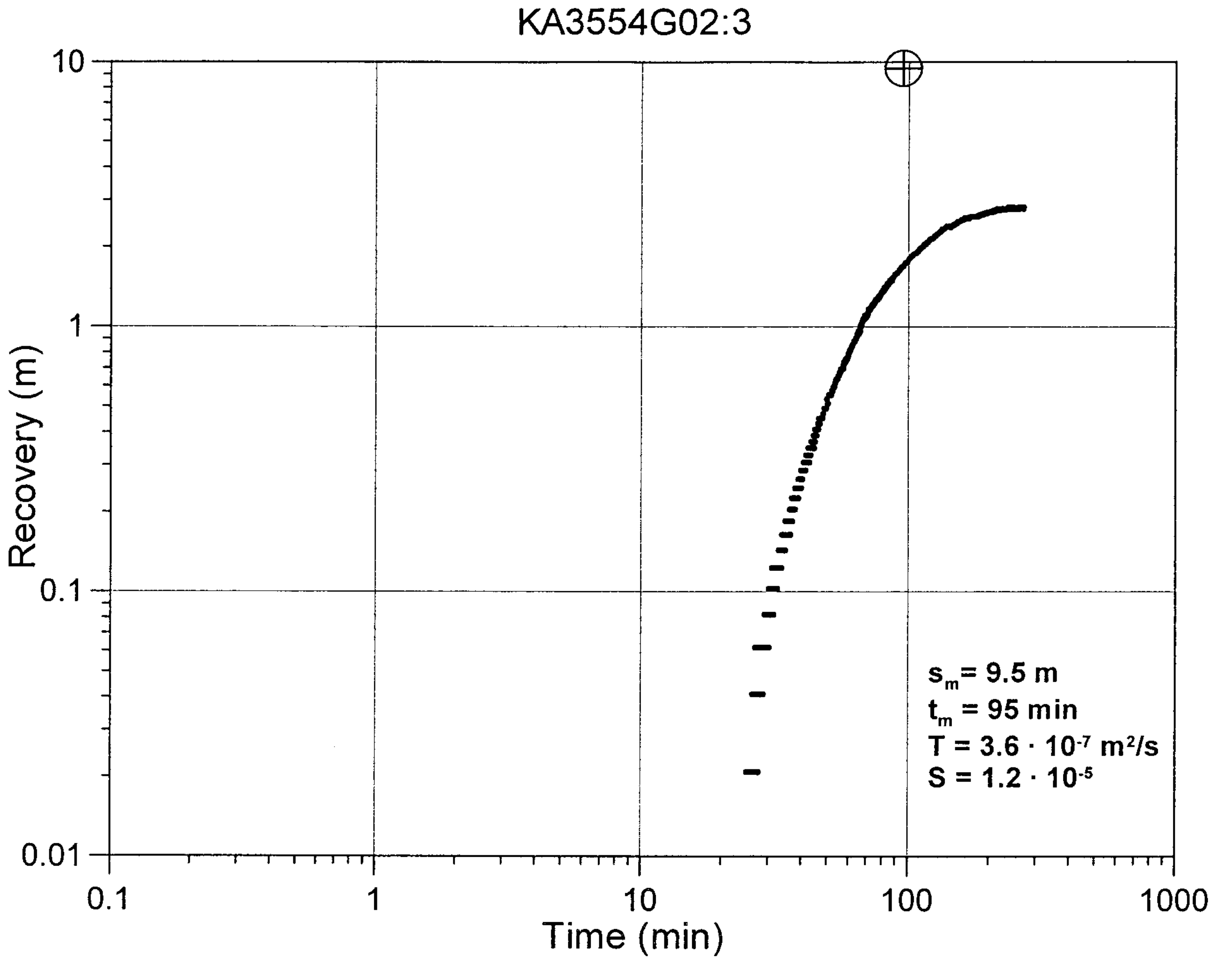

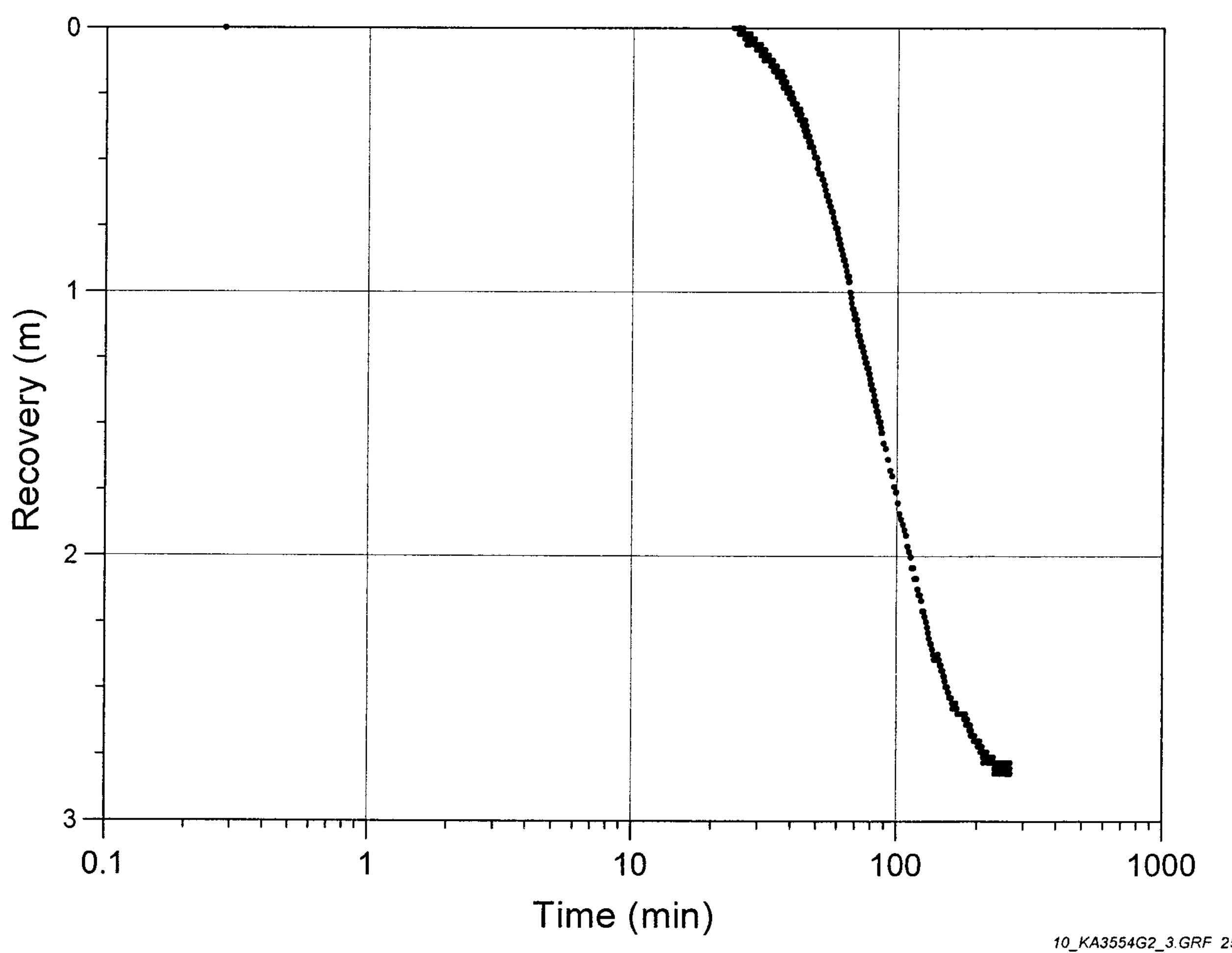

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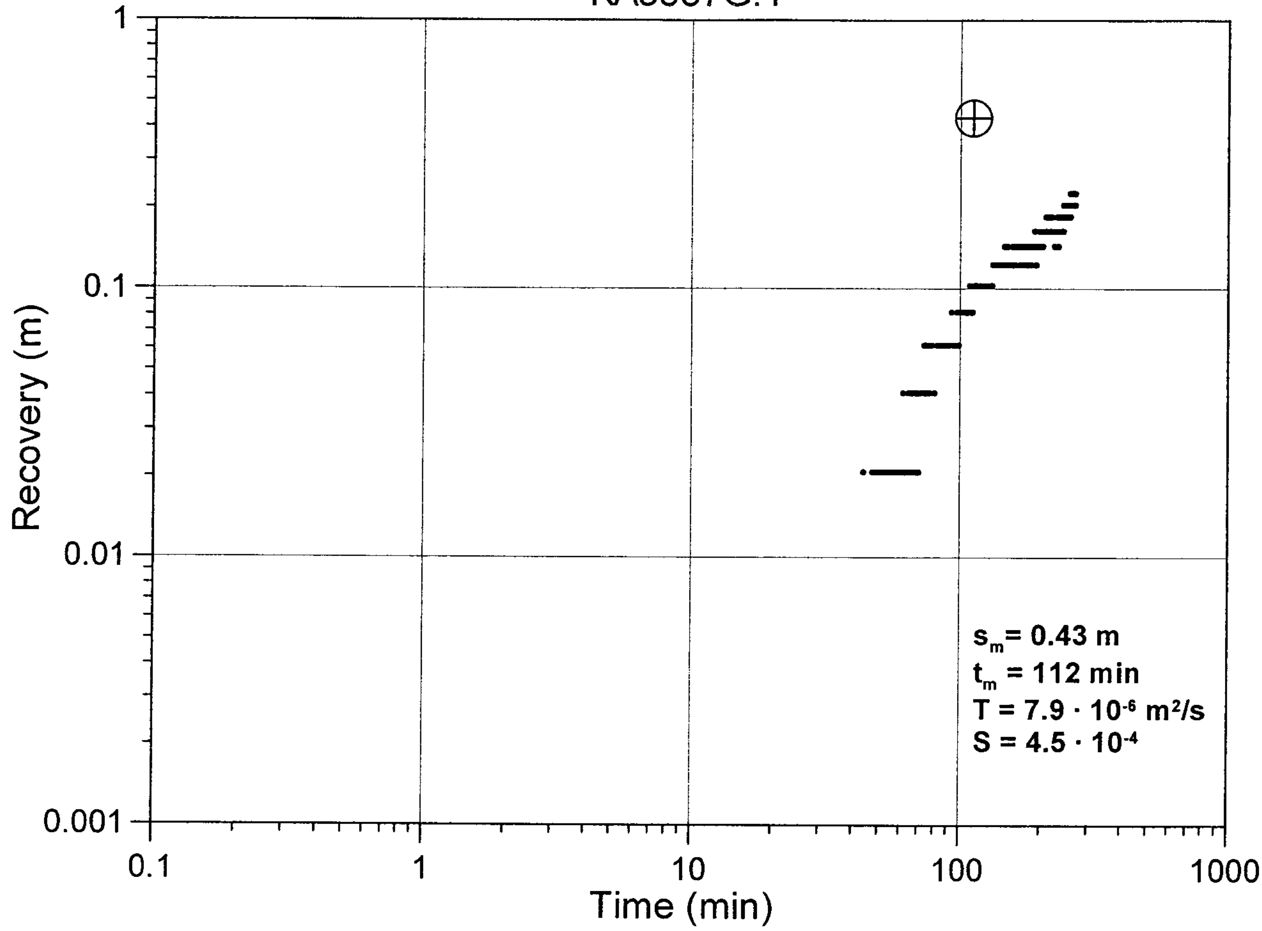

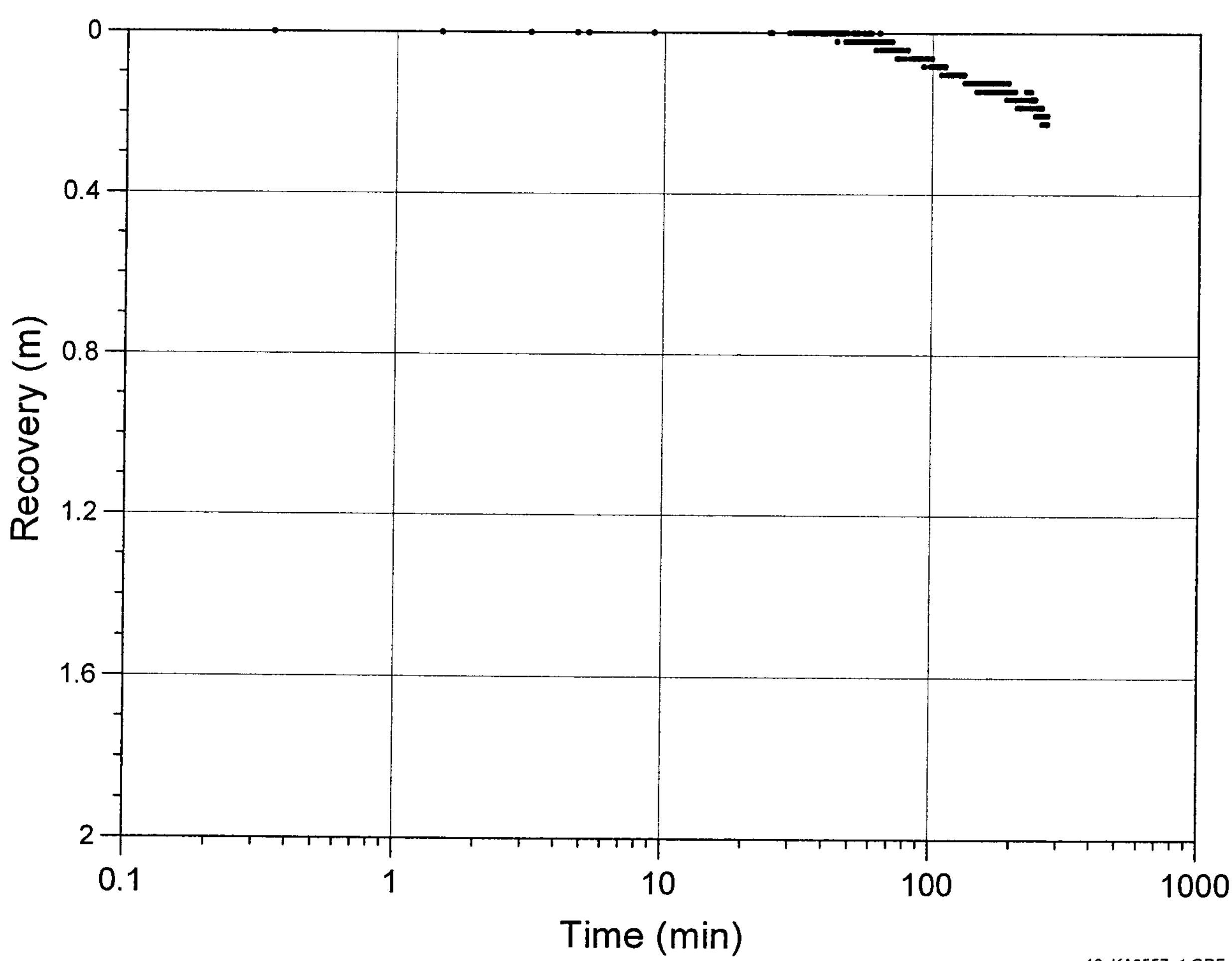

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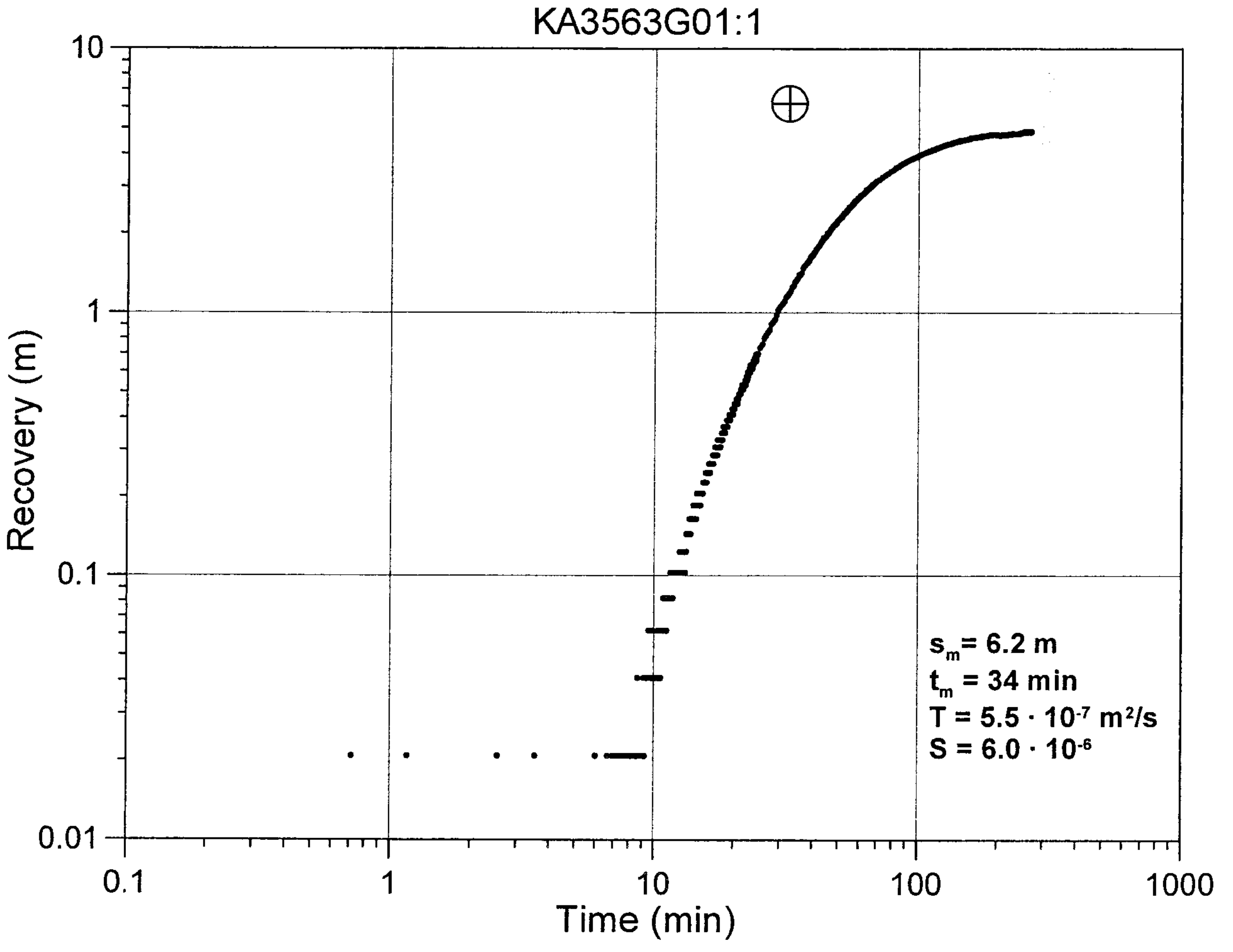

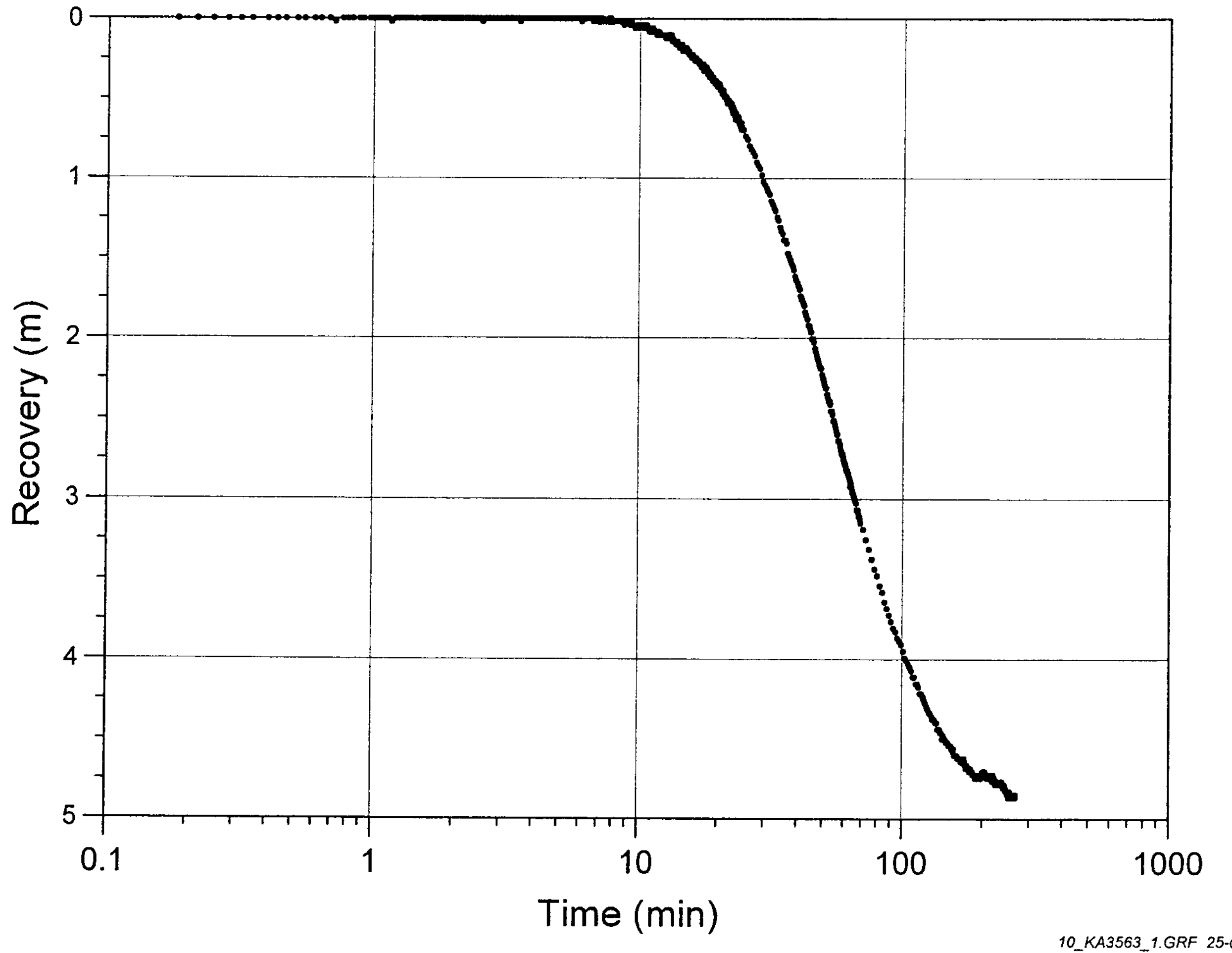

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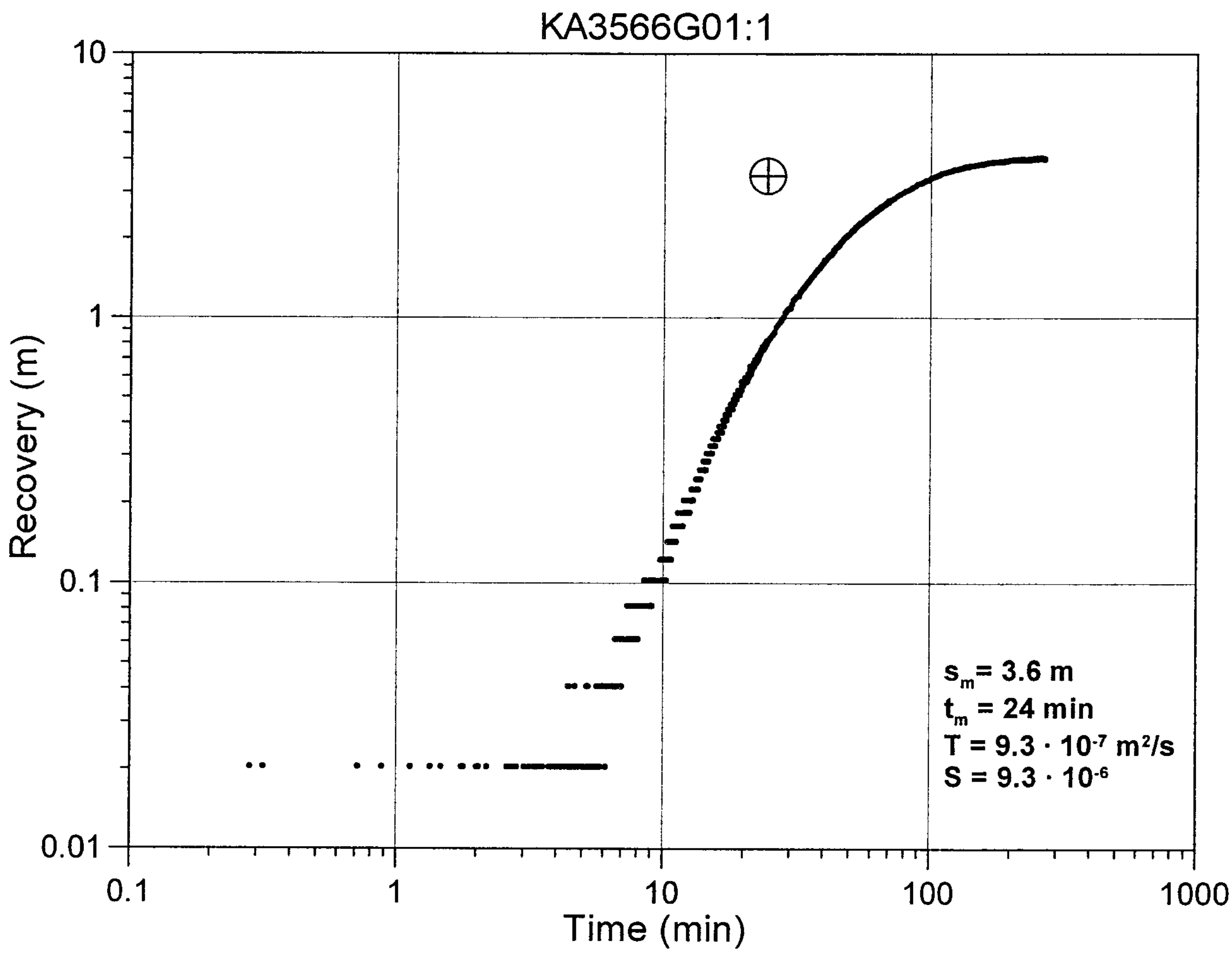

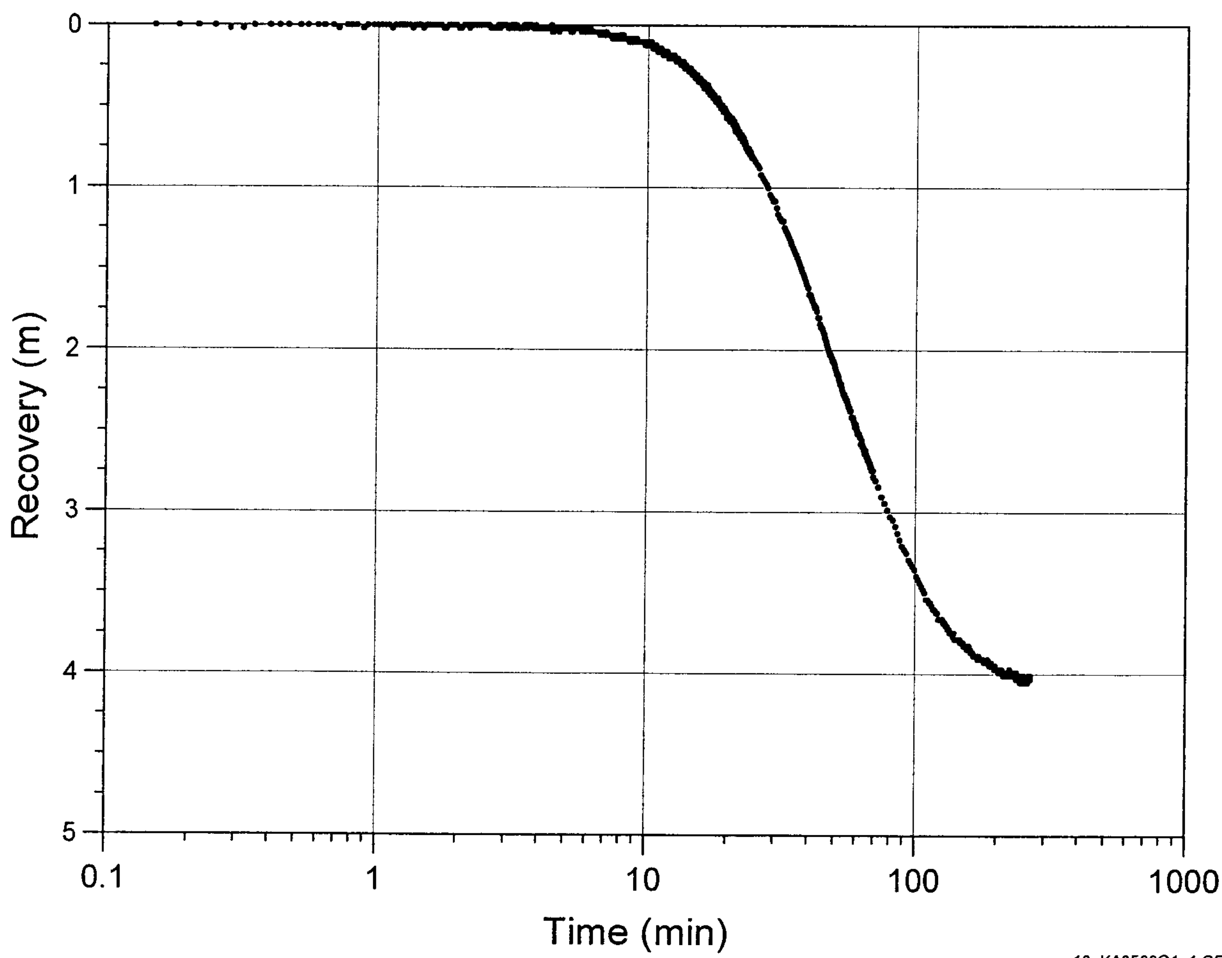

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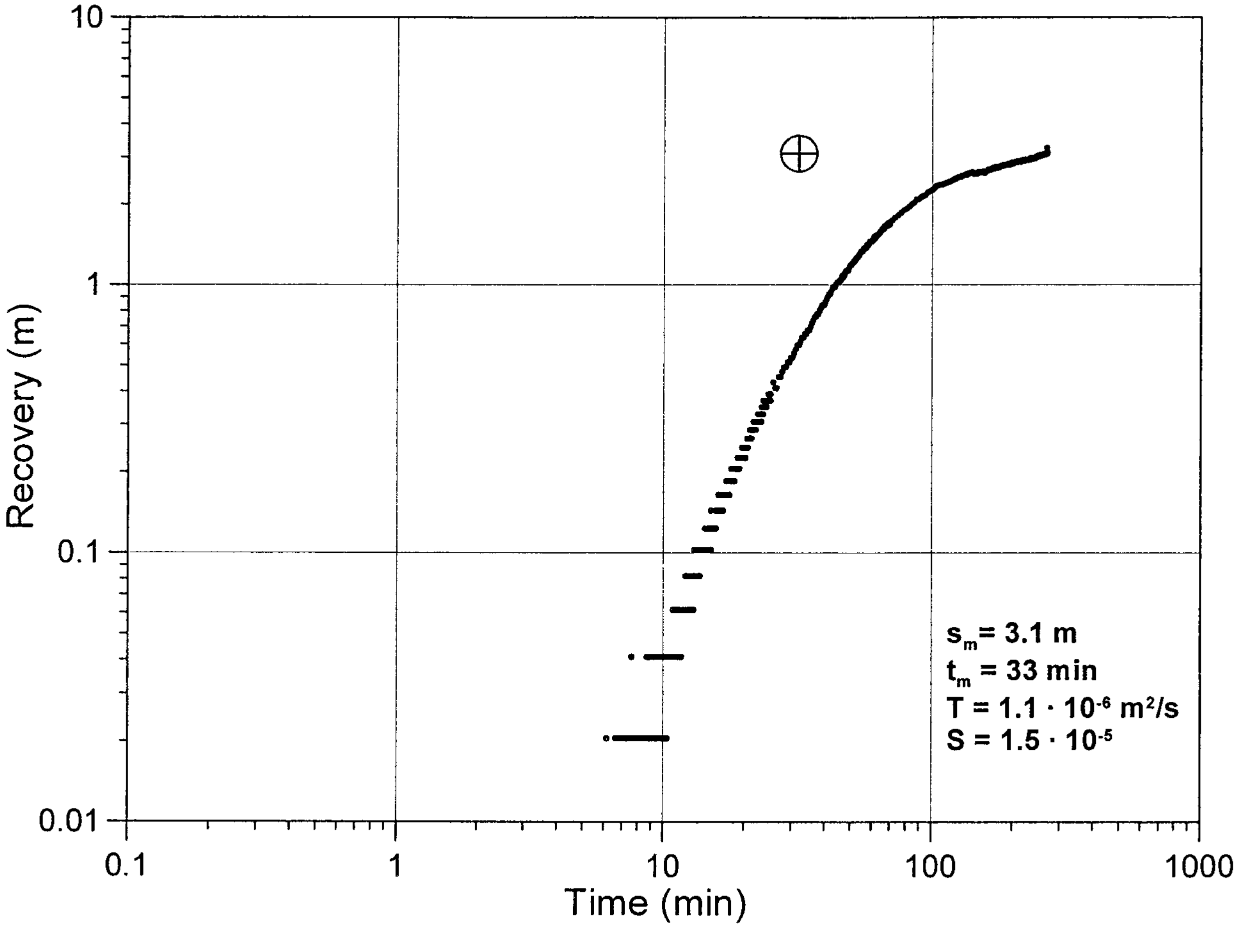

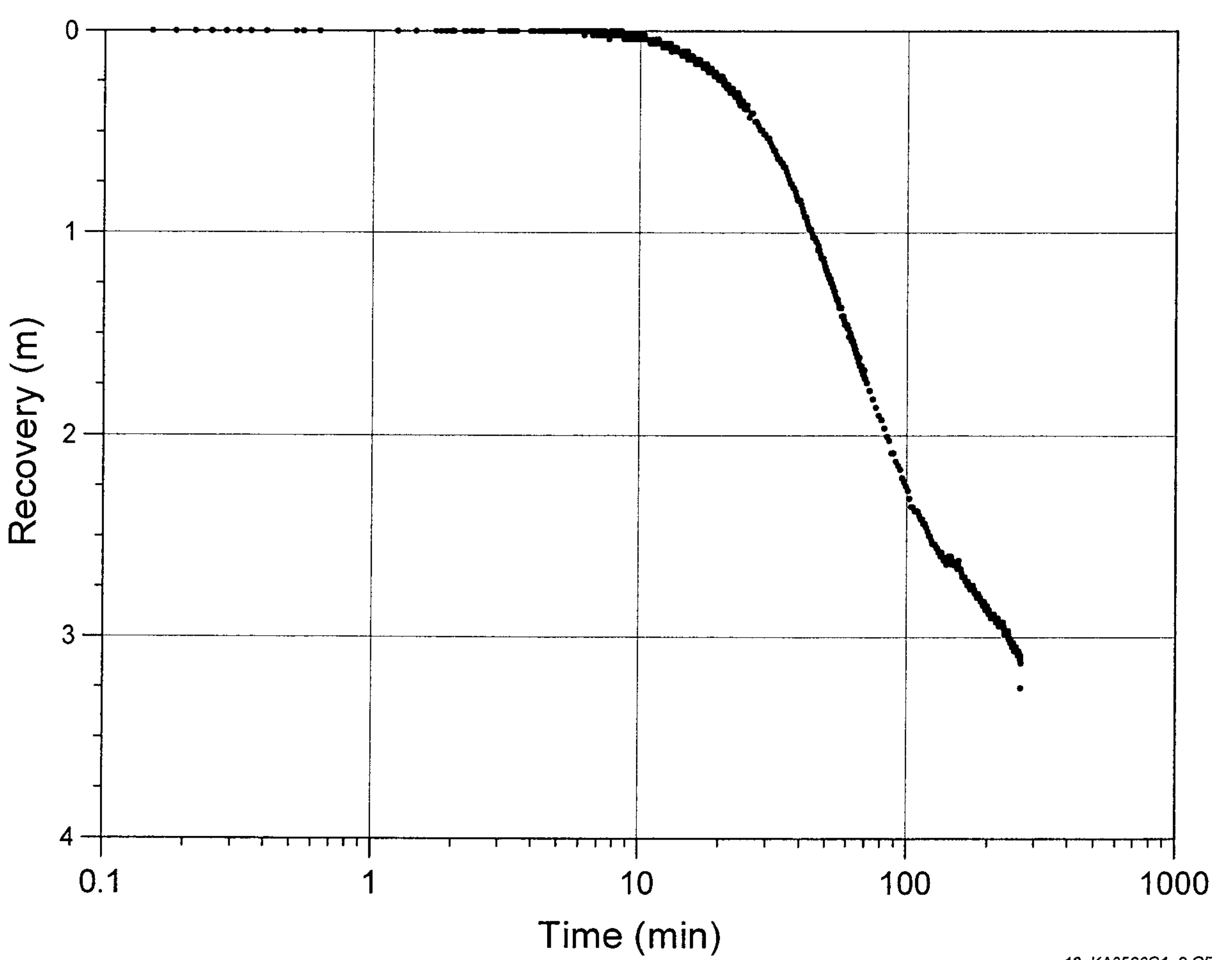

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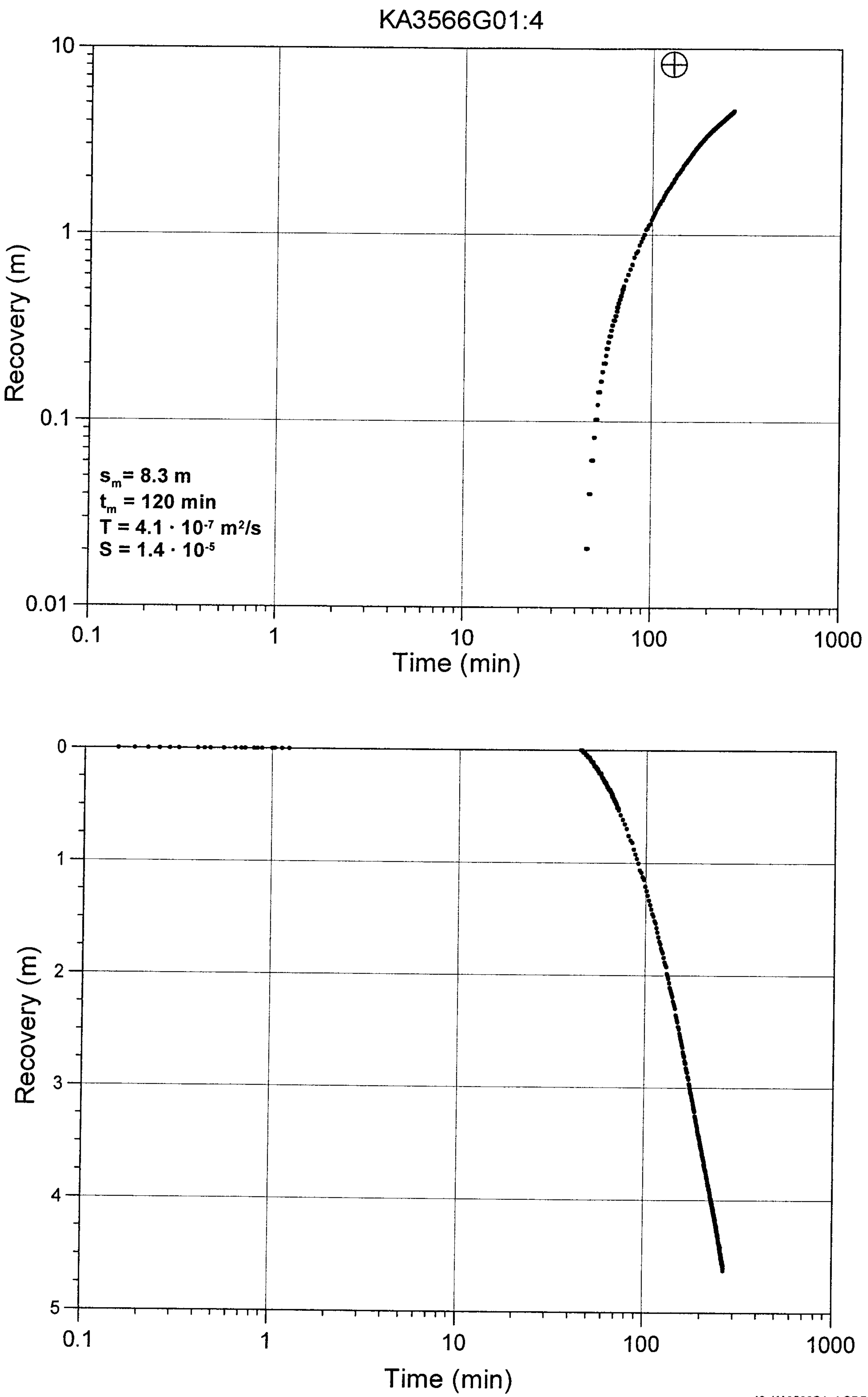

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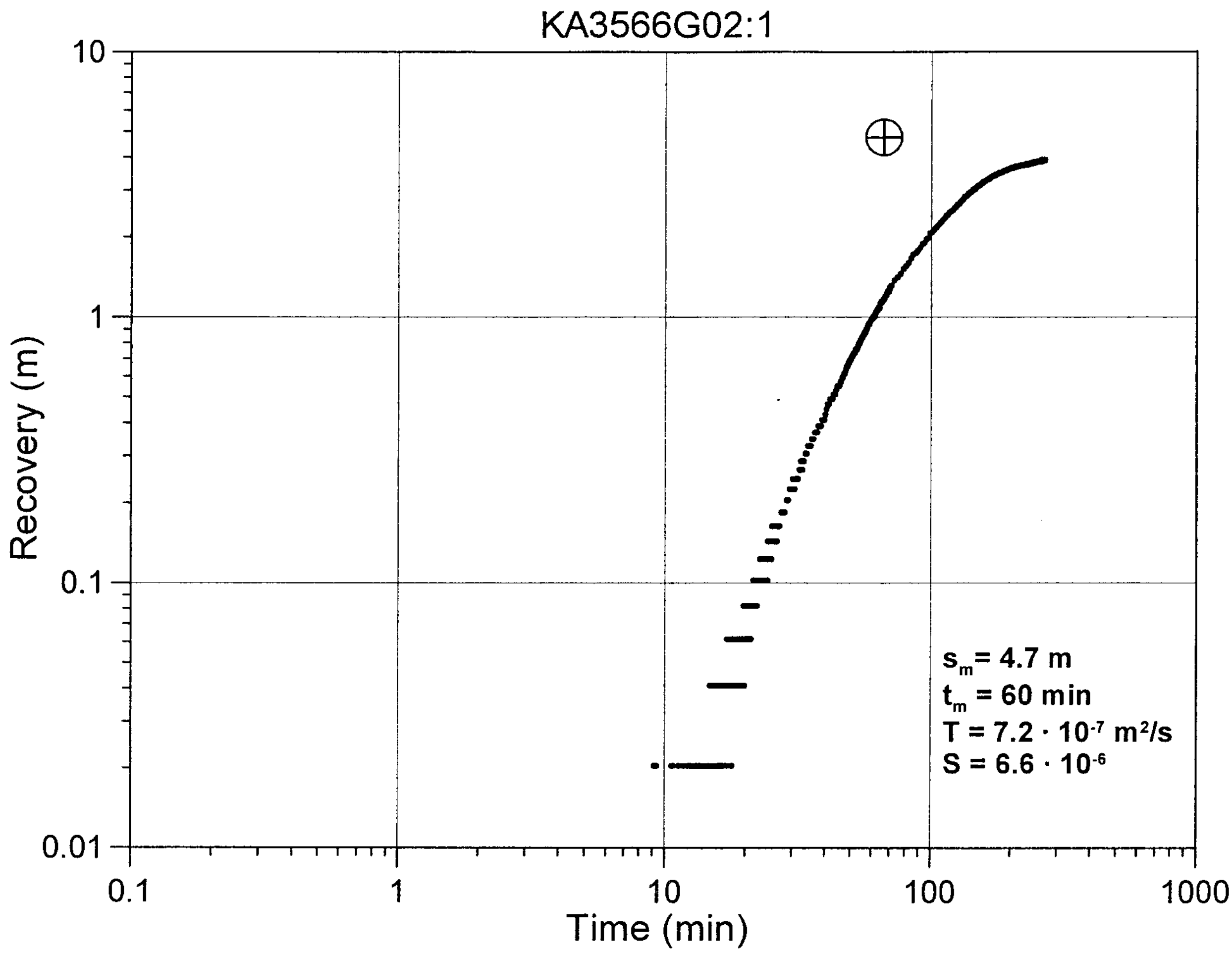

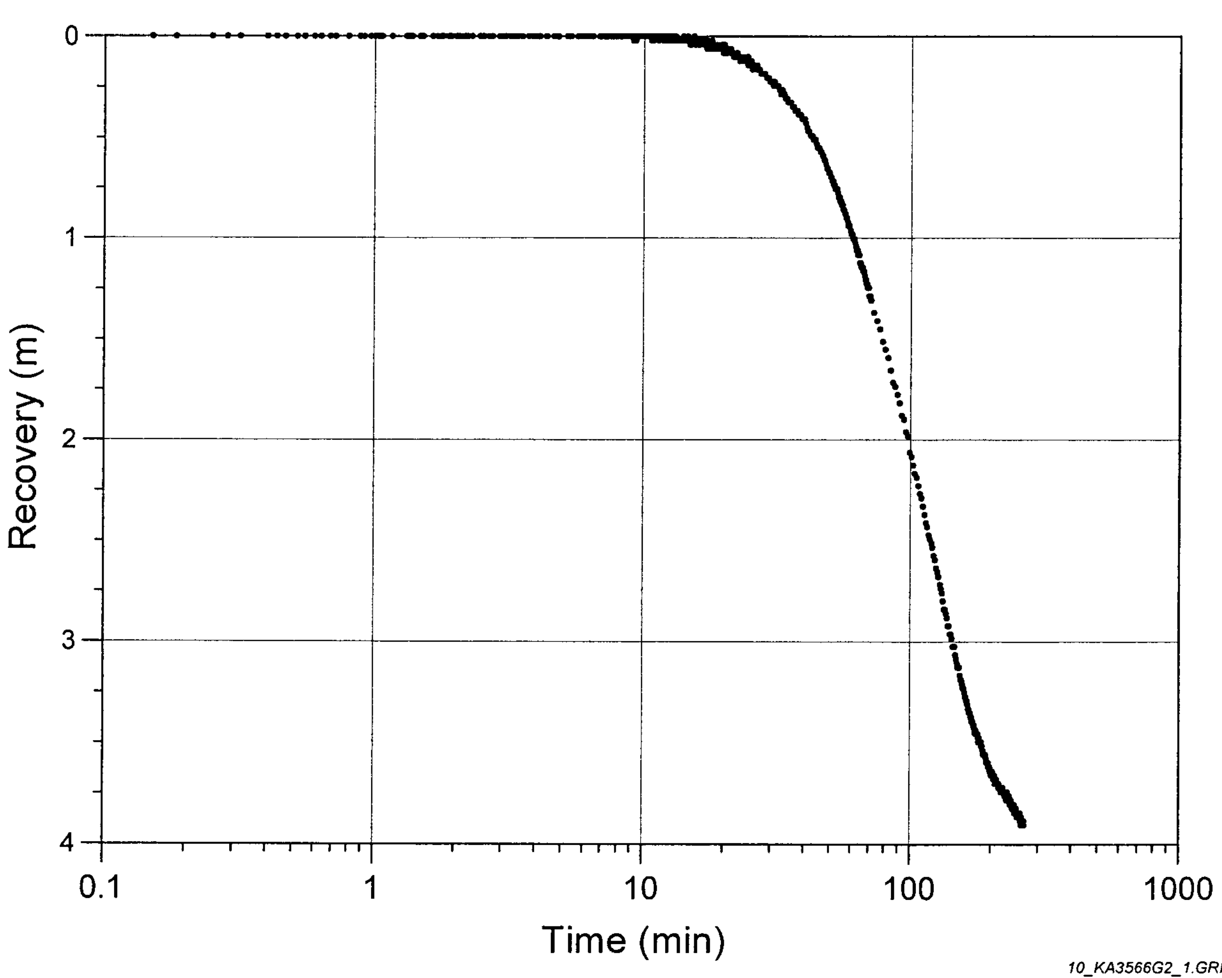

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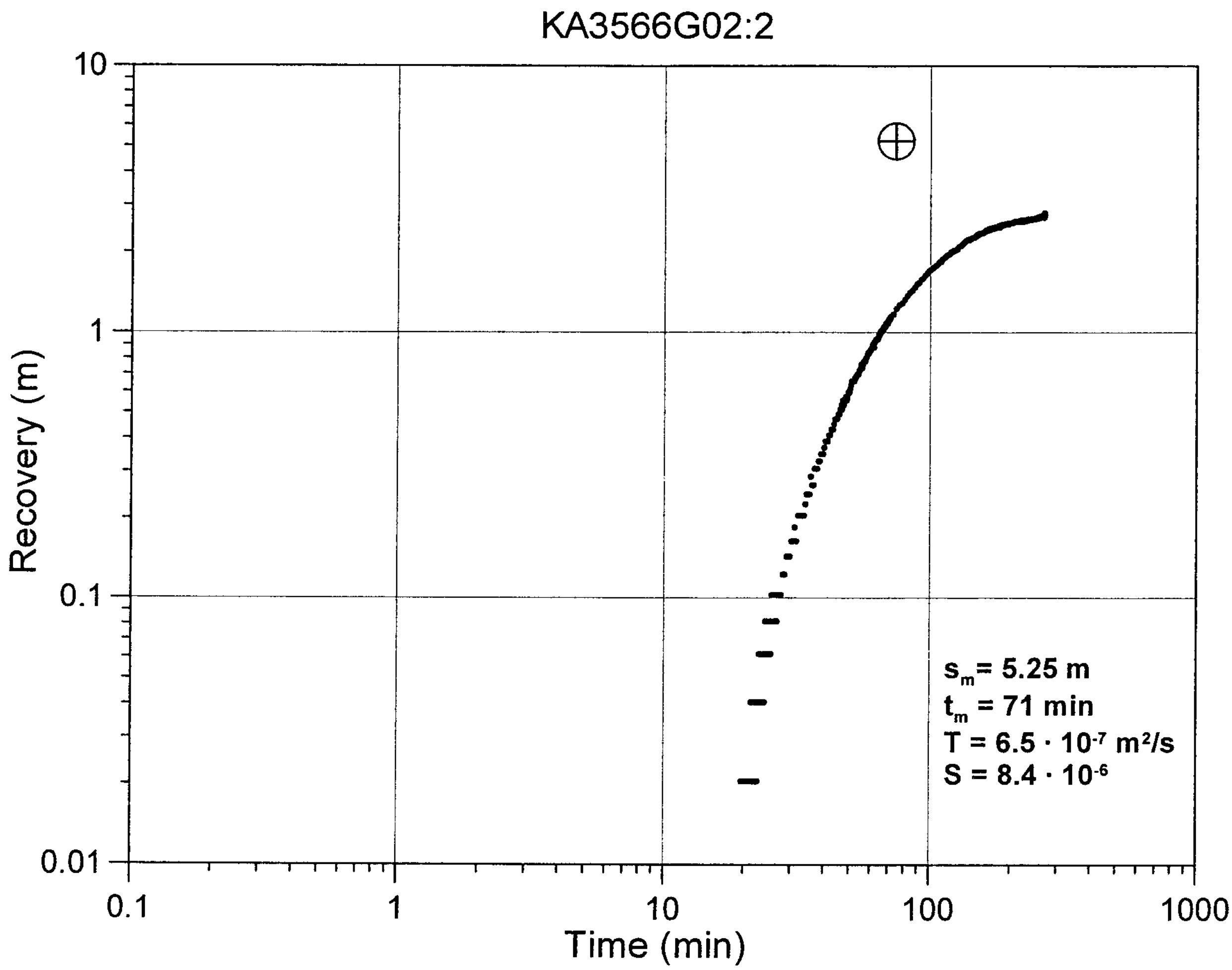

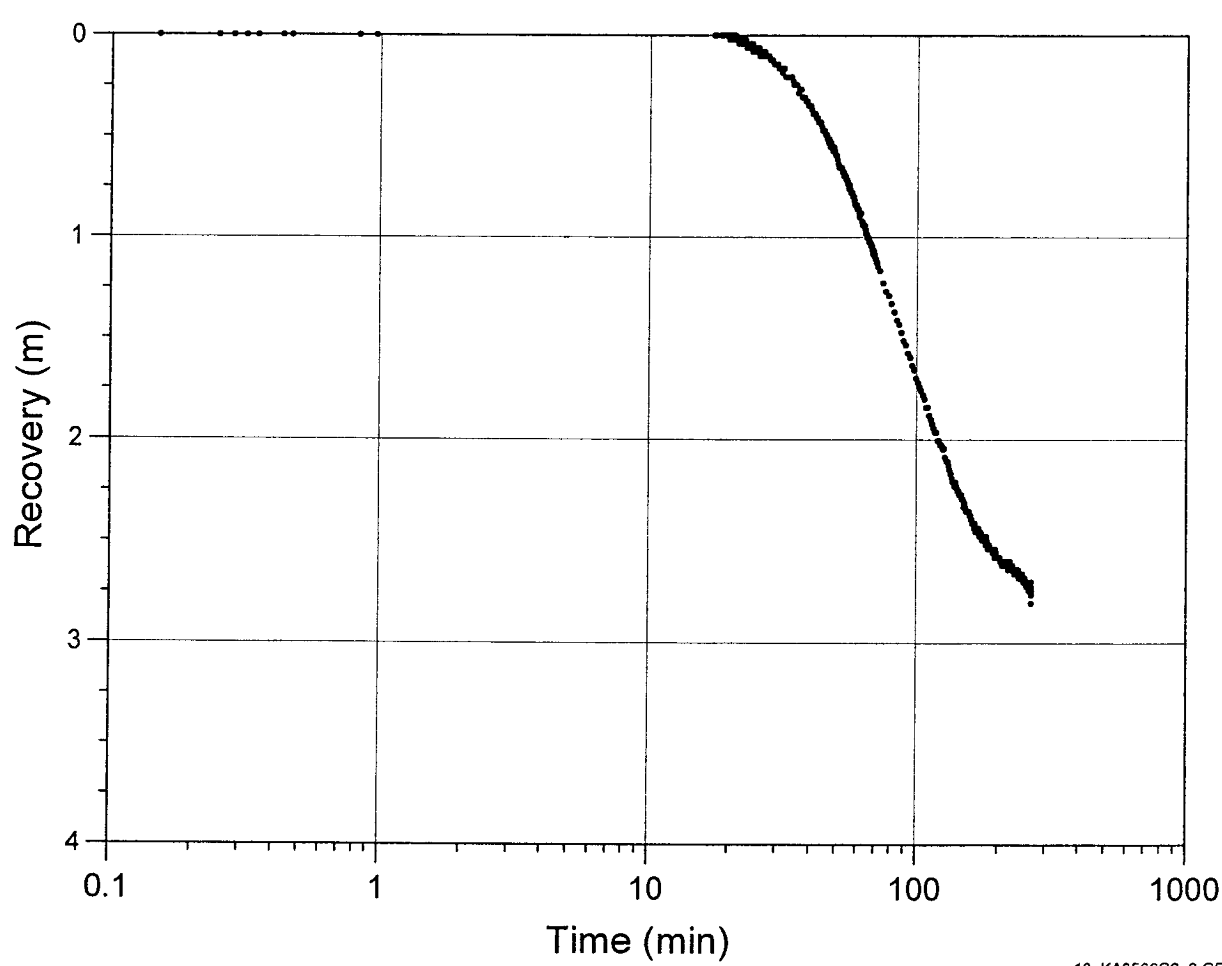

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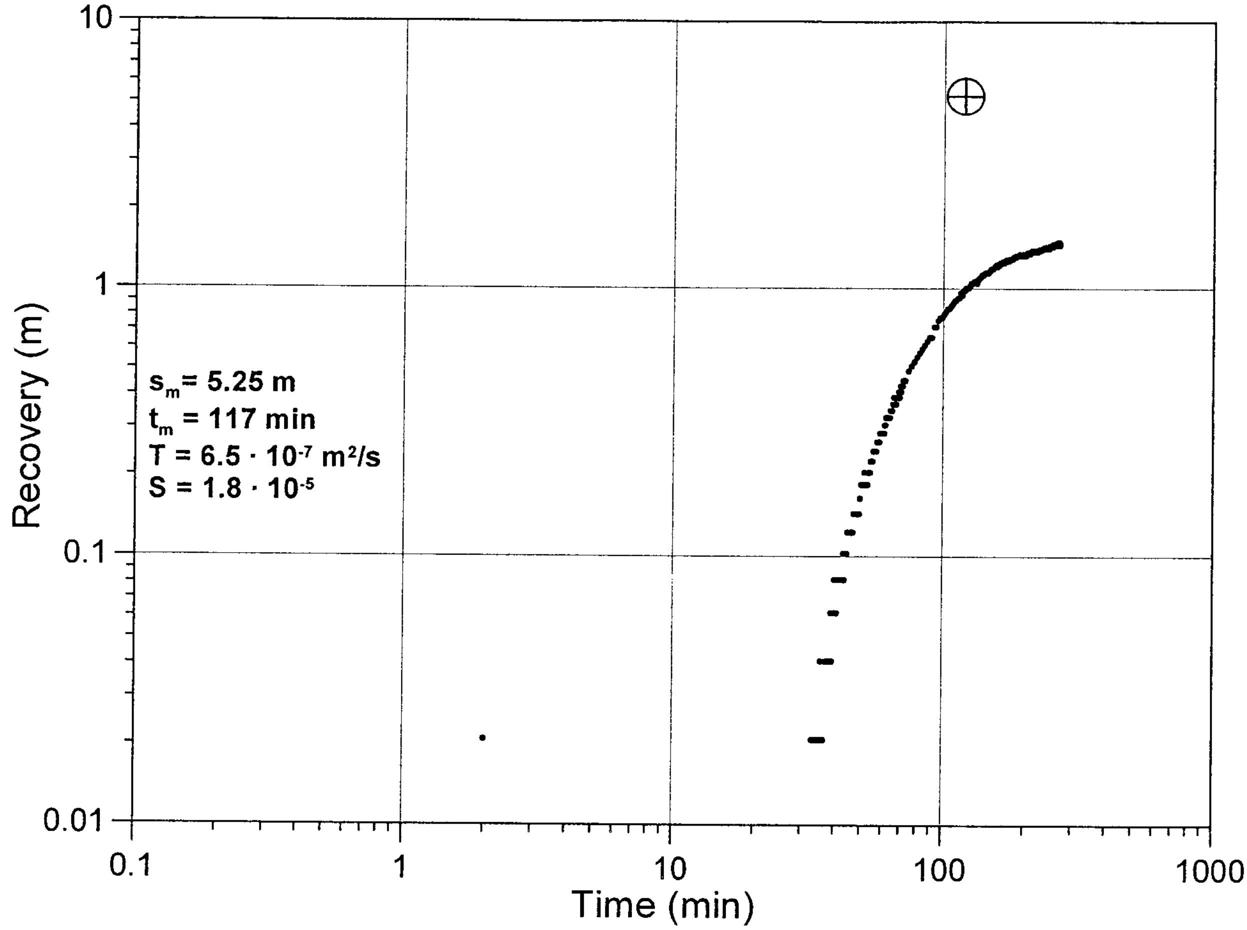

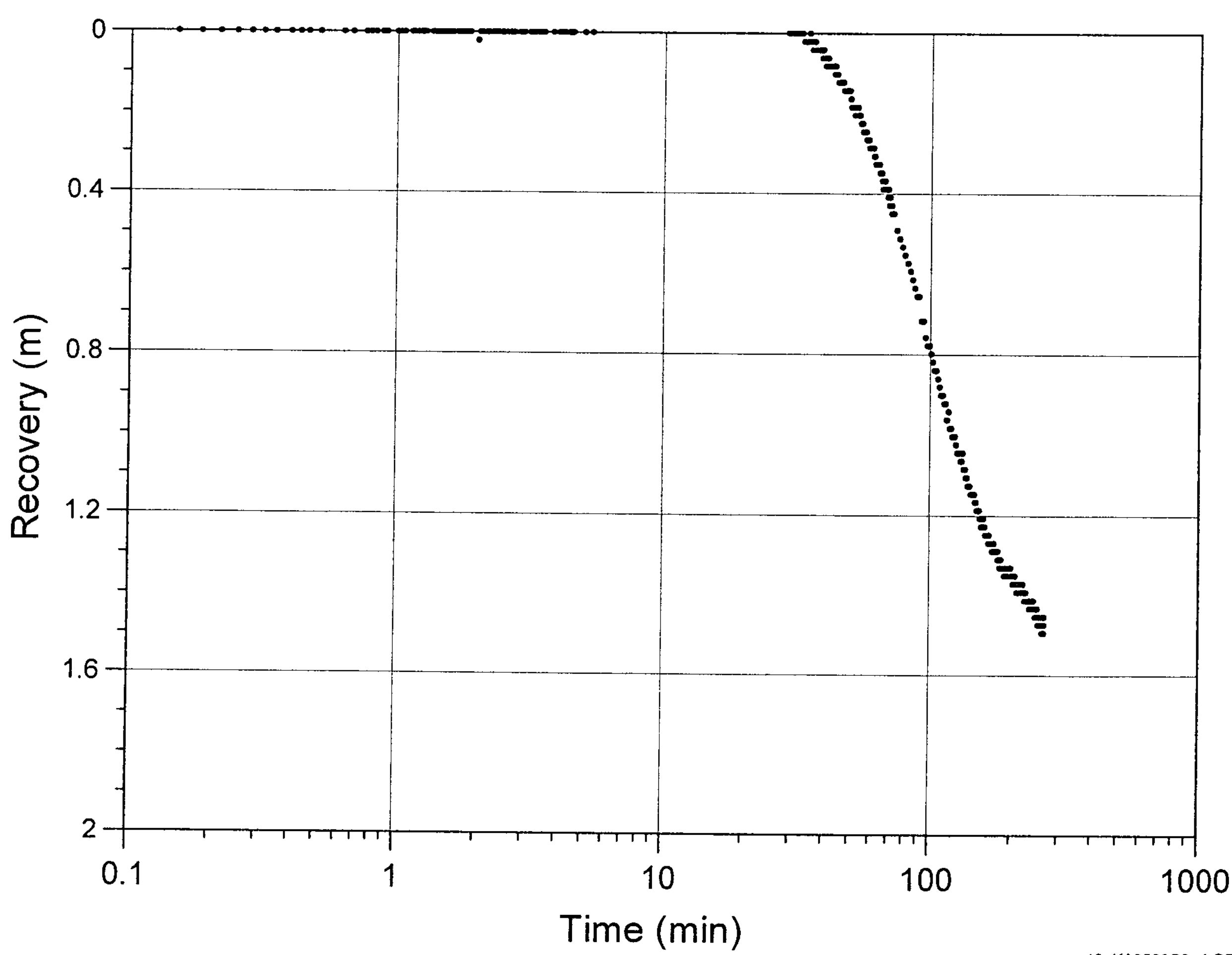

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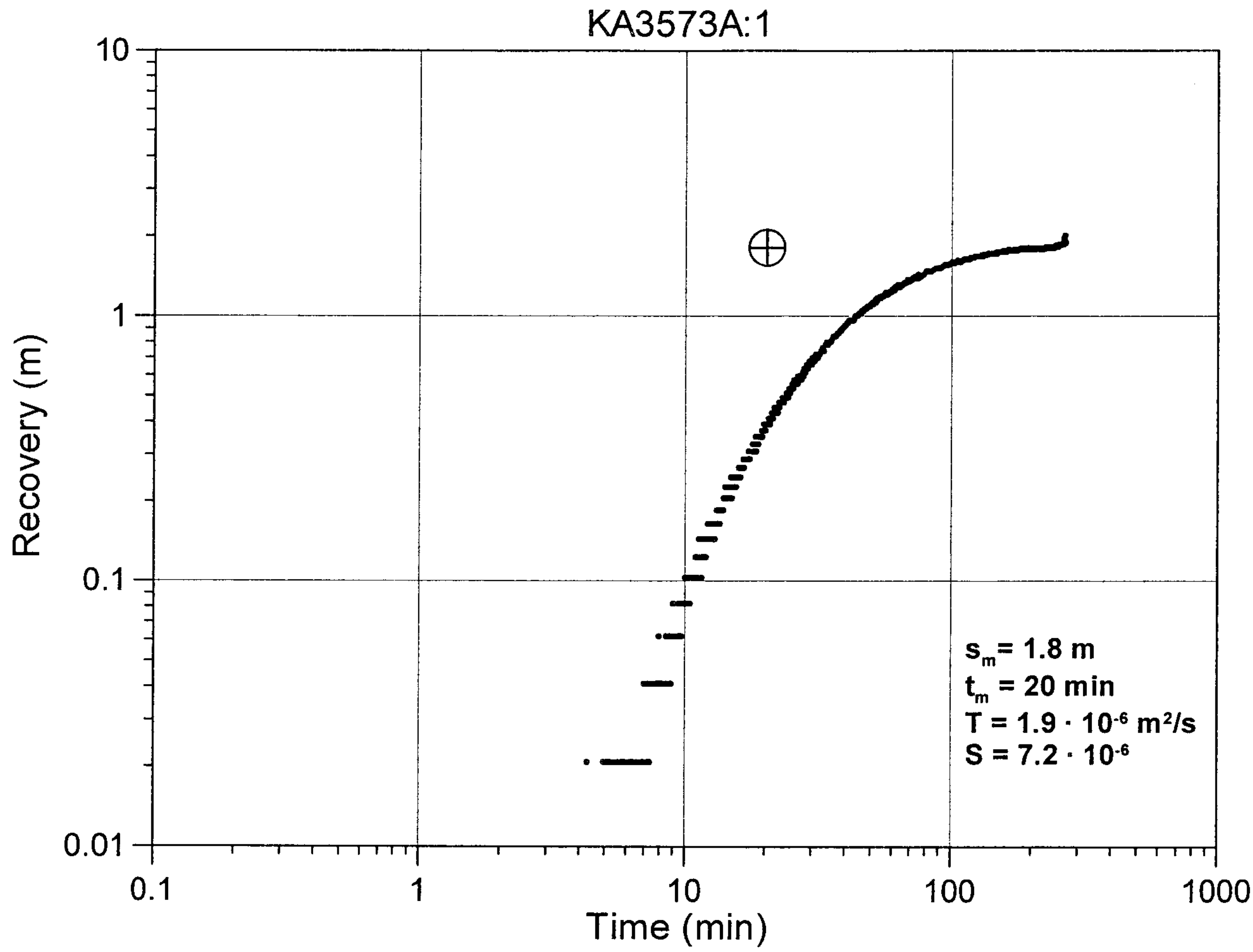

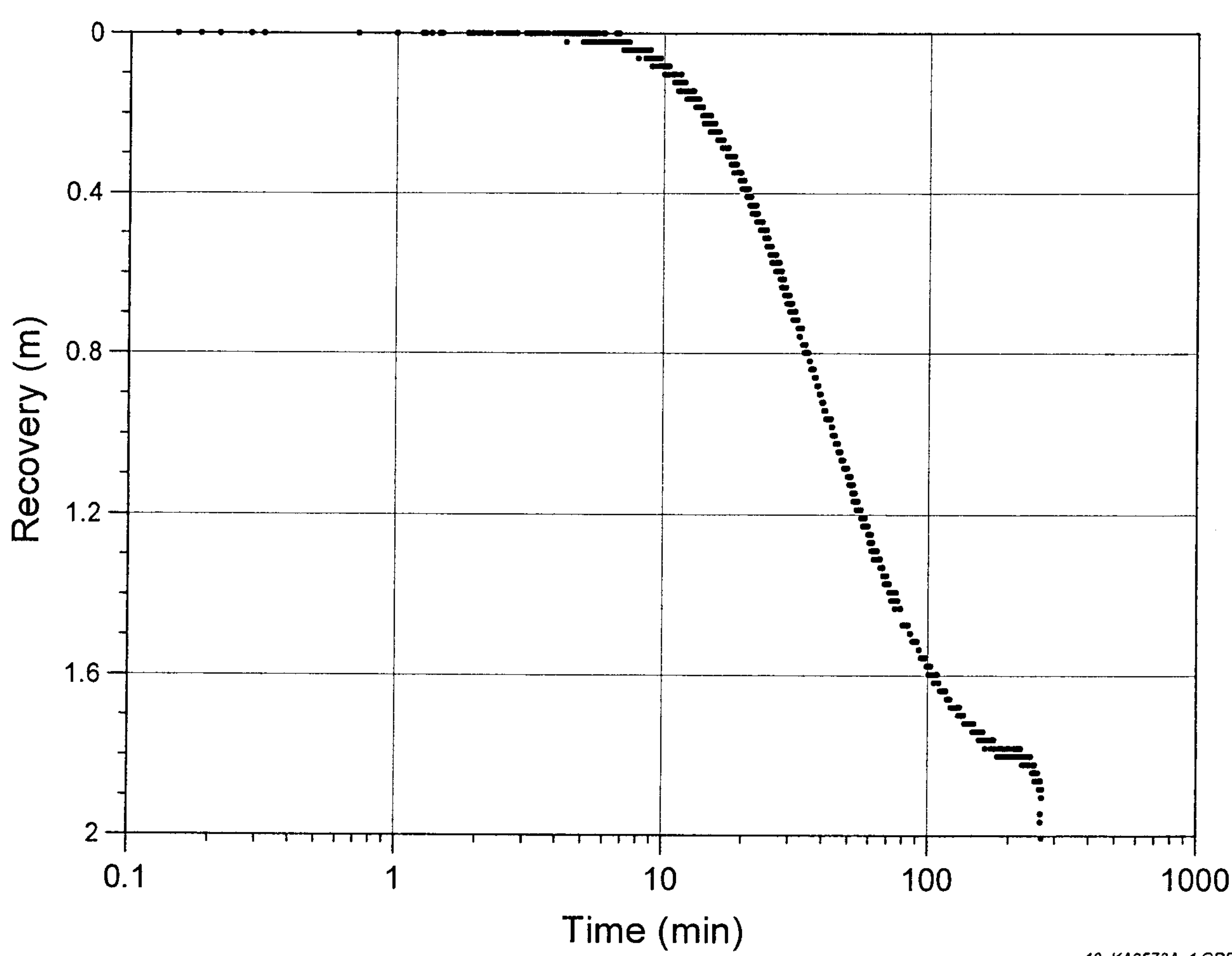

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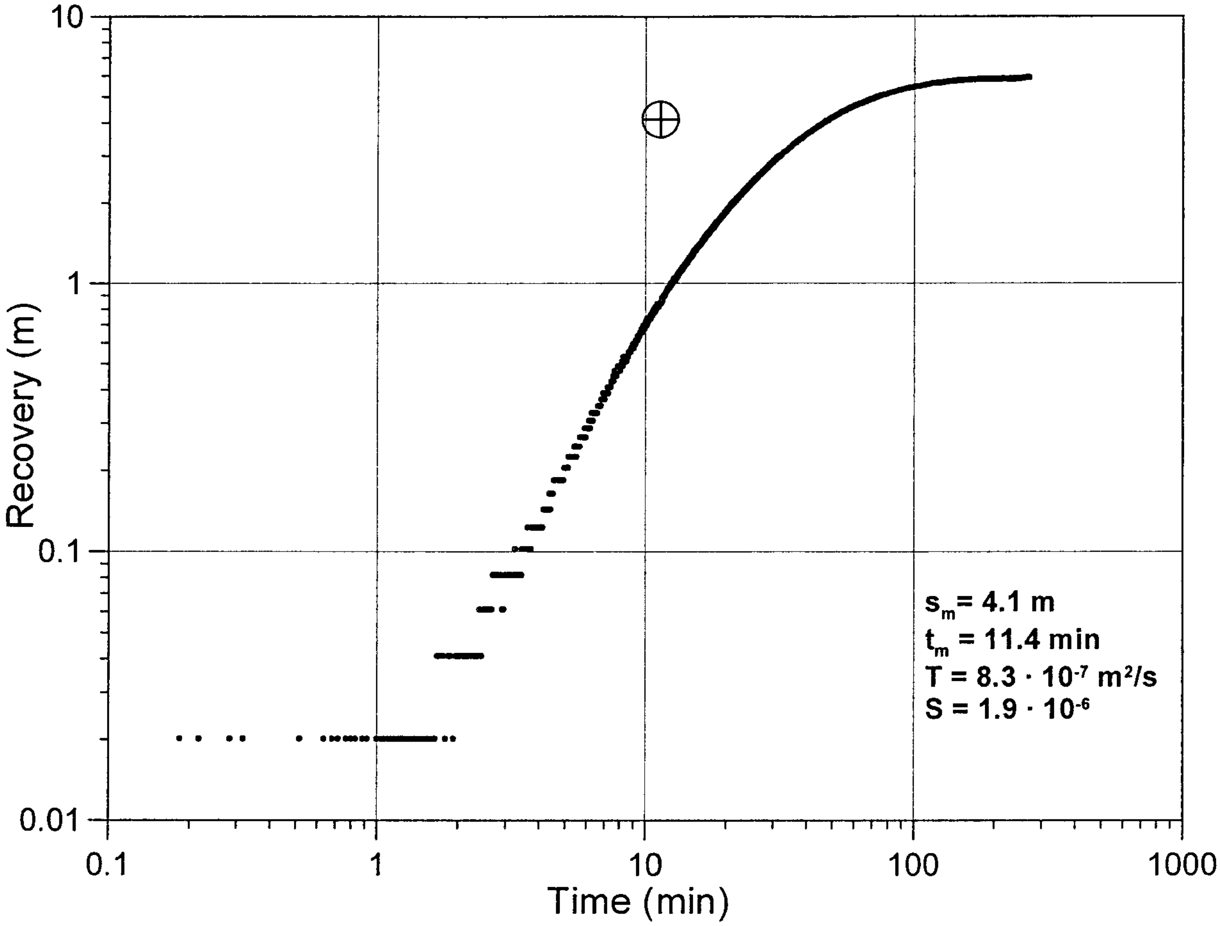

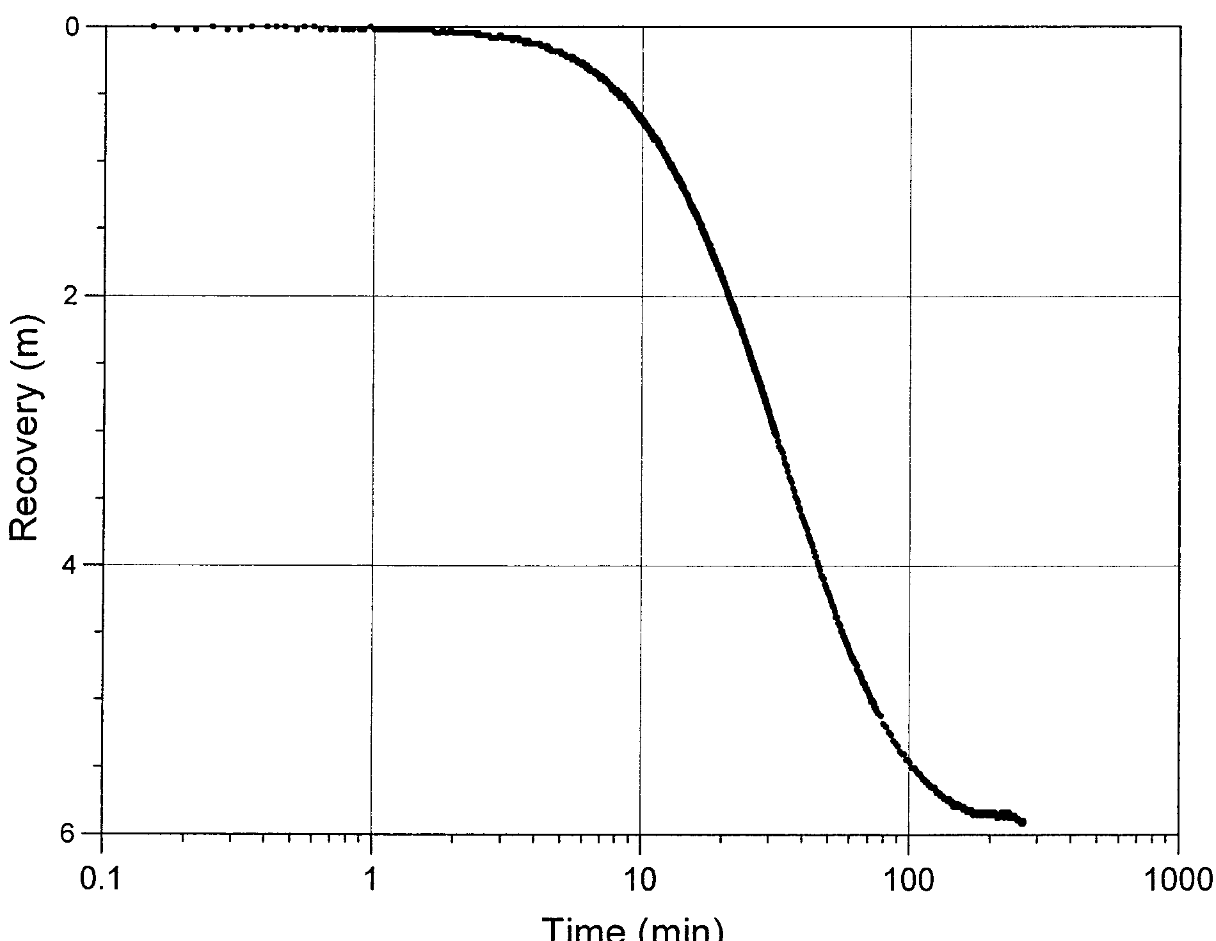

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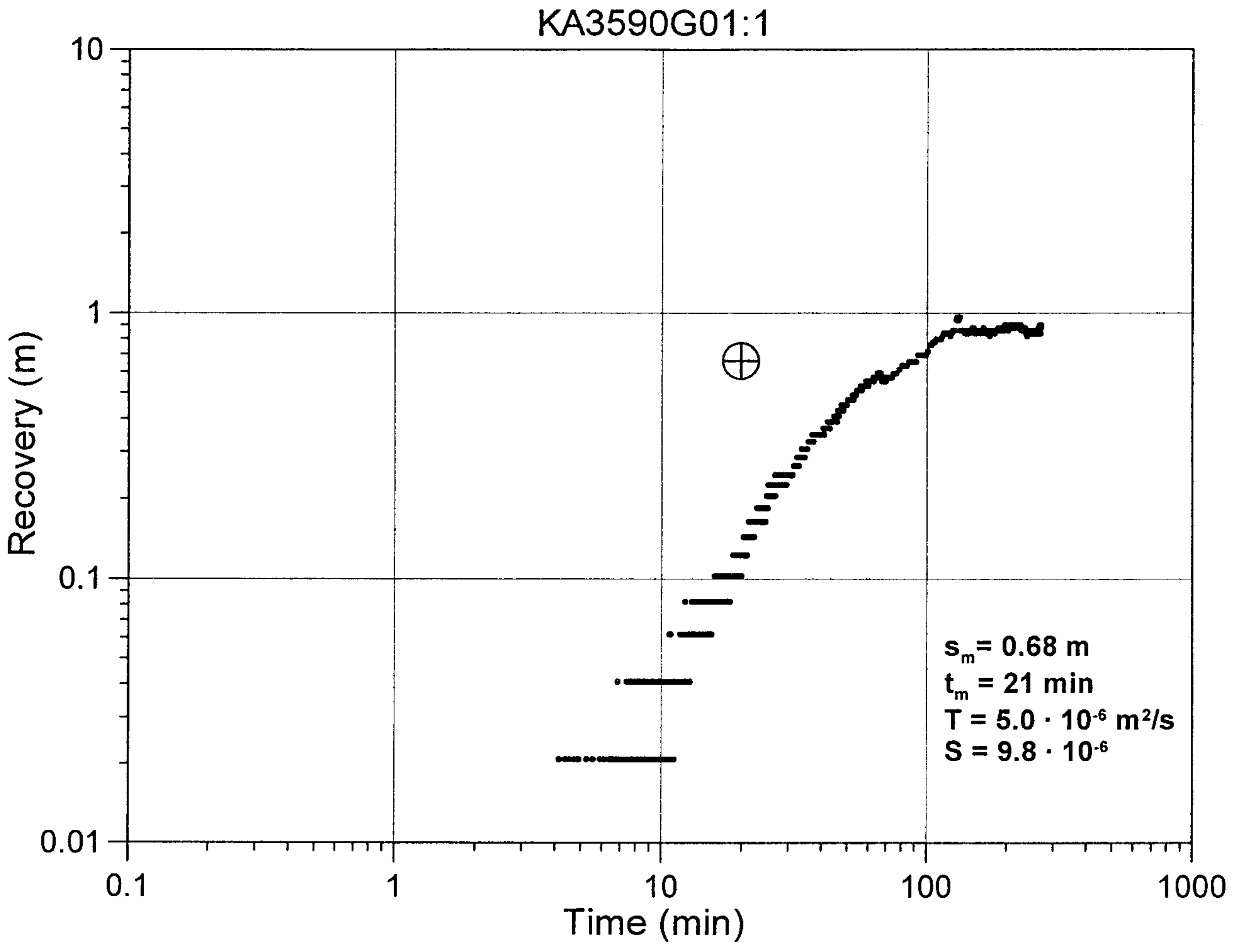

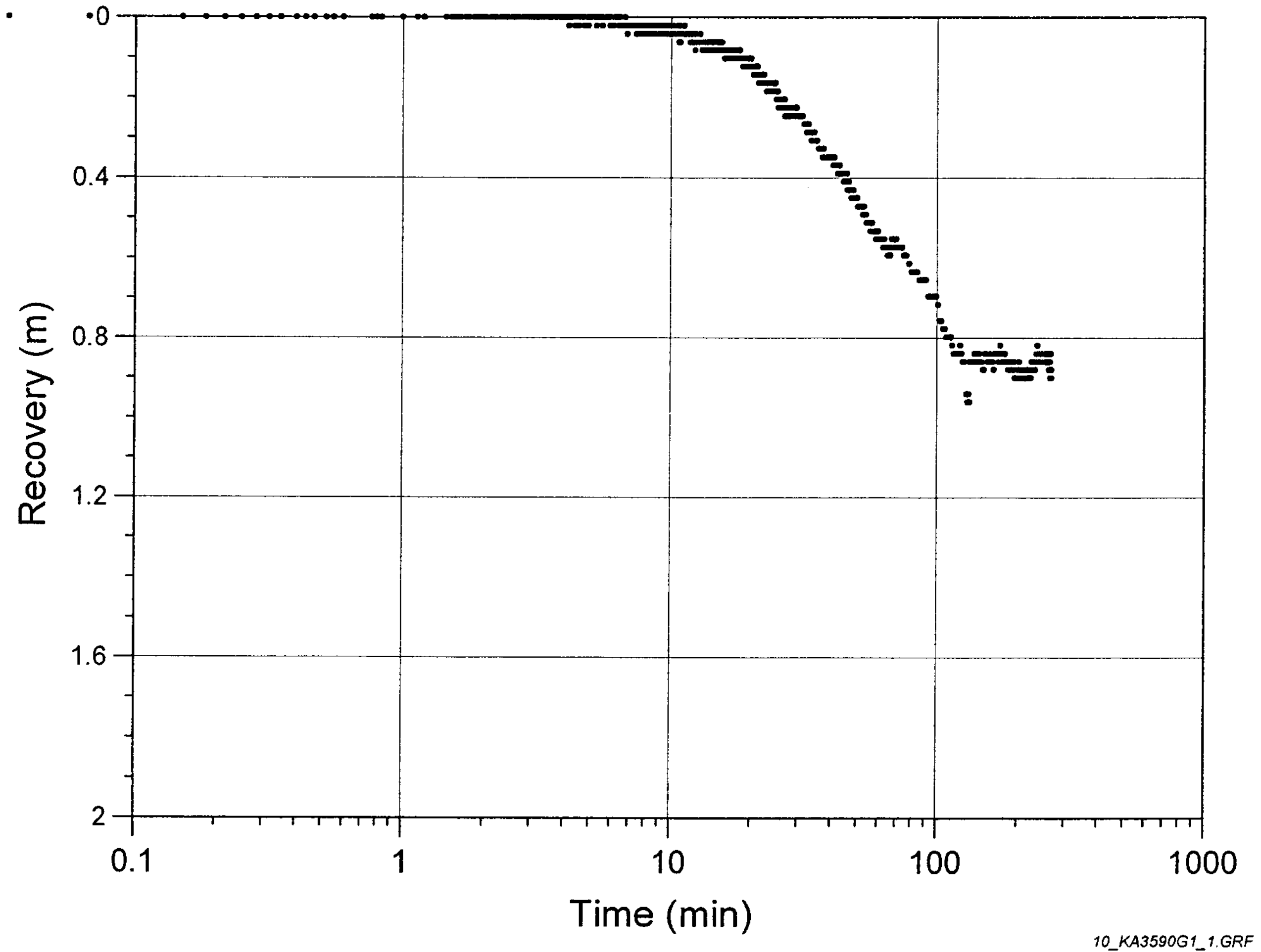

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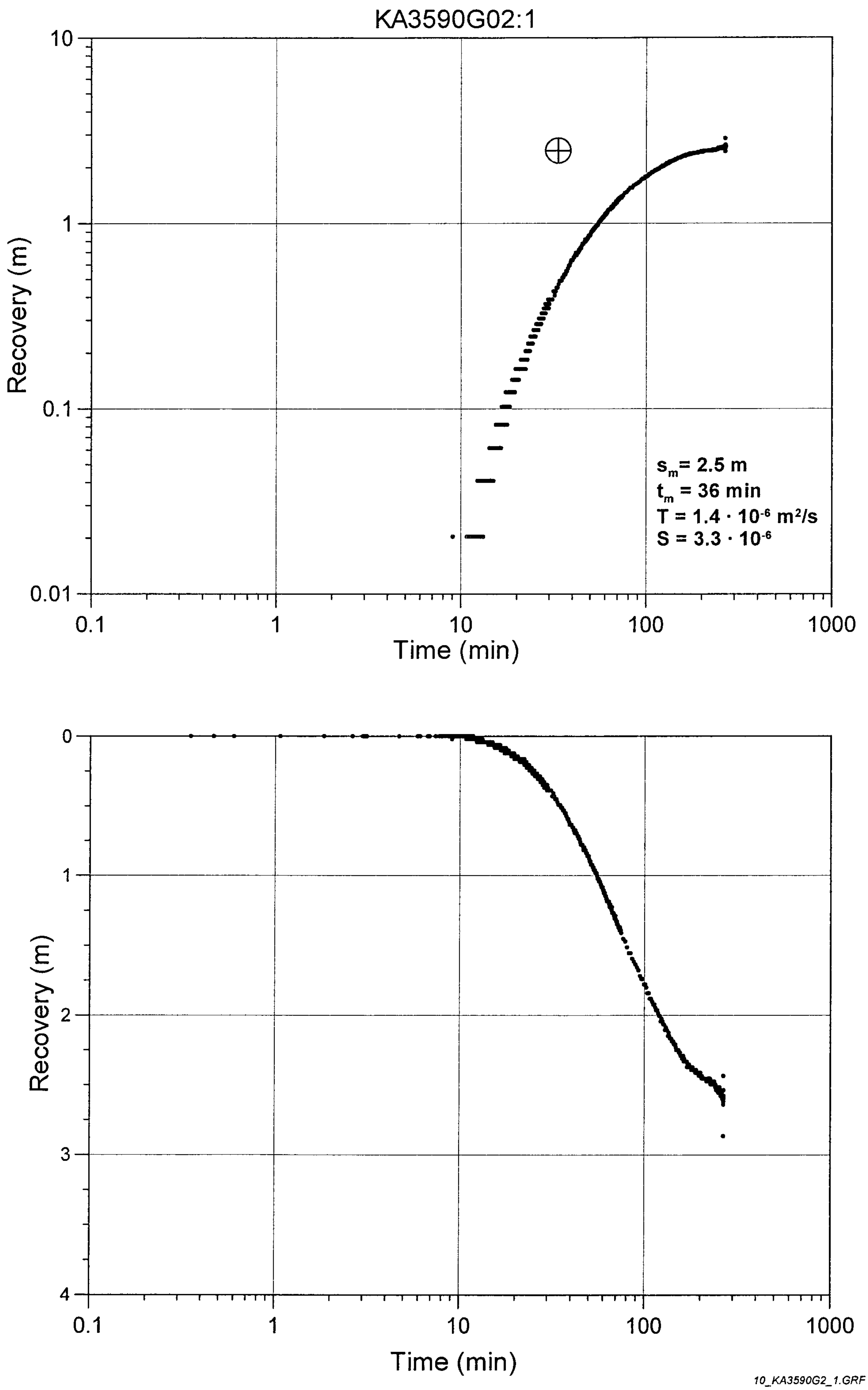

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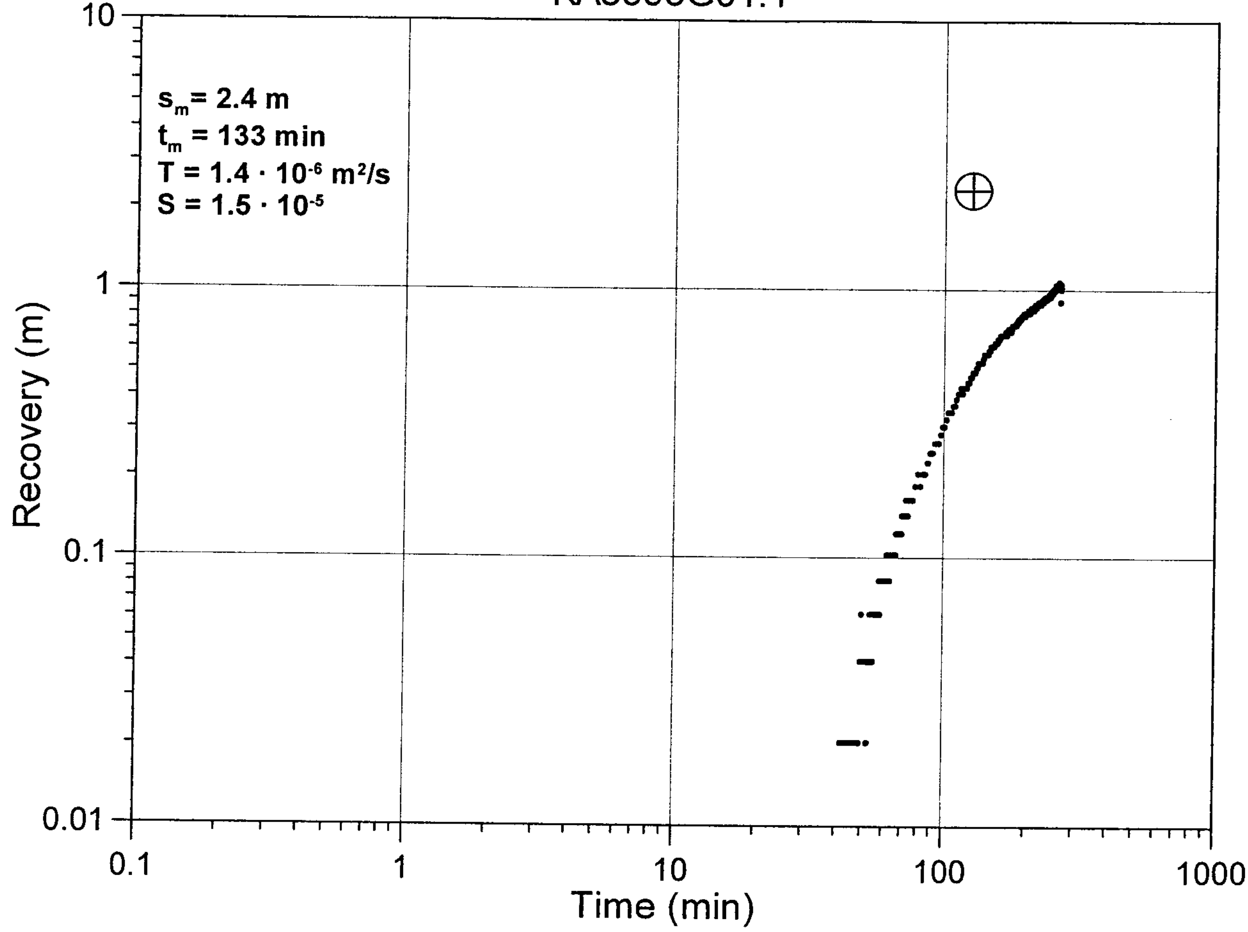

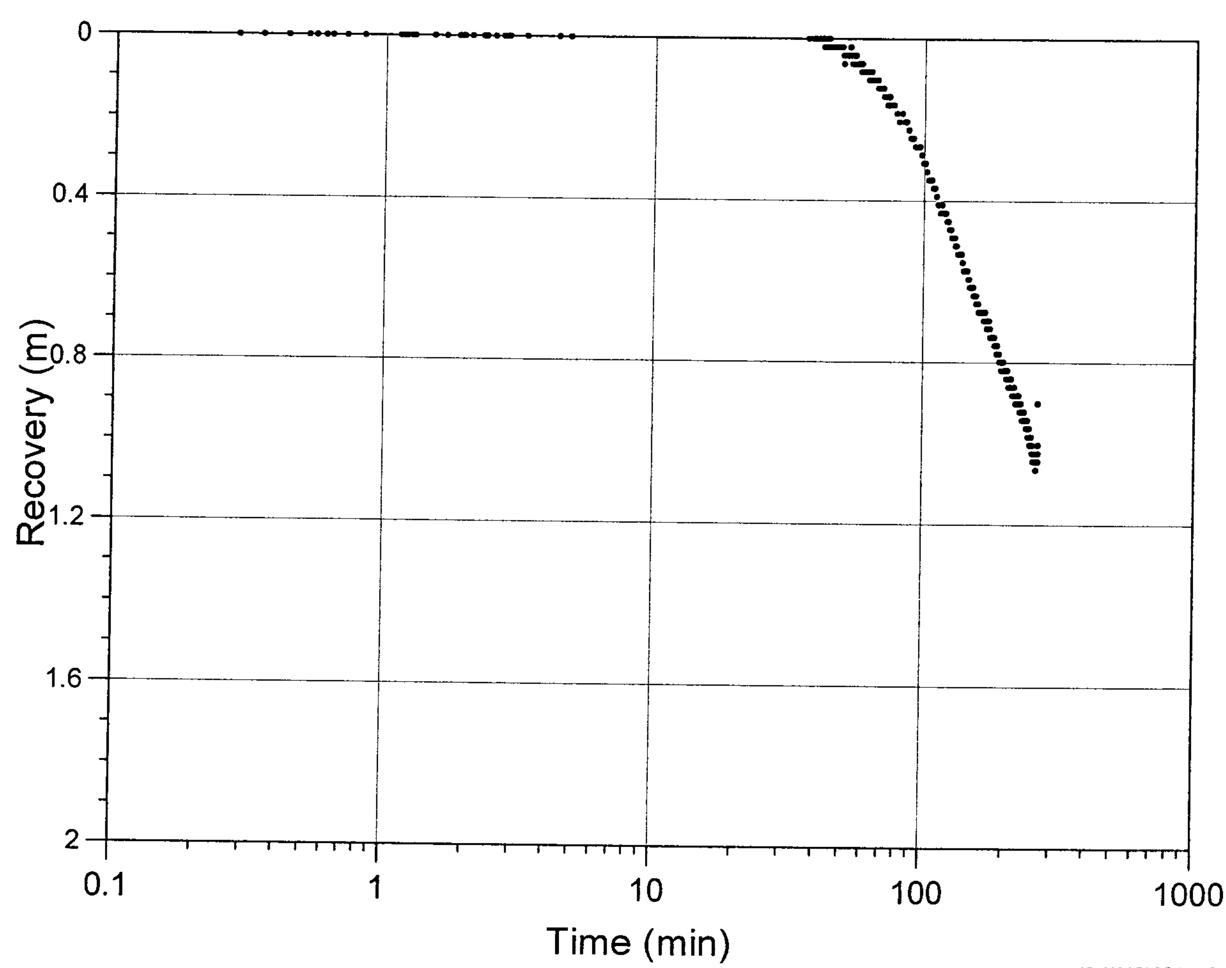

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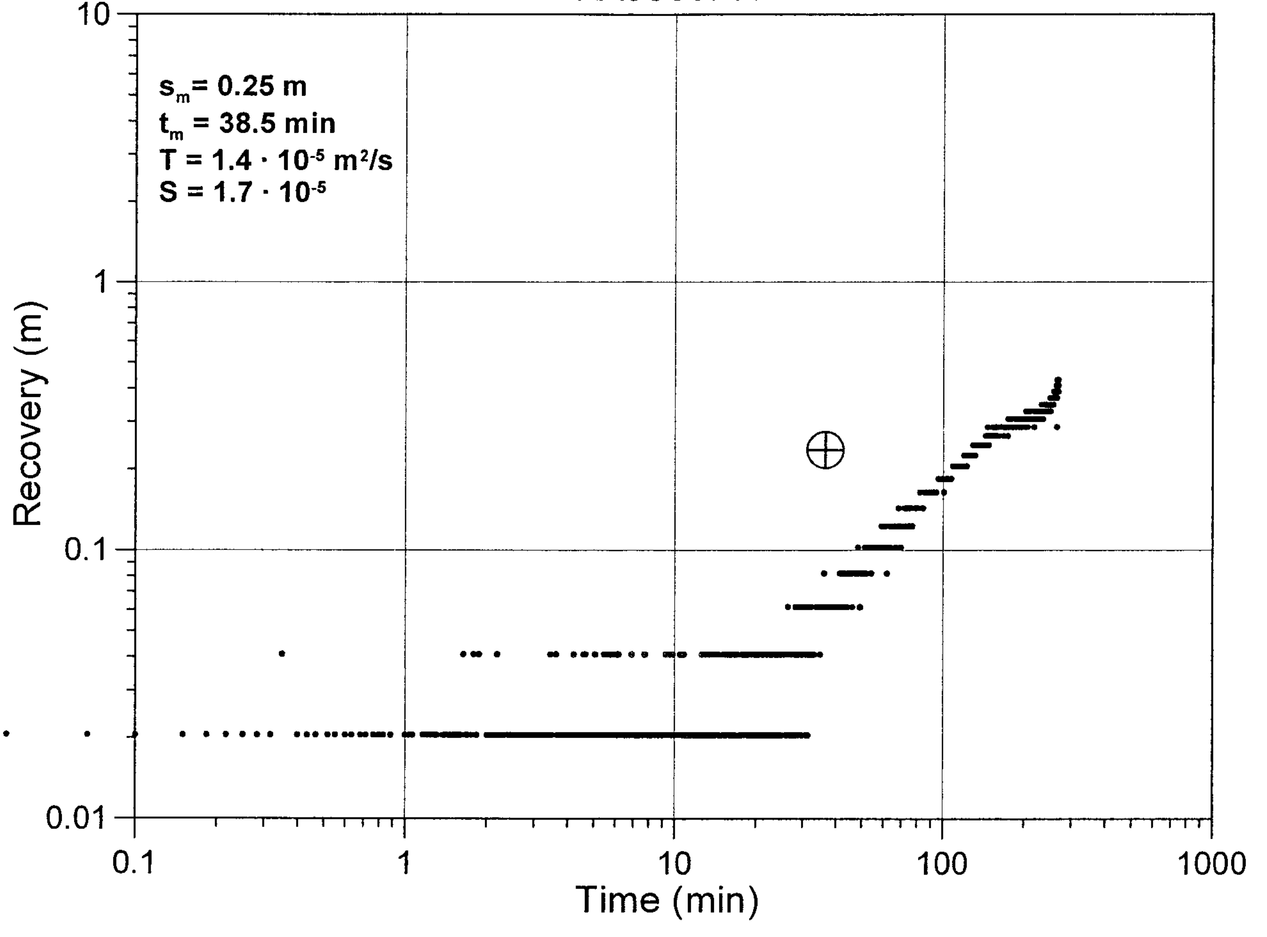

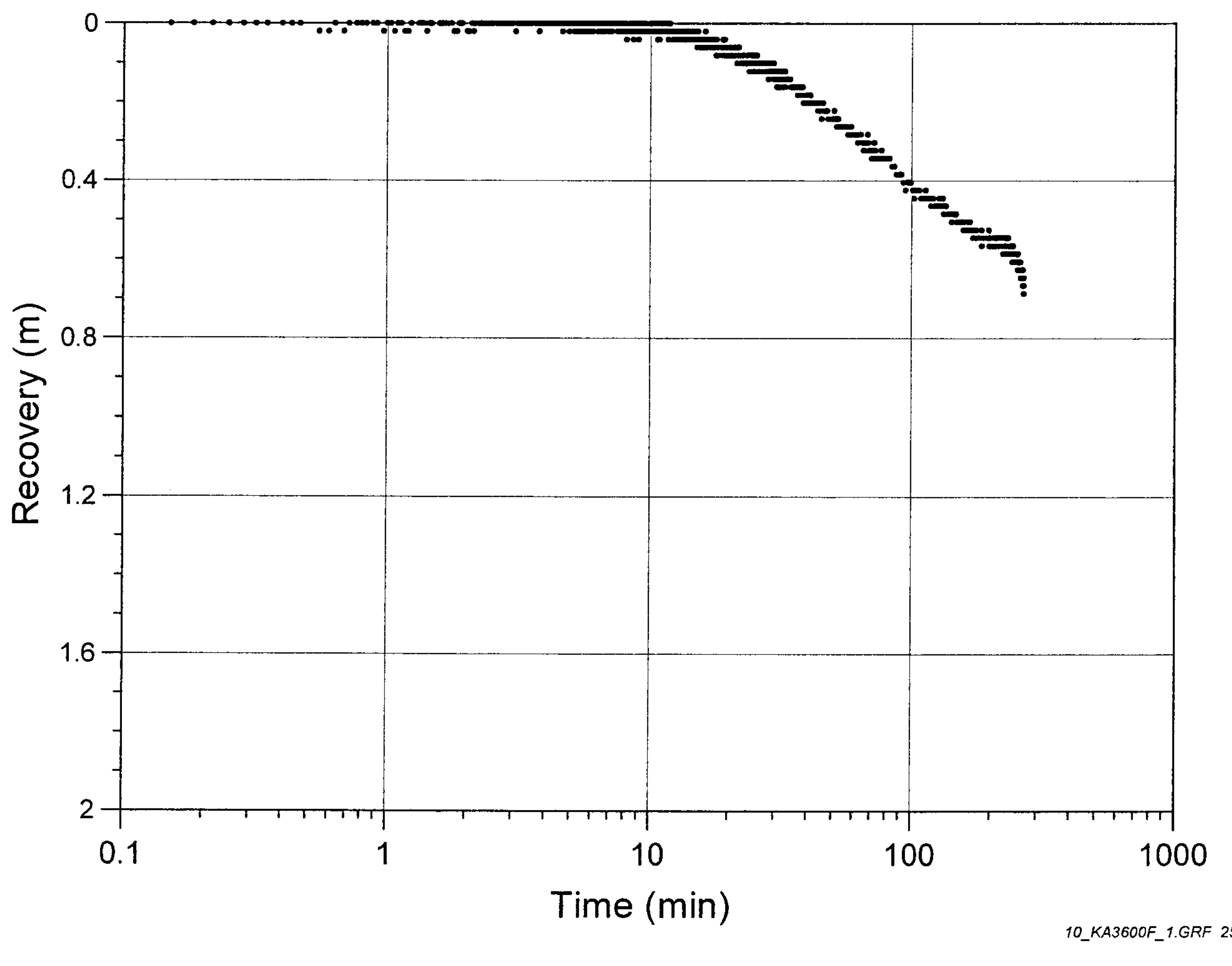

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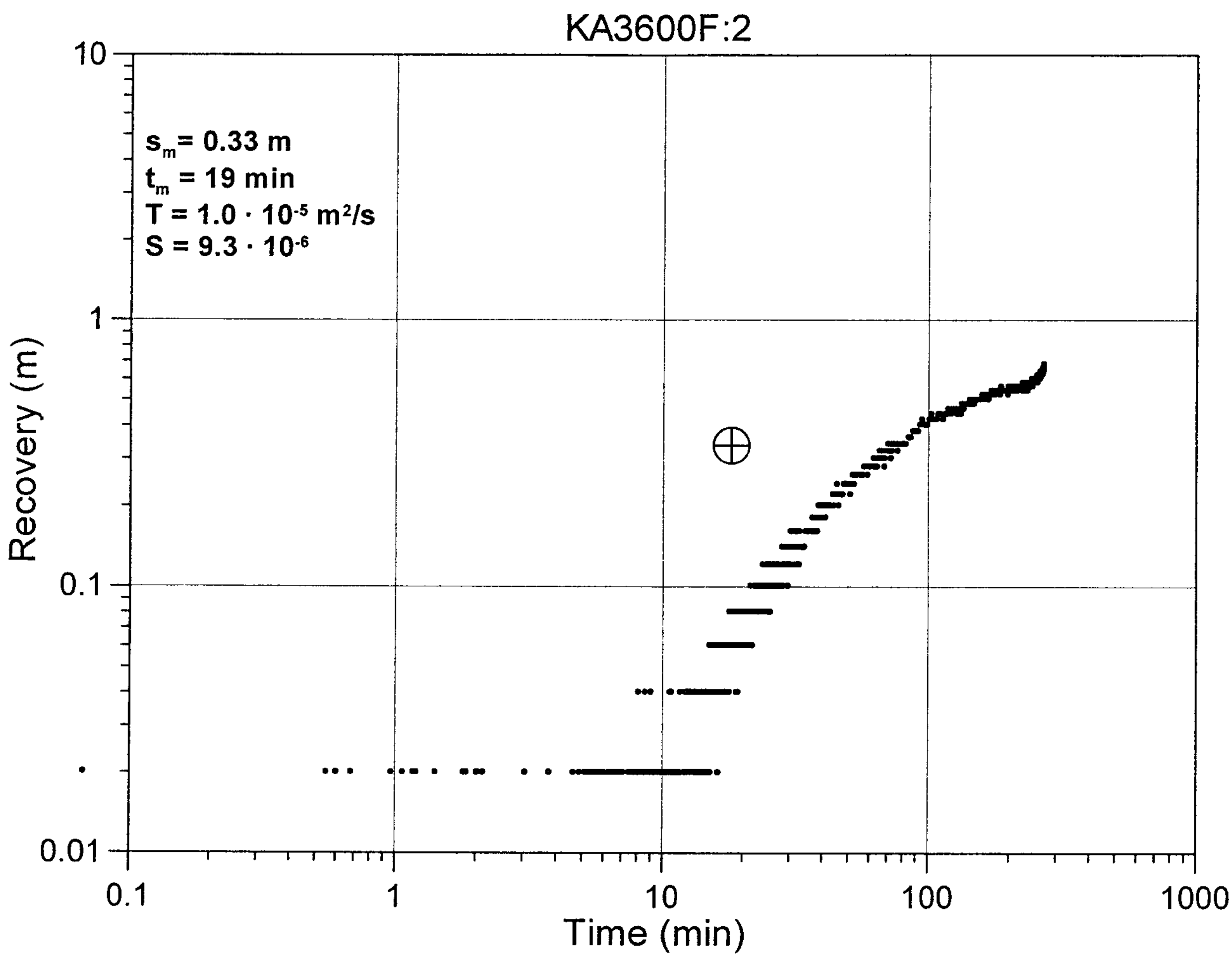

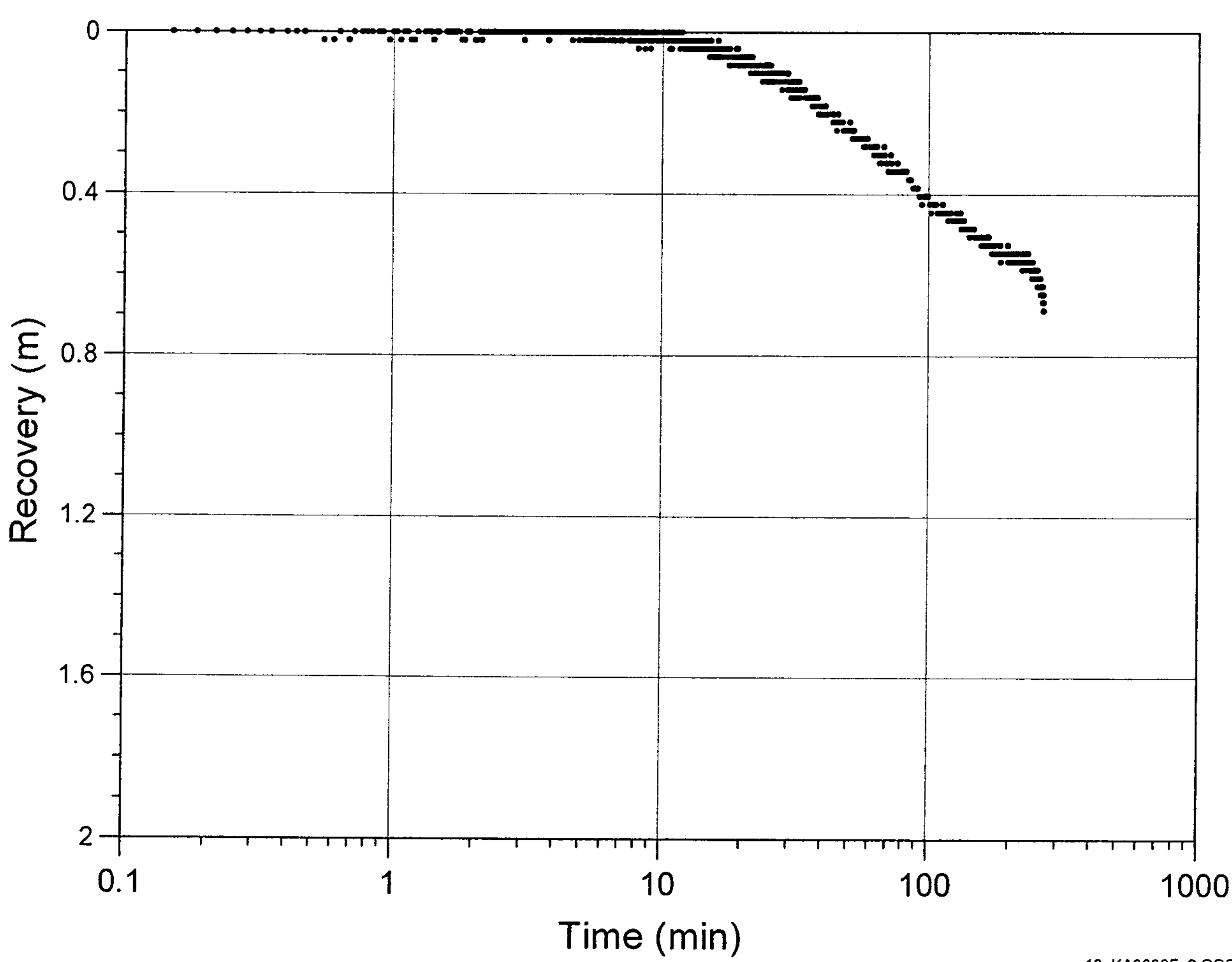

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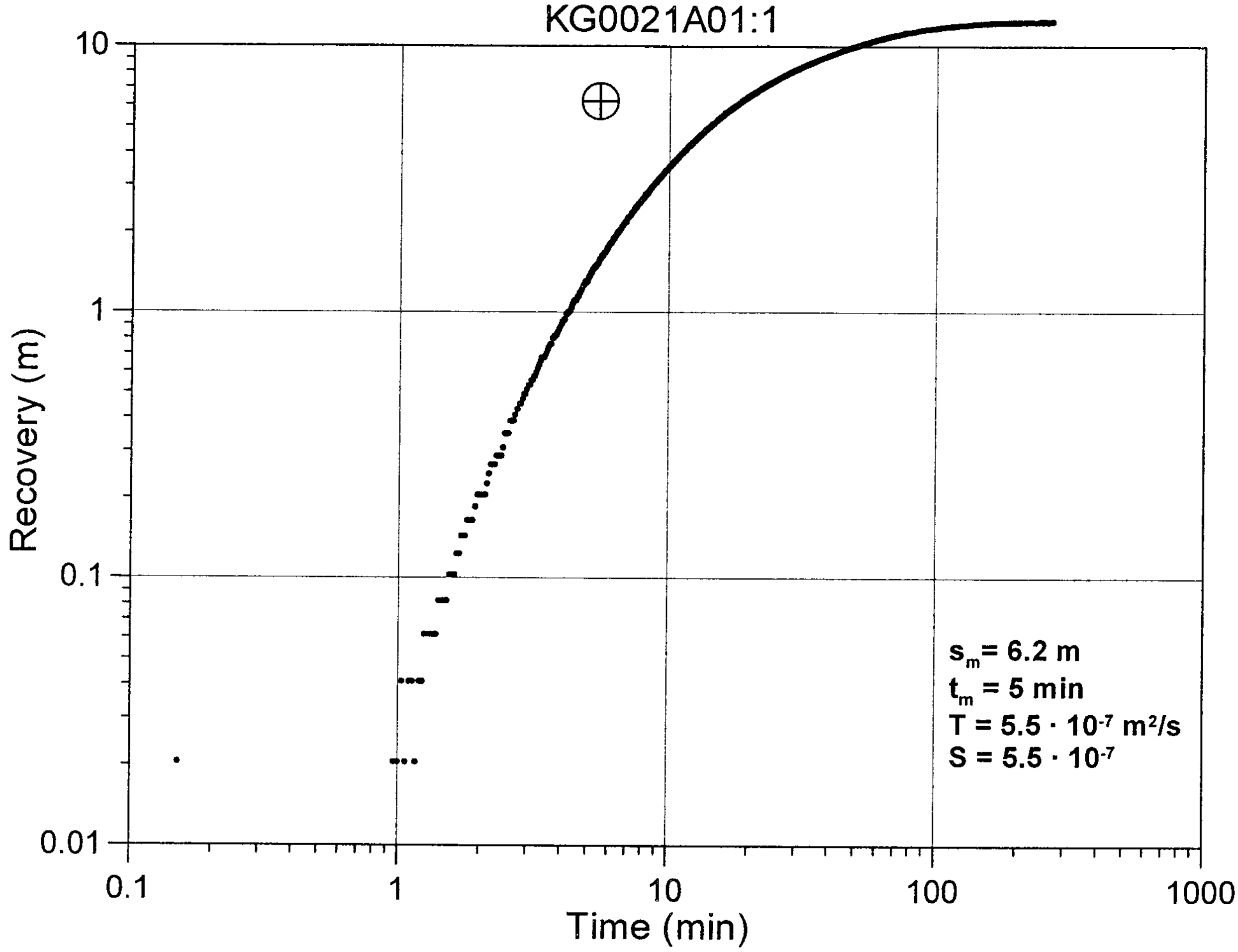

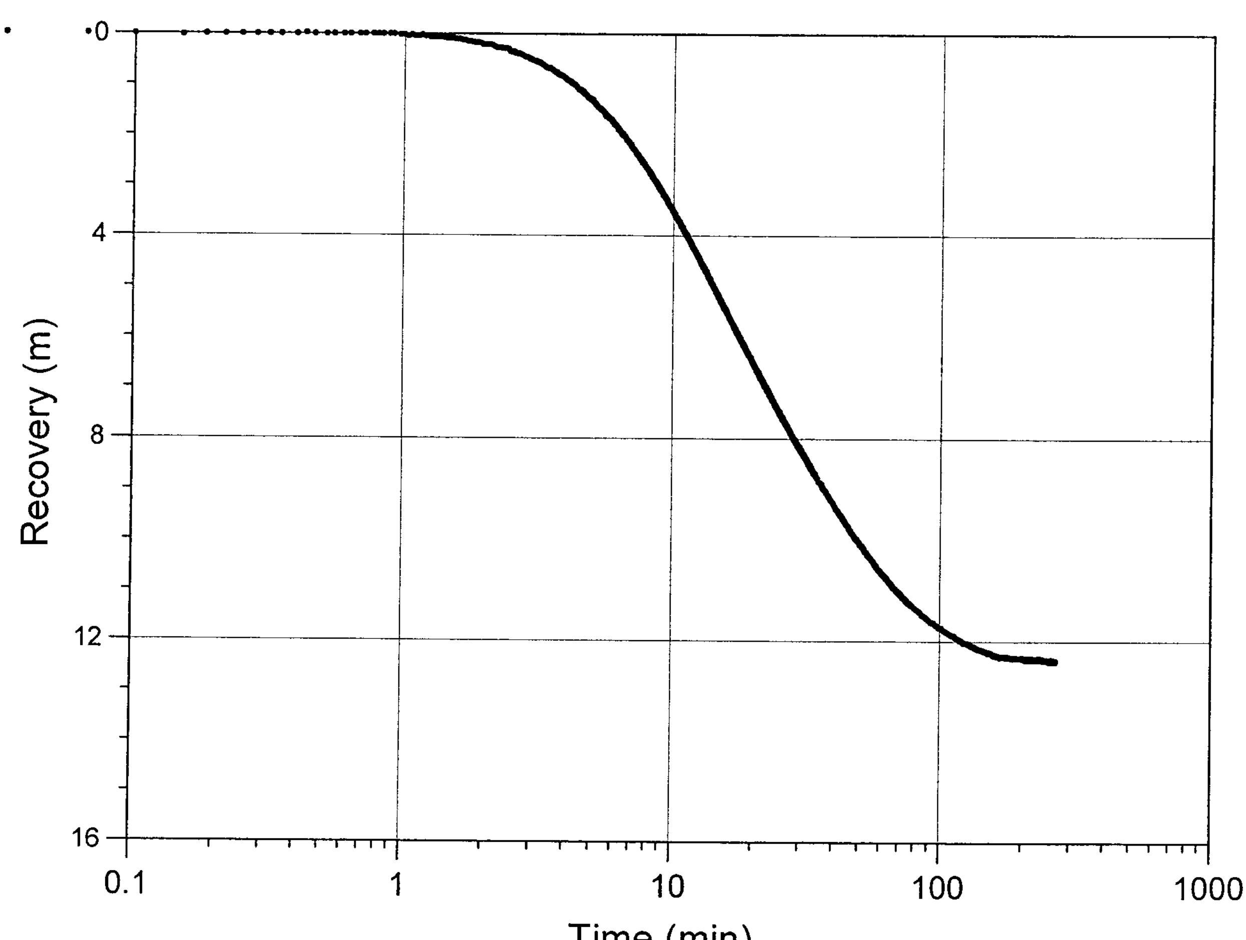

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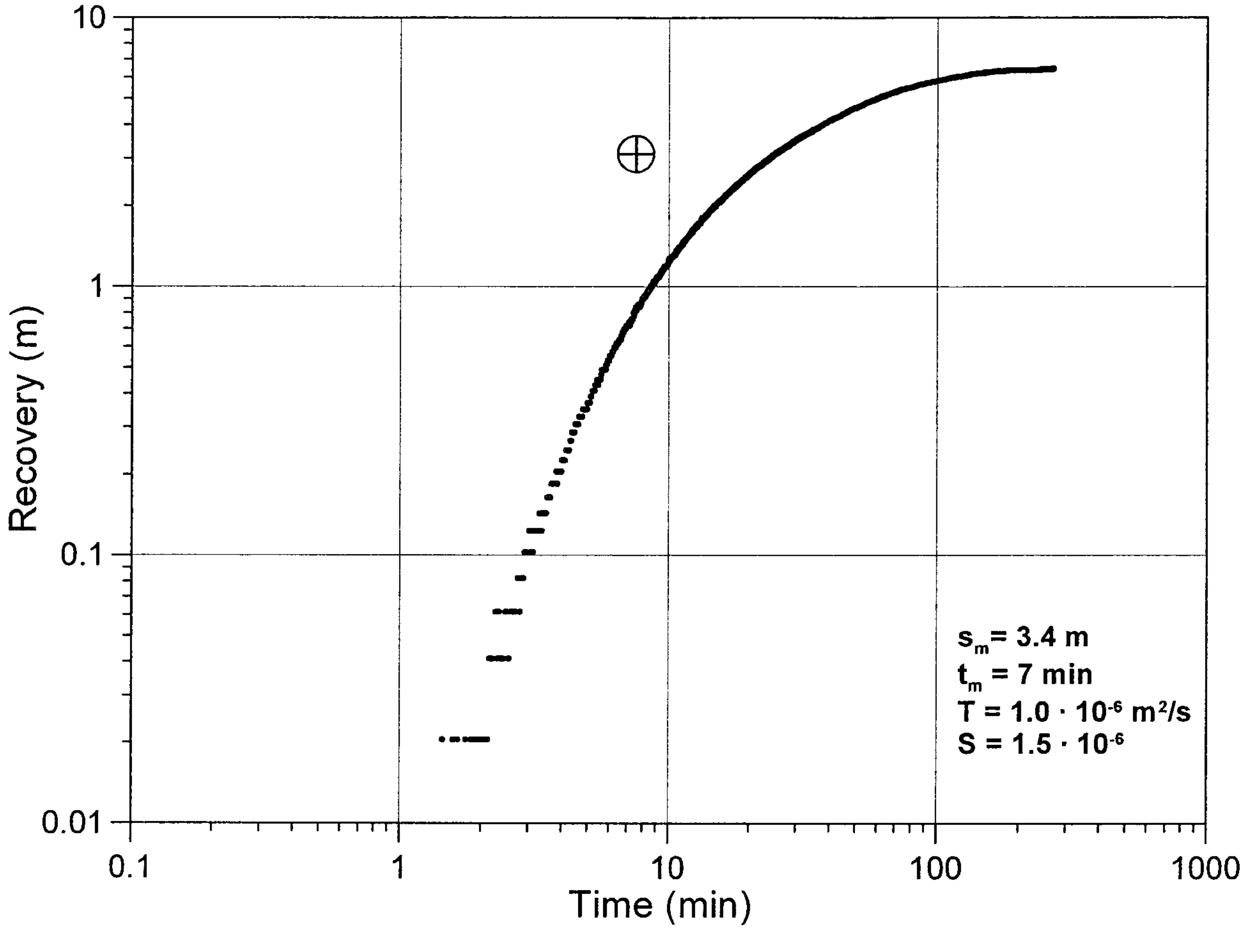

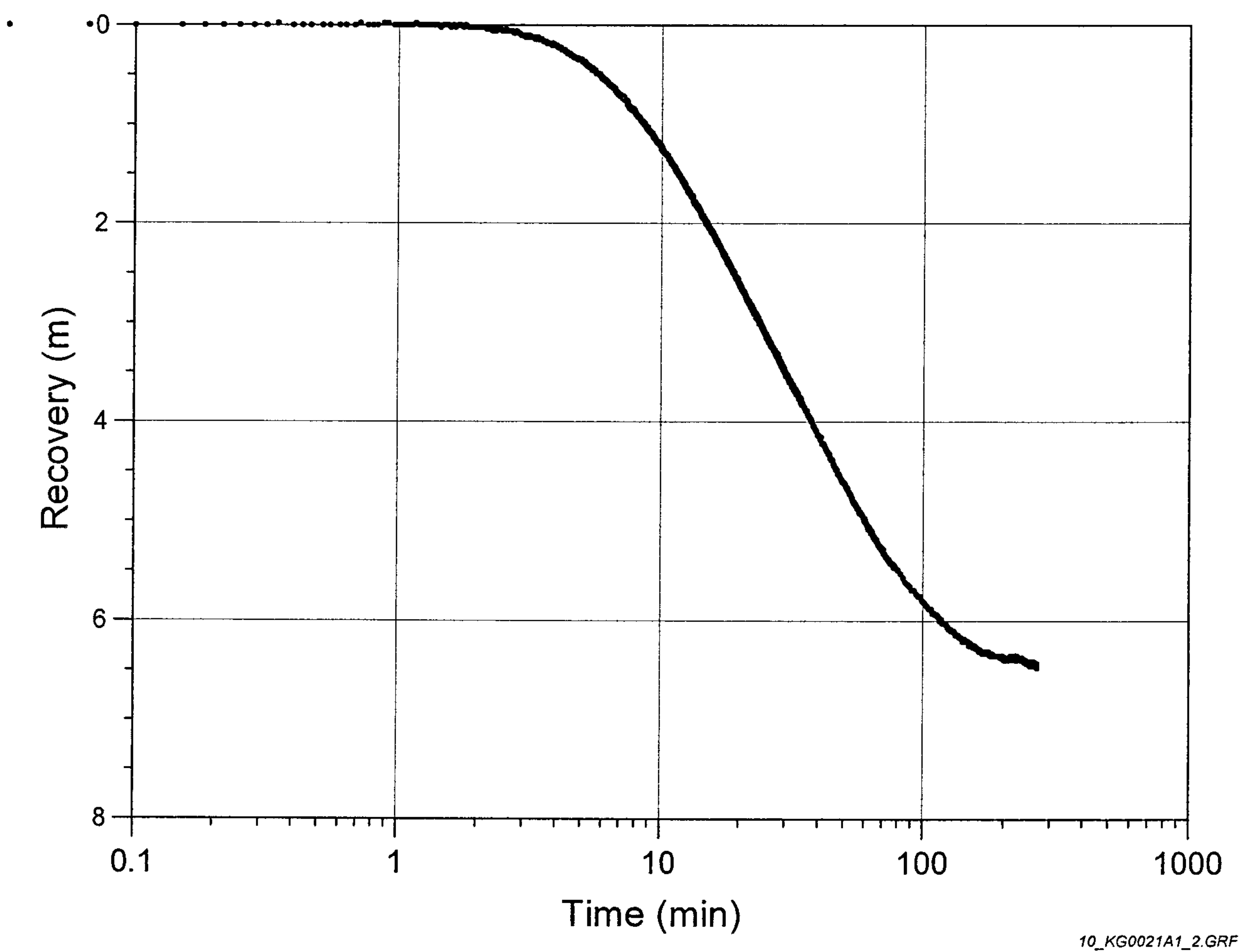

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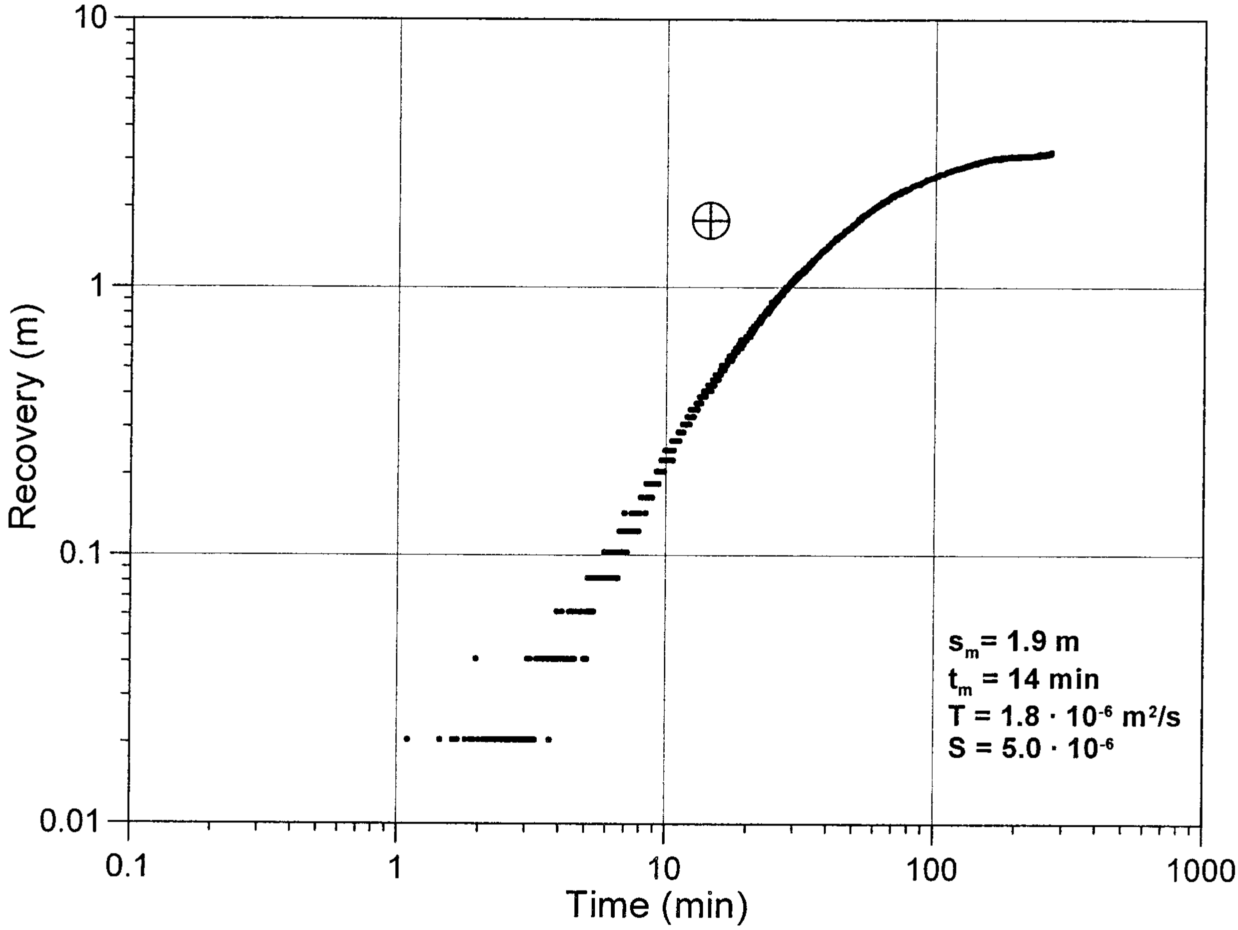

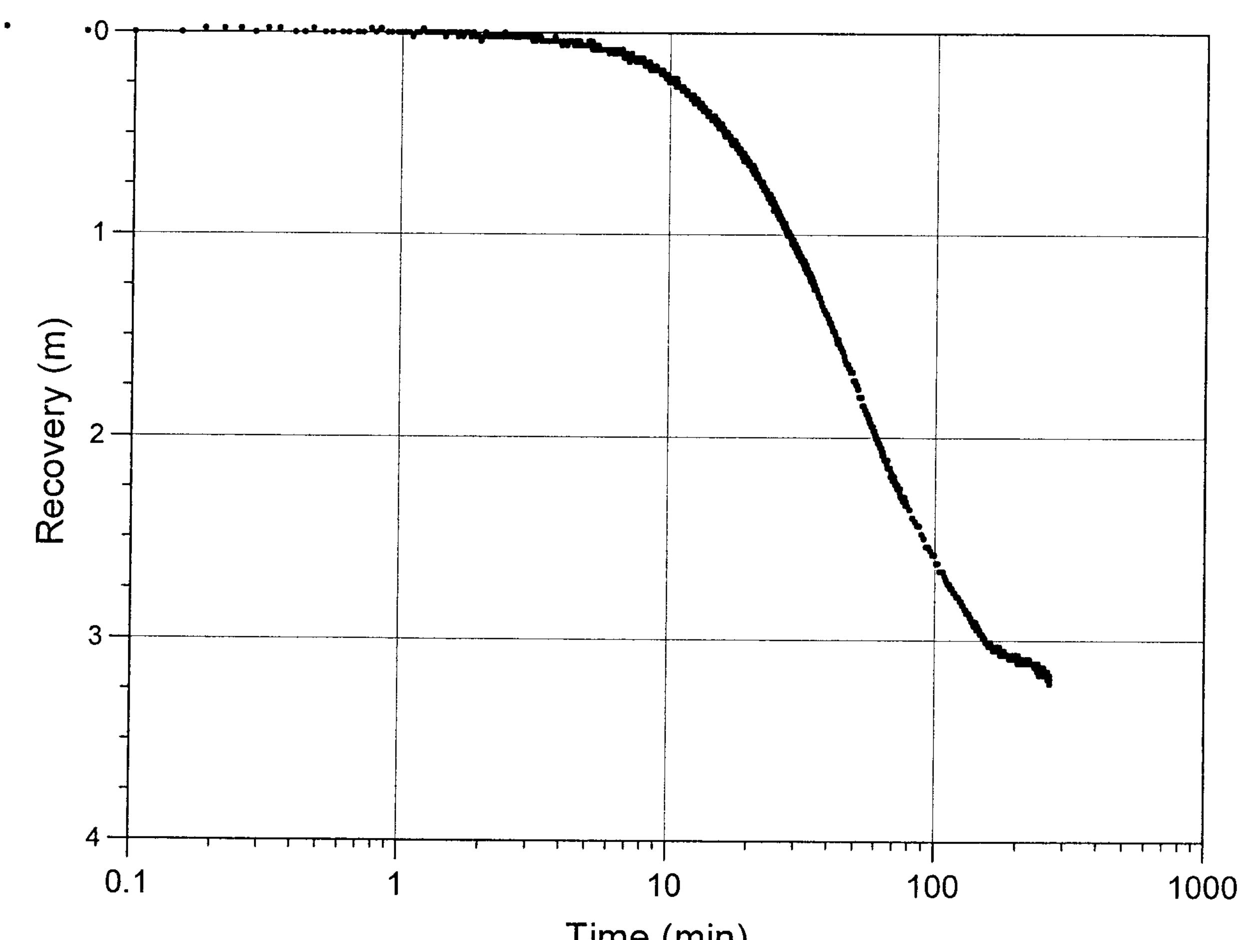

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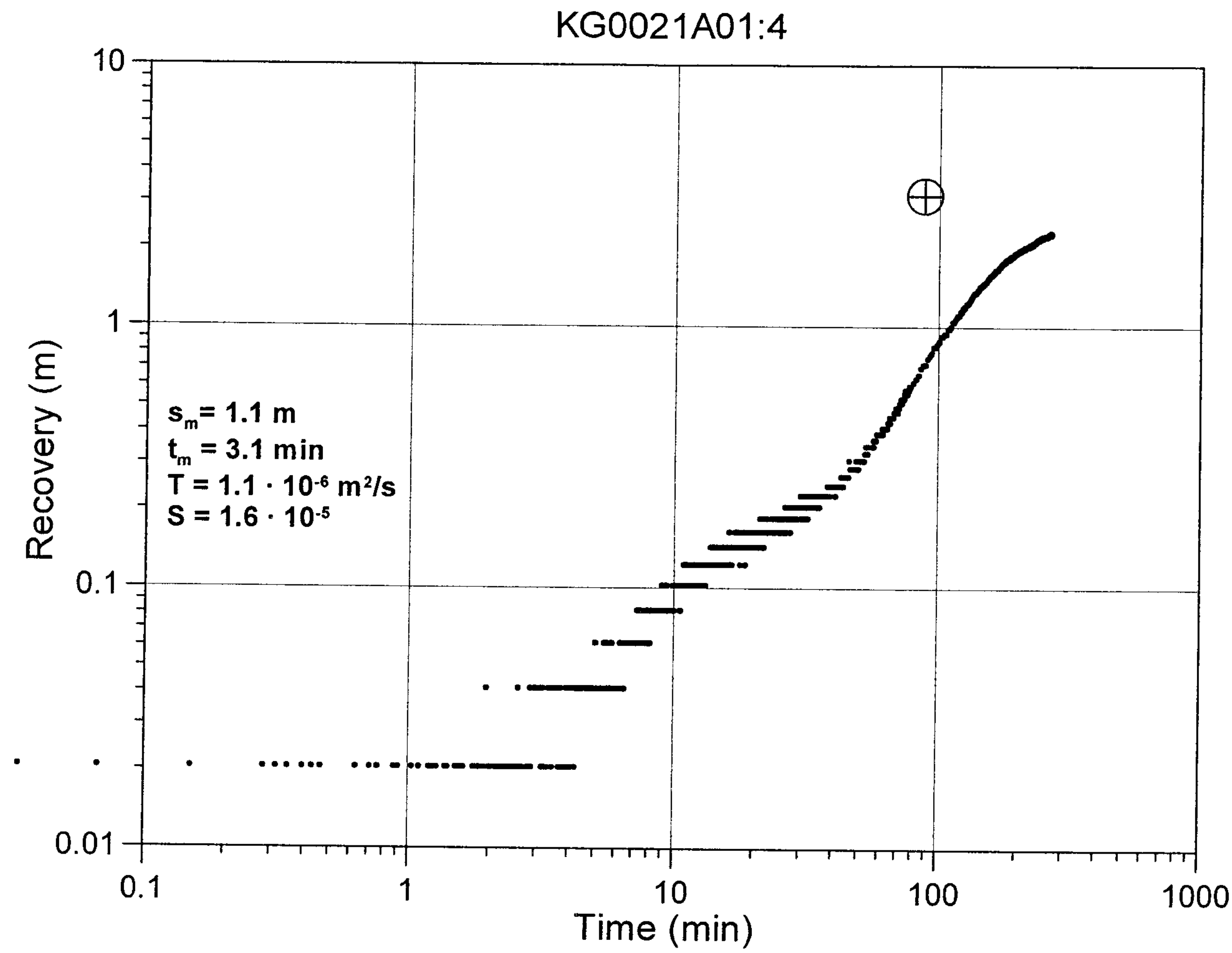

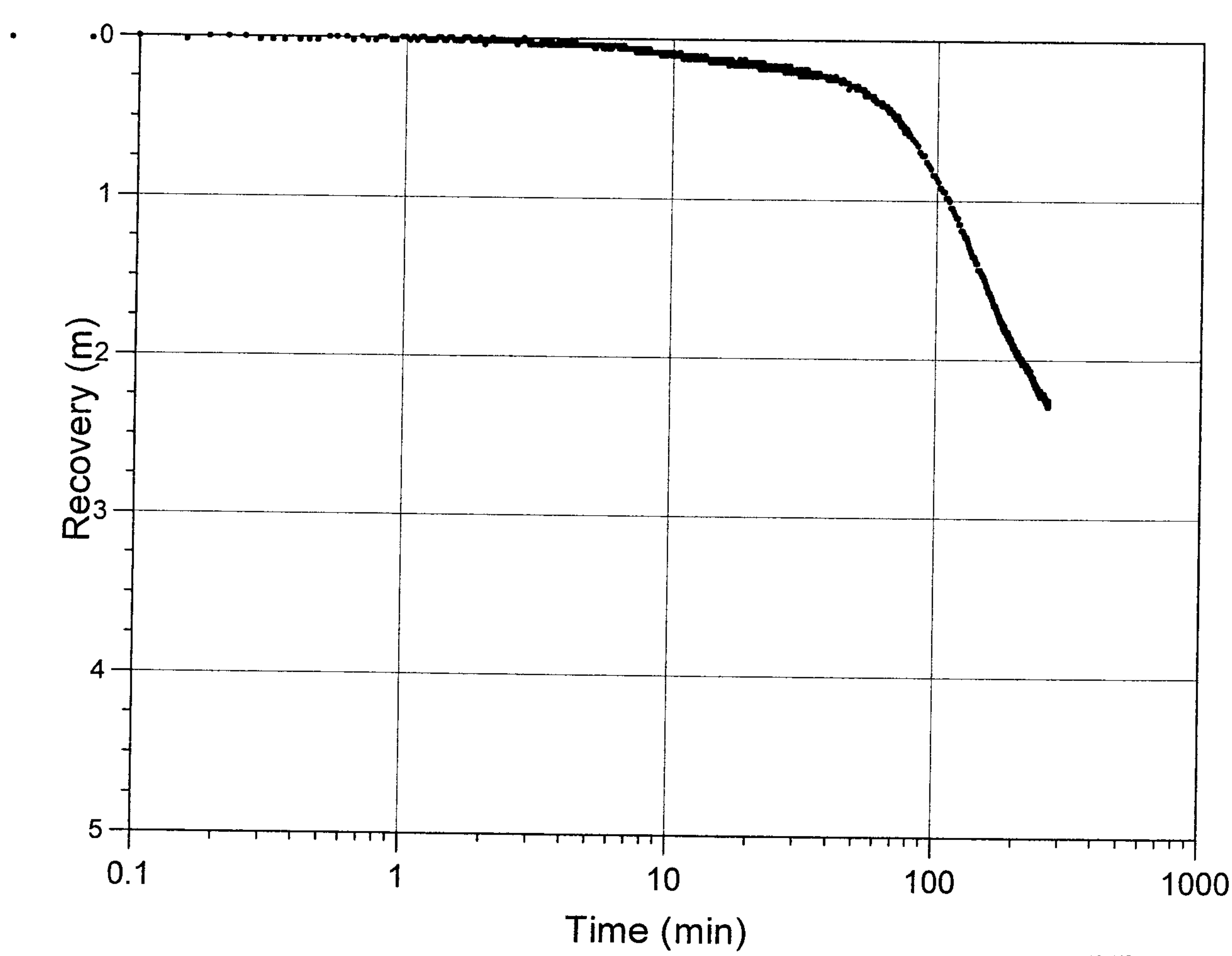

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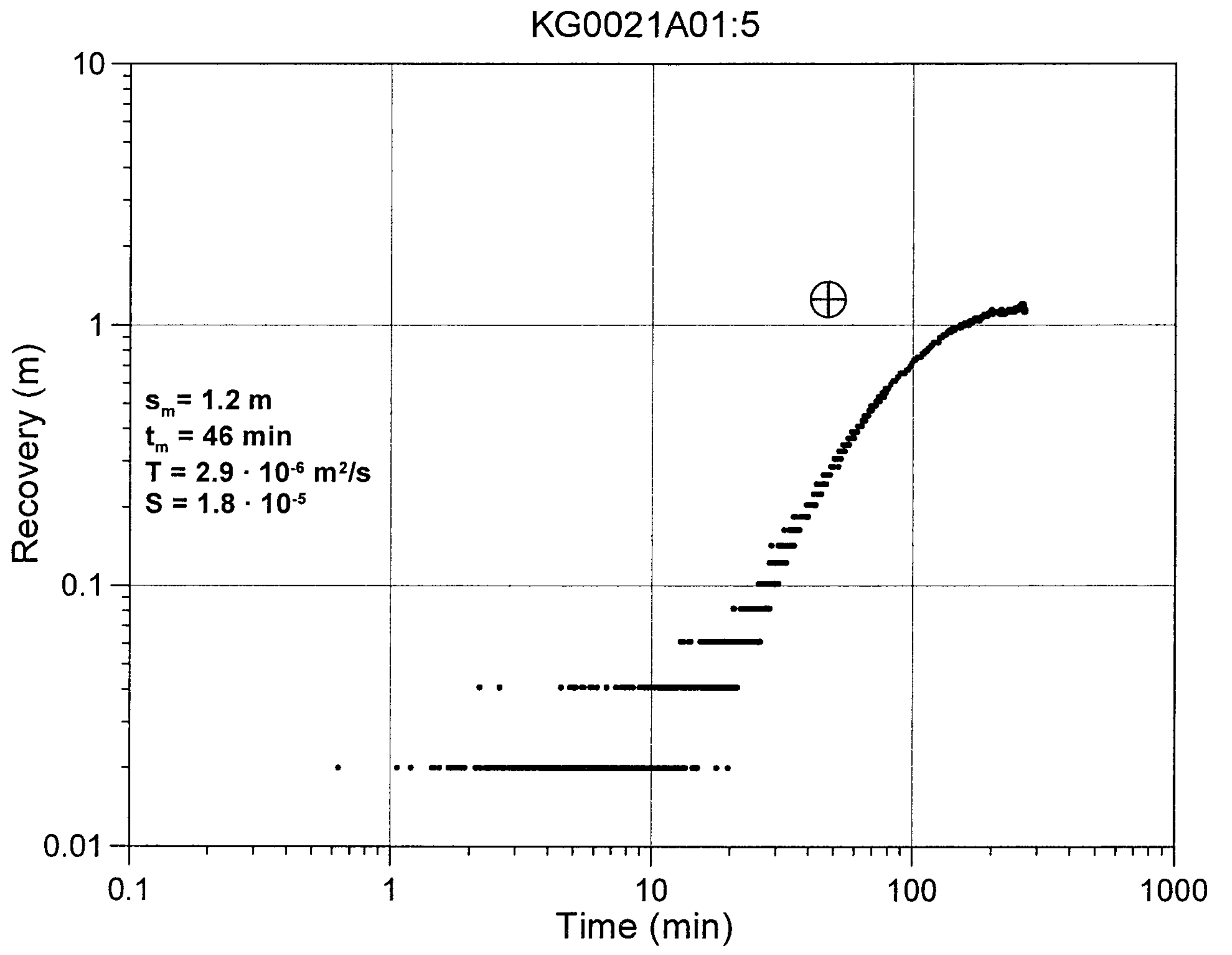

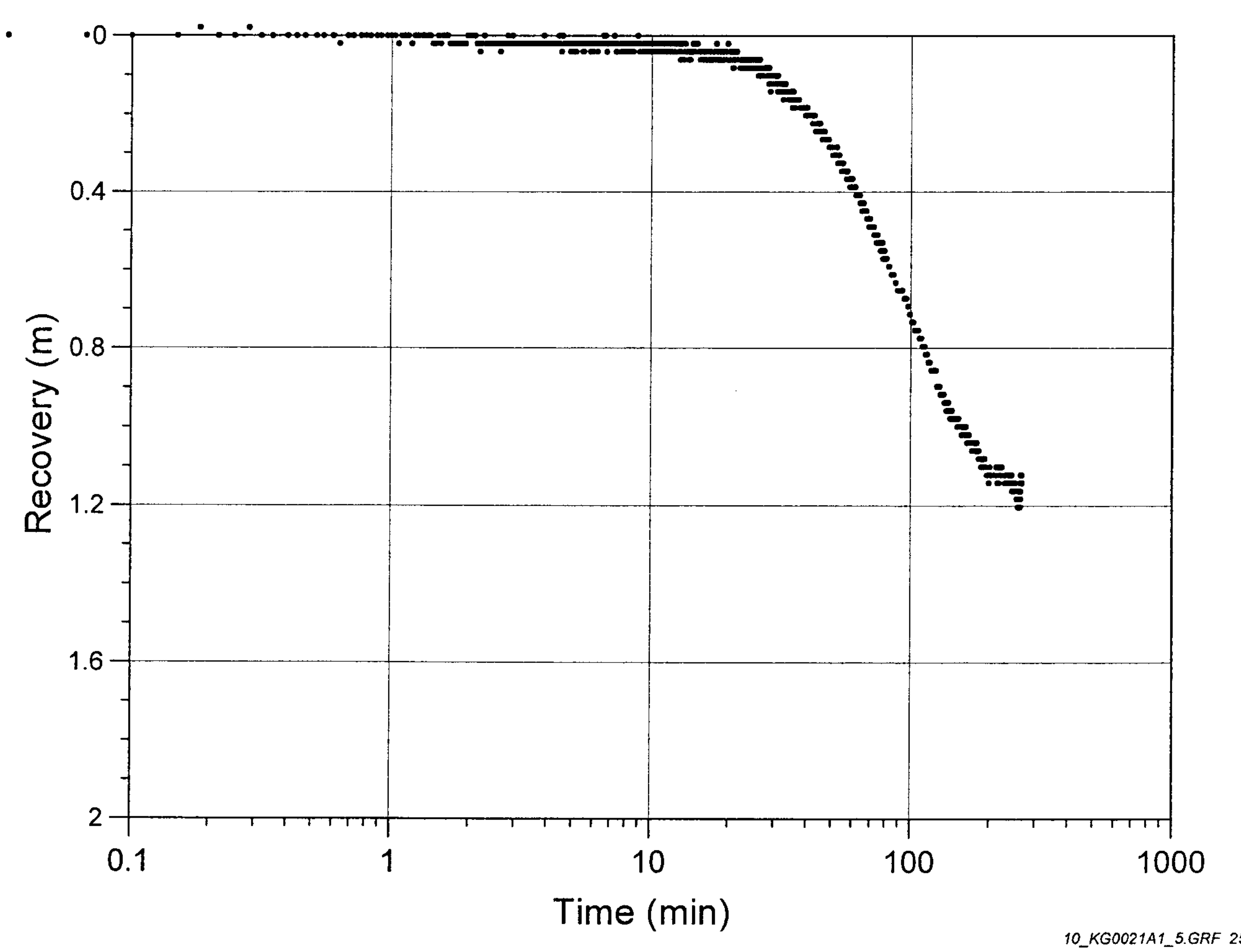

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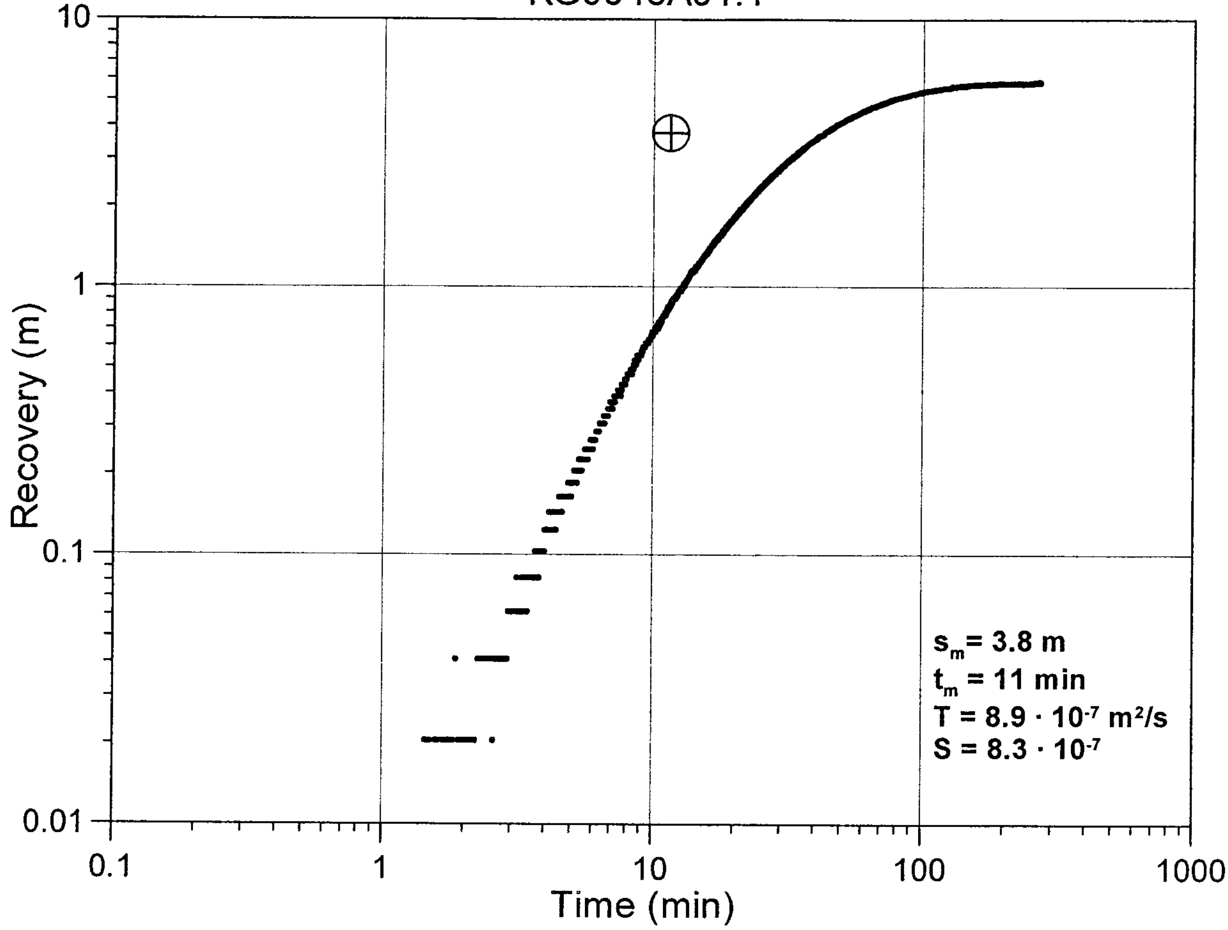

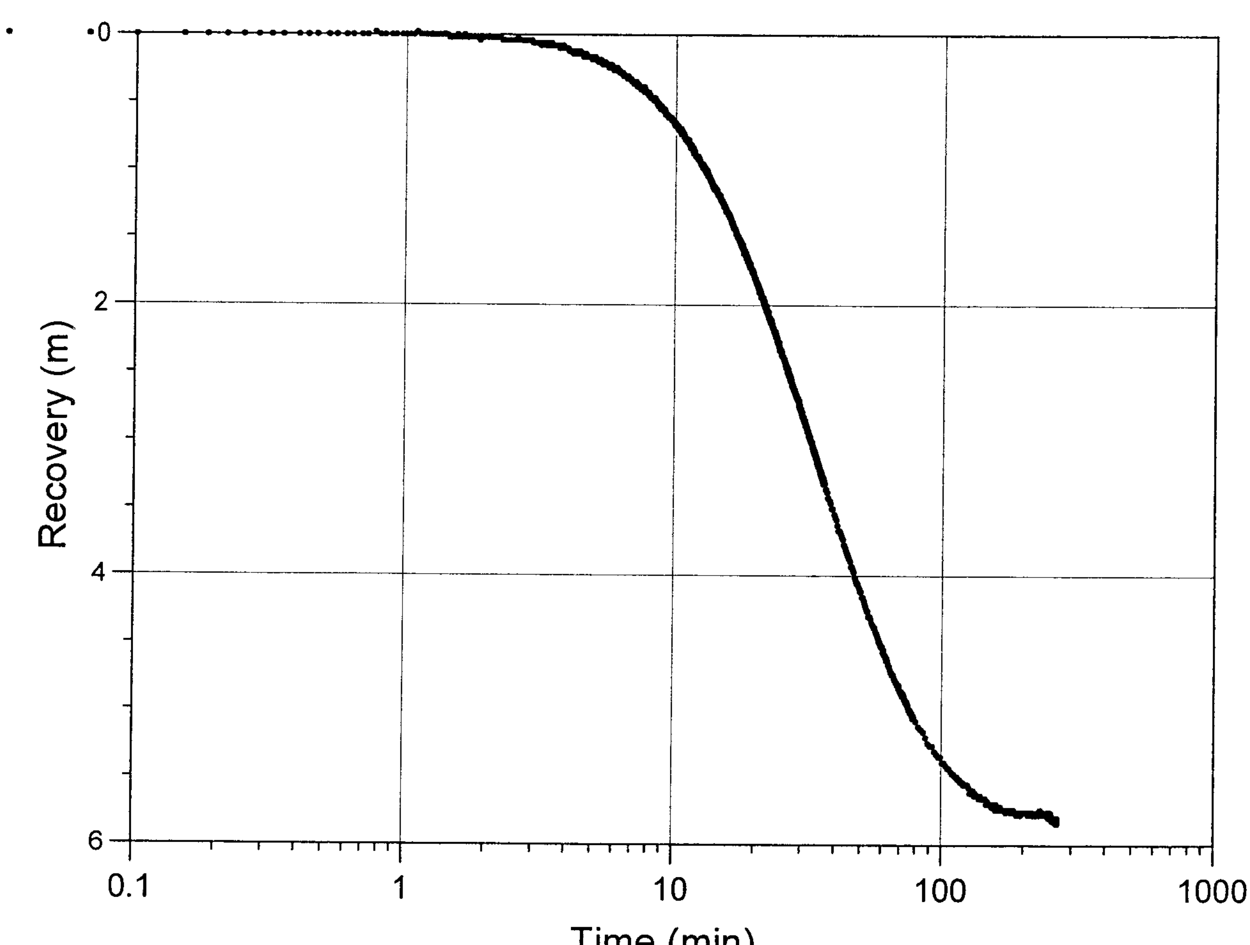

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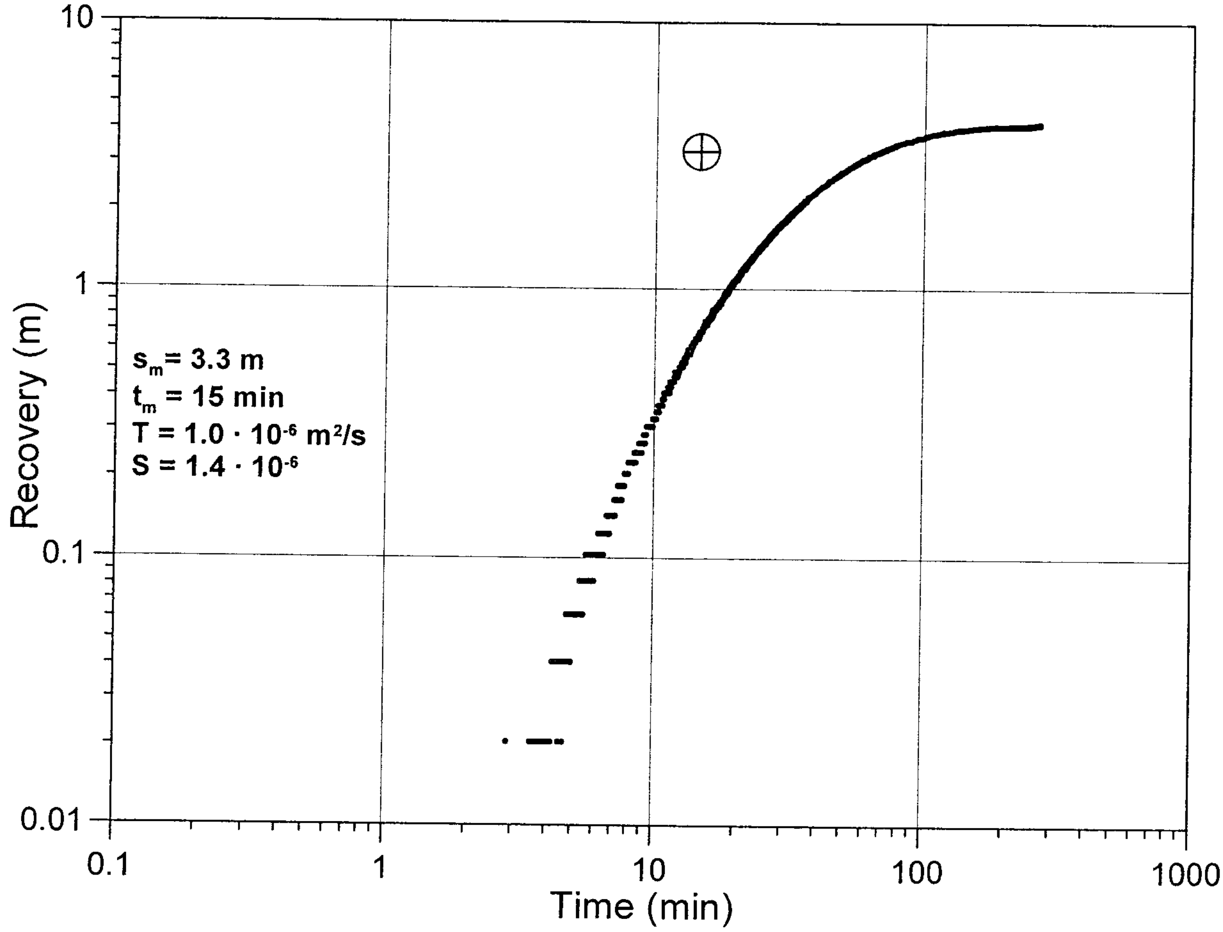

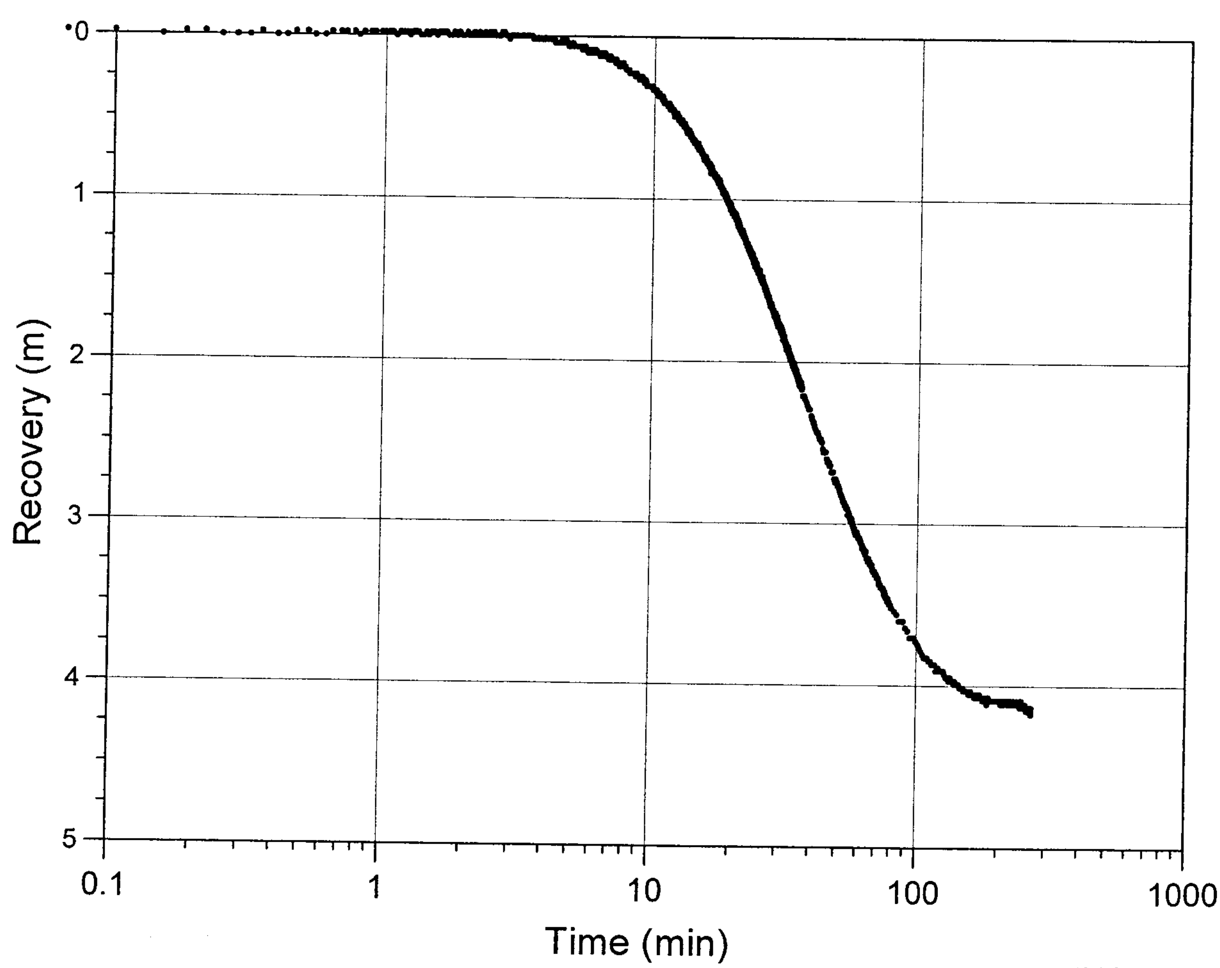

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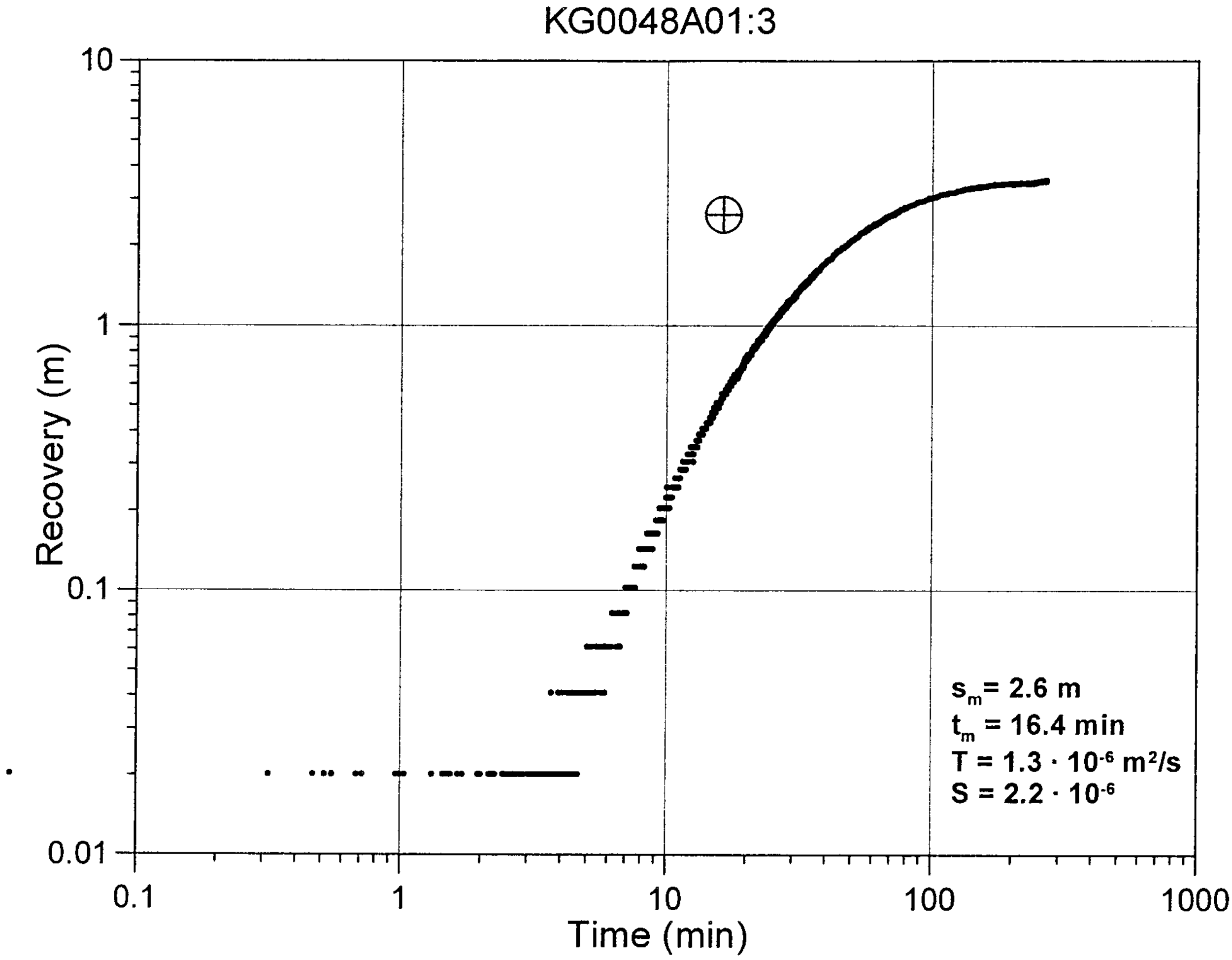

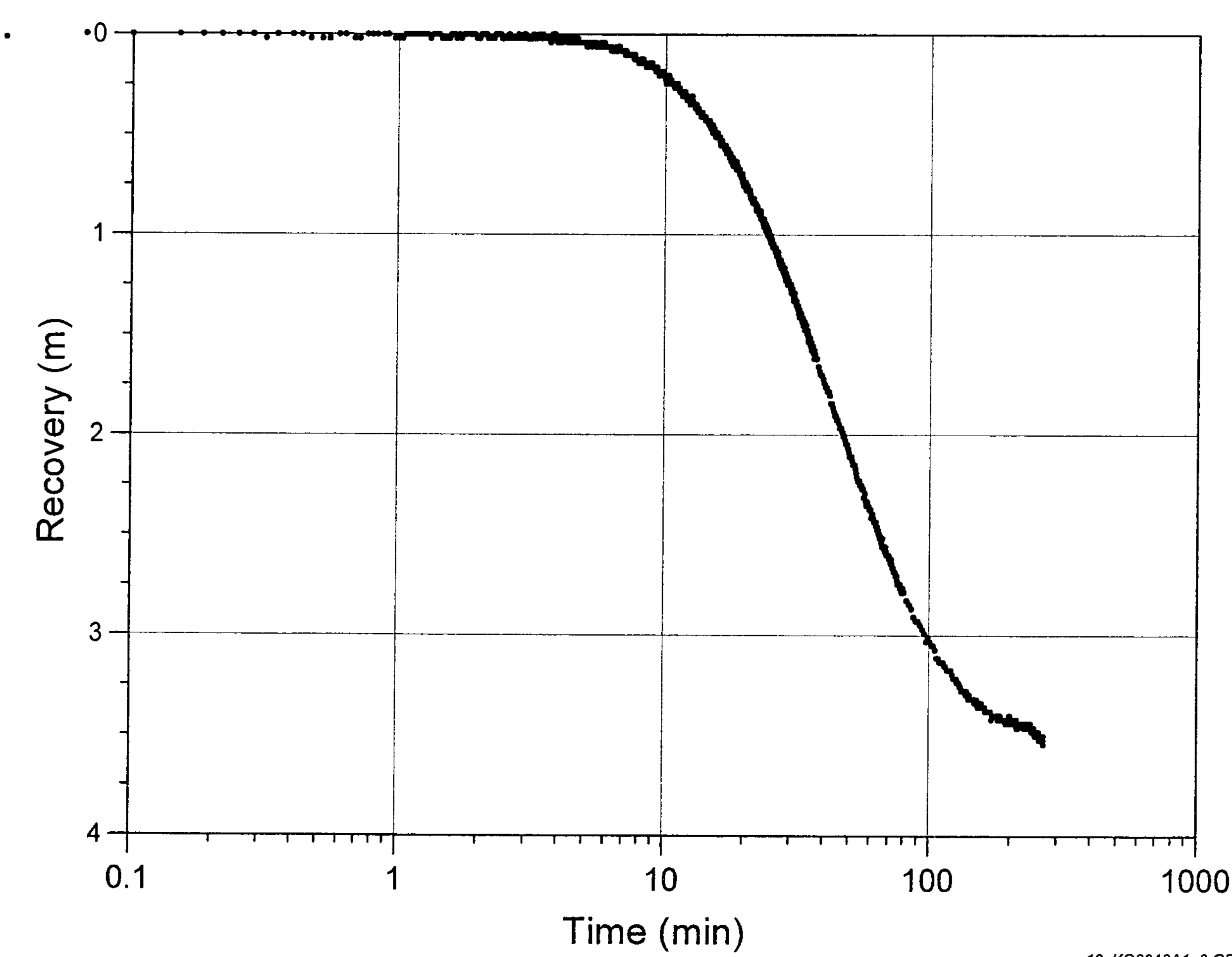

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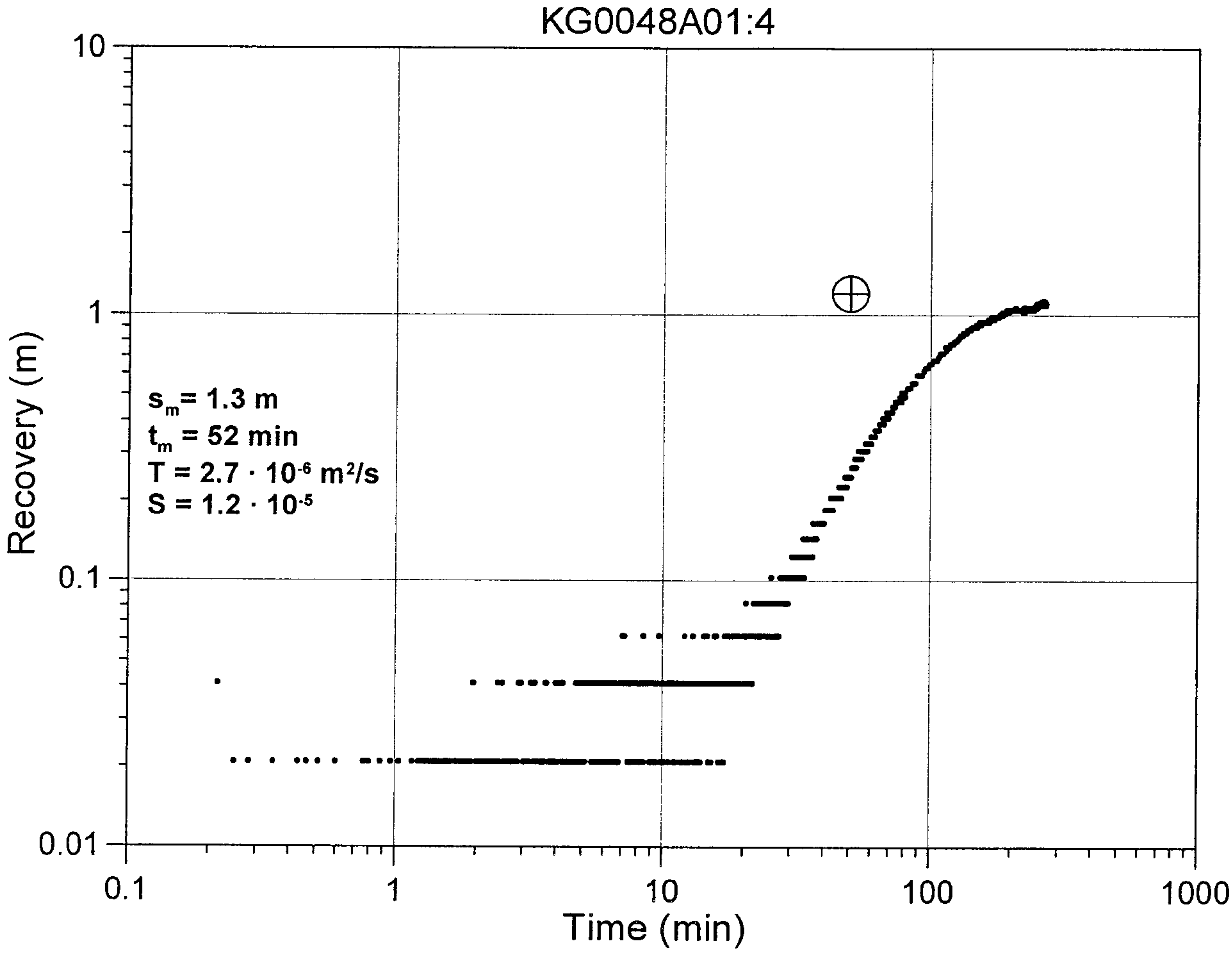
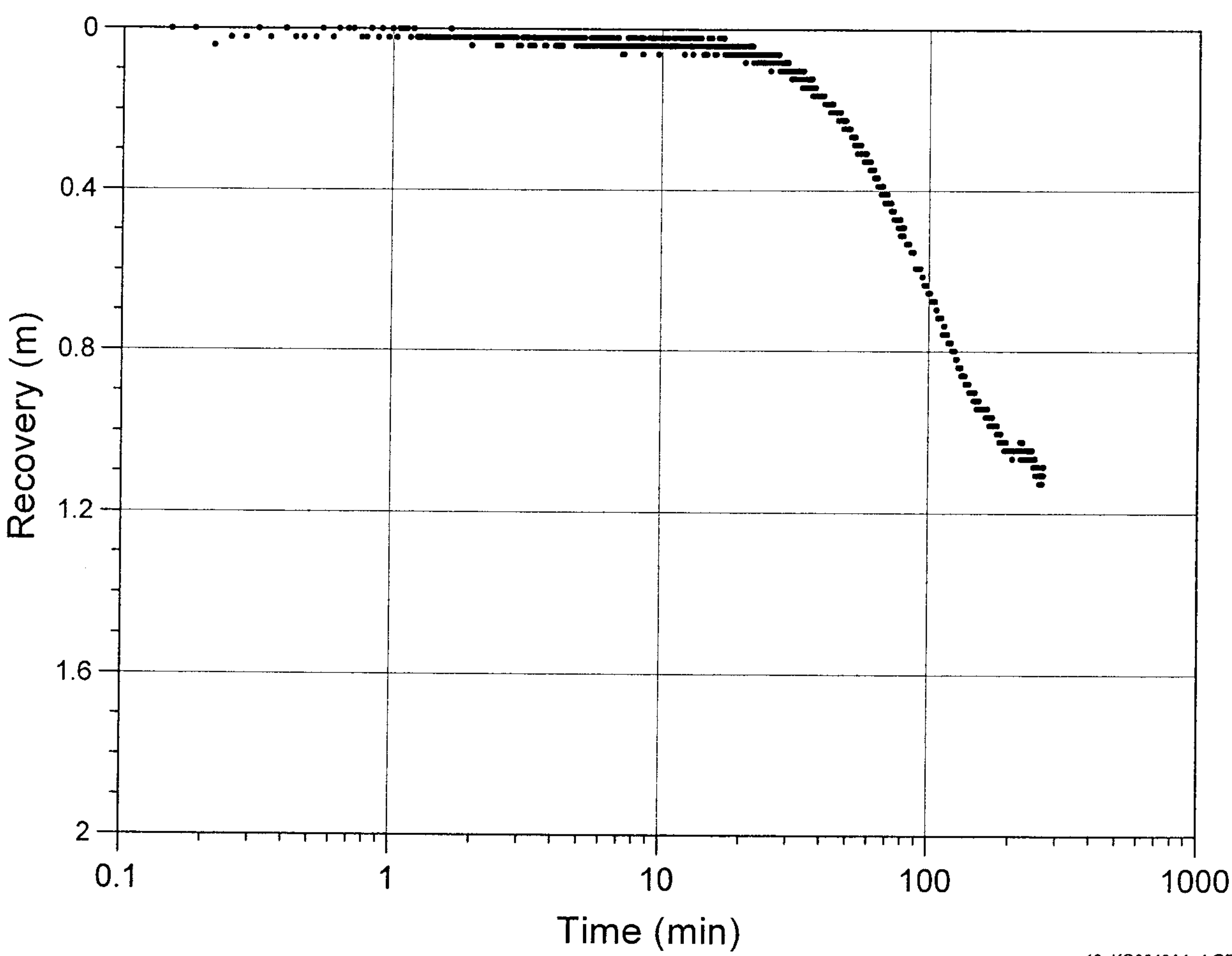




10_KG0048A1_4.GRF 25-okt-99

APPENDIX 6

Interference test 2:11 in borehole KA3542G02, section 1.30 m – 7.80 m

Date: 99-08-19 Field Crew: Bengt Gentzschein
Borehole length: 30.04 m Borehole diameter: 76 mm
Flowing borehole: KA3542G02, section #4: 1.3 – 7.80 m

Valve opened: 990819 09:00.01 Valve closed: 990819 15:01.01
End of Test: 990820 07:55

Total flowing time : 361 min Tot. Pr. Build-up time 1 014 min.

The test was performed as an Interference test. Pressure responses were monitored in 61 borehole sections.

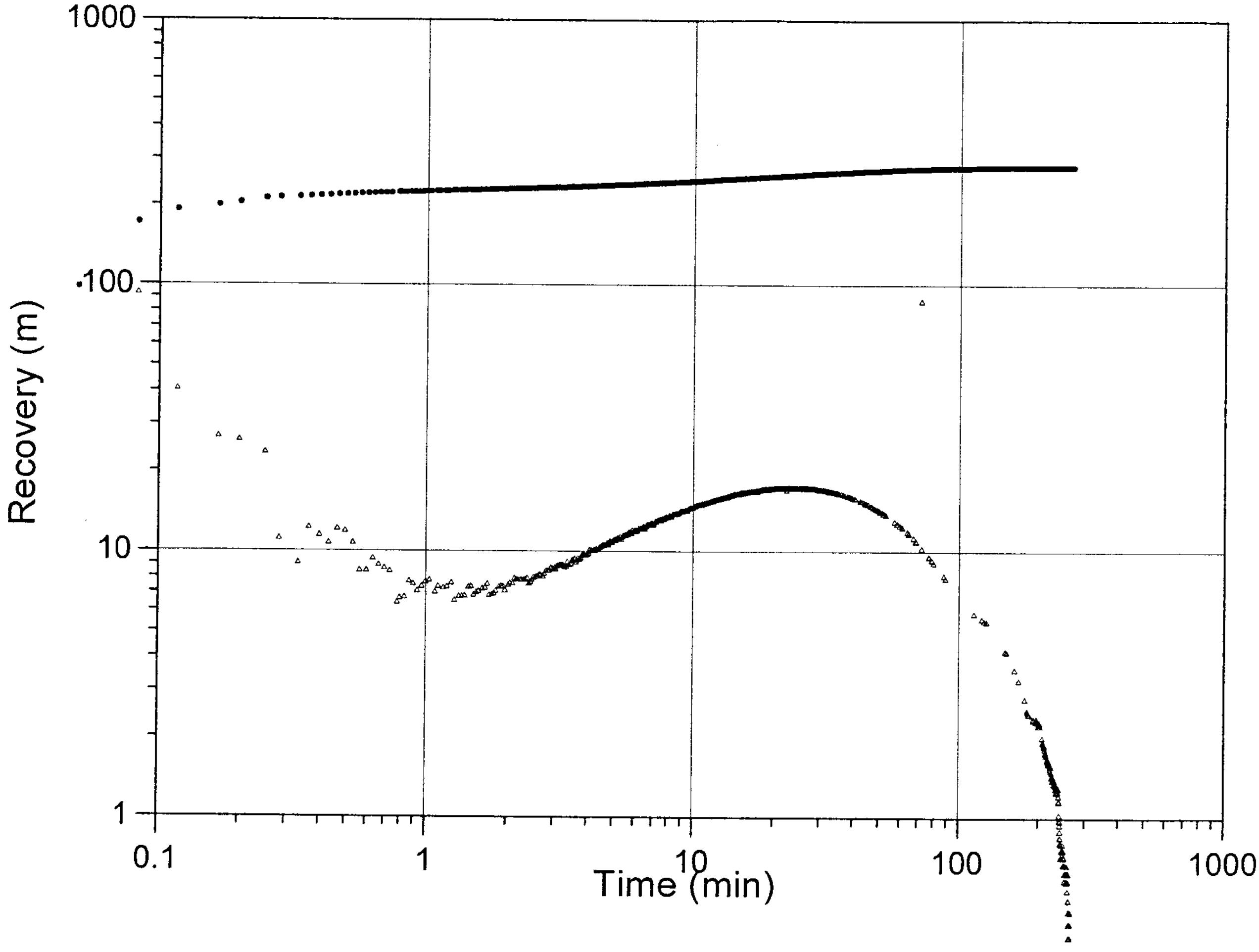
Flow data

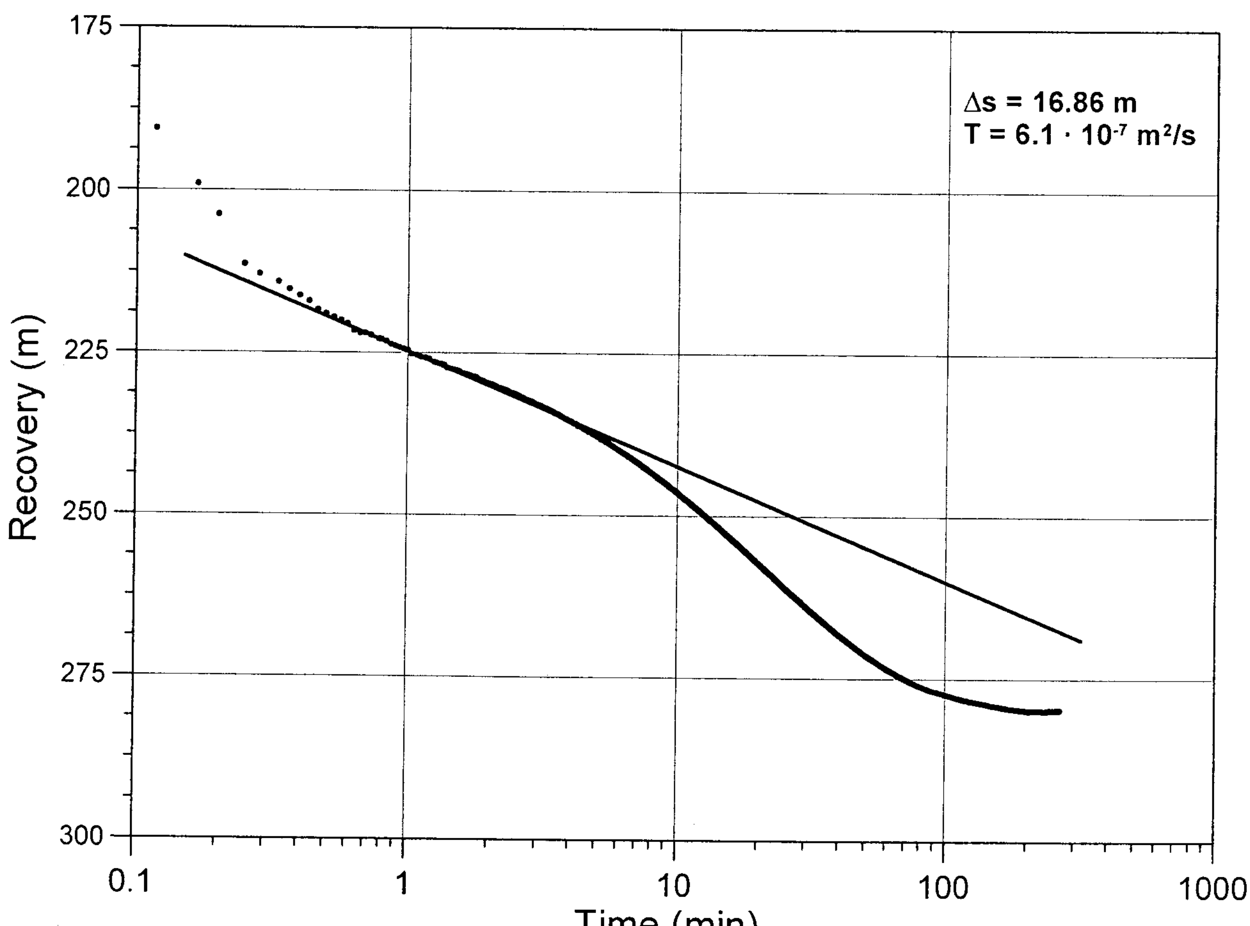
Manually measured flow rates of KA3542G02, section 1.30– 7.80 m are presented in the table below:

Table Manually measured flow rates, Interference test in KA3542G02, section 1.30 – 7.80 m (test #11). Prototype repository, August 1999.

Time	Flow rate (l/min)
09:00.31	4.37
09:03.01	3.88
09:06.11	3.82
09:15	3.70
09:30	3.595
09:45	3.525
10:00	3.51
14:51	3.36
14:55	3.37
14:58	3.37

KA3542G02:4





11_KA3542G2_4.GRF 27-okt-99

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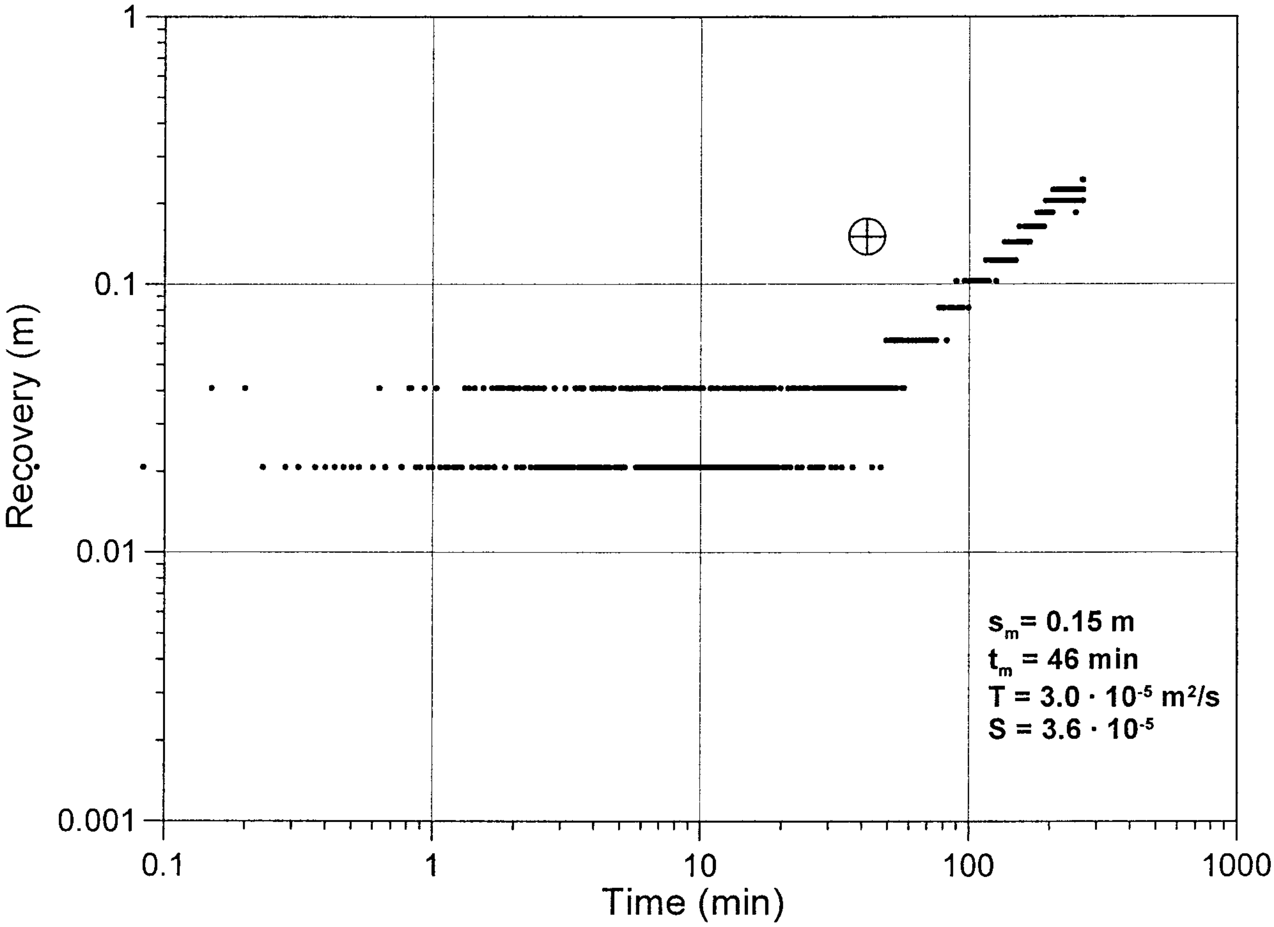
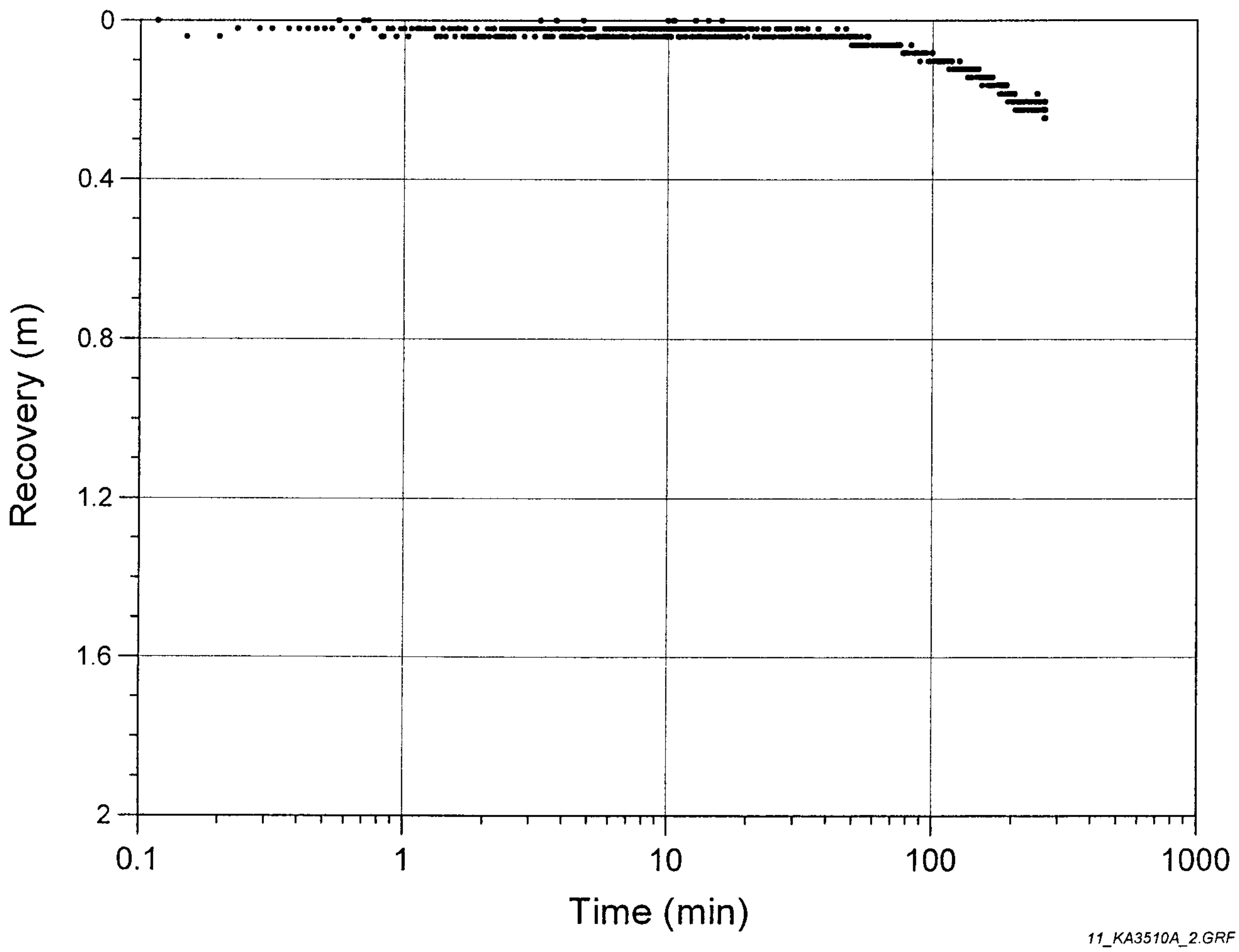
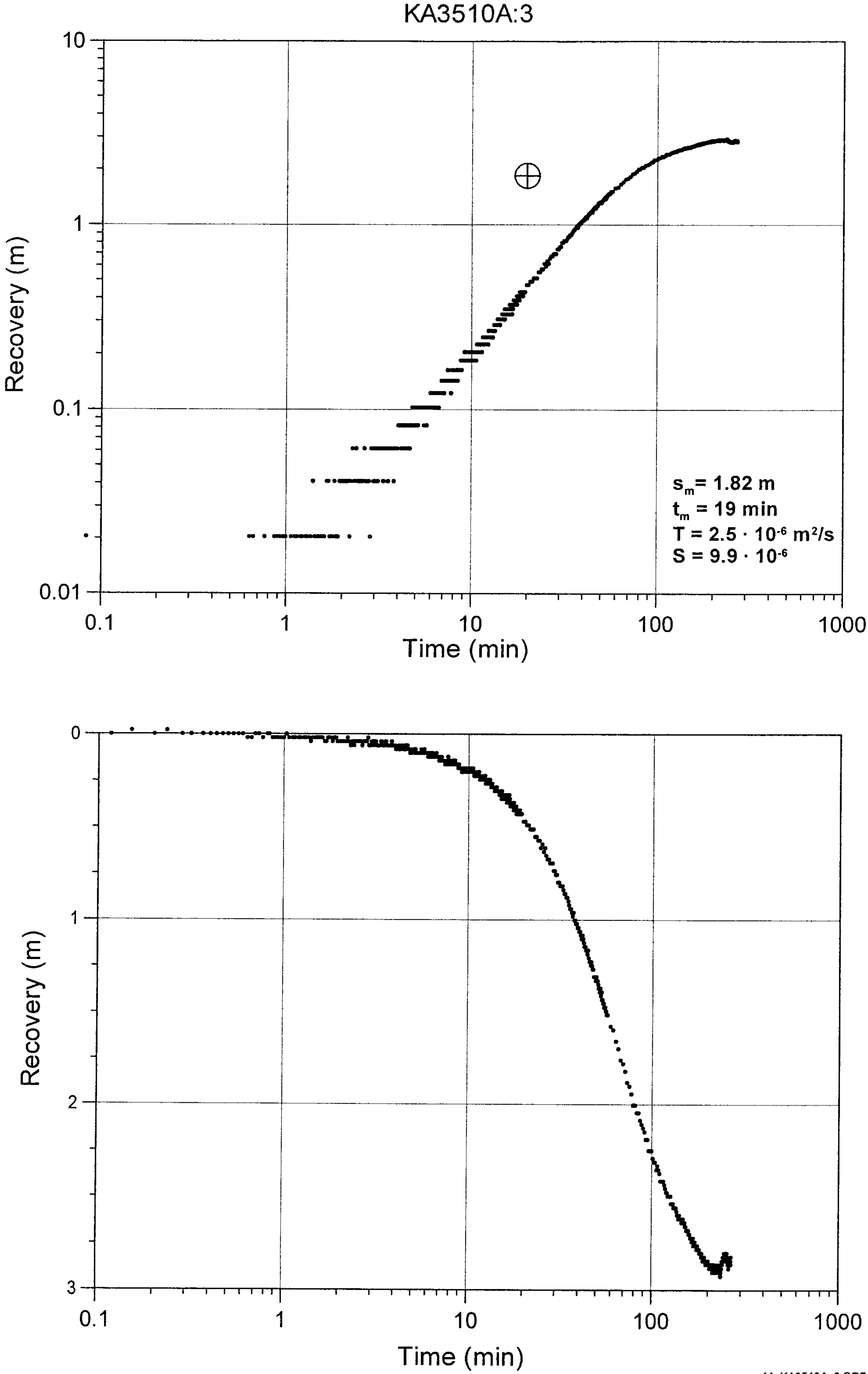
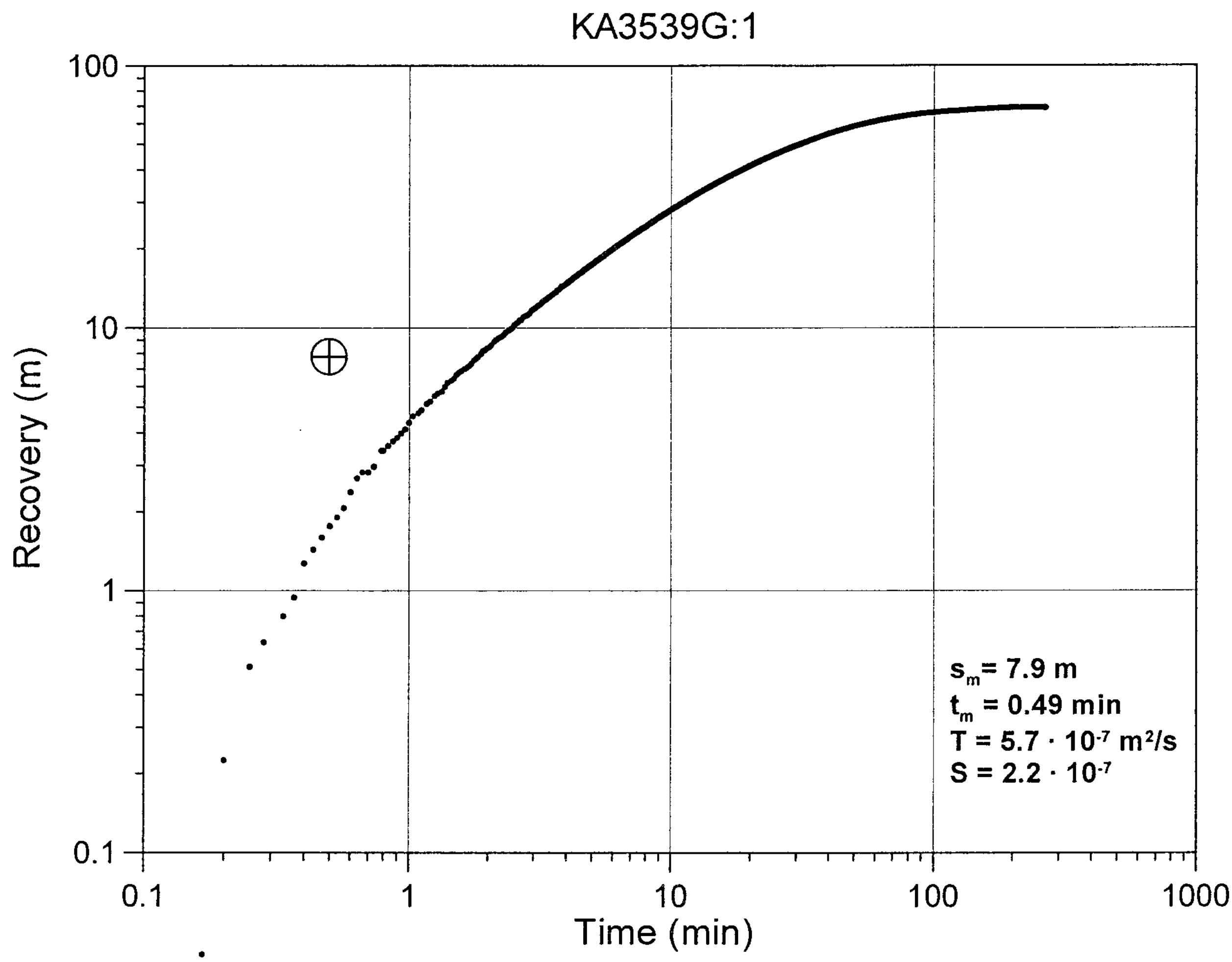
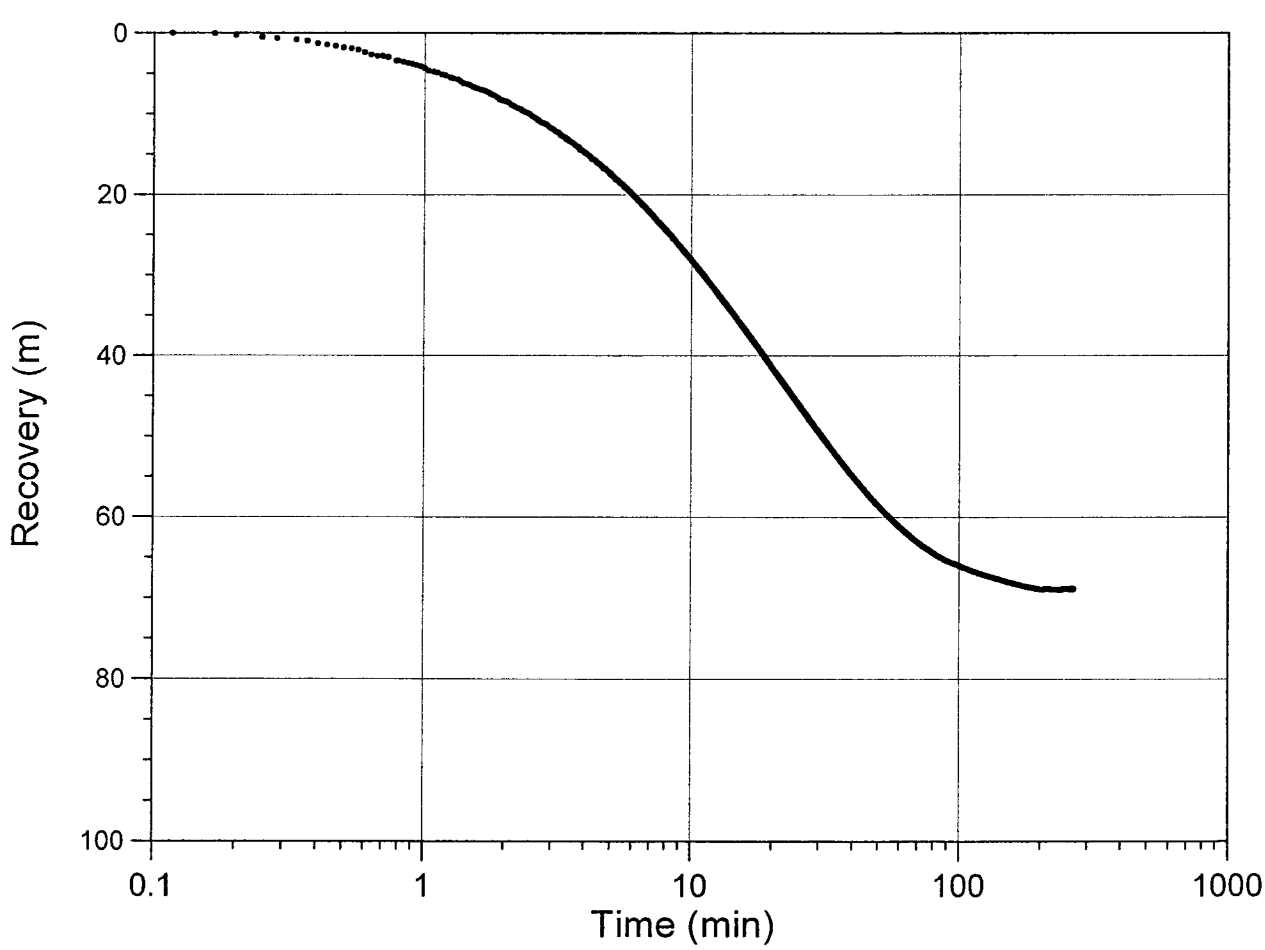




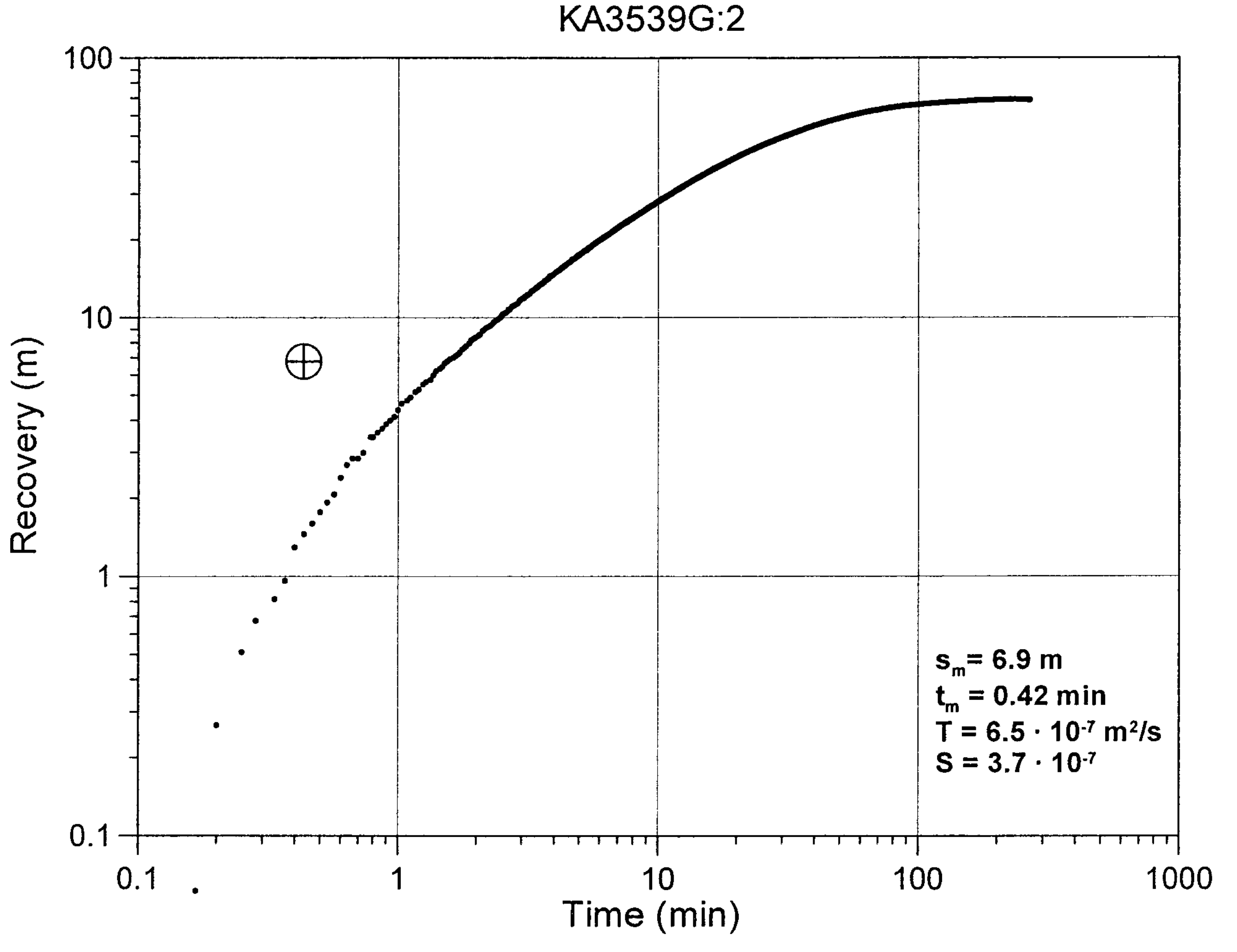
11_KA3510A_2.GRF 25-okt-99

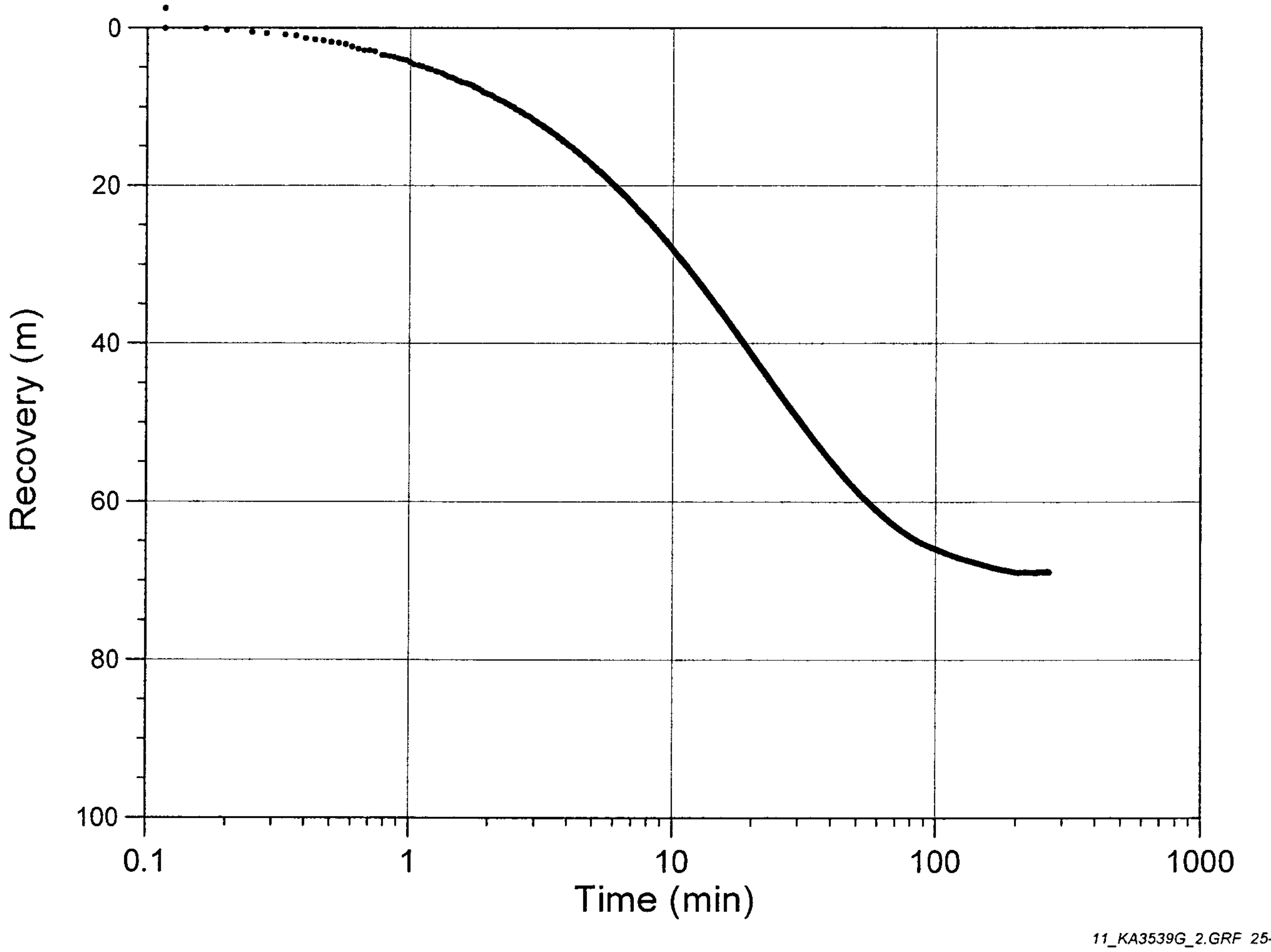

KA3510A:3
Recovery (m)
Time (min)
s_m = 1.82 m
t_m = 19 min
T = 2.5 · 10^{-6} m^2/s
S = 9.9 · 10^{-6}
Recovery (m)
Time (min)



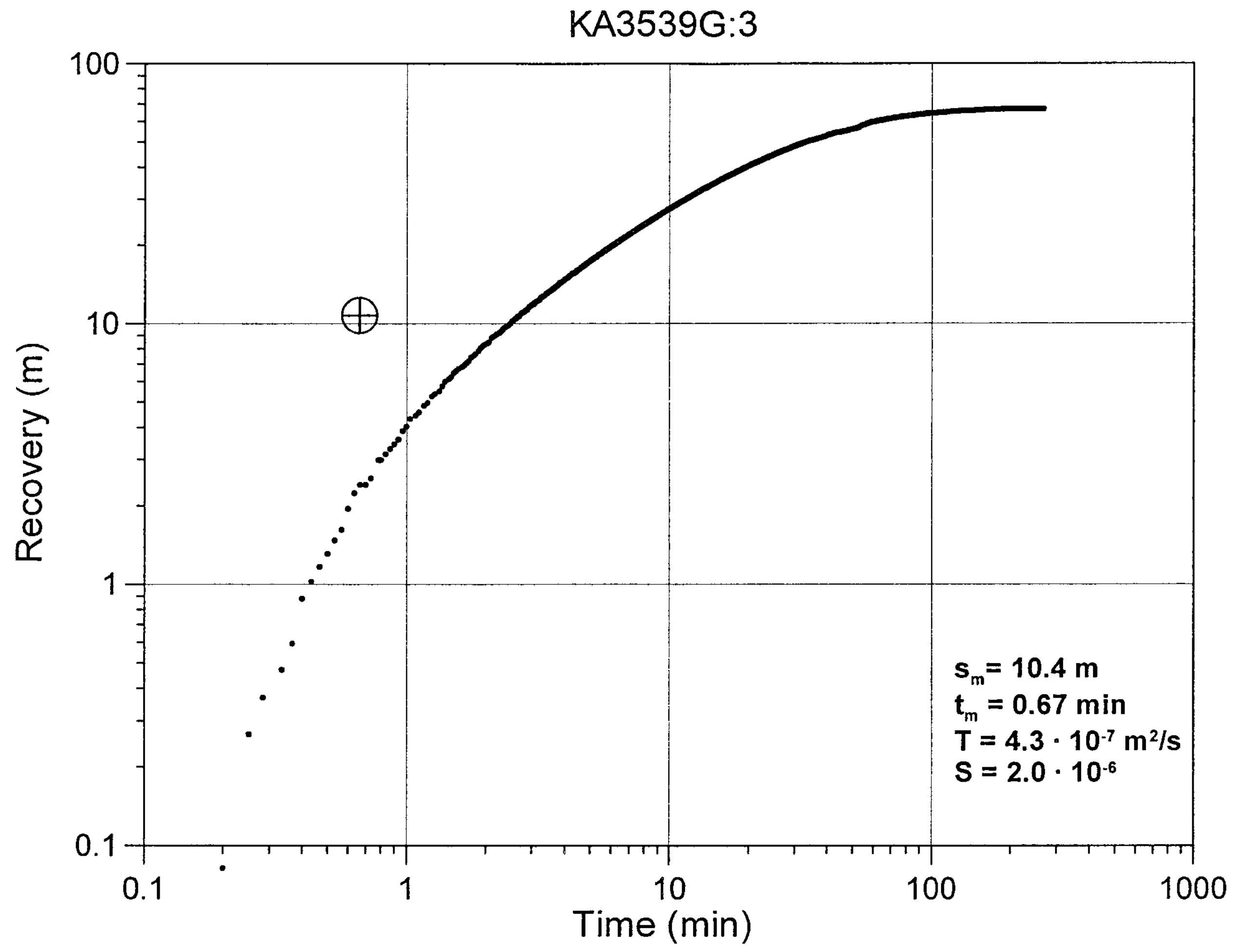


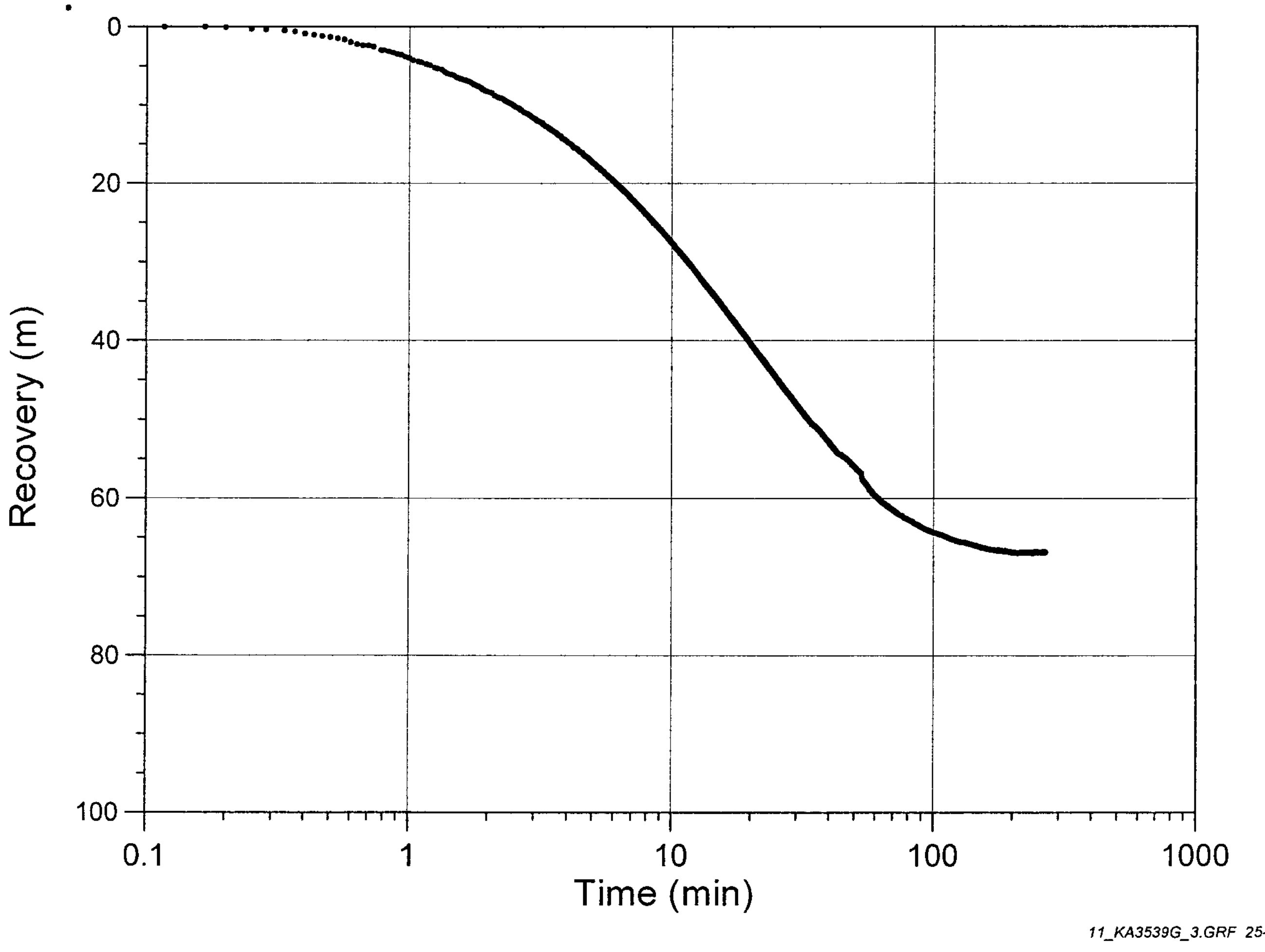
11_KA3539G_1.GRF 25-okt-99



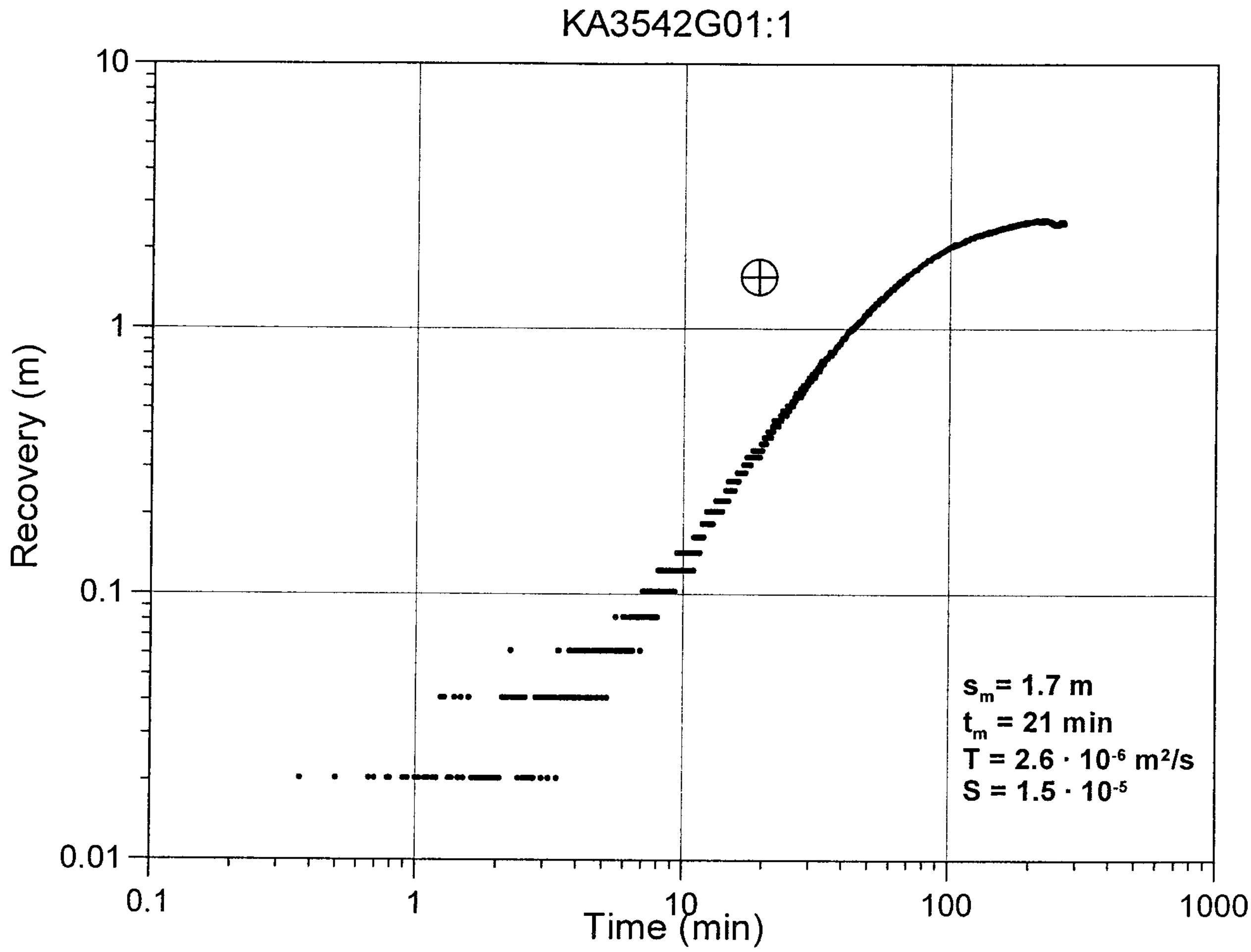


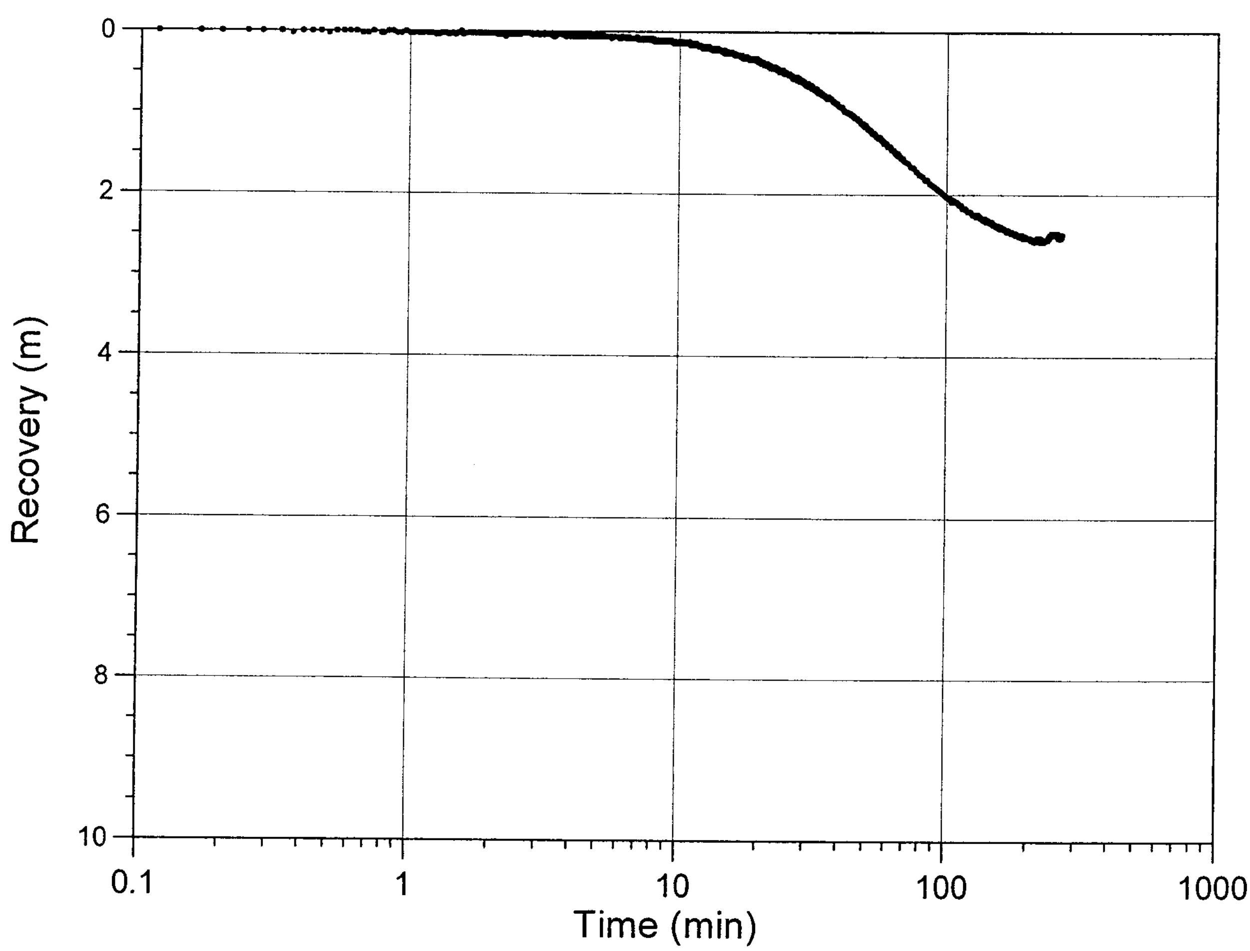
11_KA3539G_2.GRF 25-okt-99



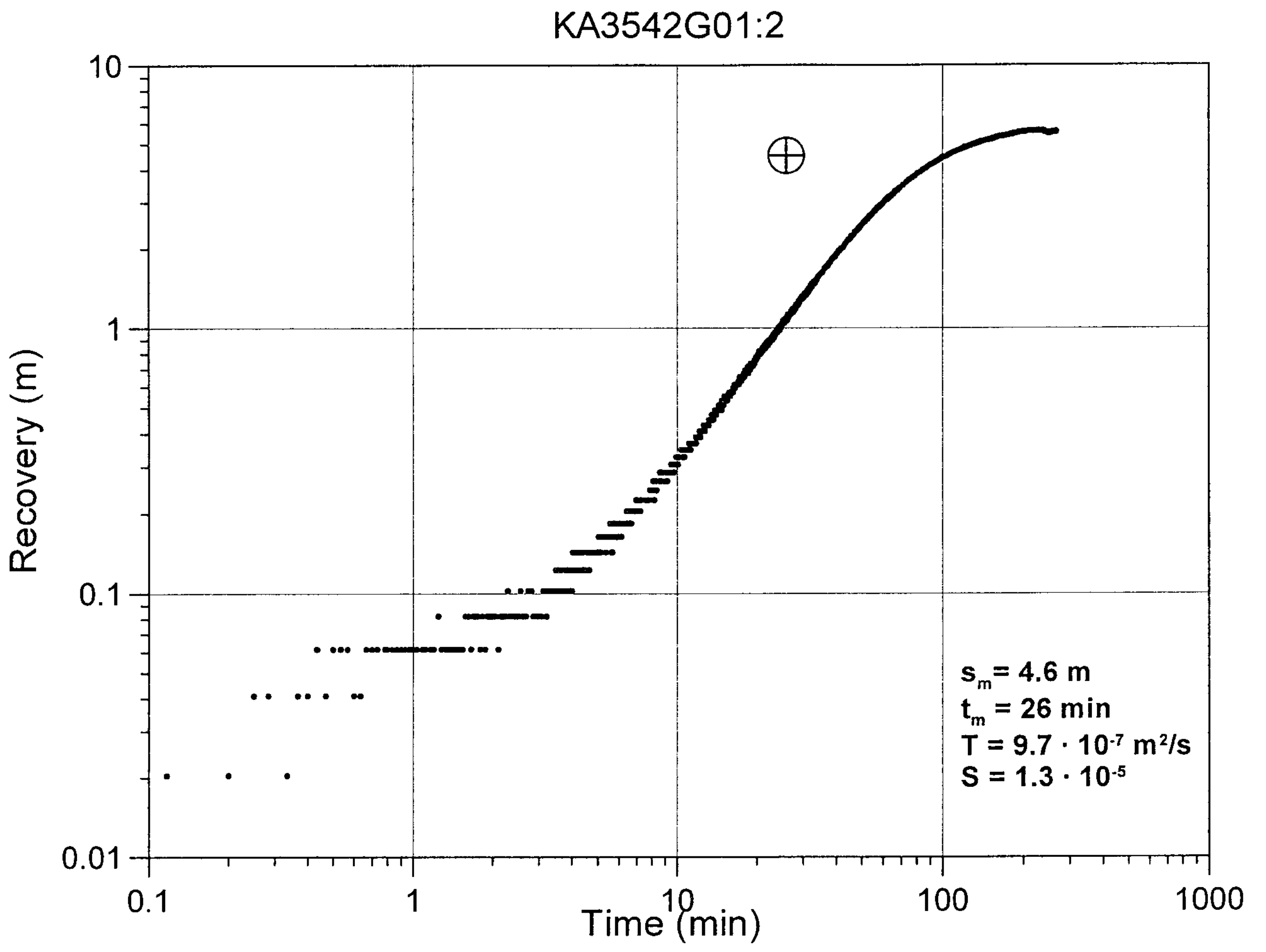


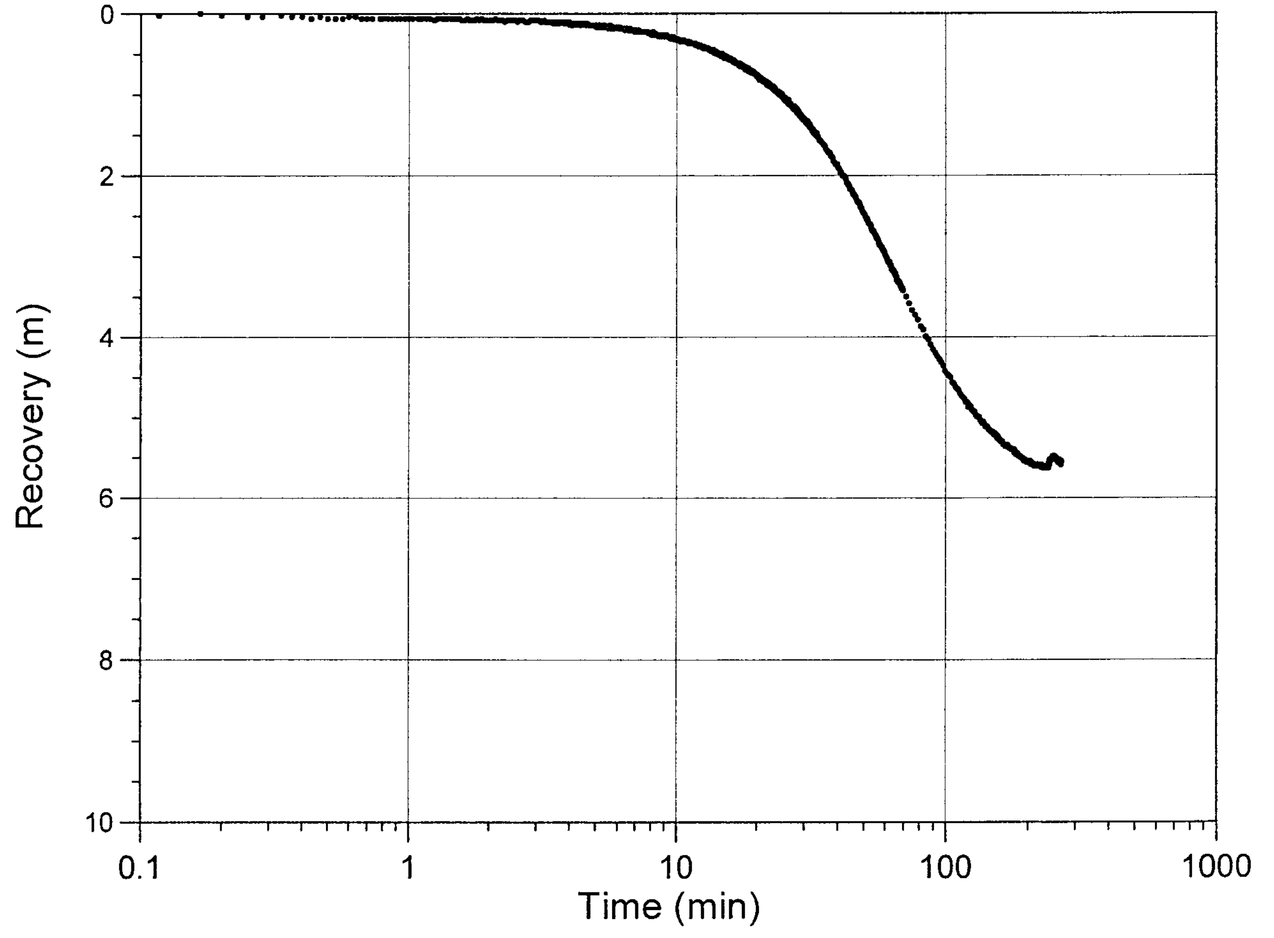
11_KA3539G_3.GRF 25-okt-99



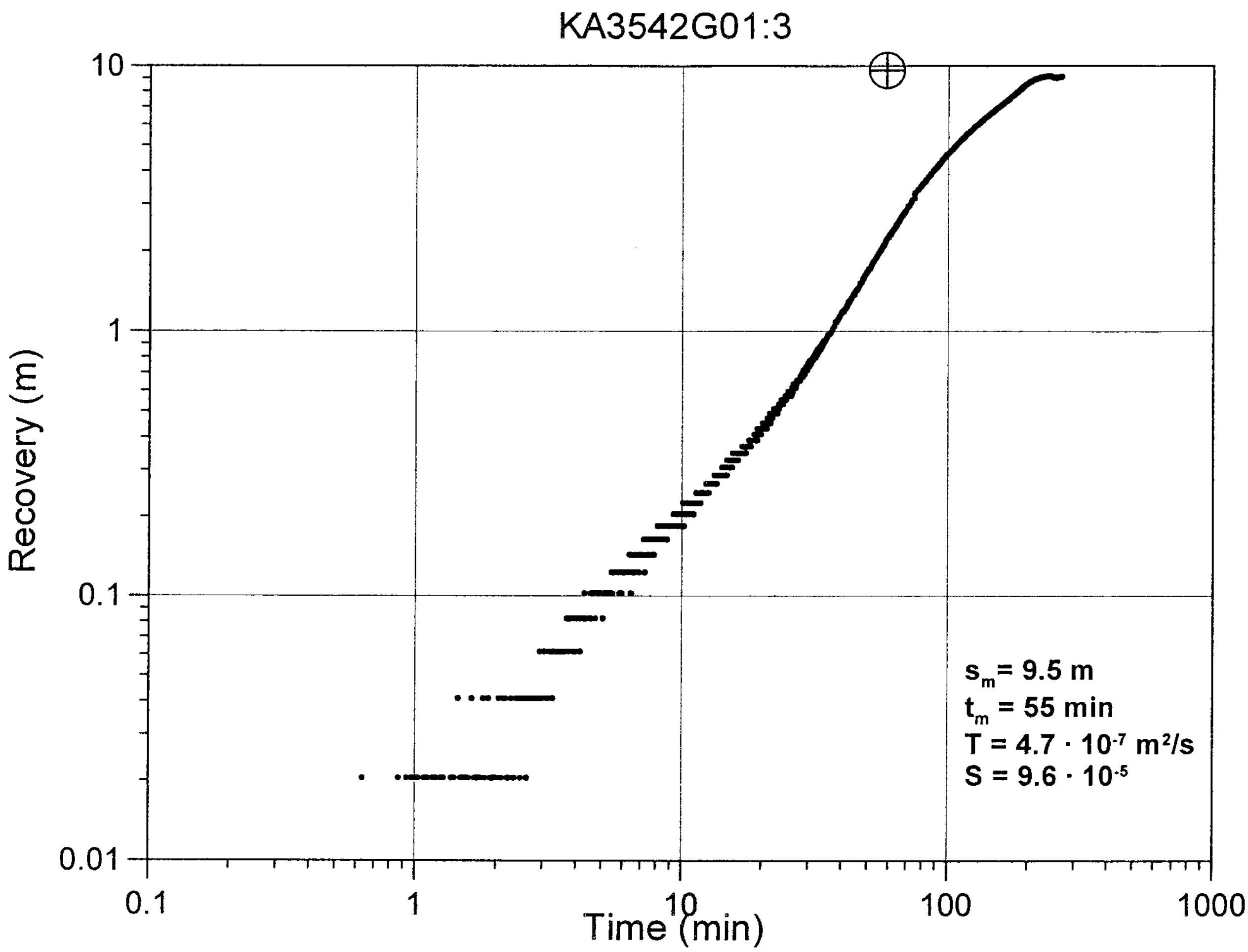


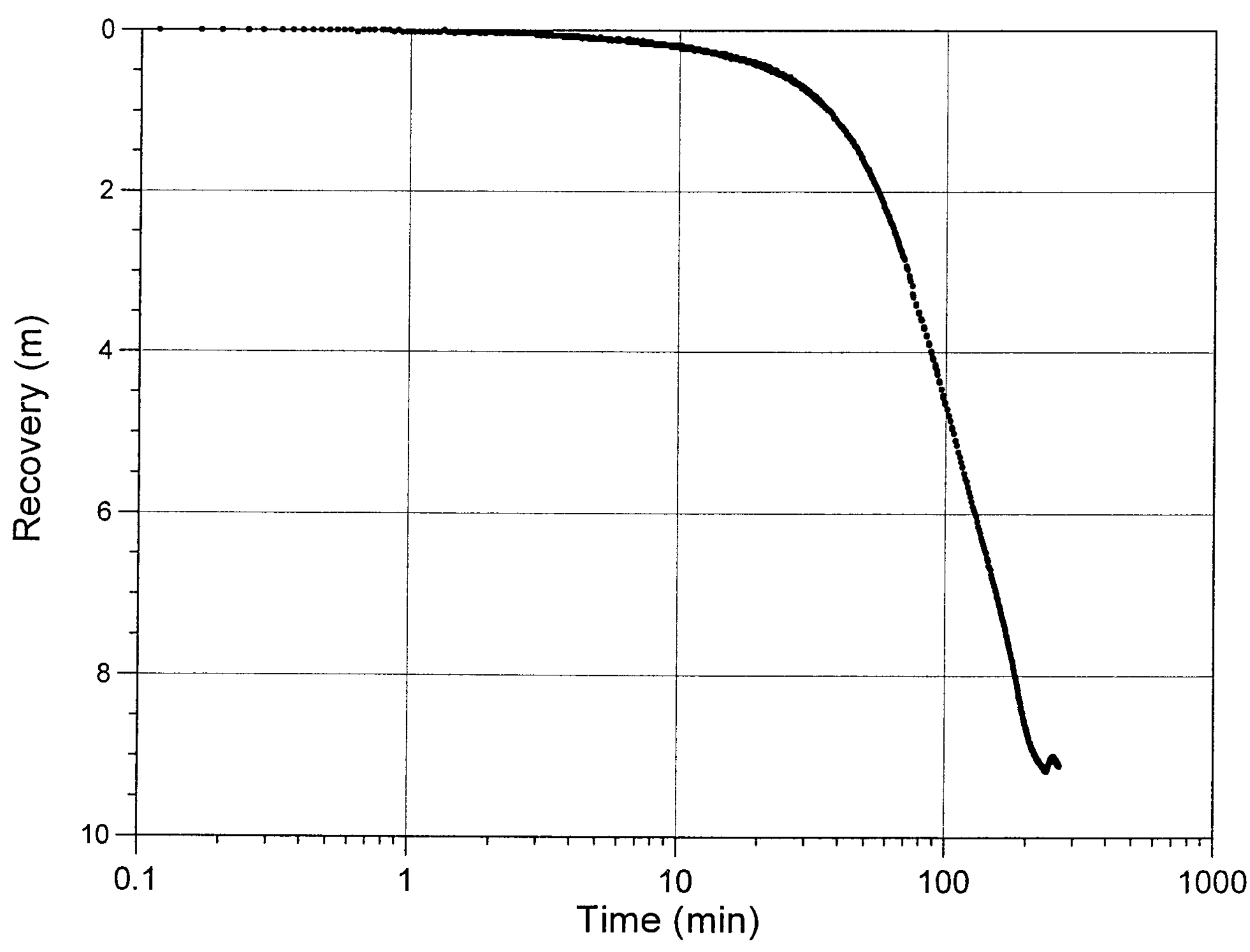
11_KA3542G1_1.GRF 25-okt-99





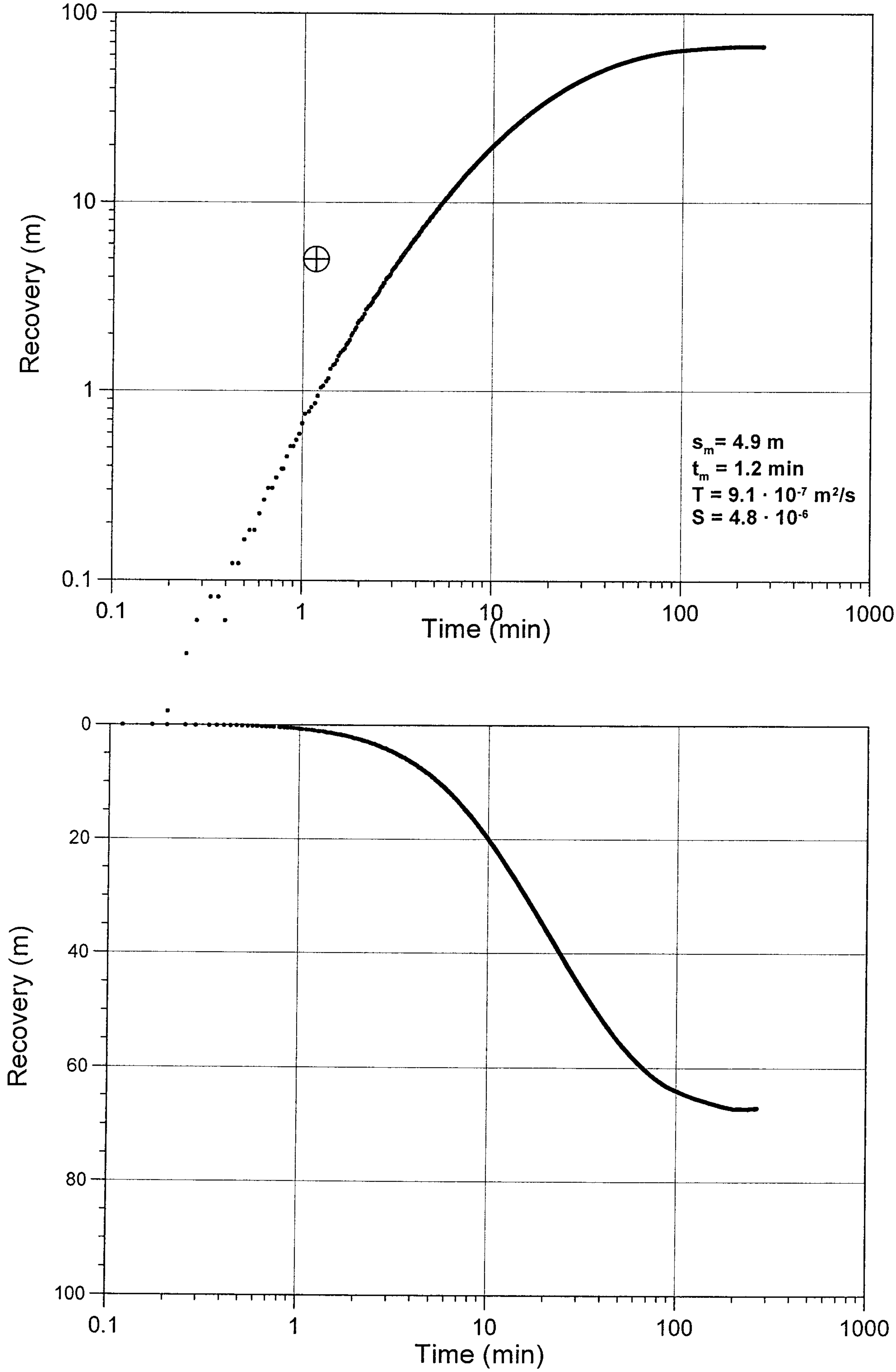
11_KA3542G1_2.GRF 25-okt-99



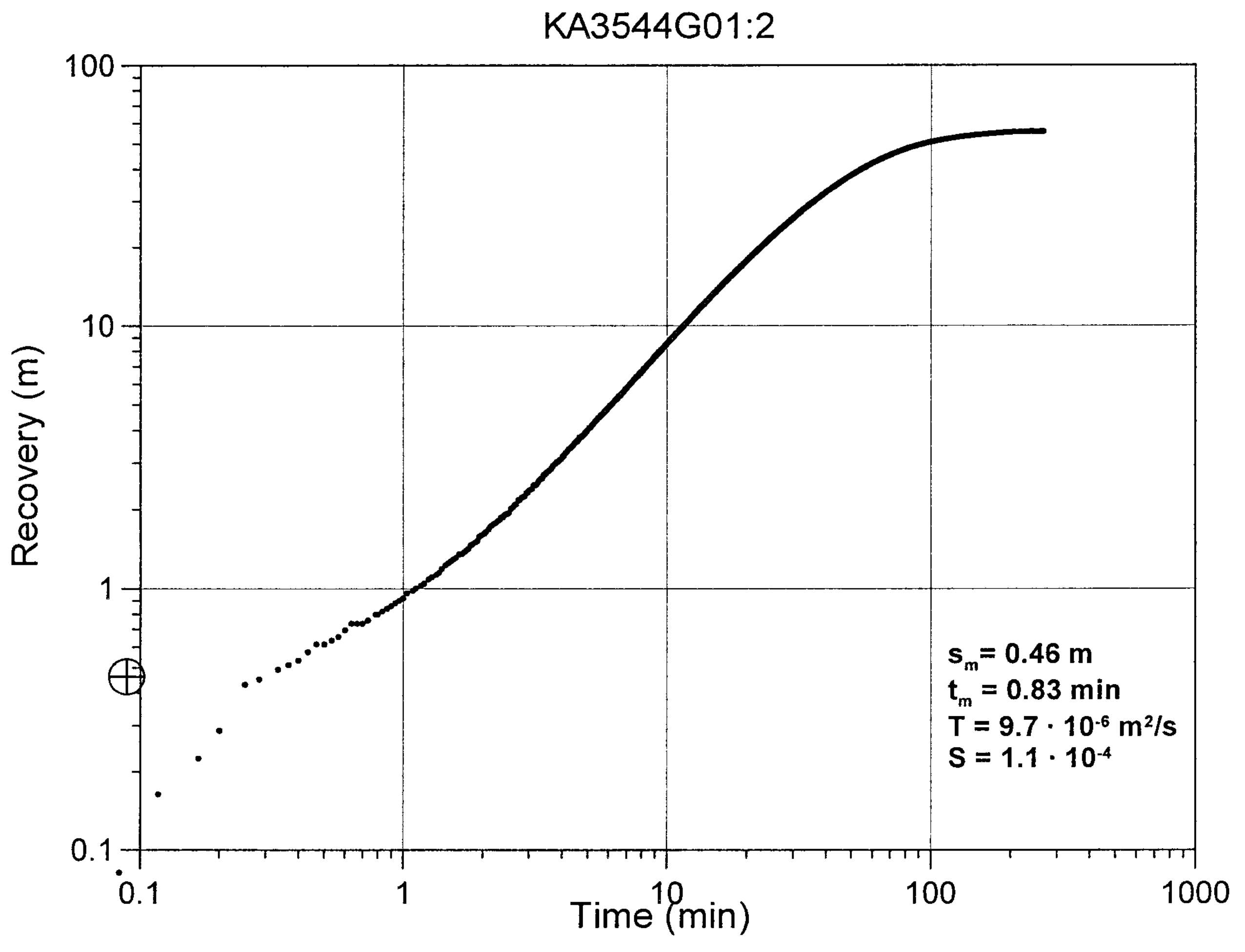


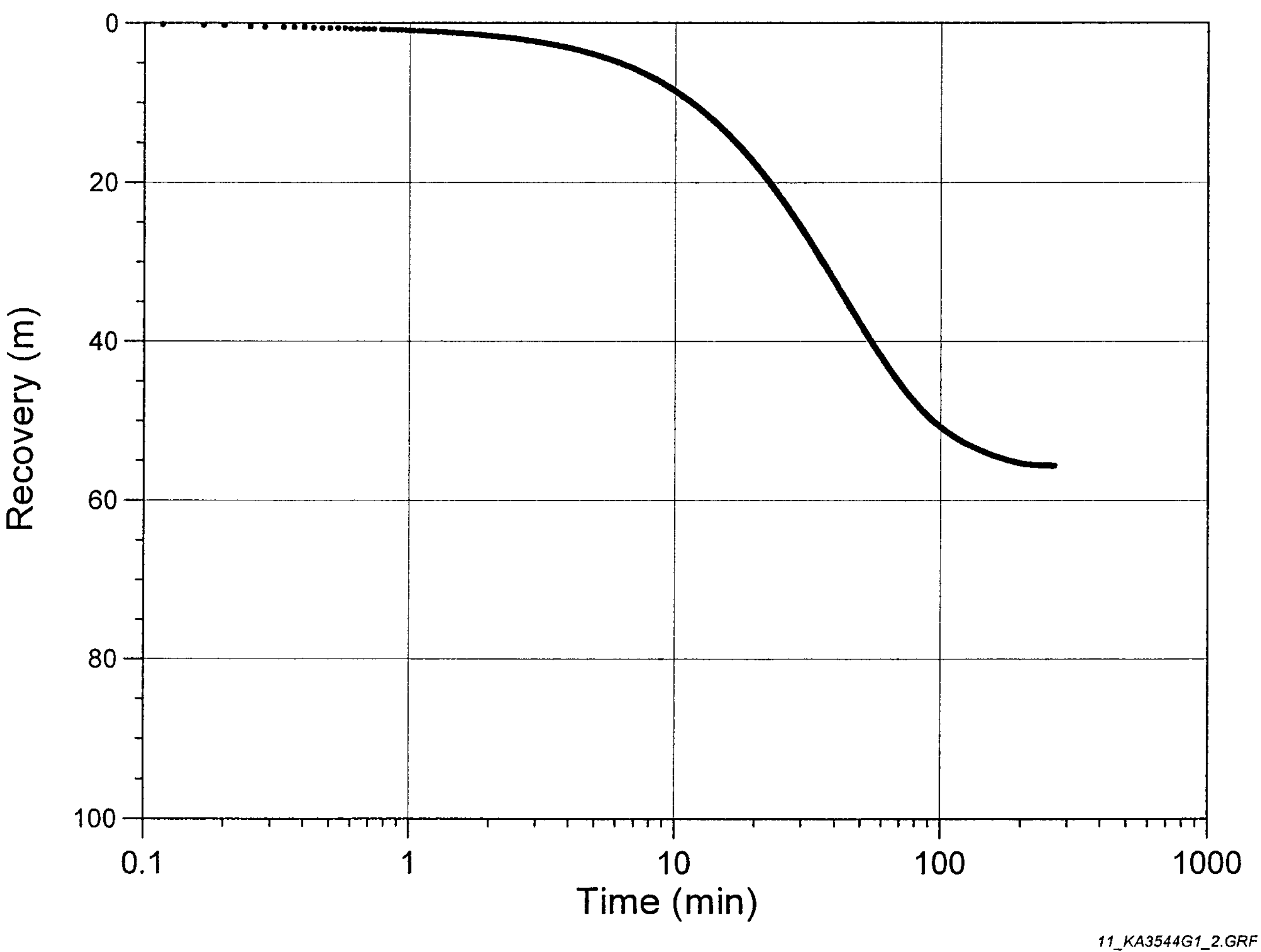
11_KA3542G1_3.GRF 25-okt-99

KA3544G01:1

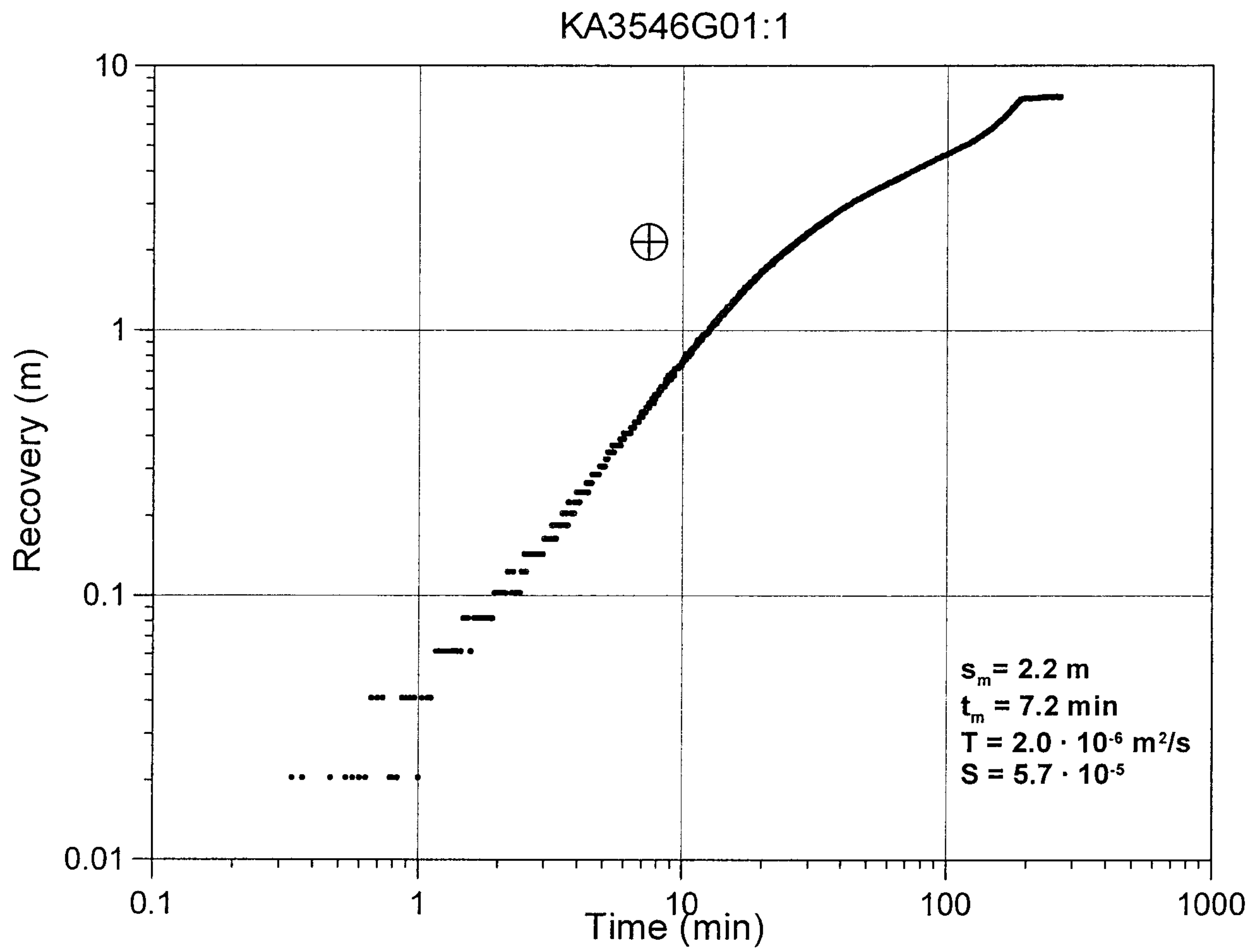


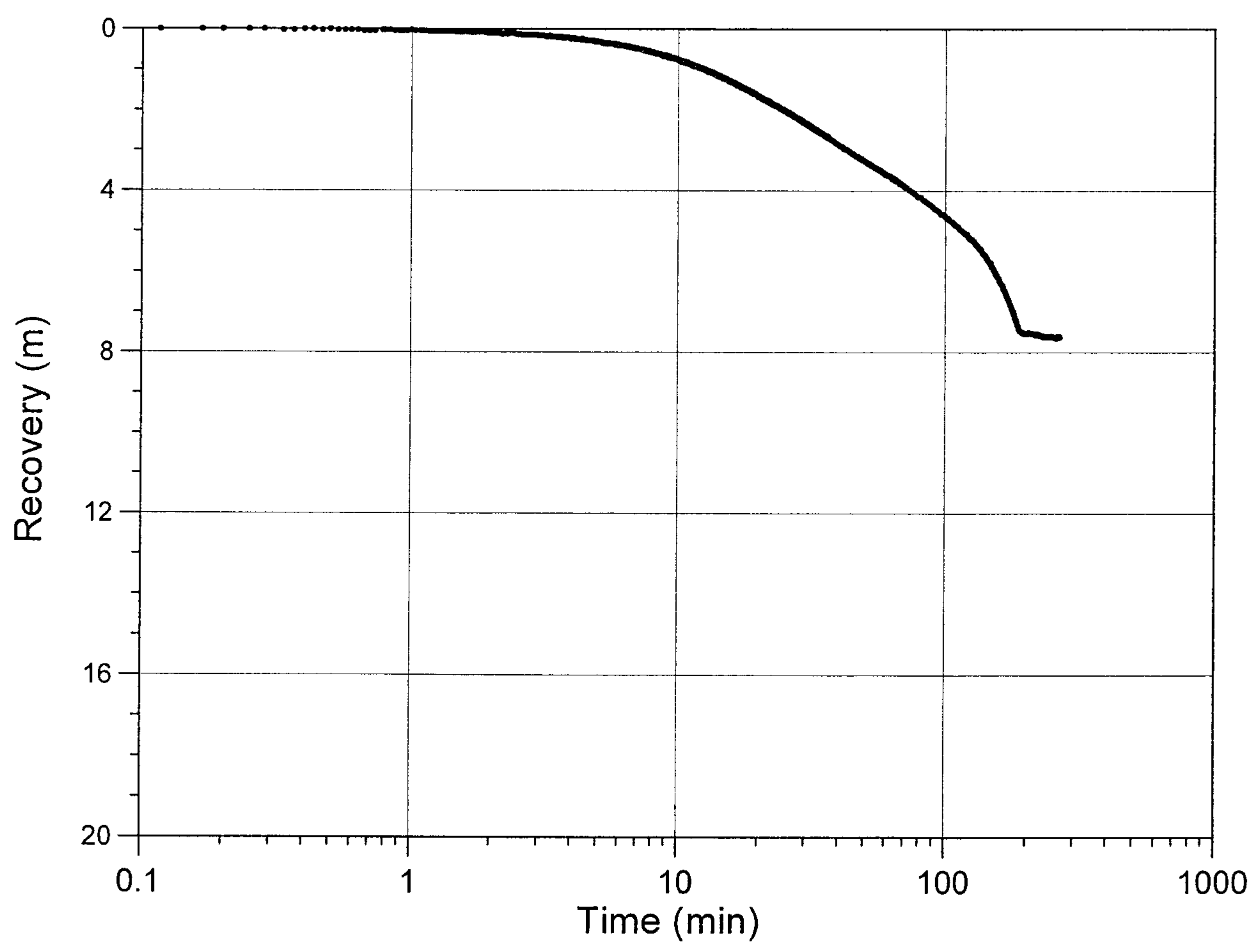
11_KA3544G1_1.GRF 25-okt-99



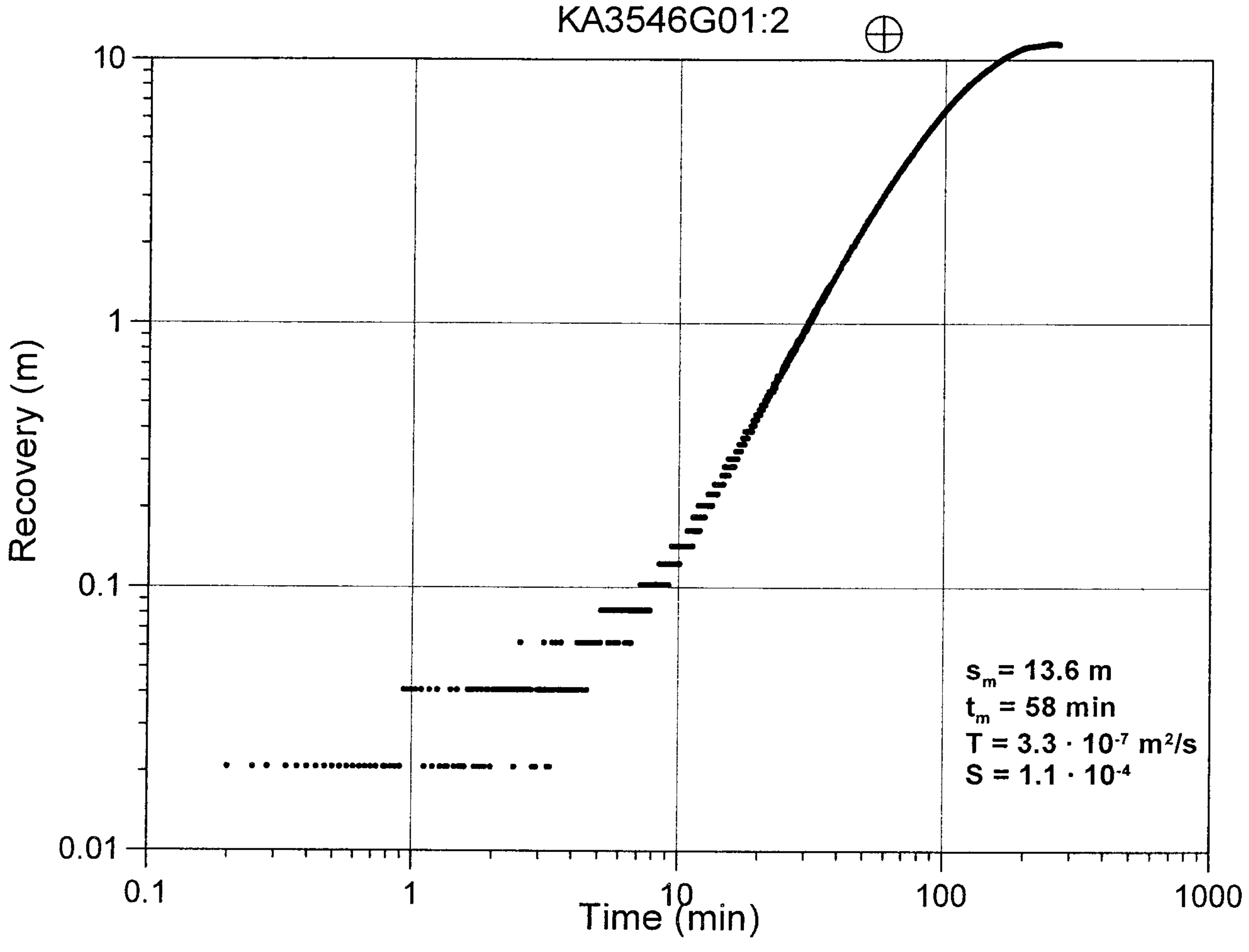


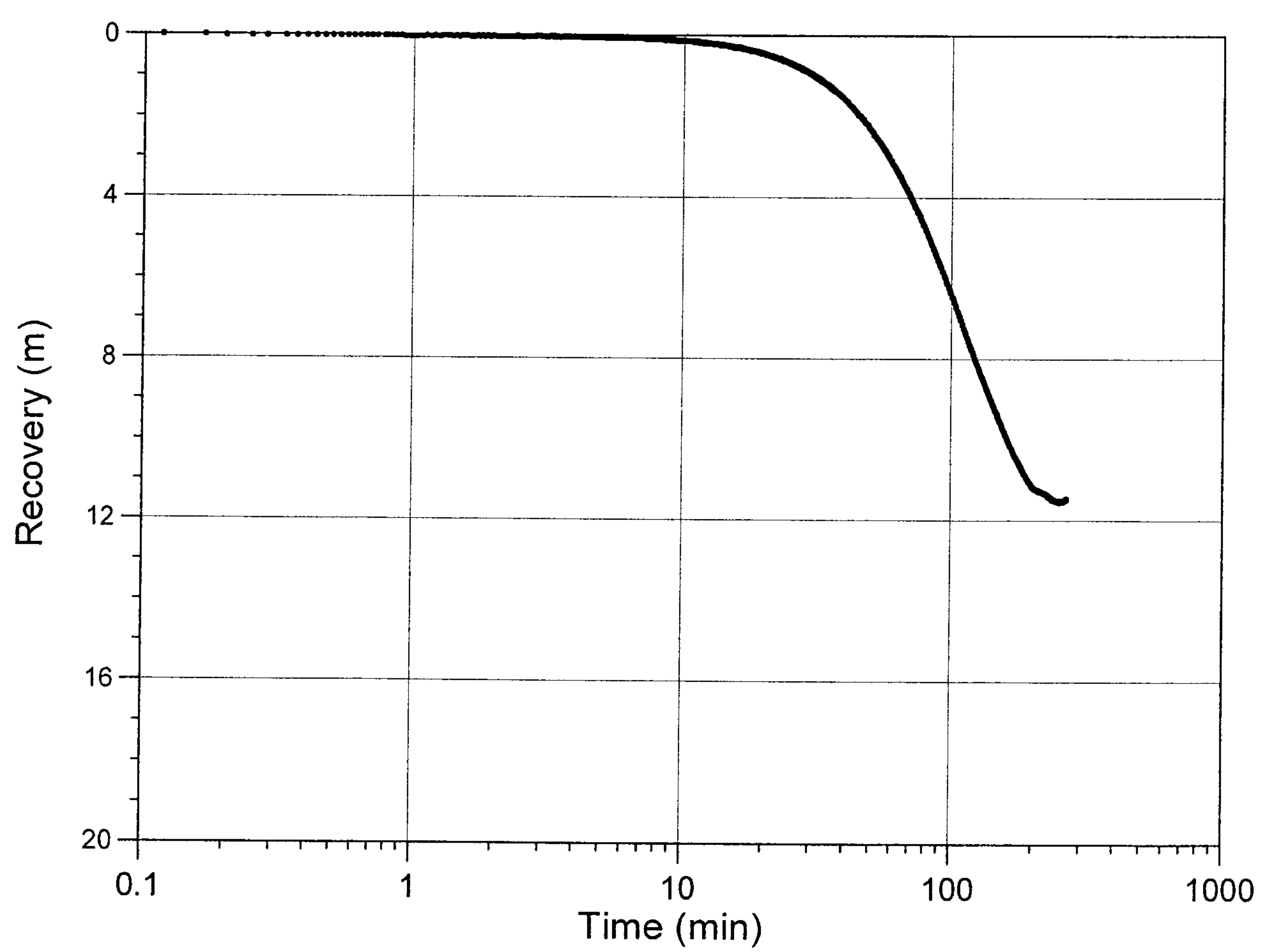
11_KA3544G1_2.GRF 25-okt-99



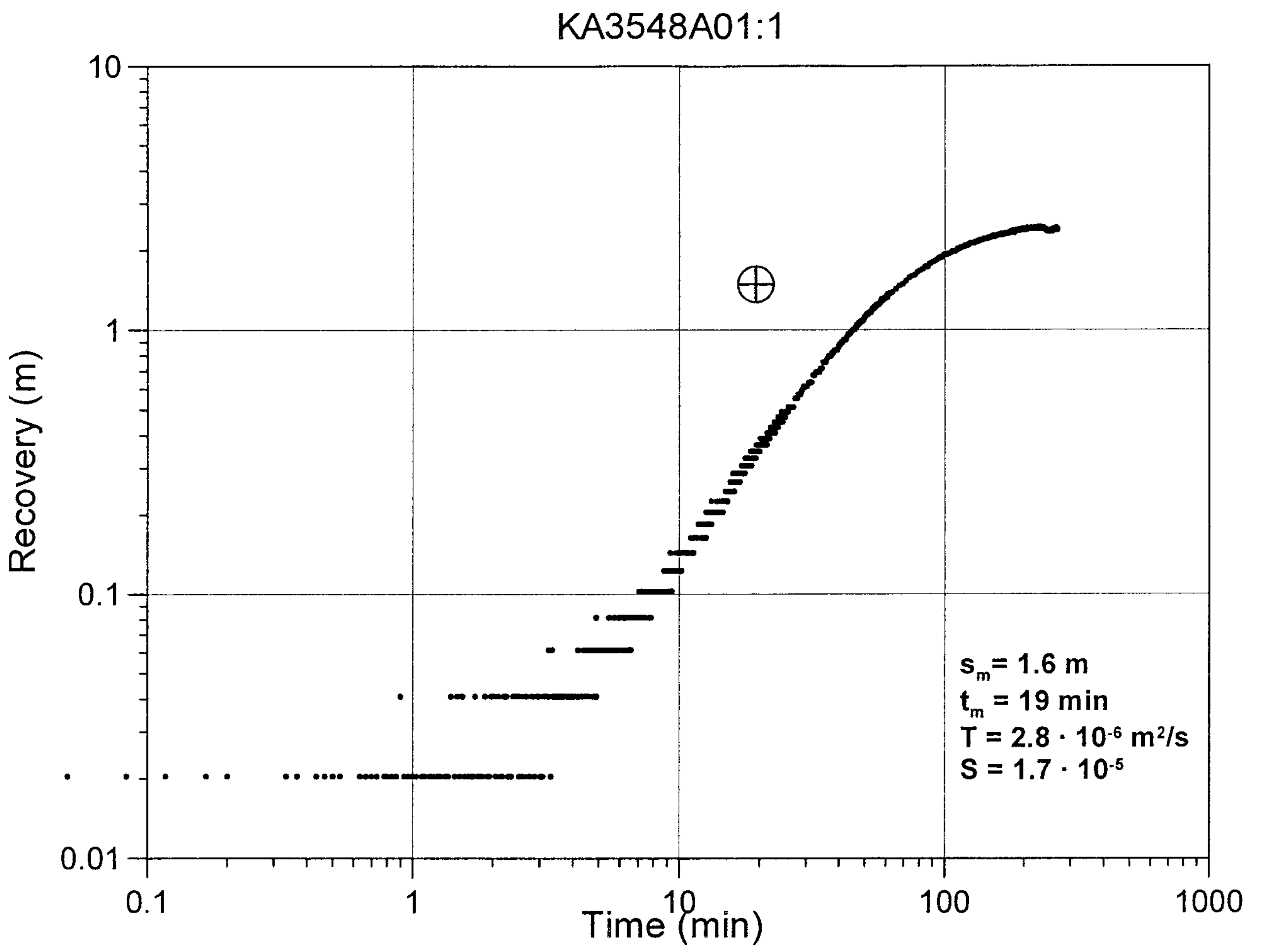


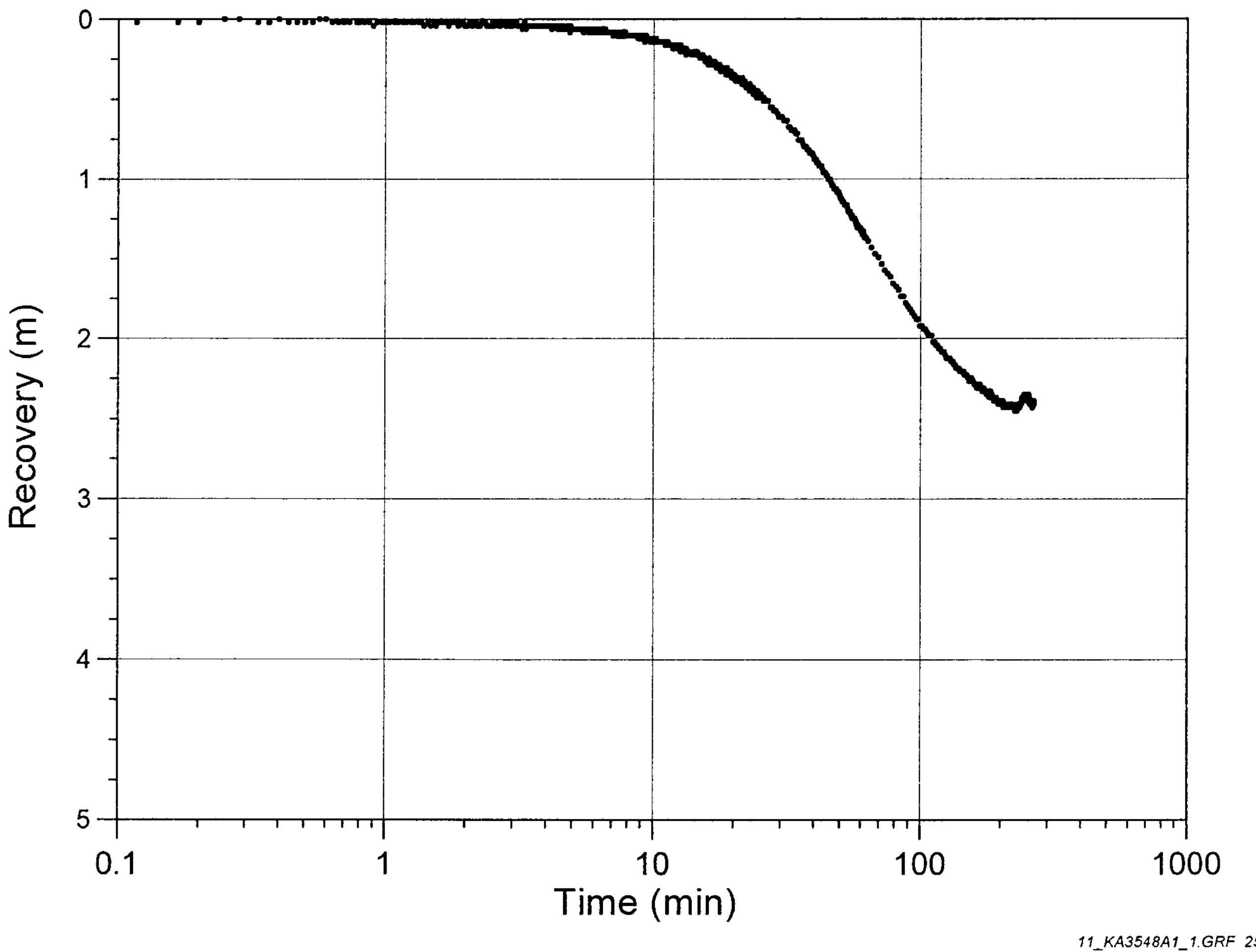
11_KA3546G1_1.GRF 25-okt-99





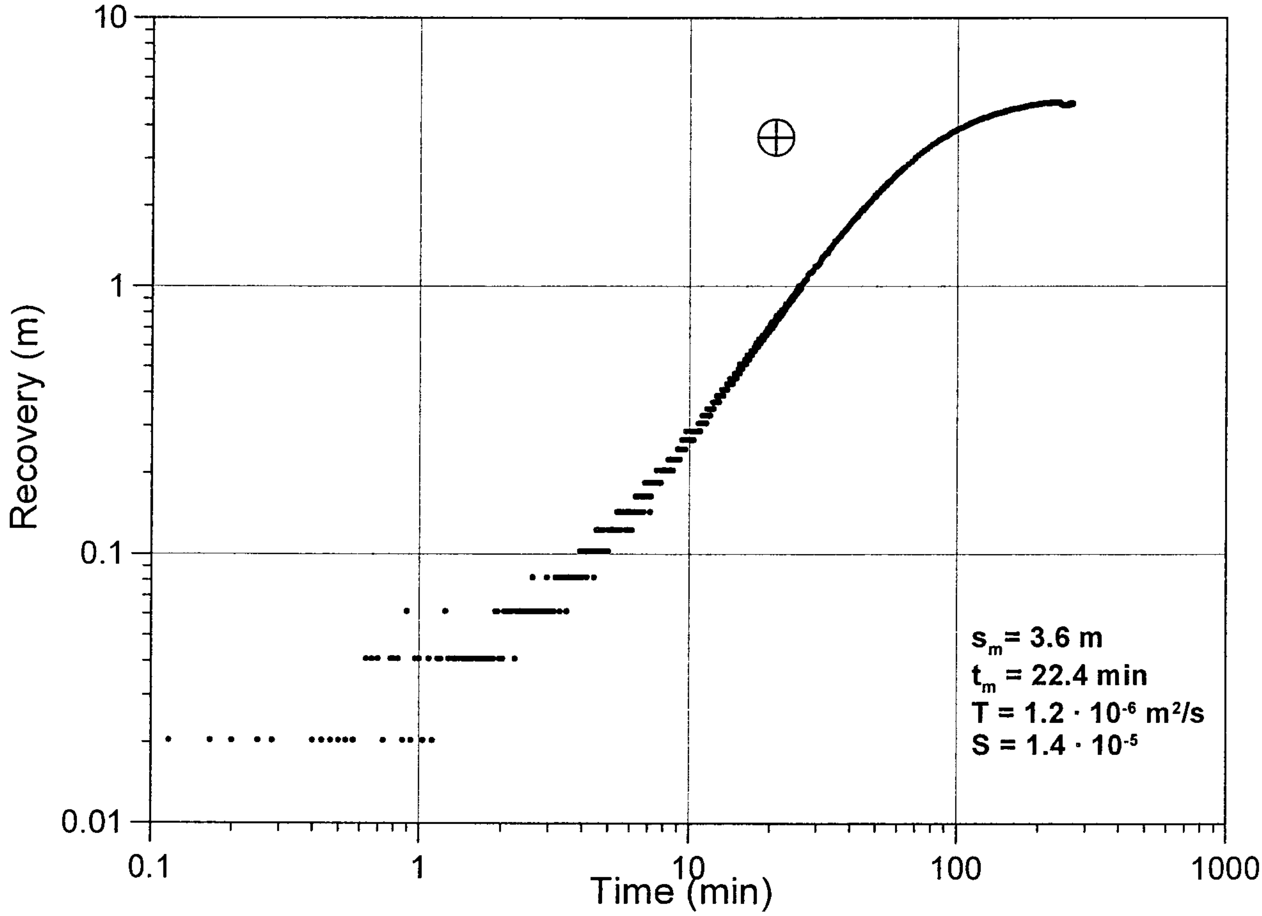
11_KA3546G1_2.GRF 25-okt-99

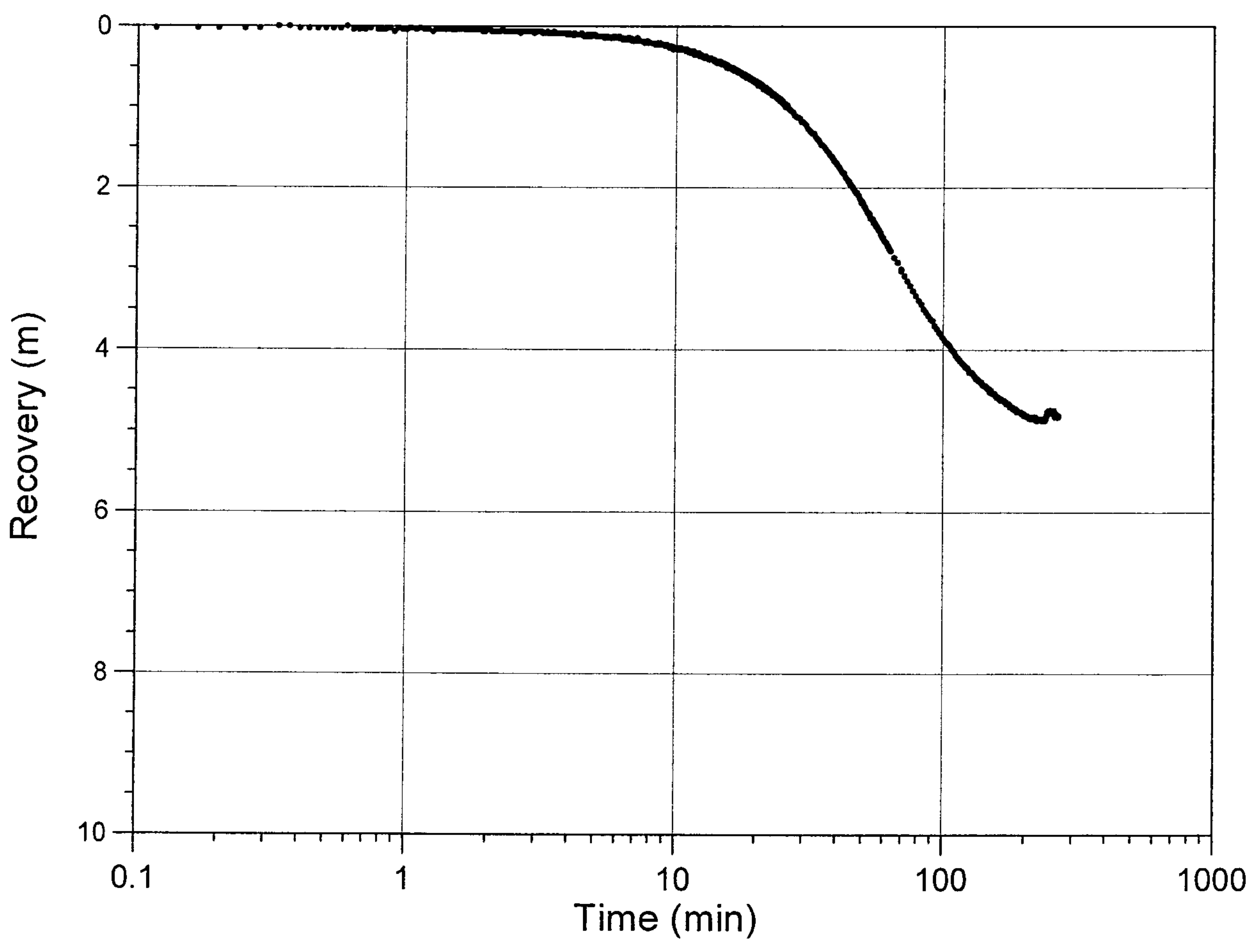




11_KA3548A1_1.GRF 25-okt-99

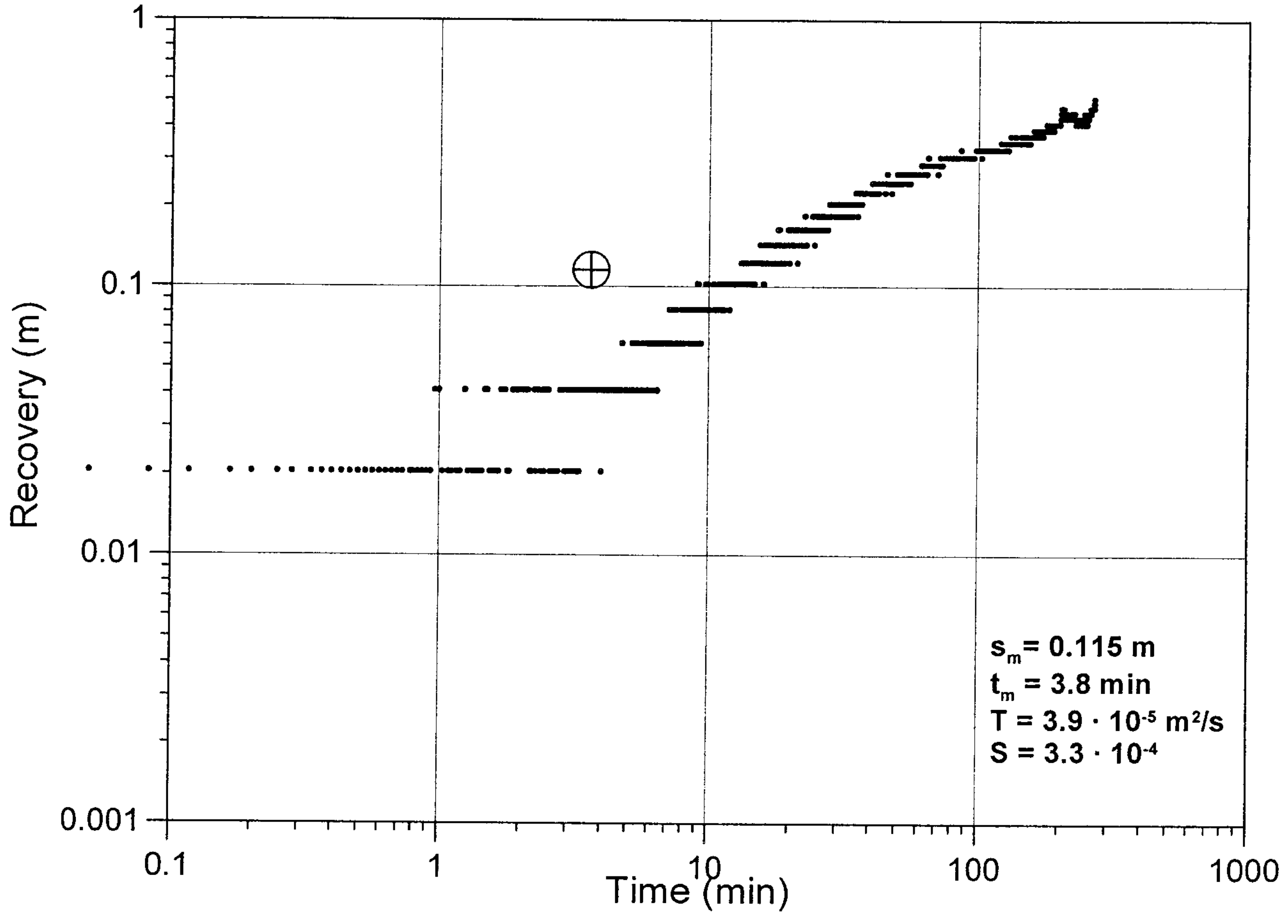
KA3548A01:2

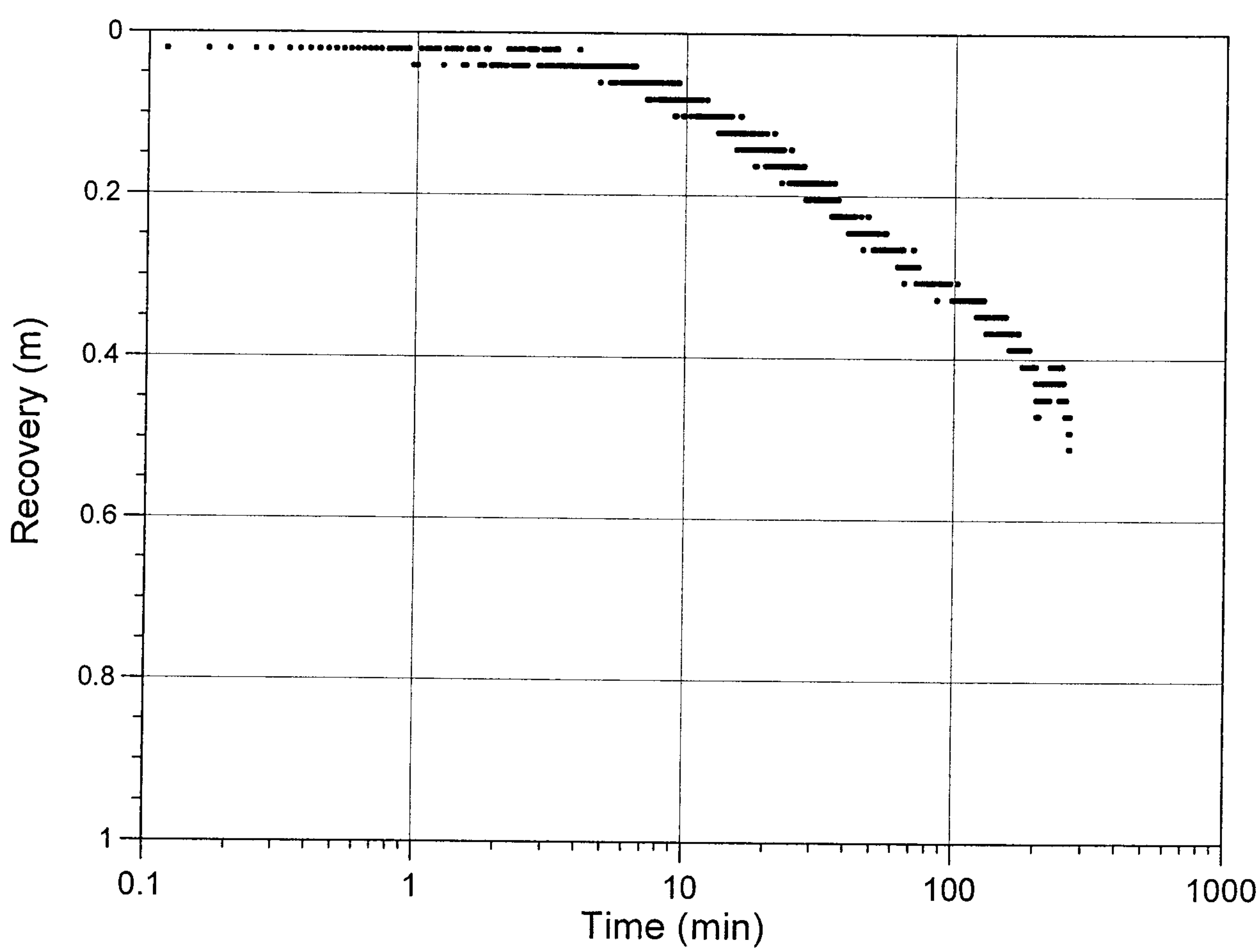




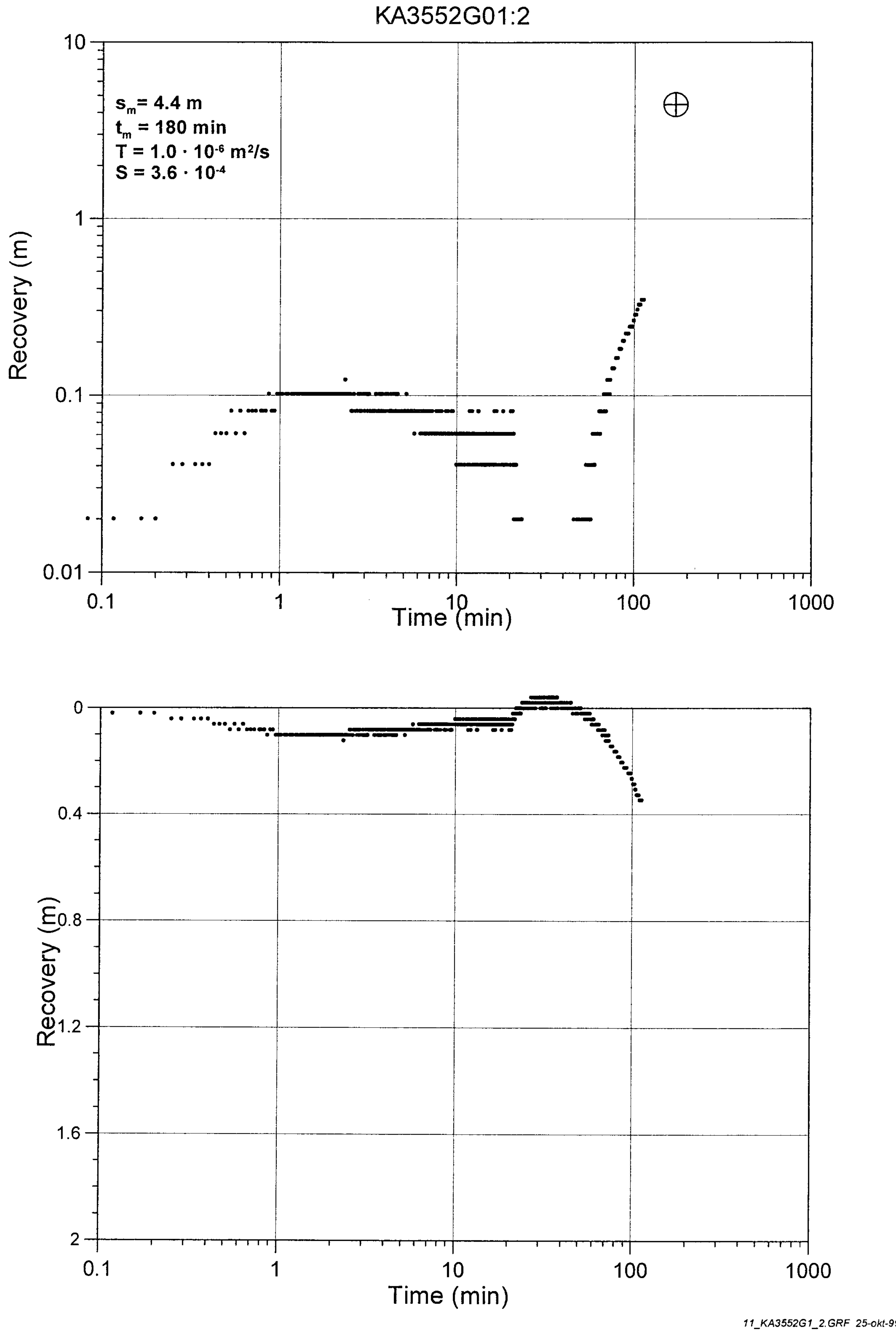
11_KA3548A1_2.GRF 25-okt-99

KA3550G01:1

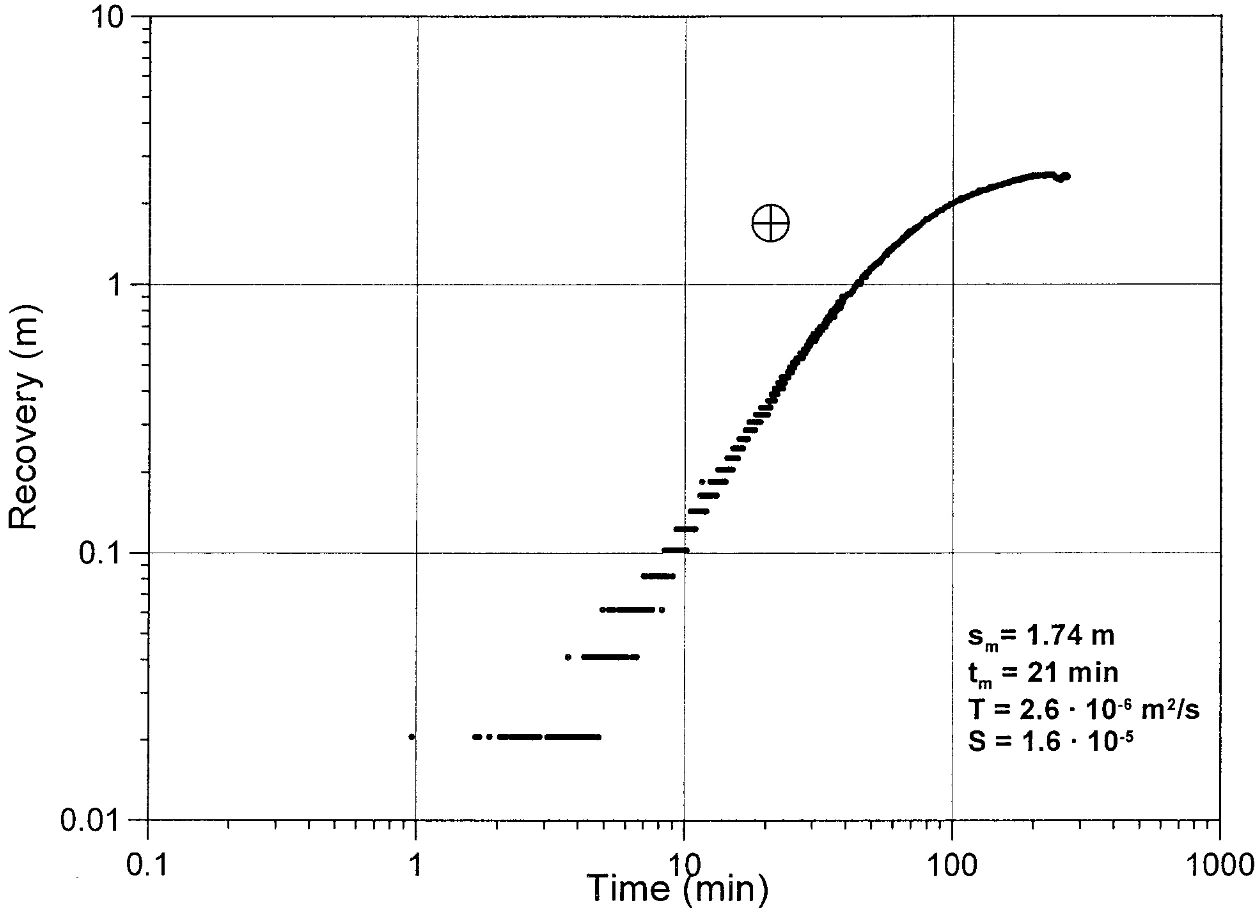


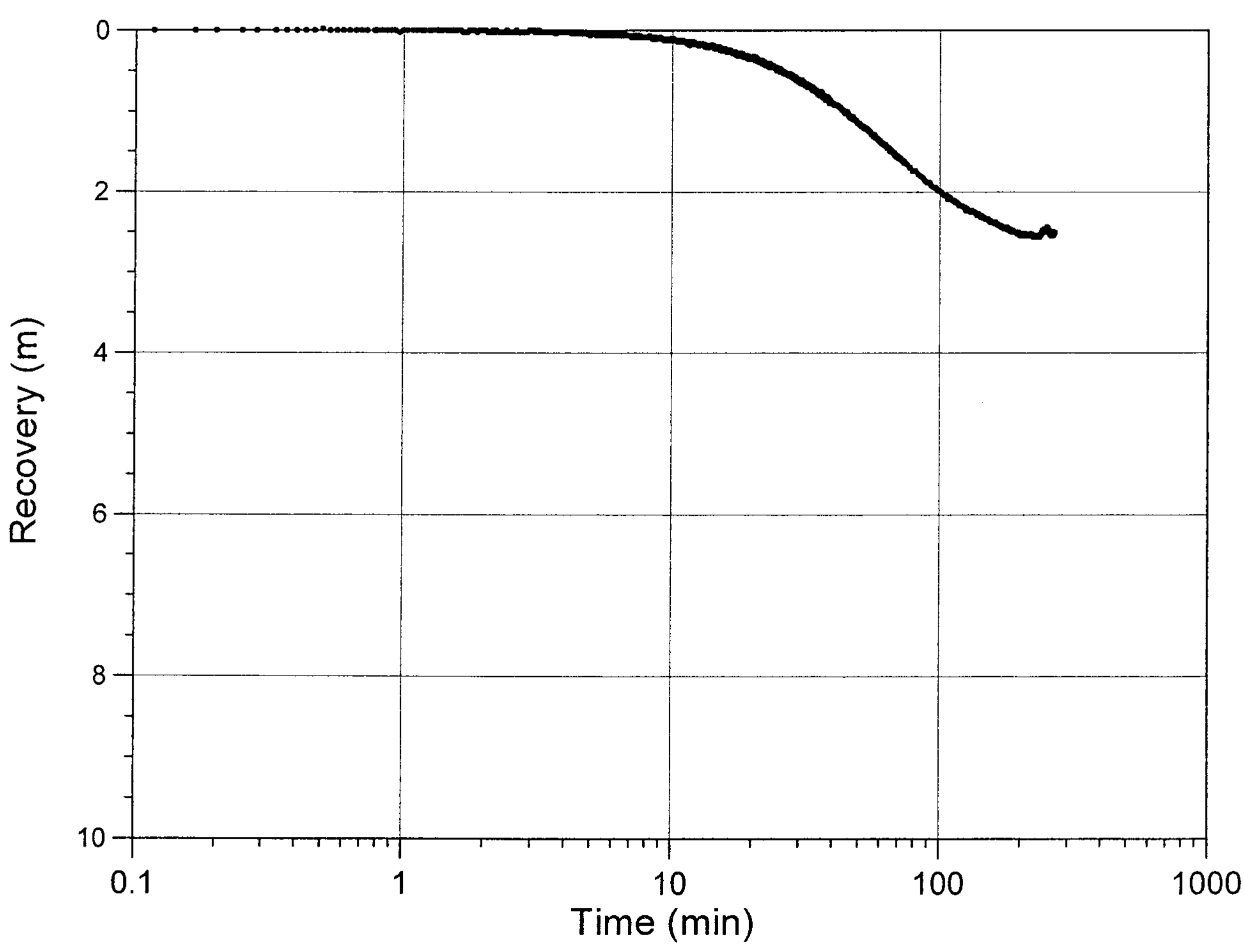


11_KA3550G1_1.GRF 25-okt-99

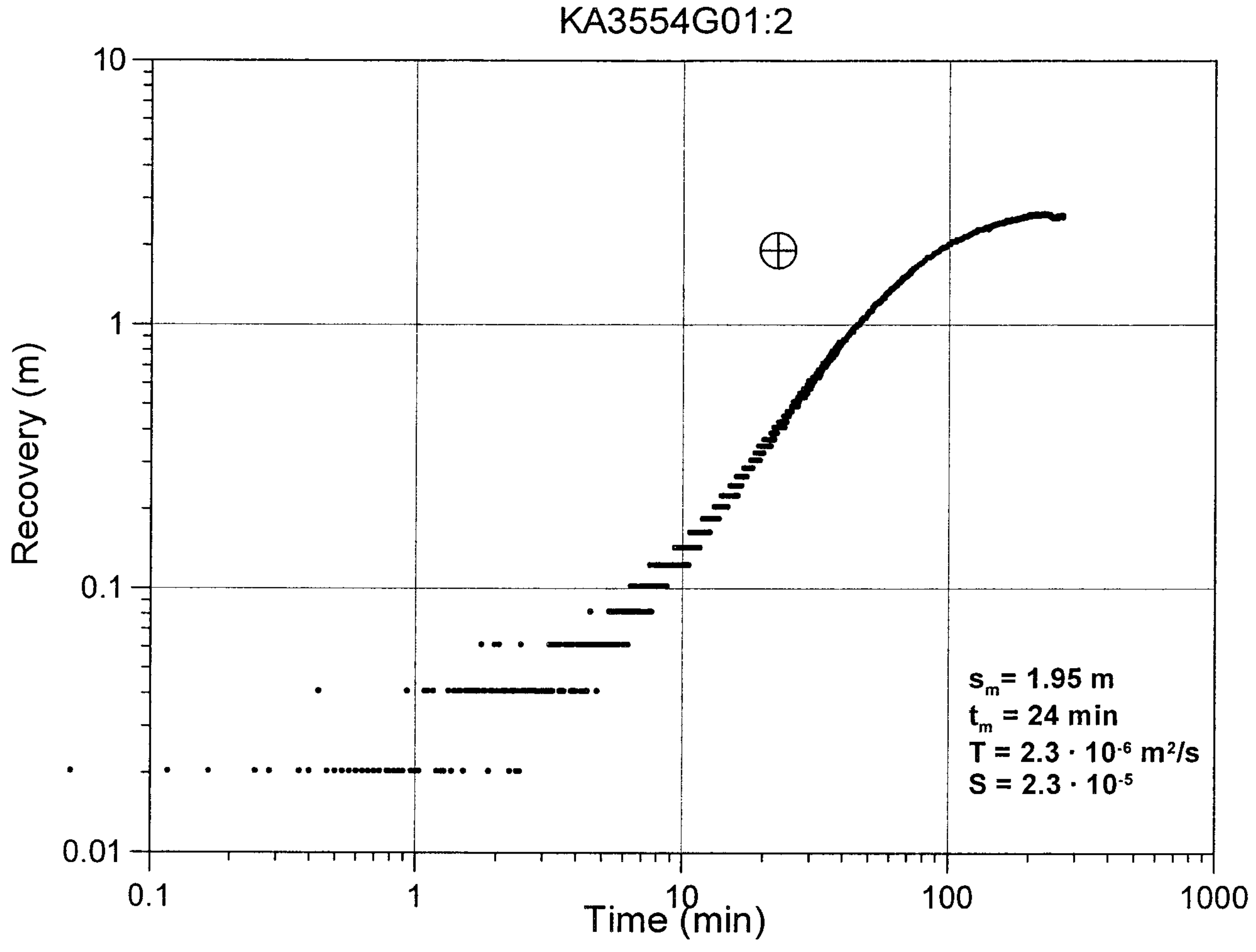

KA3552G01:2
s_m= 4.4 m
t_m = 180 min
T = 1.0 · 10^{-6} m^2/s
S = 3.6 · 10^{-4}
Recovery (m)
Time (min)
Recovery (m)
Time (min)
11_KA3552G1_2.GRF 25-okt-99

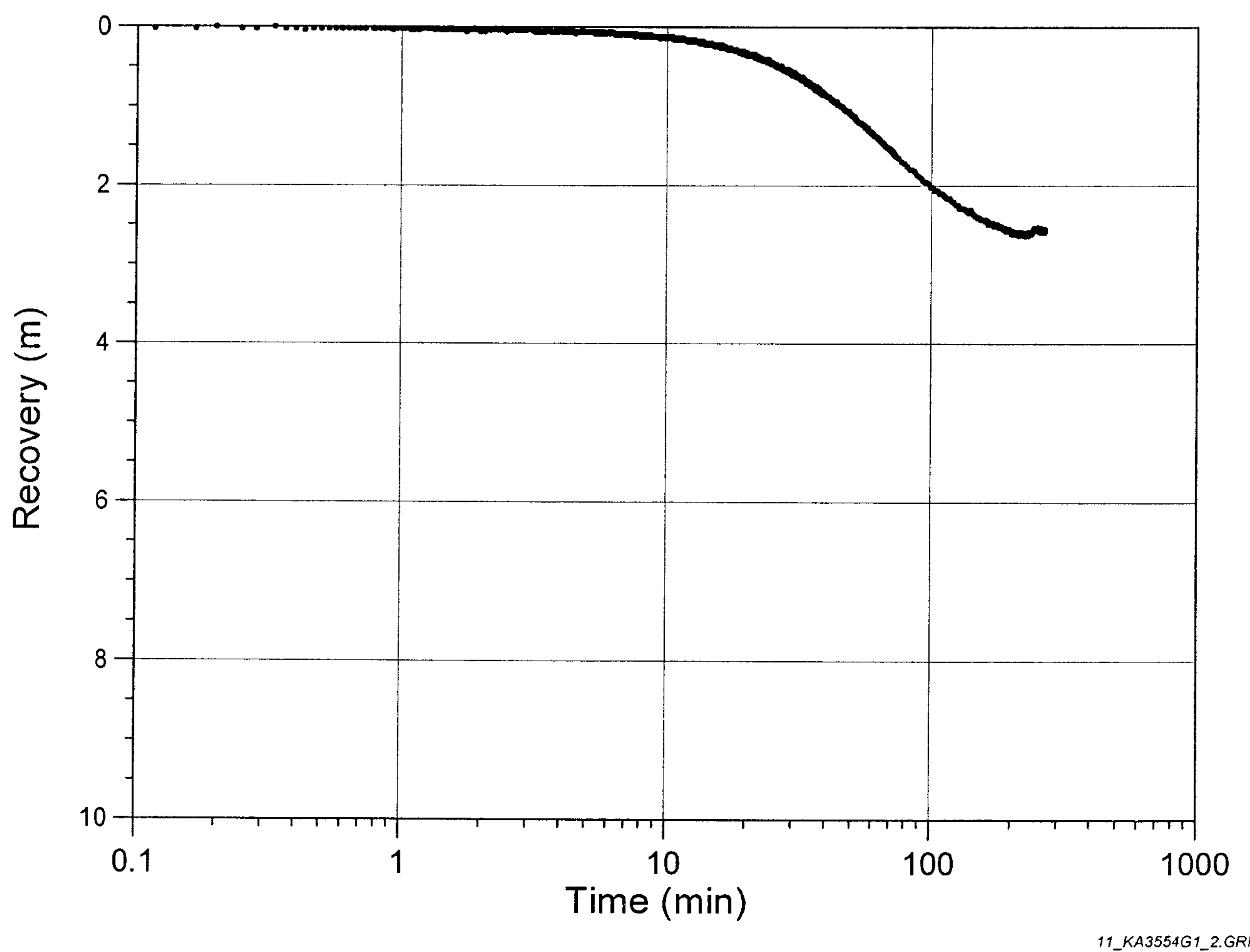
KA3554G01:1



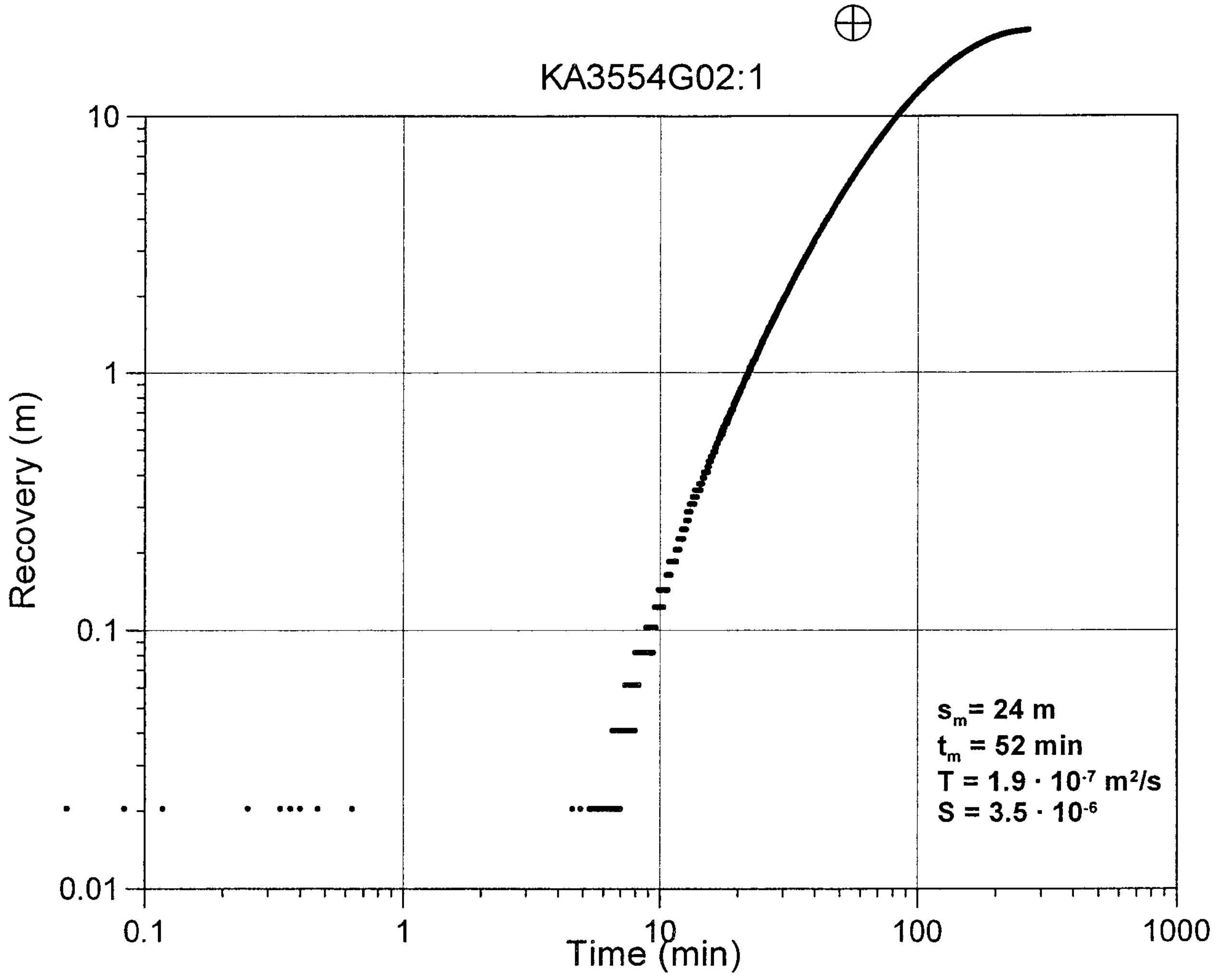


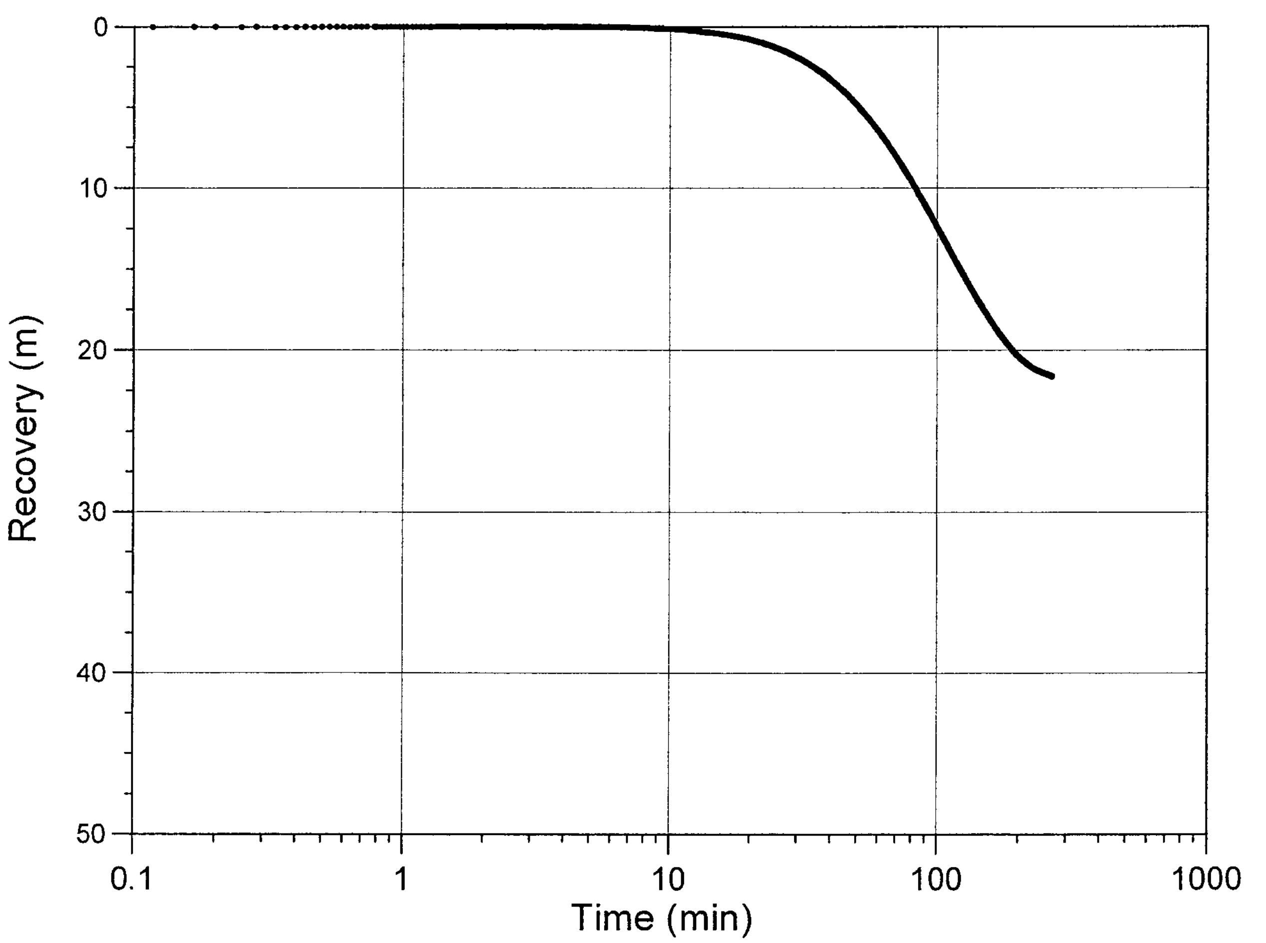
11_KA3554G1_1.GRF 25-okt-99





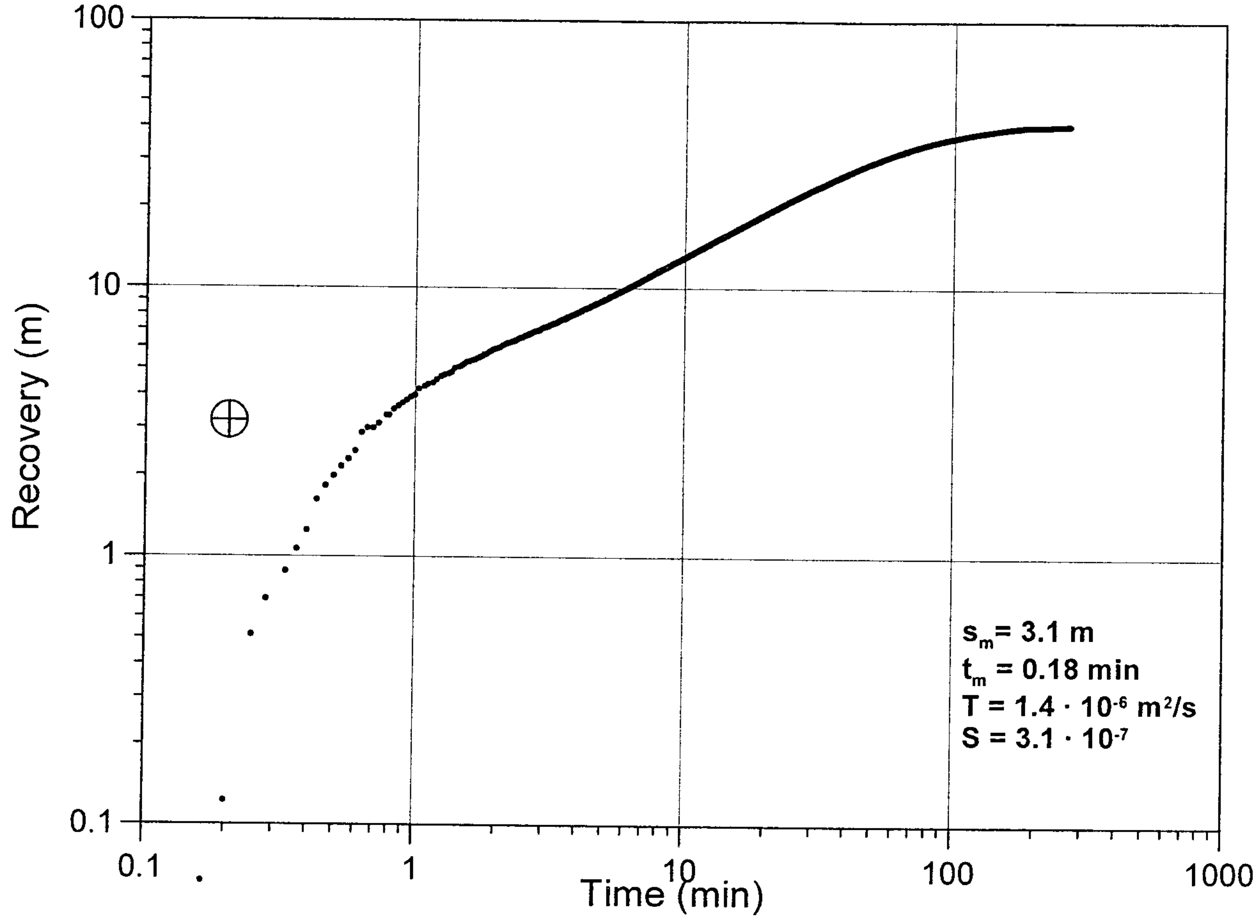
11_KA3554G1_2.GRF 25-okt-99

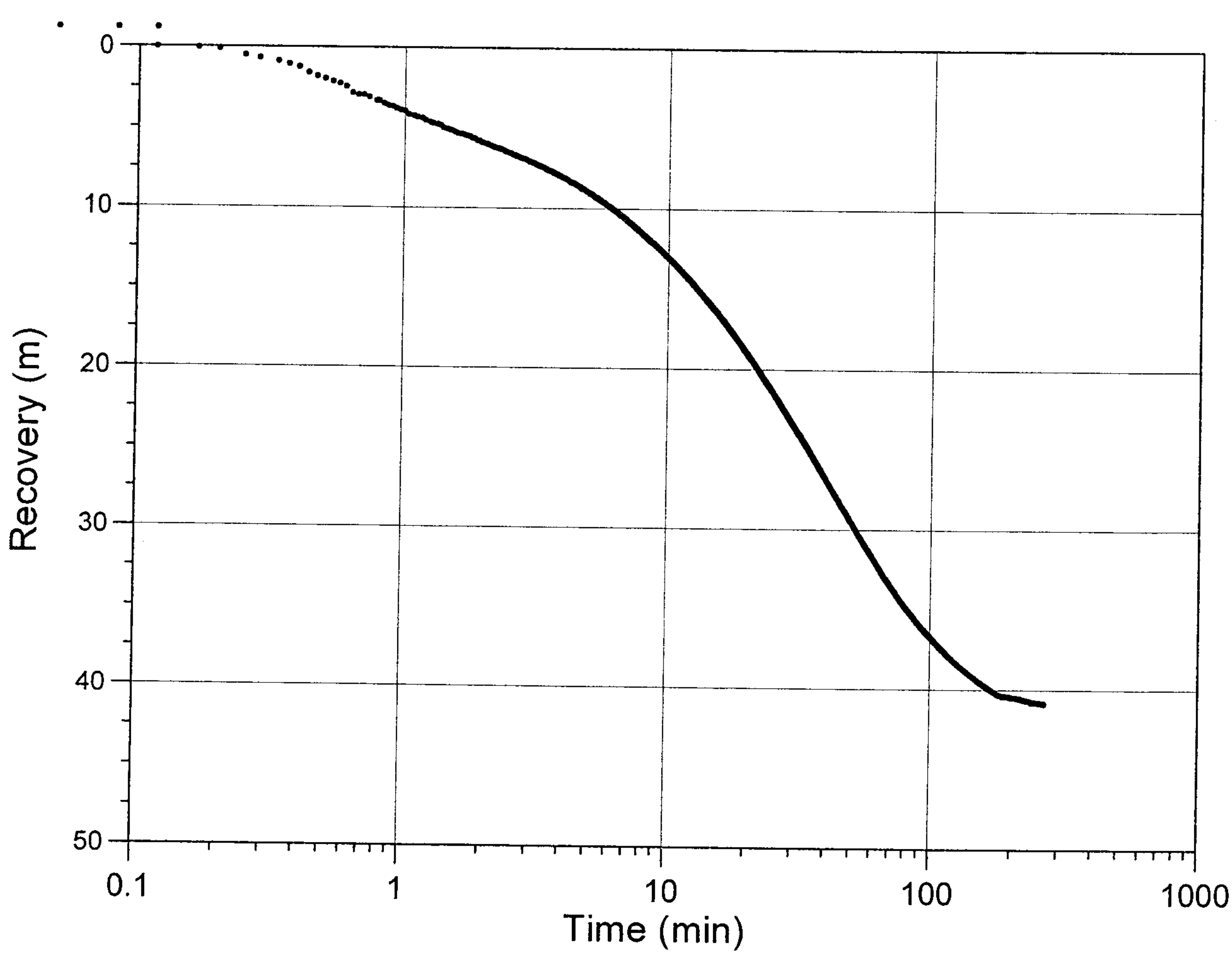




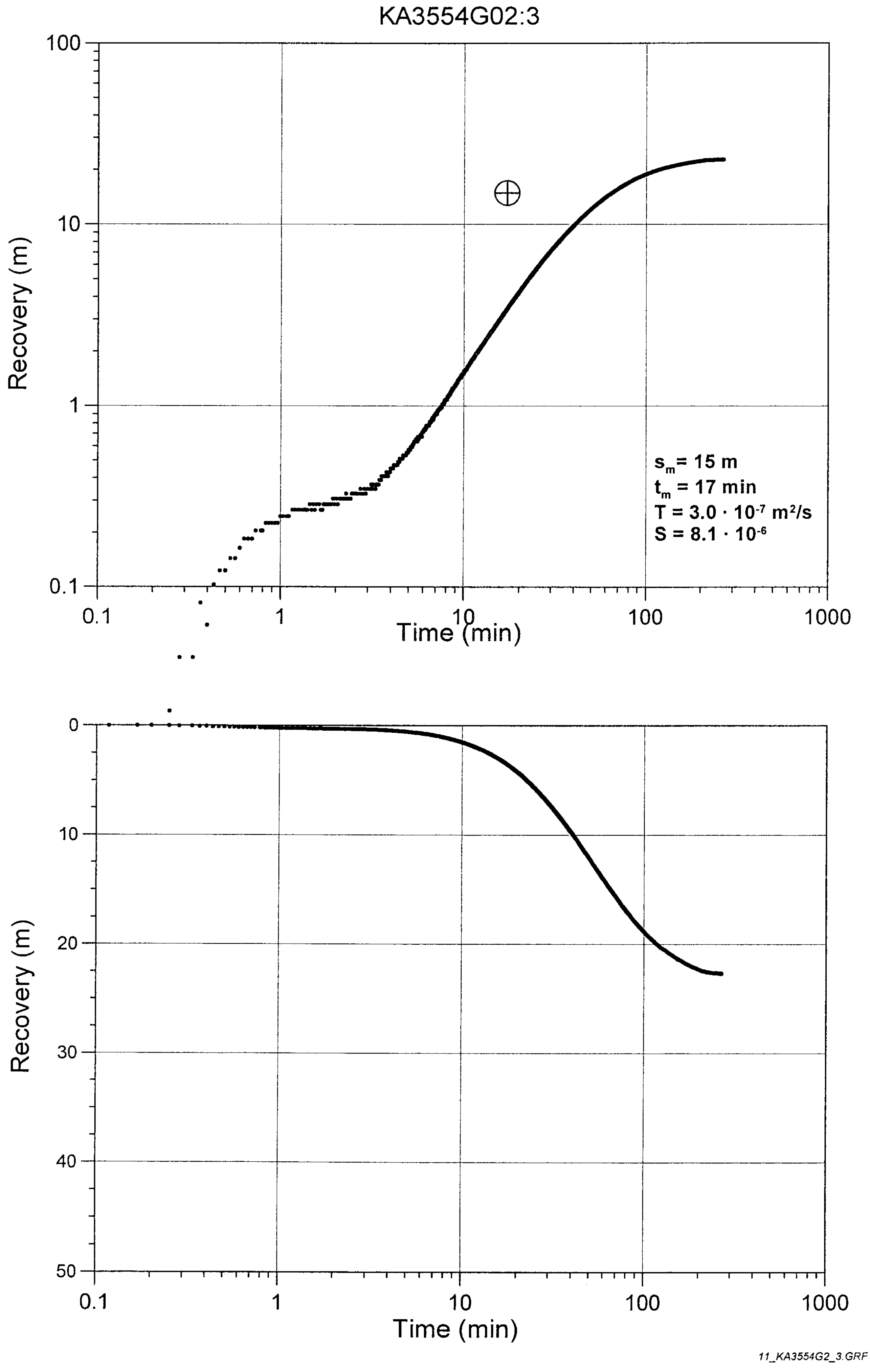
11_KA3554G2_1.GRF 25-okt-99

KA3554G02:2



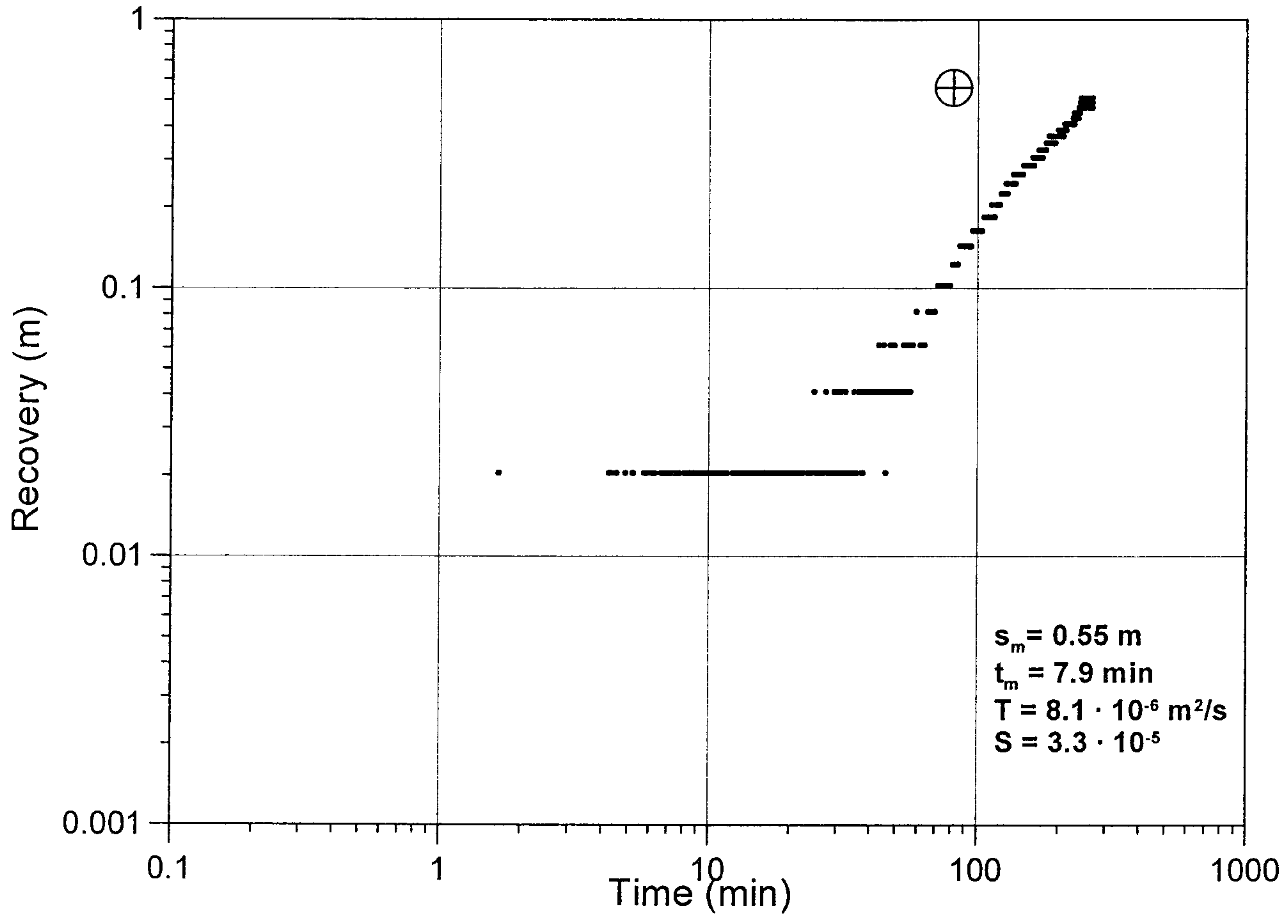


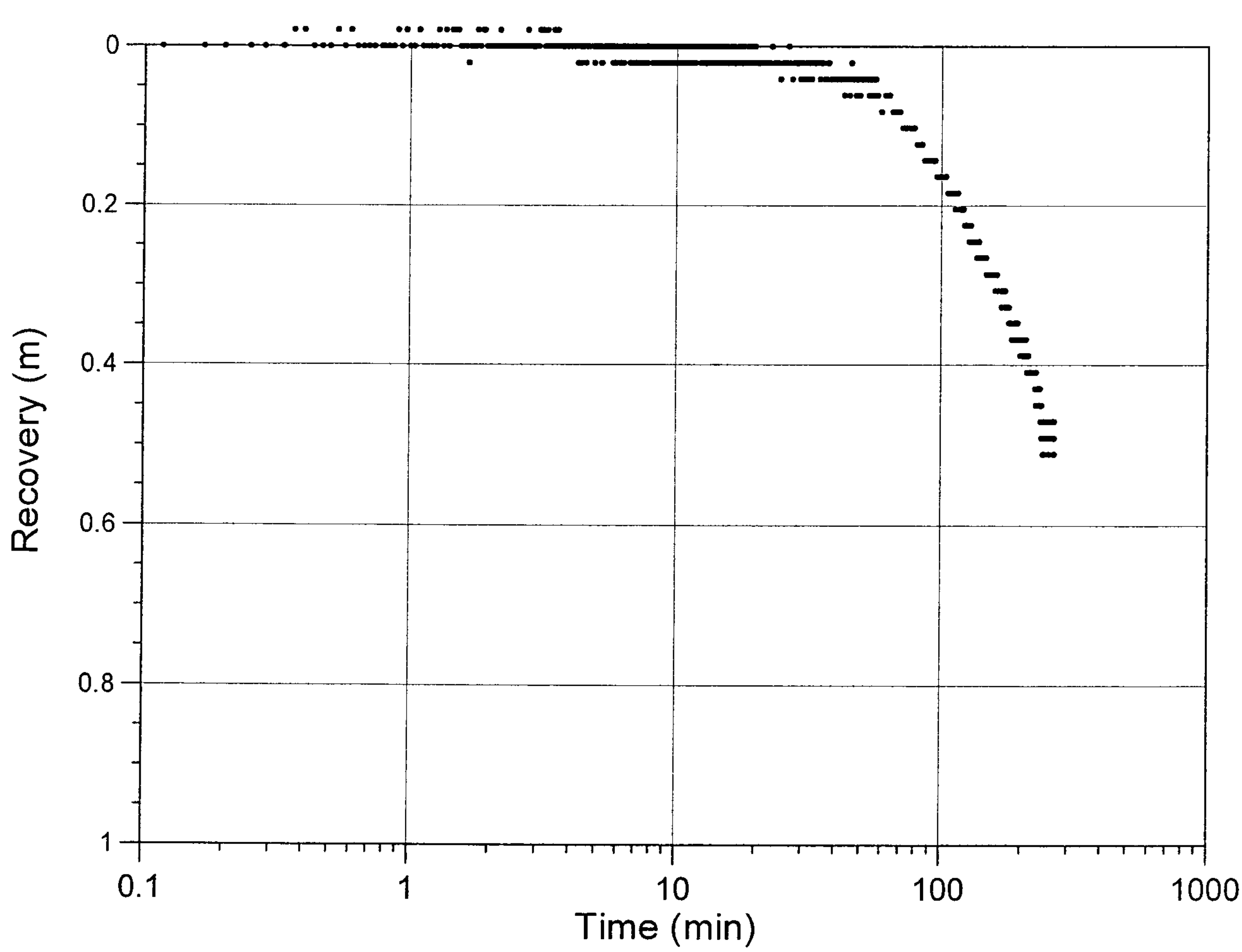
11_KA3554G2_2.GRF 25-okt-99



11_KA3554G2_3.GRF 25-okt-99

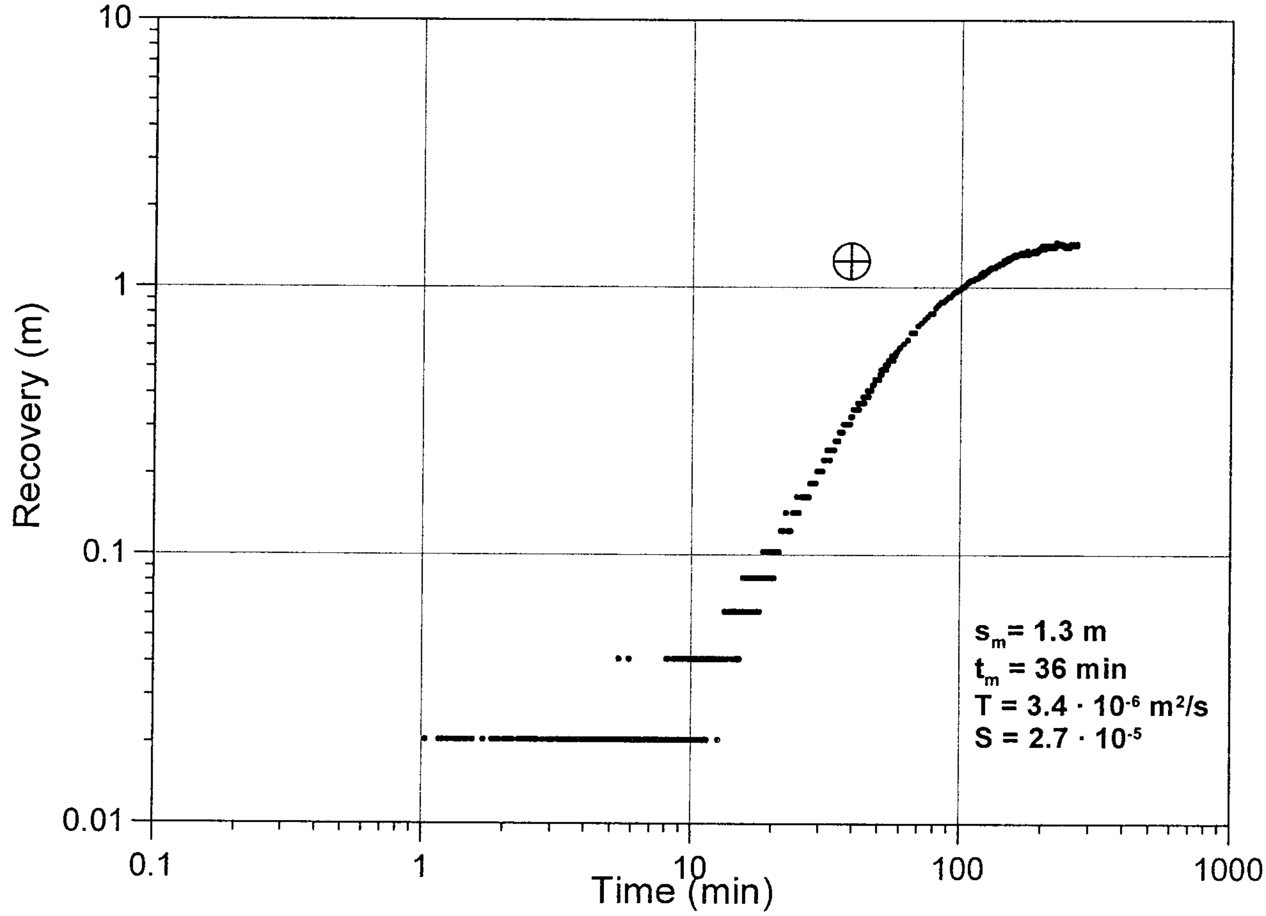
KA3563G01:1

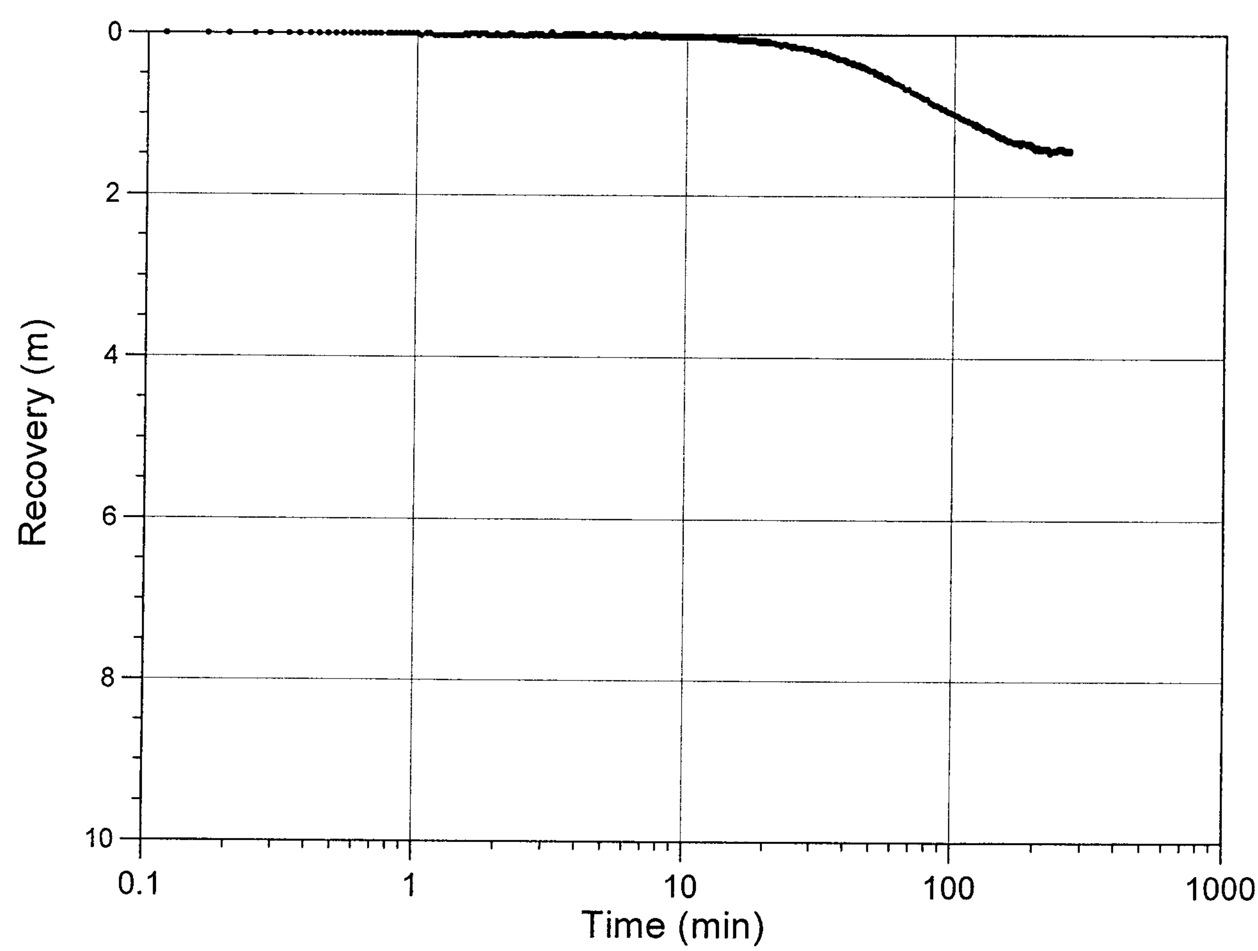




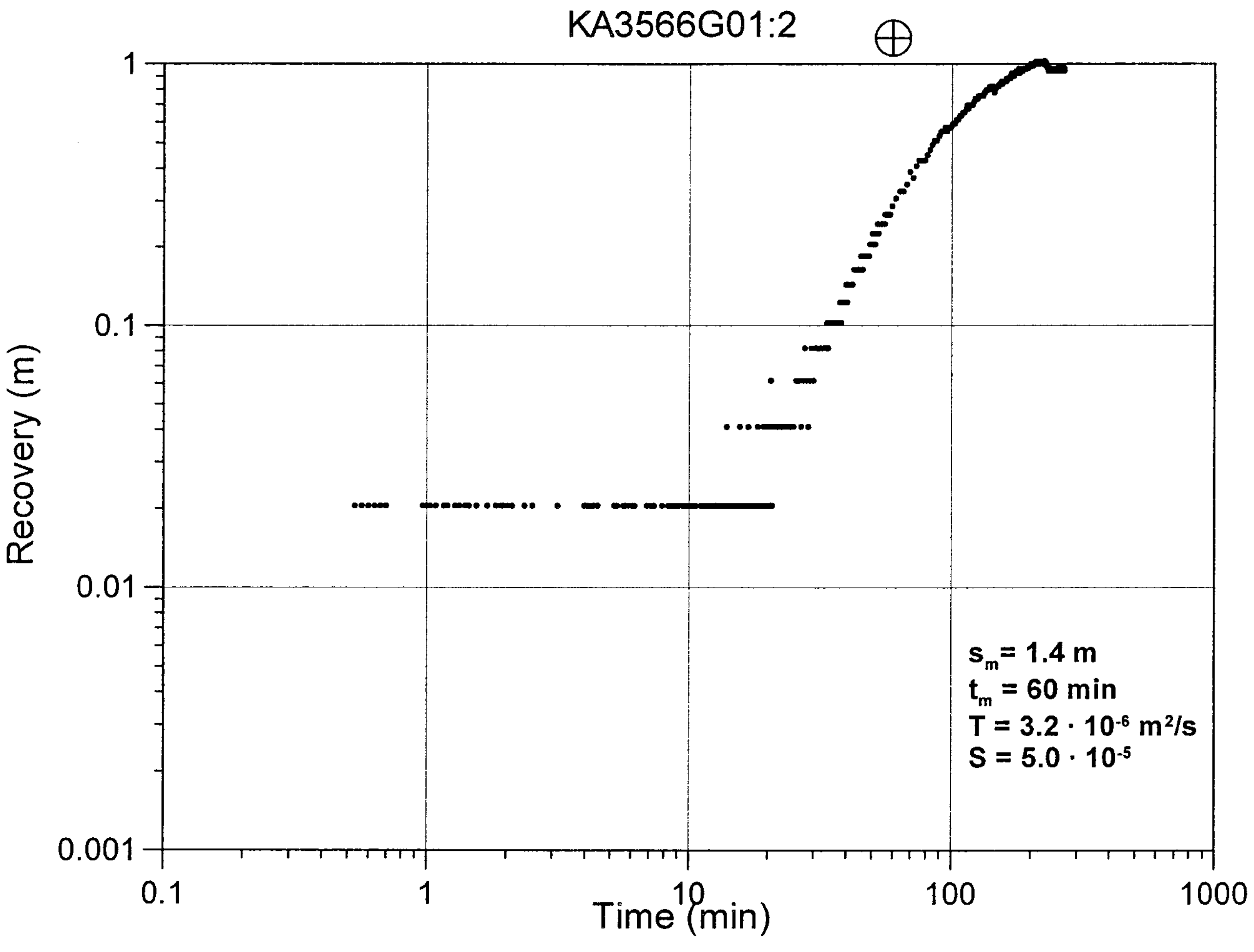
11_KA3563G1_1.GRF 25-okt-99

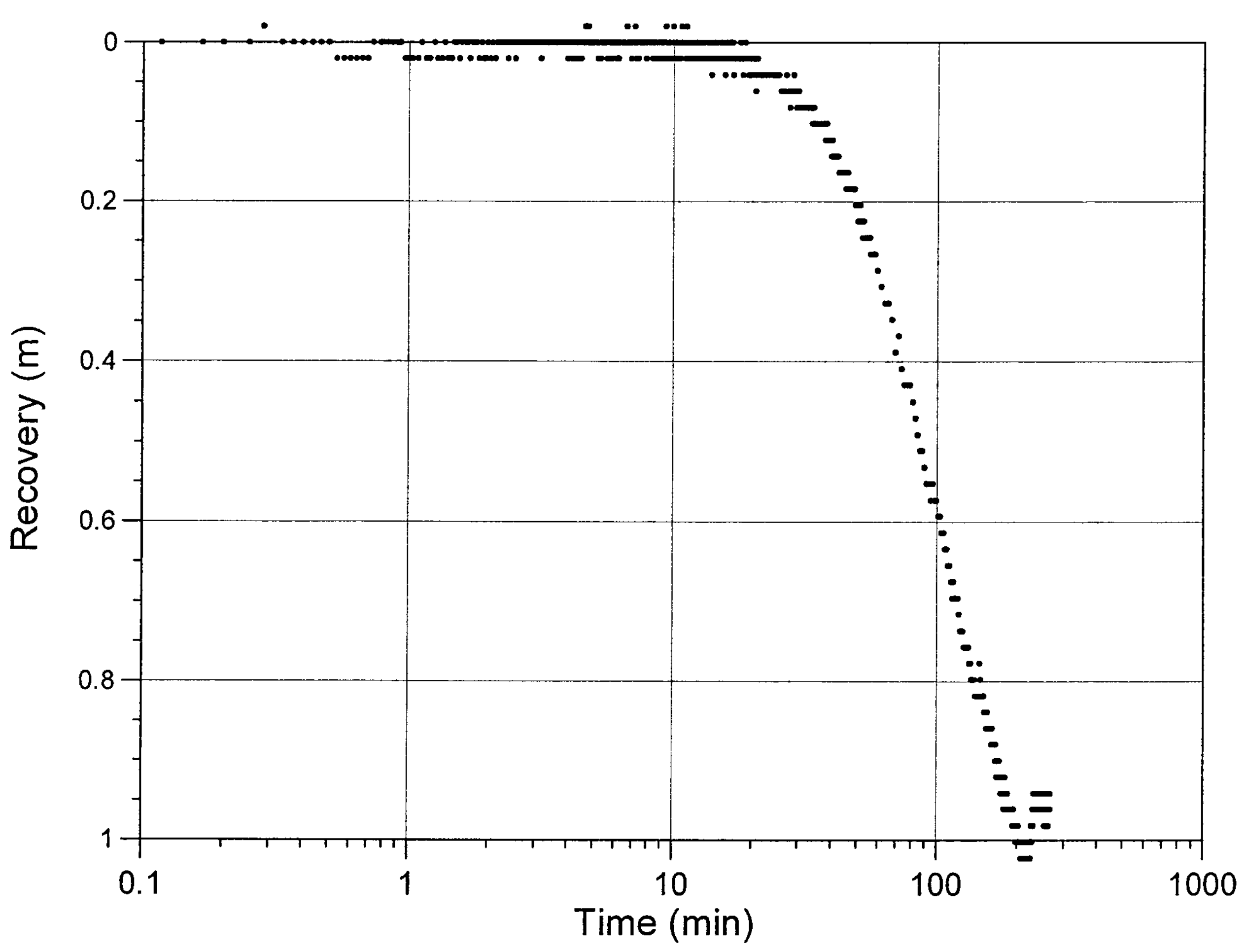
KA3566G01:1



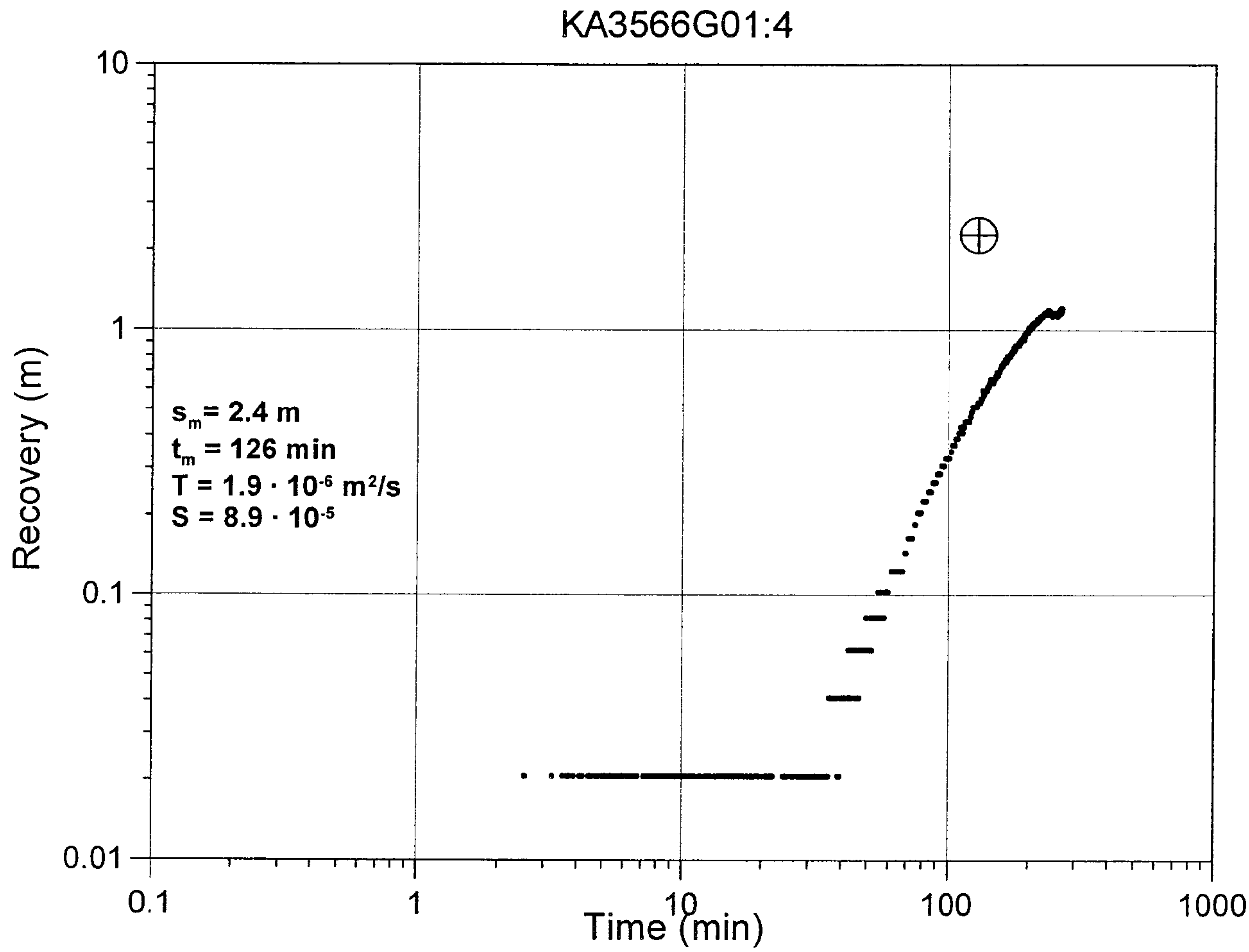


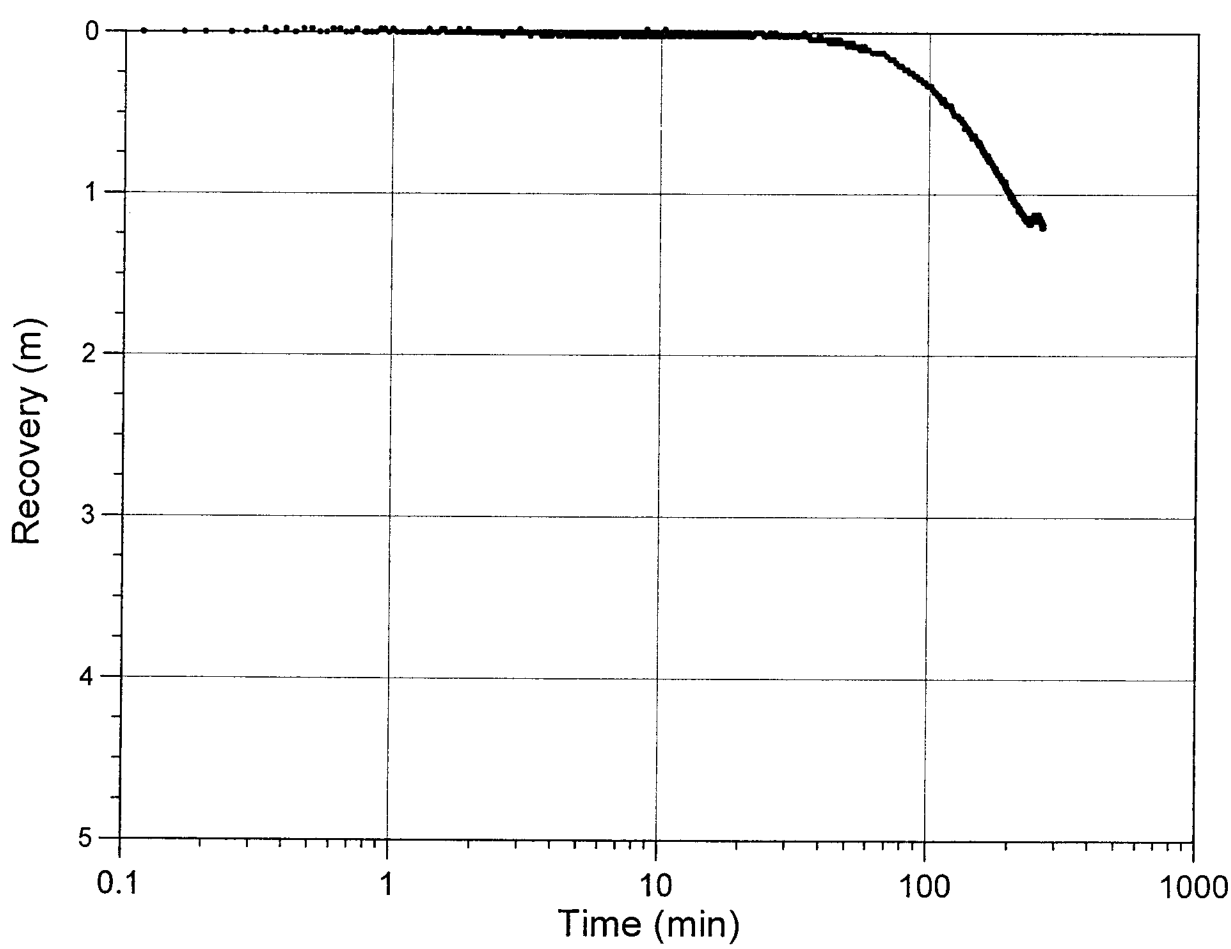
11_KA3566G1_1.GRF 25-okt-99



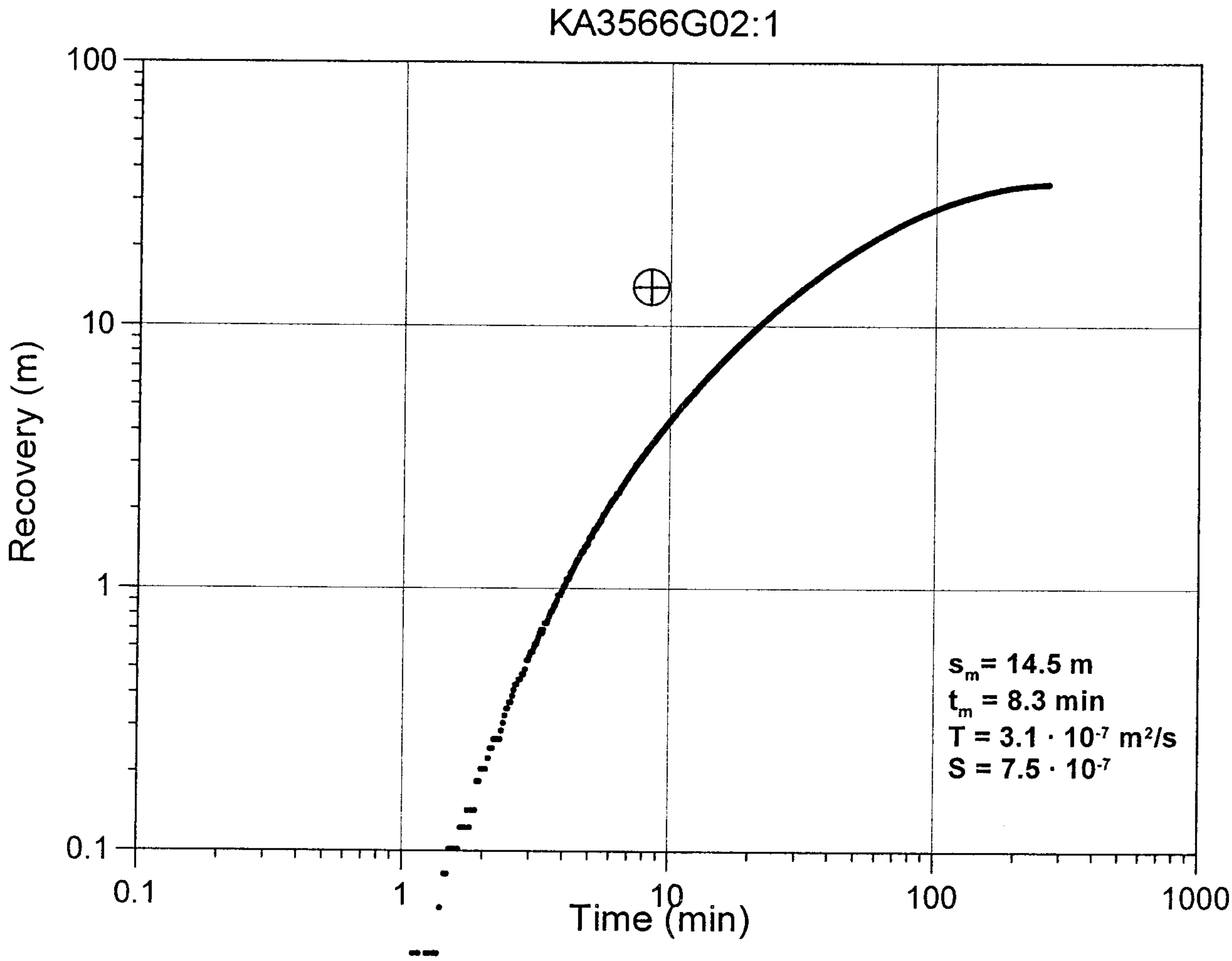


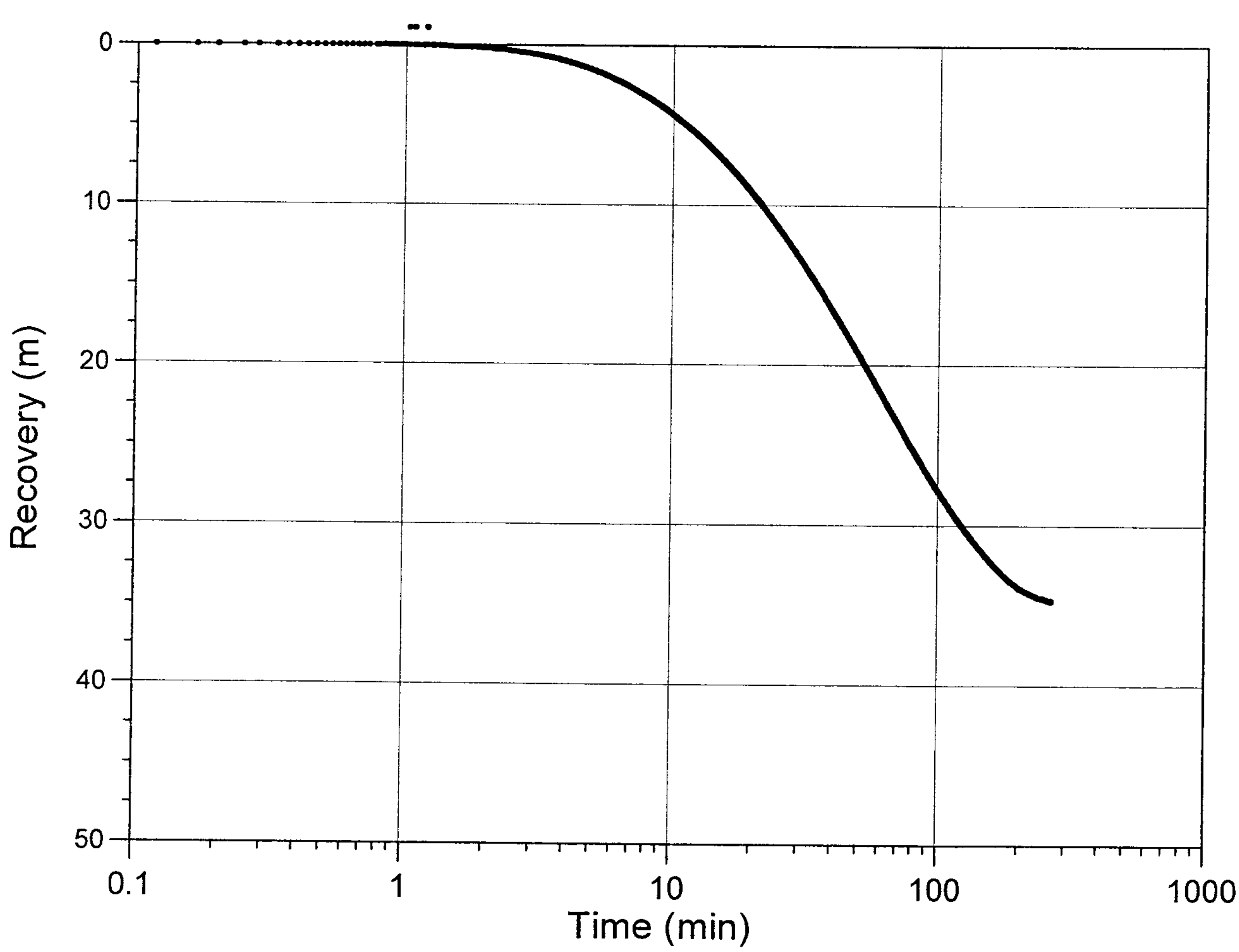
11_KA3566G1_2.GRF 25-okt-99

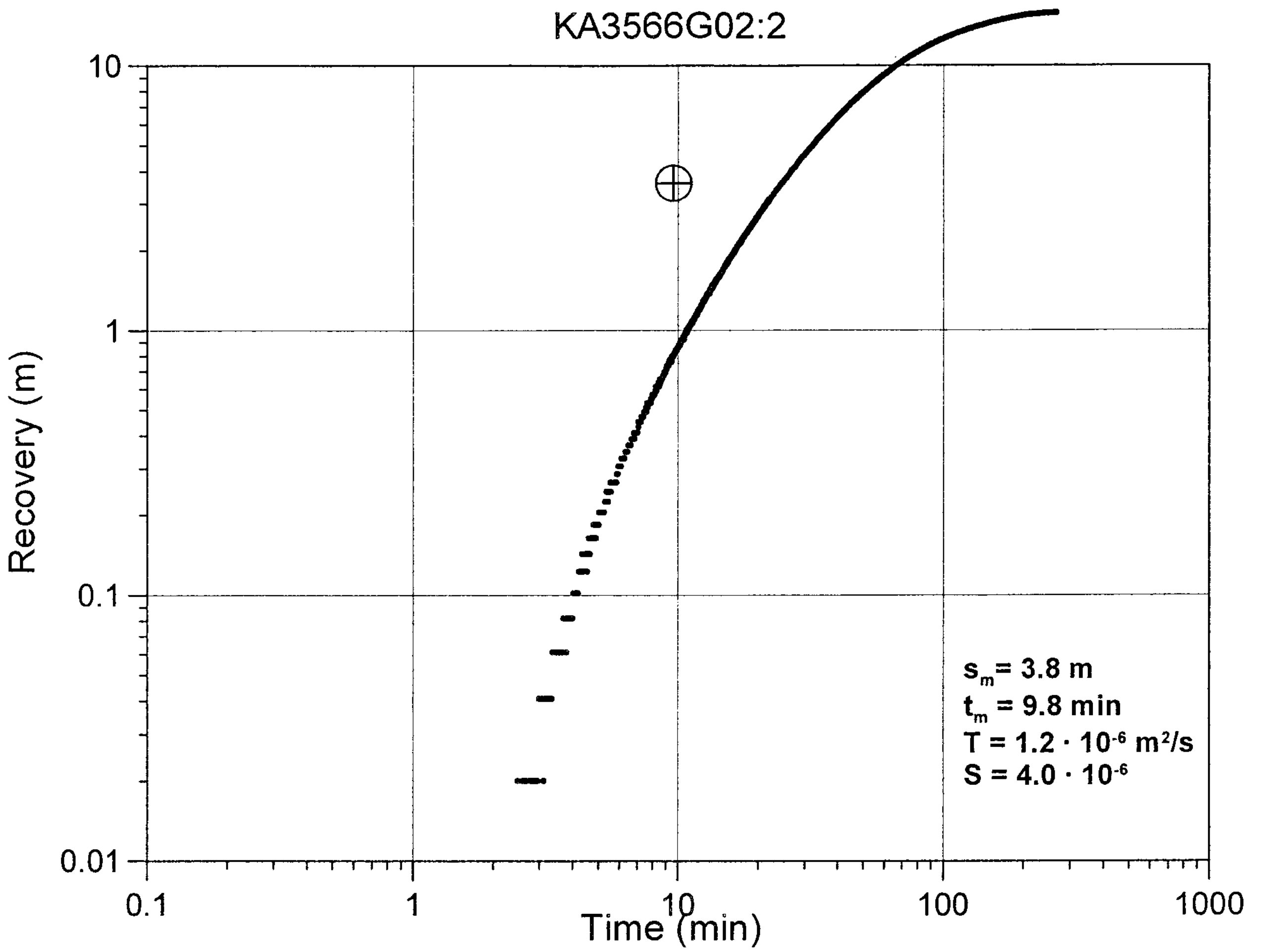


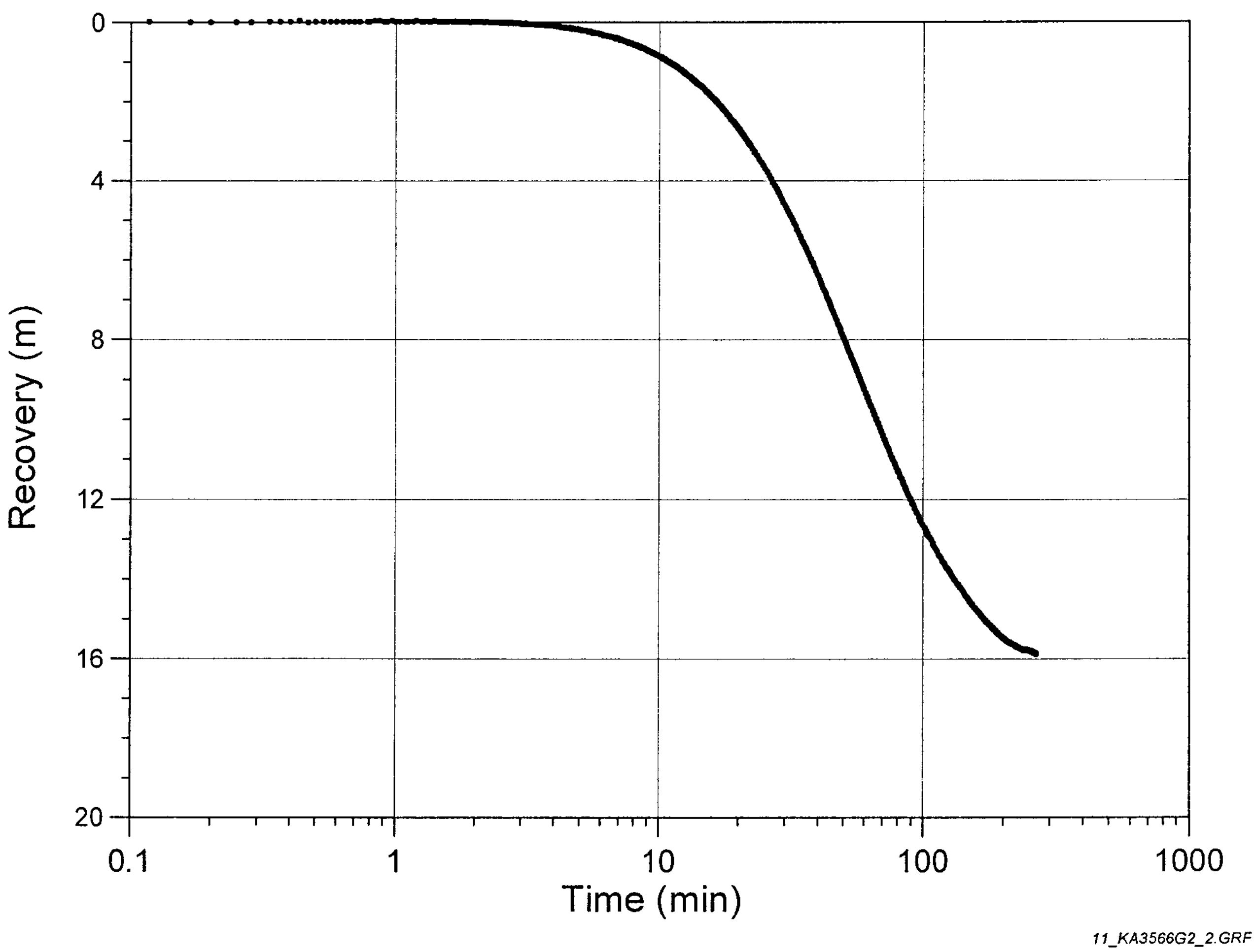


11_KA3566G1_4.GRF 25-okt-99


KA3566G02:1
100
10
1
0.1
Recovery (m)
0.1
1
10
100
1000
Time (min)
s_m= 14.5 m
t_m = 8.3 min
T = 3.1 · 10^{-7} m²/s
S = 7.5 · 10^{-7}

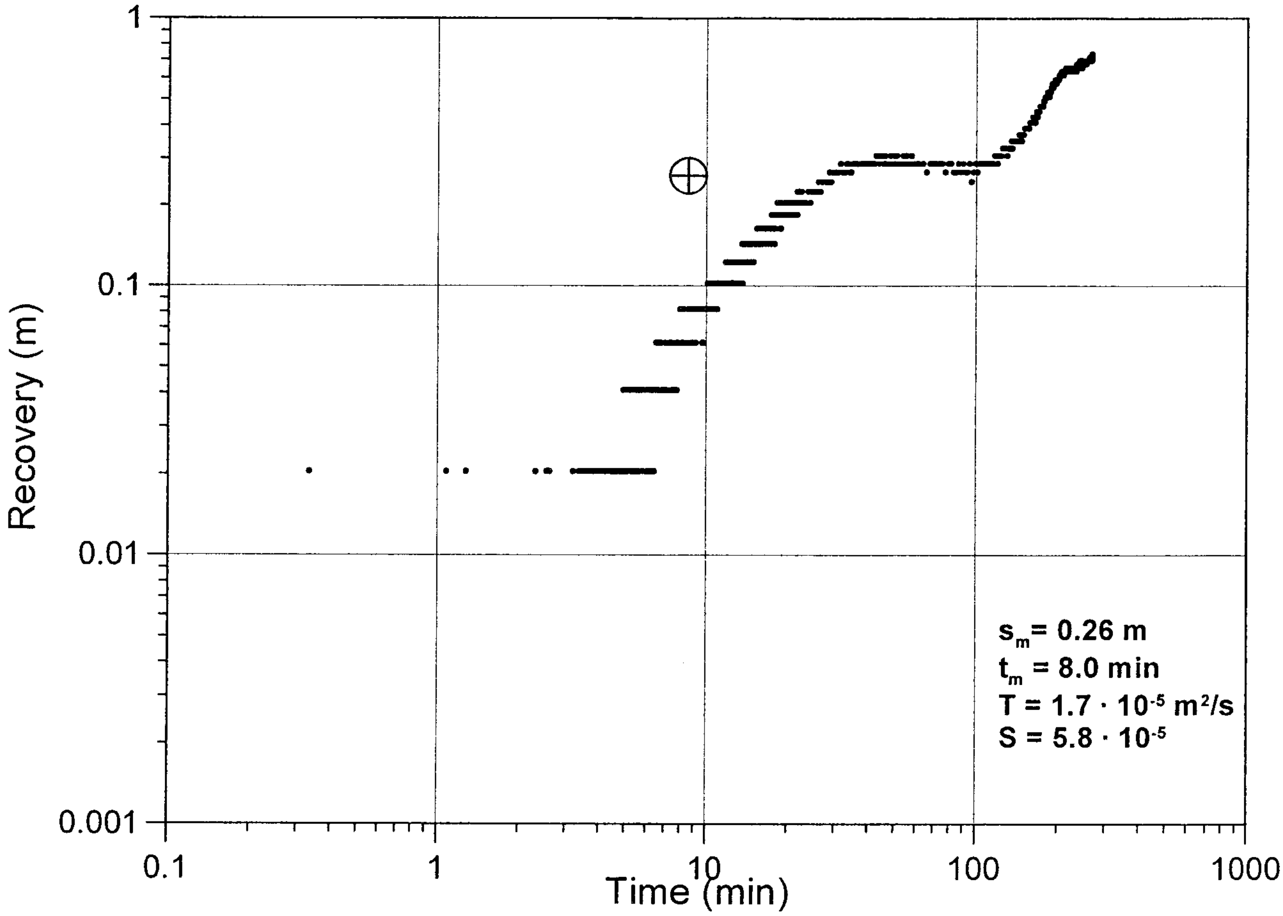

0
10
20
30
40
50
Recovery (m)
0.1
1
10
100
1000
Time (min)

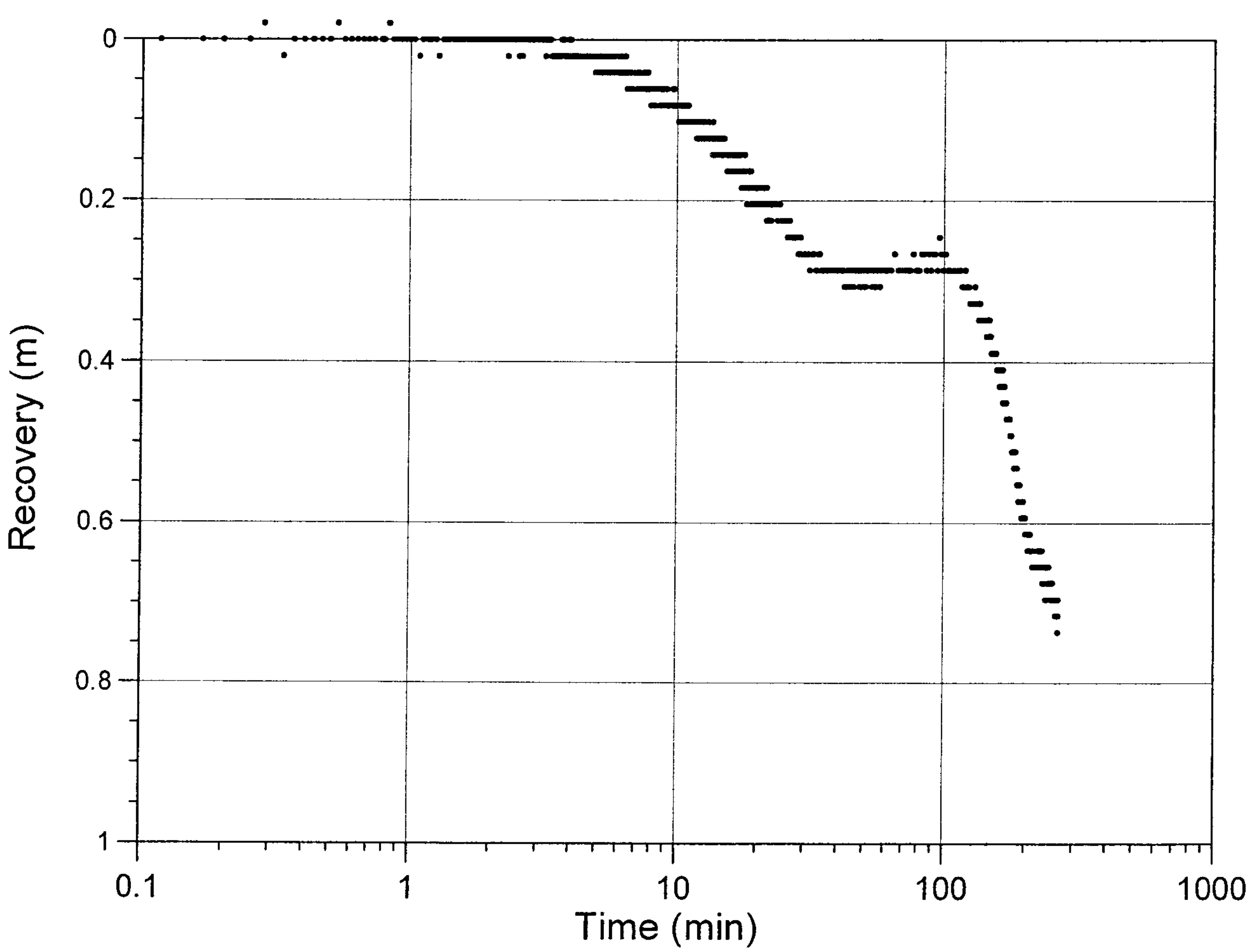




11_KA3566G2_2.GRF 25-okt-99

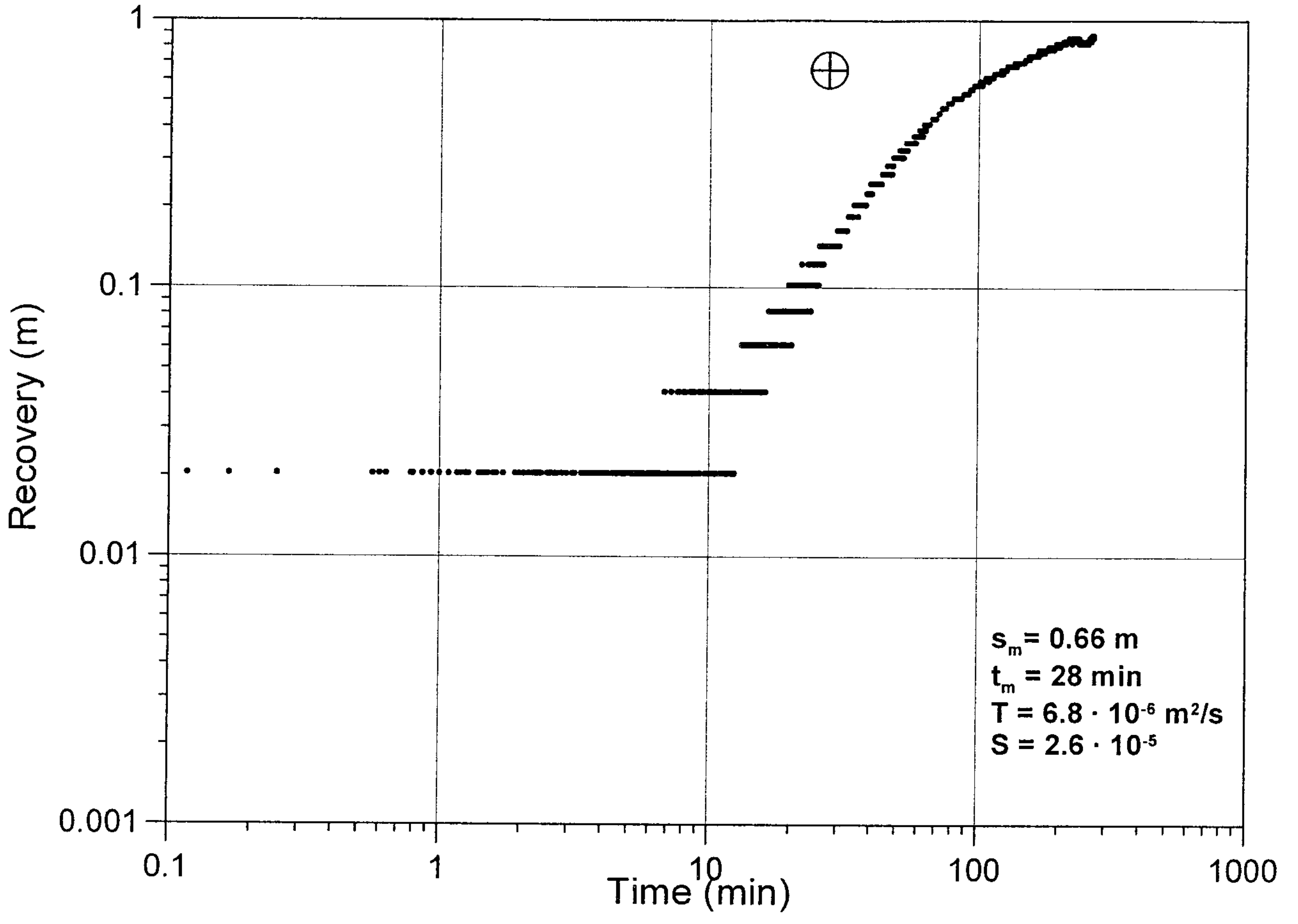
KA3566G02:4

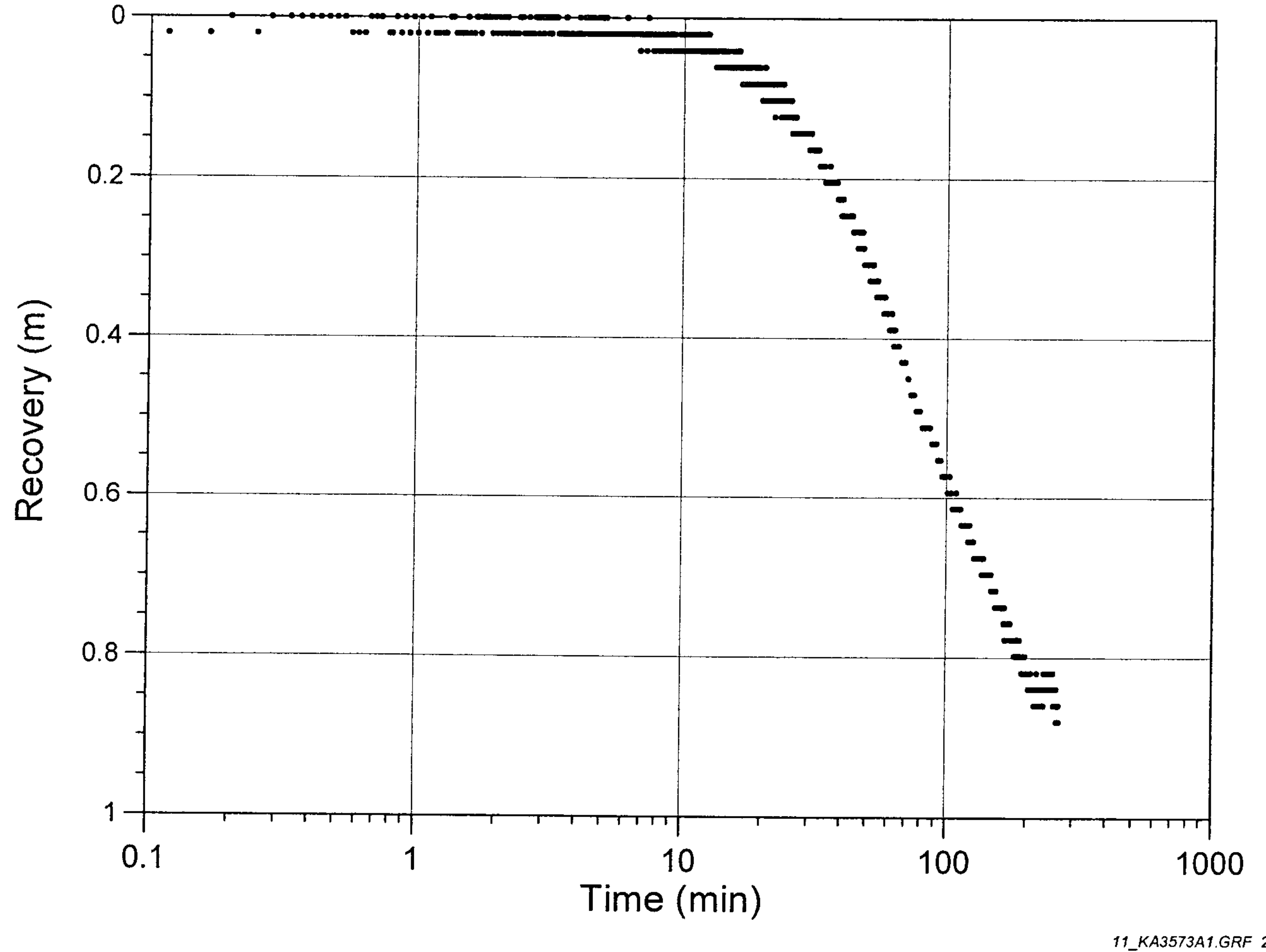




11_KA3566G2_4.GRF 25-okt-99

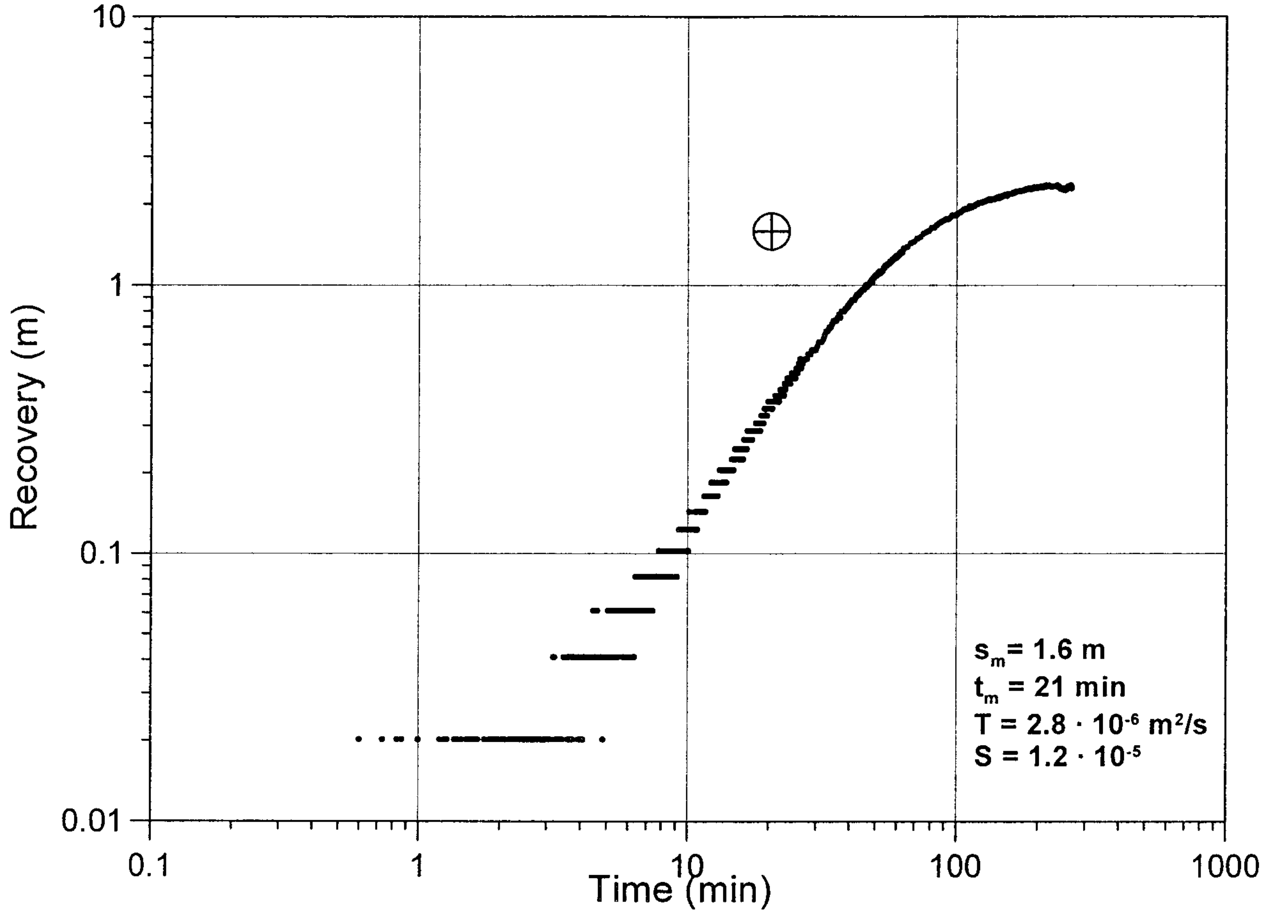
KA3573A1

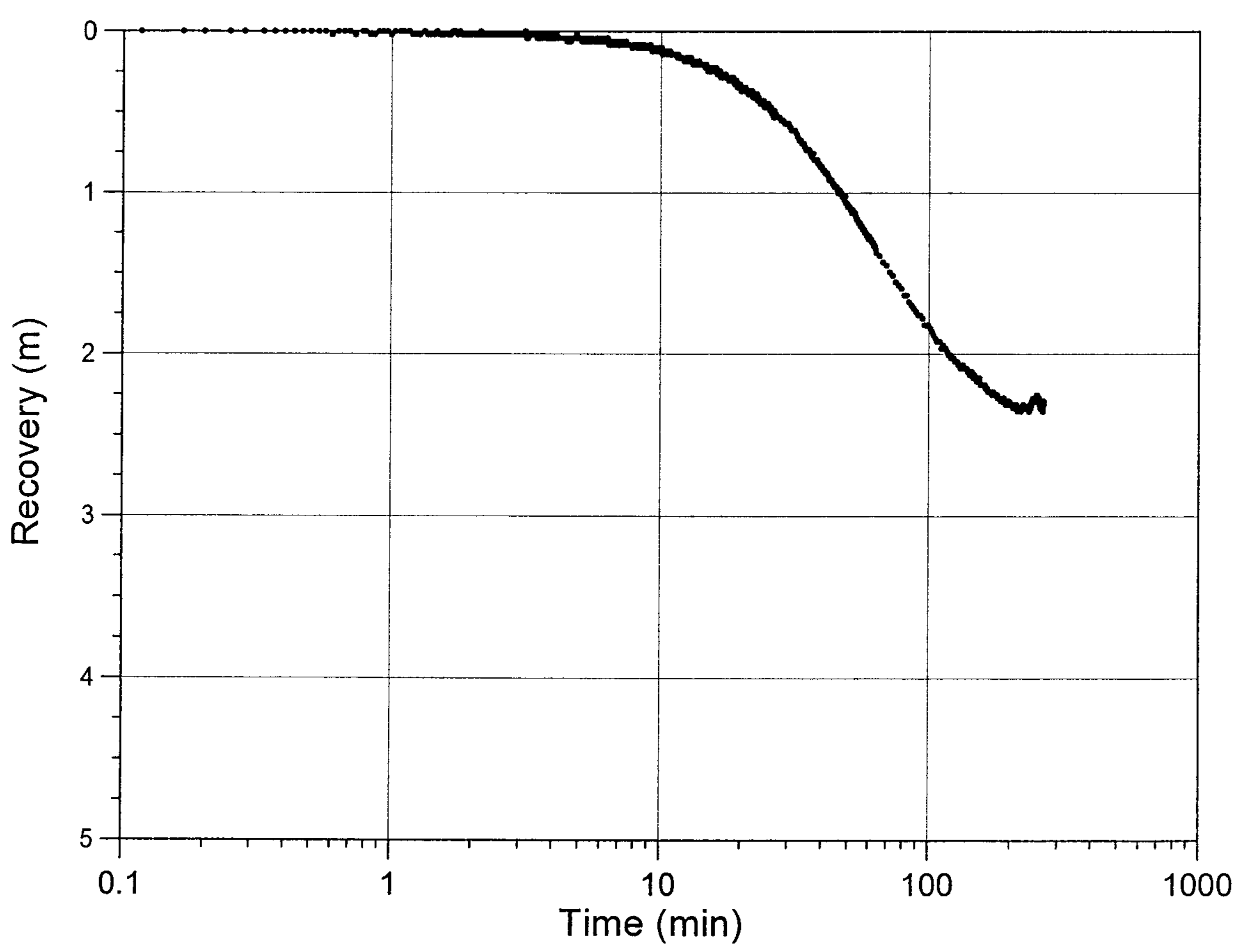




11_KA3573A1.GRF 25-okt-99

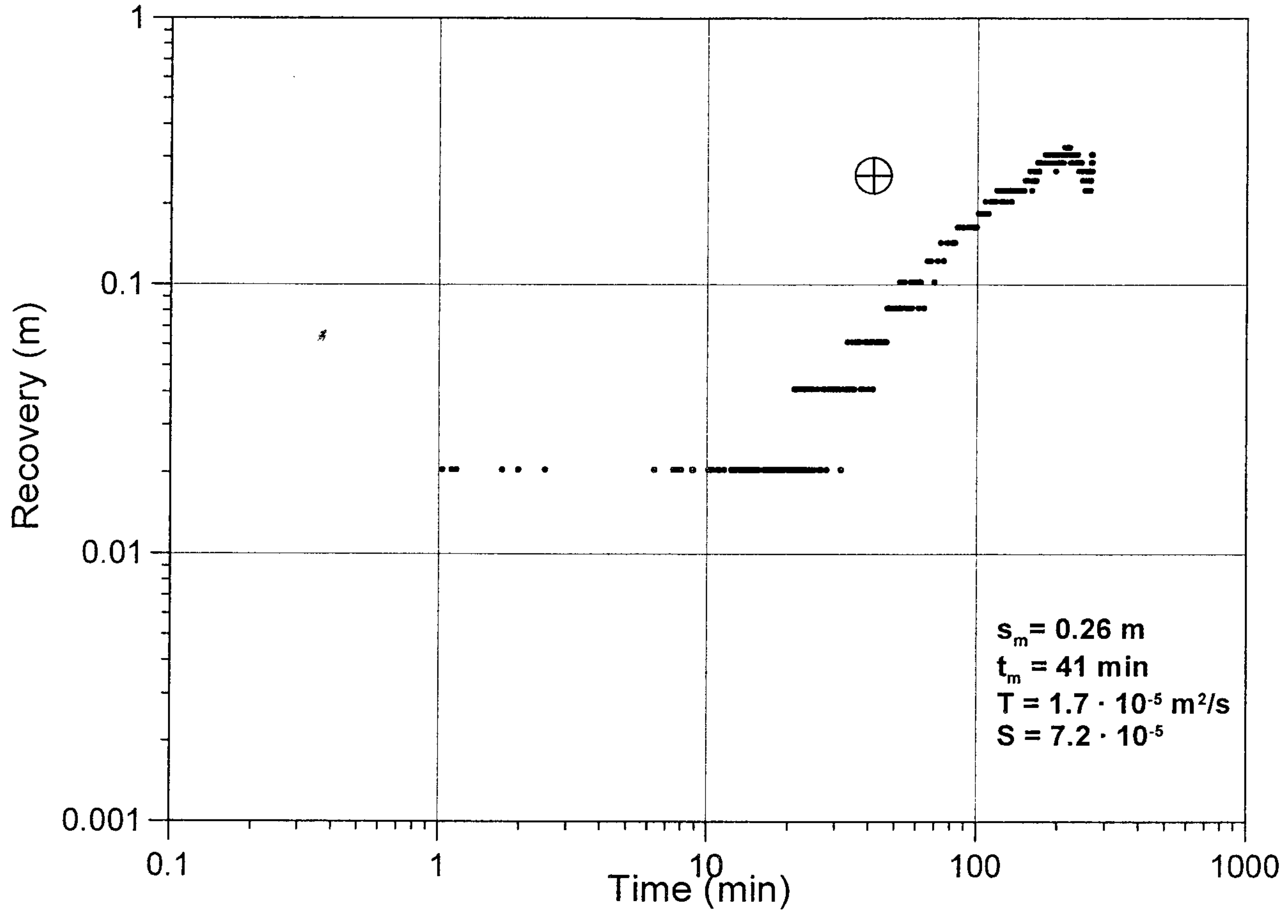
KA3573A2

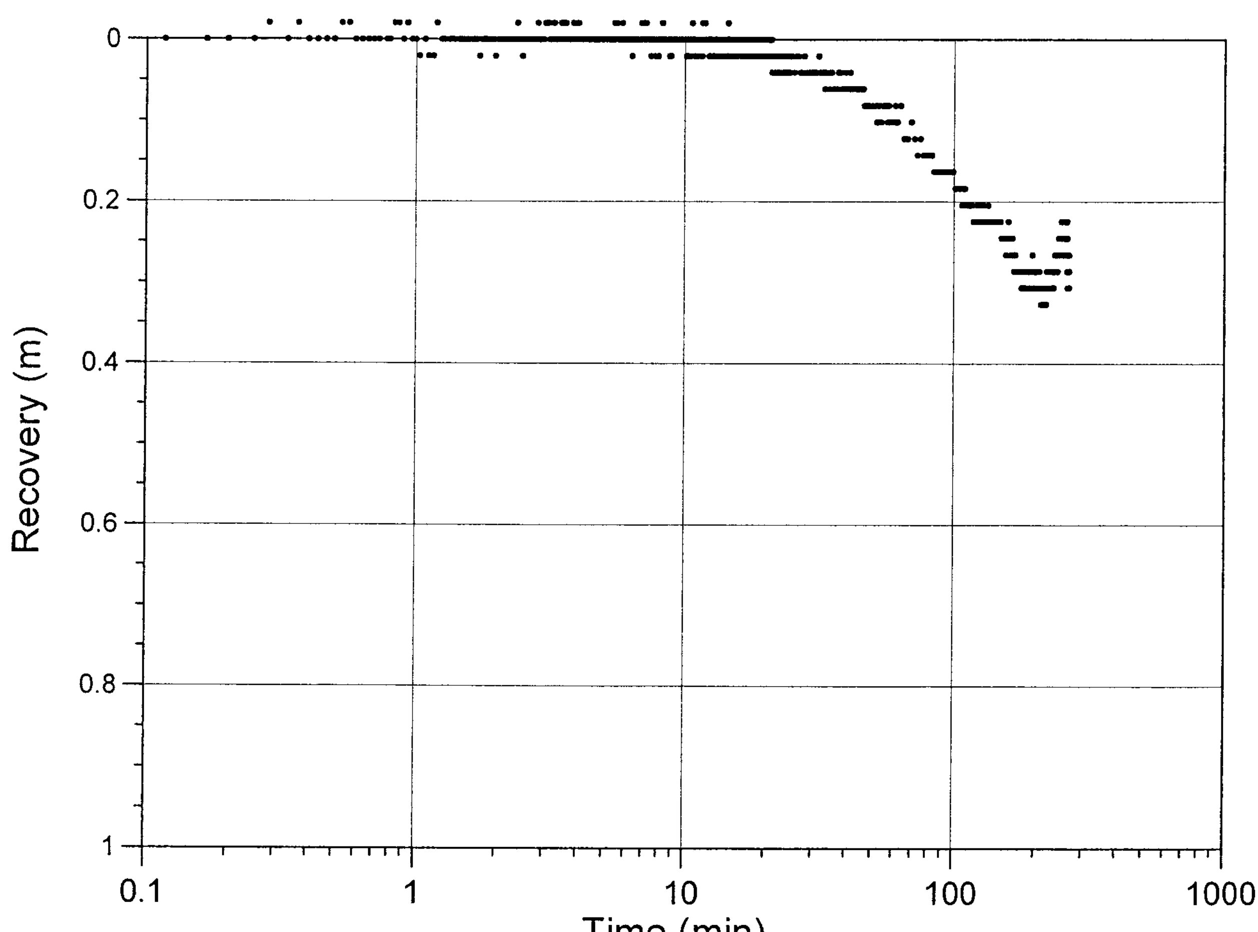




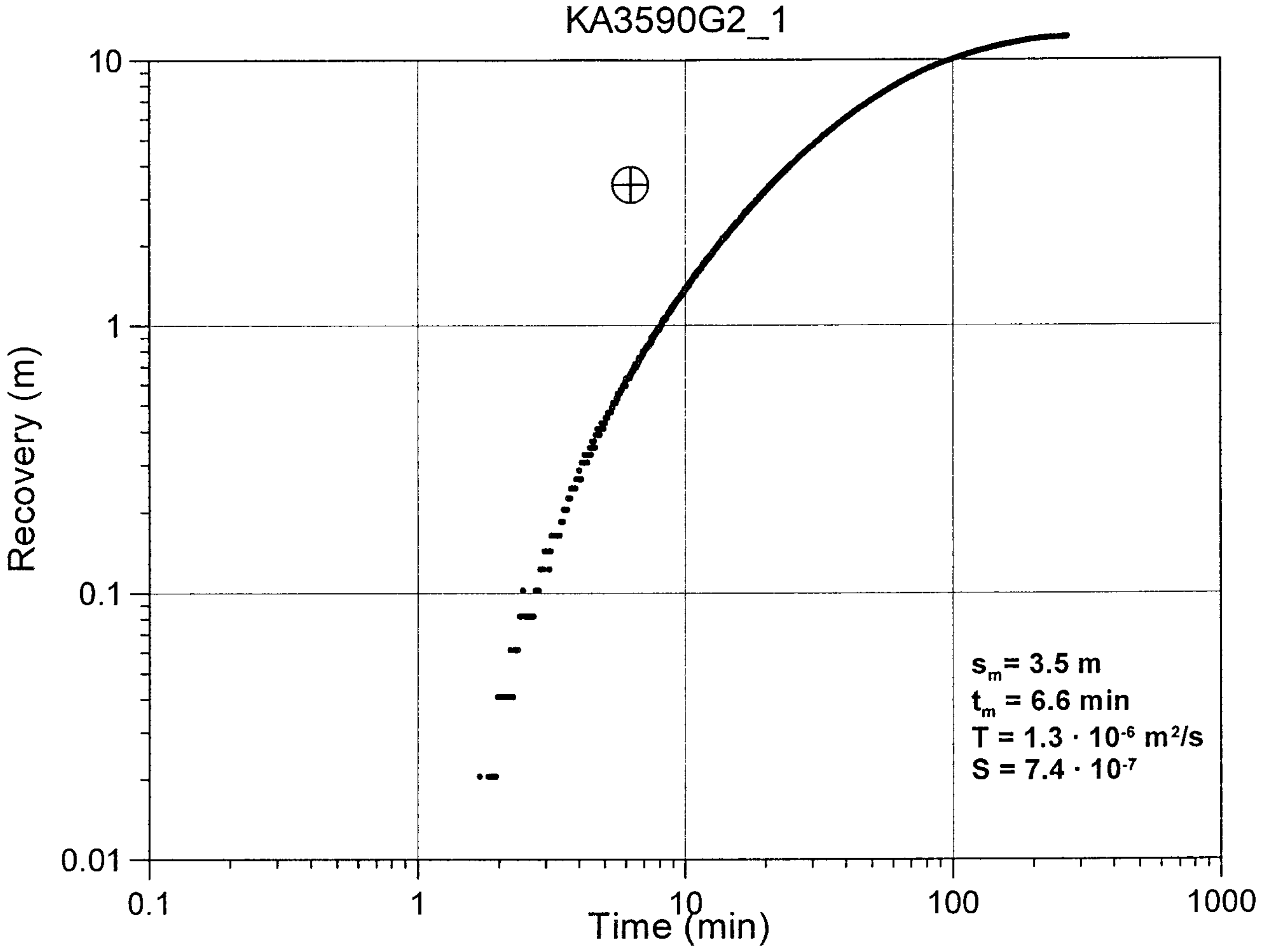
11_KA3573A2.GRF 25-okt-99

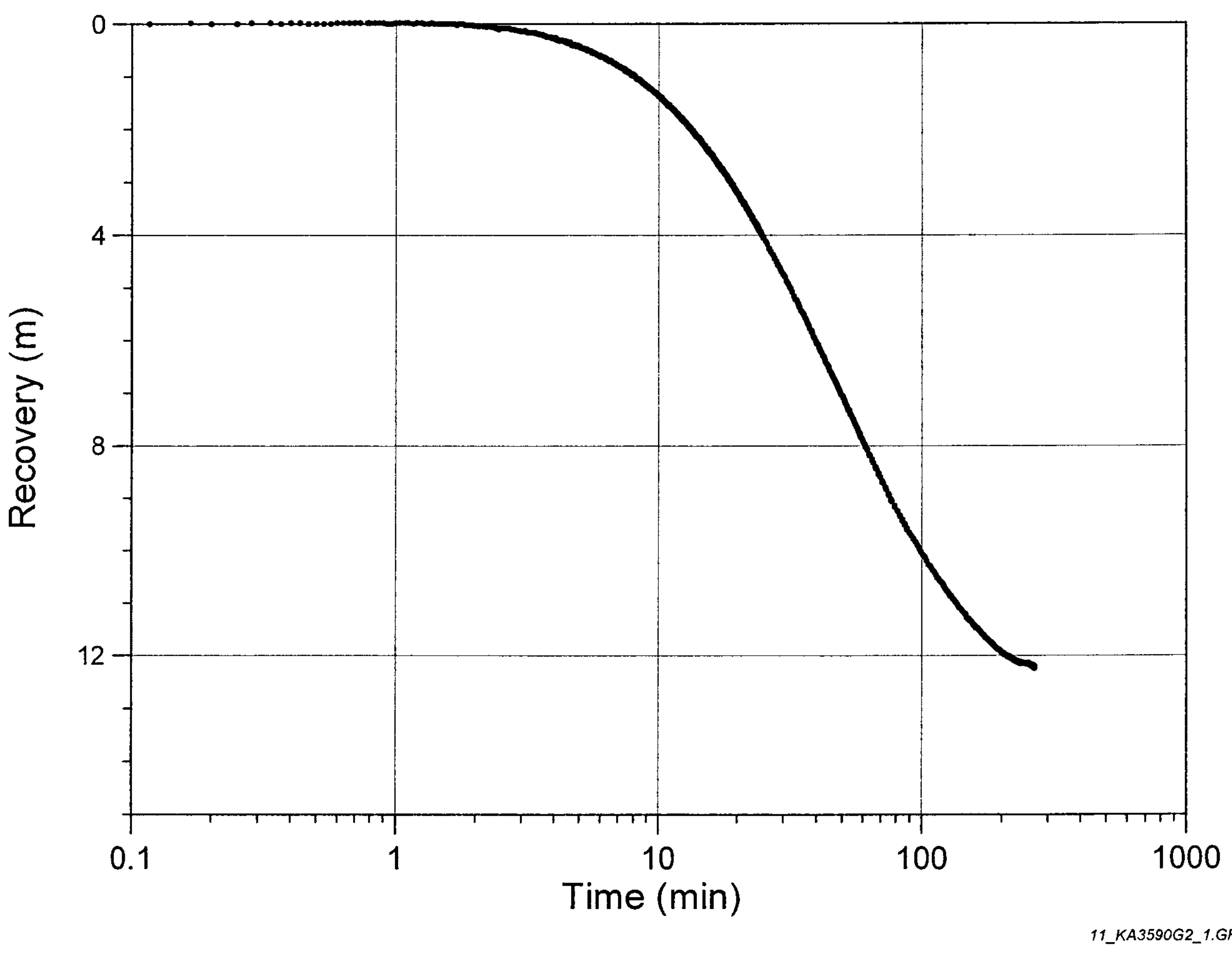
KA3590G1_1





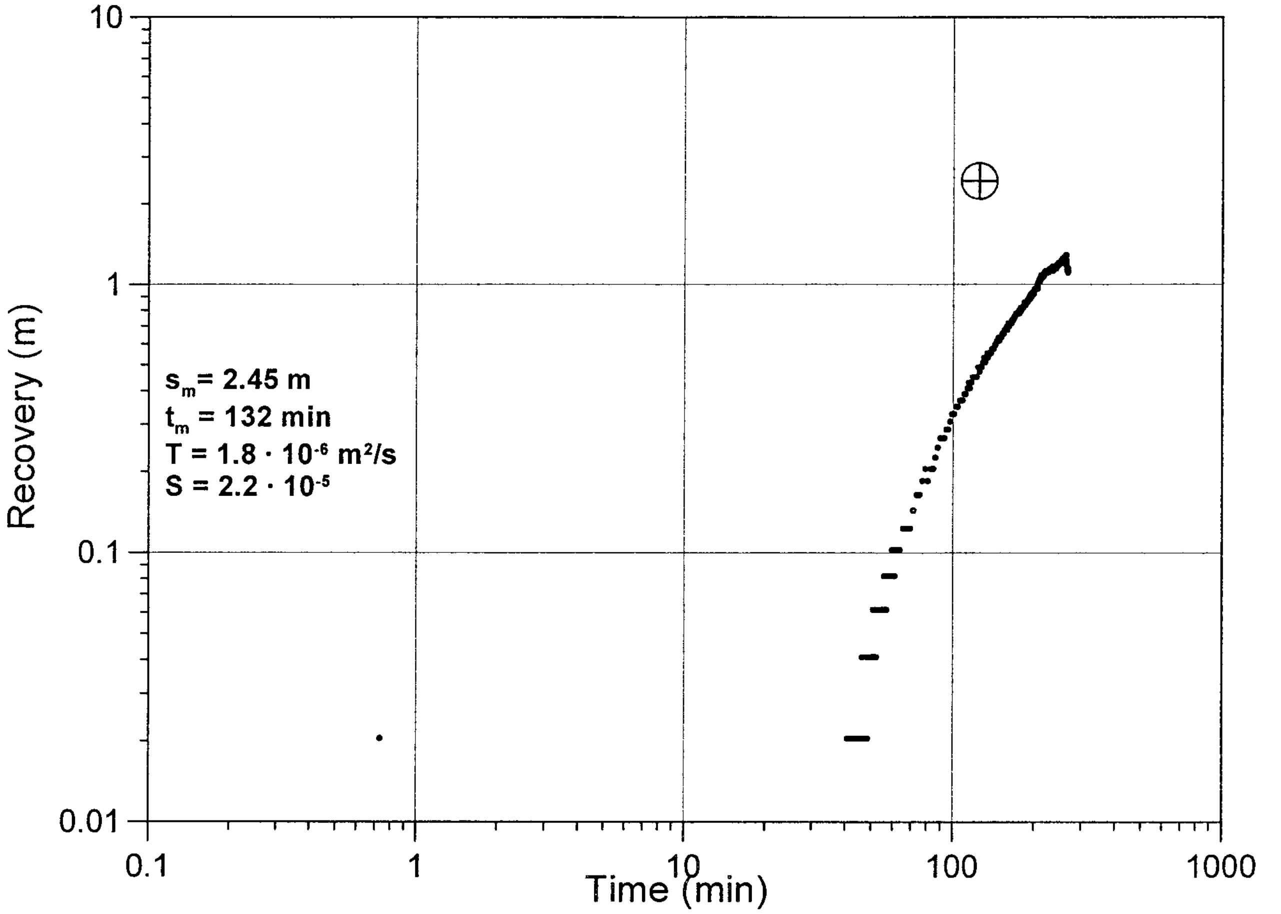
11_KA3590G1_1.GRF 25-okt-99

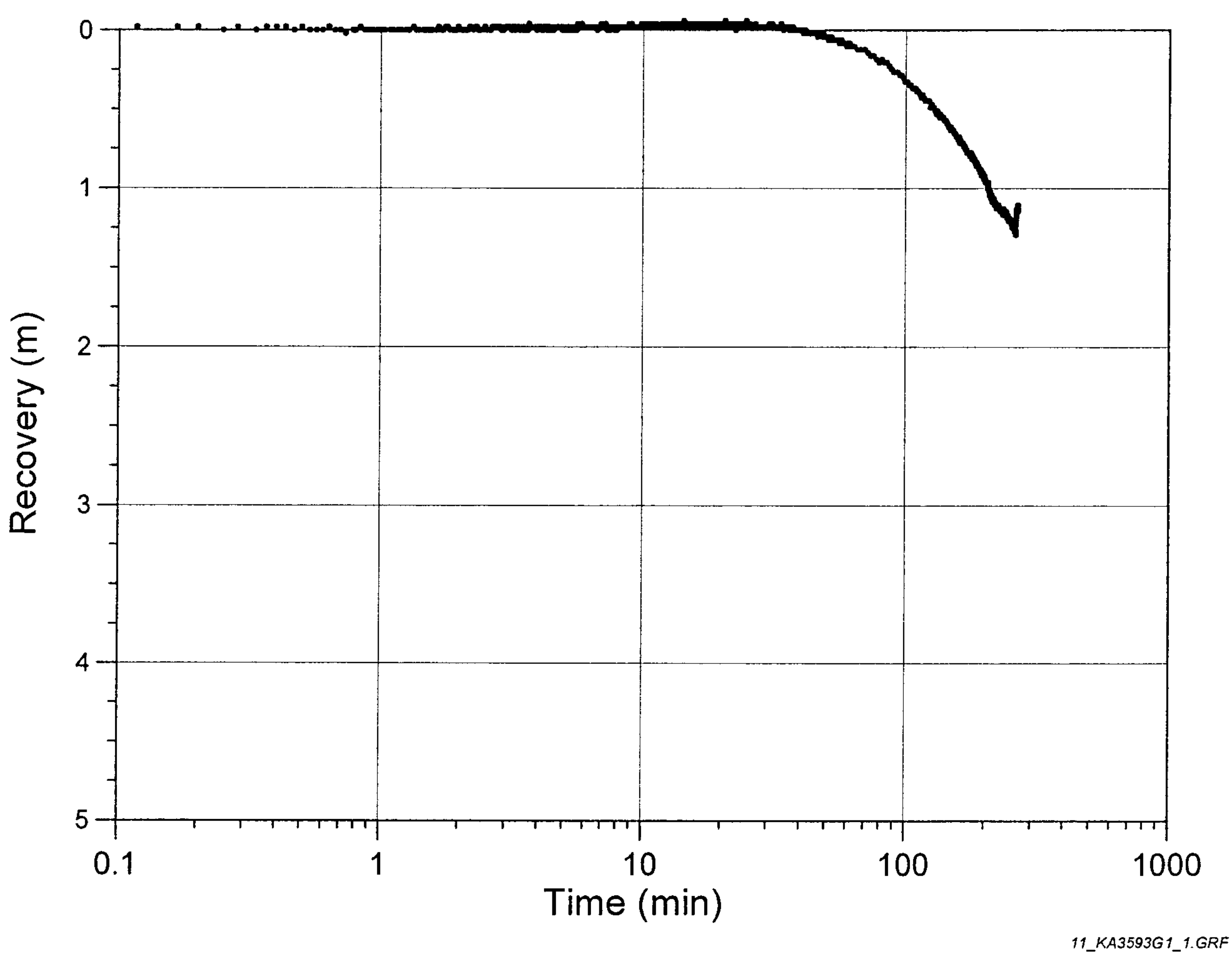




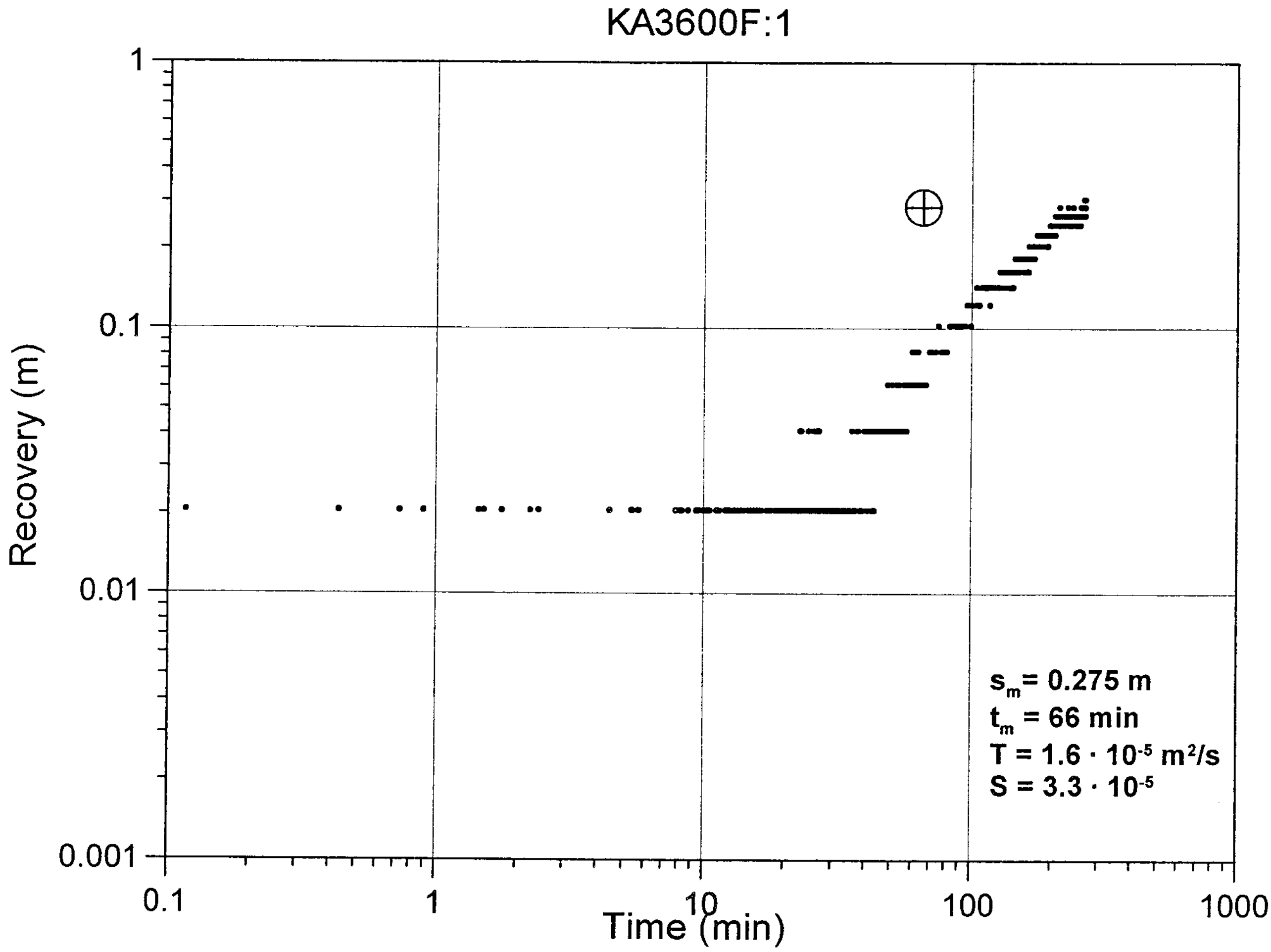
11_KA3590G2_1.GRF 25-okt-99

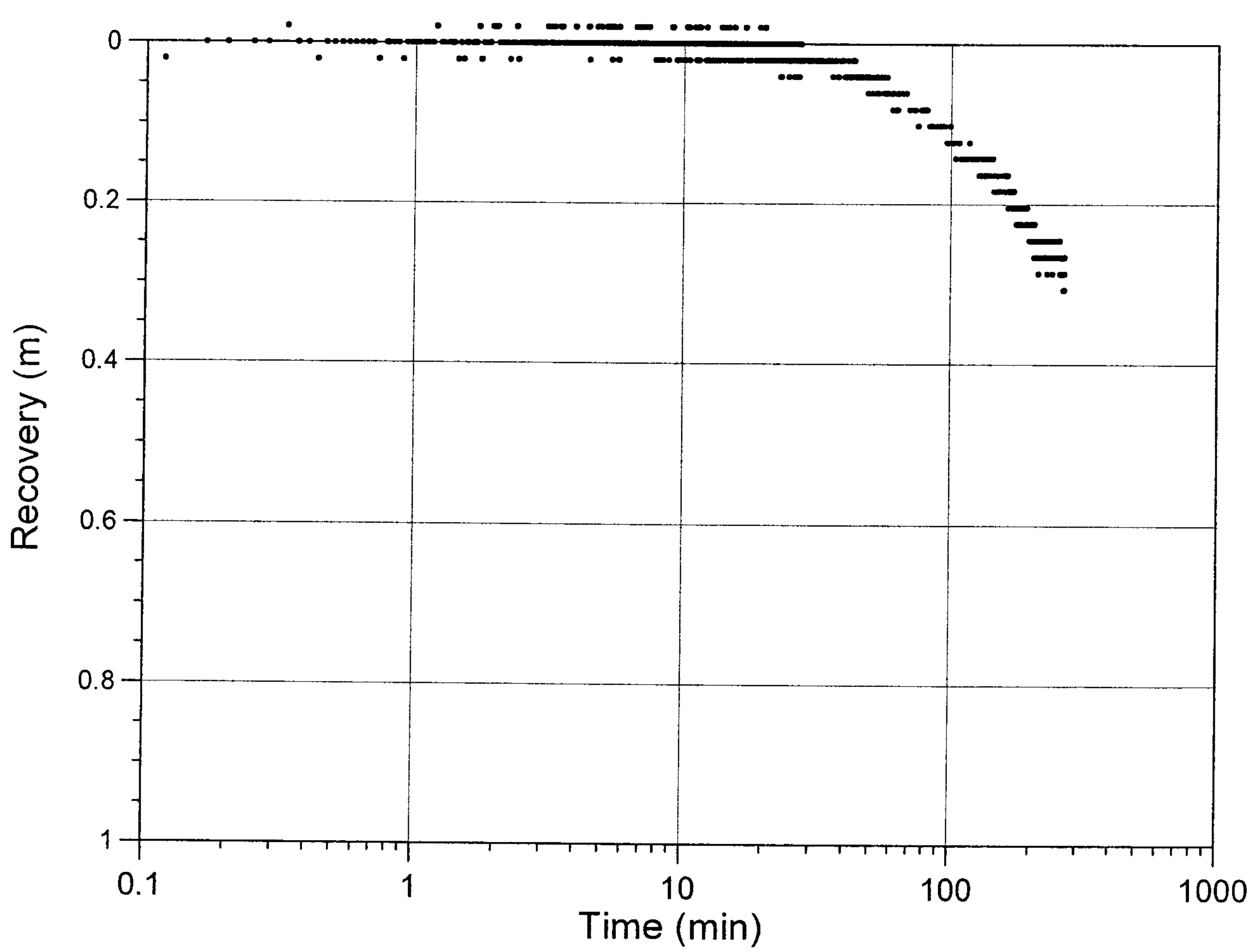
KA3593G1_1

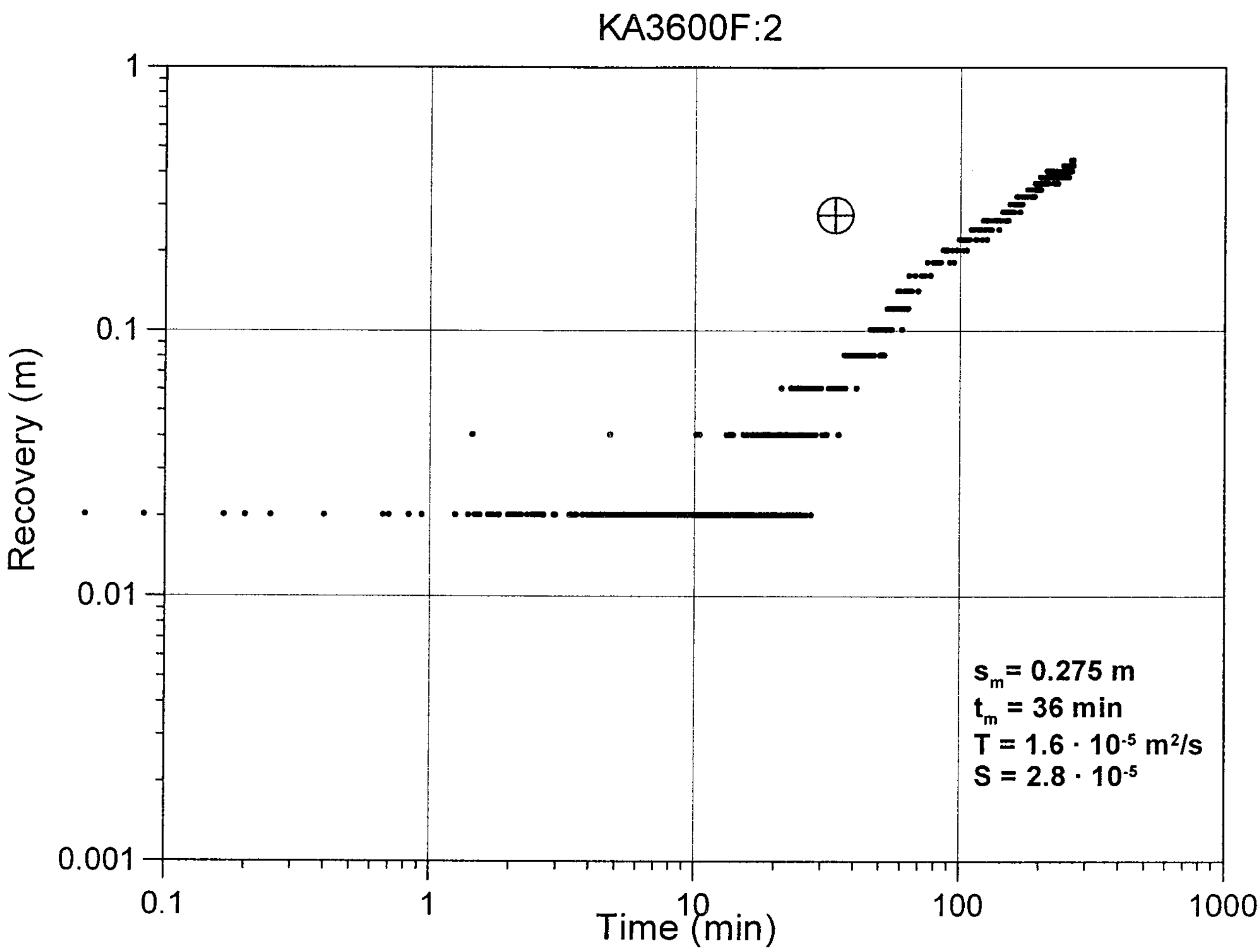


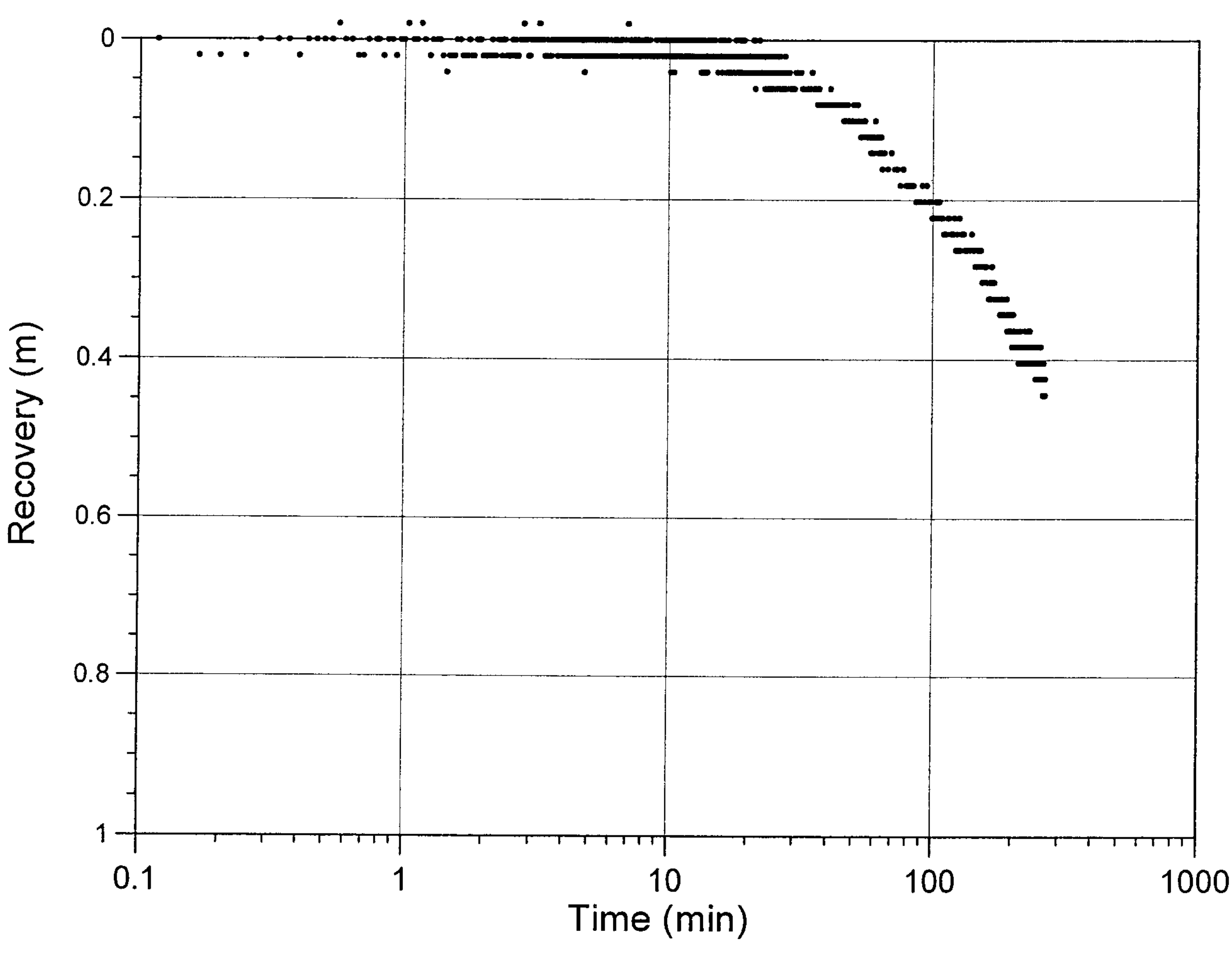


11_KA3593G1_1.GRF 25-okt-99

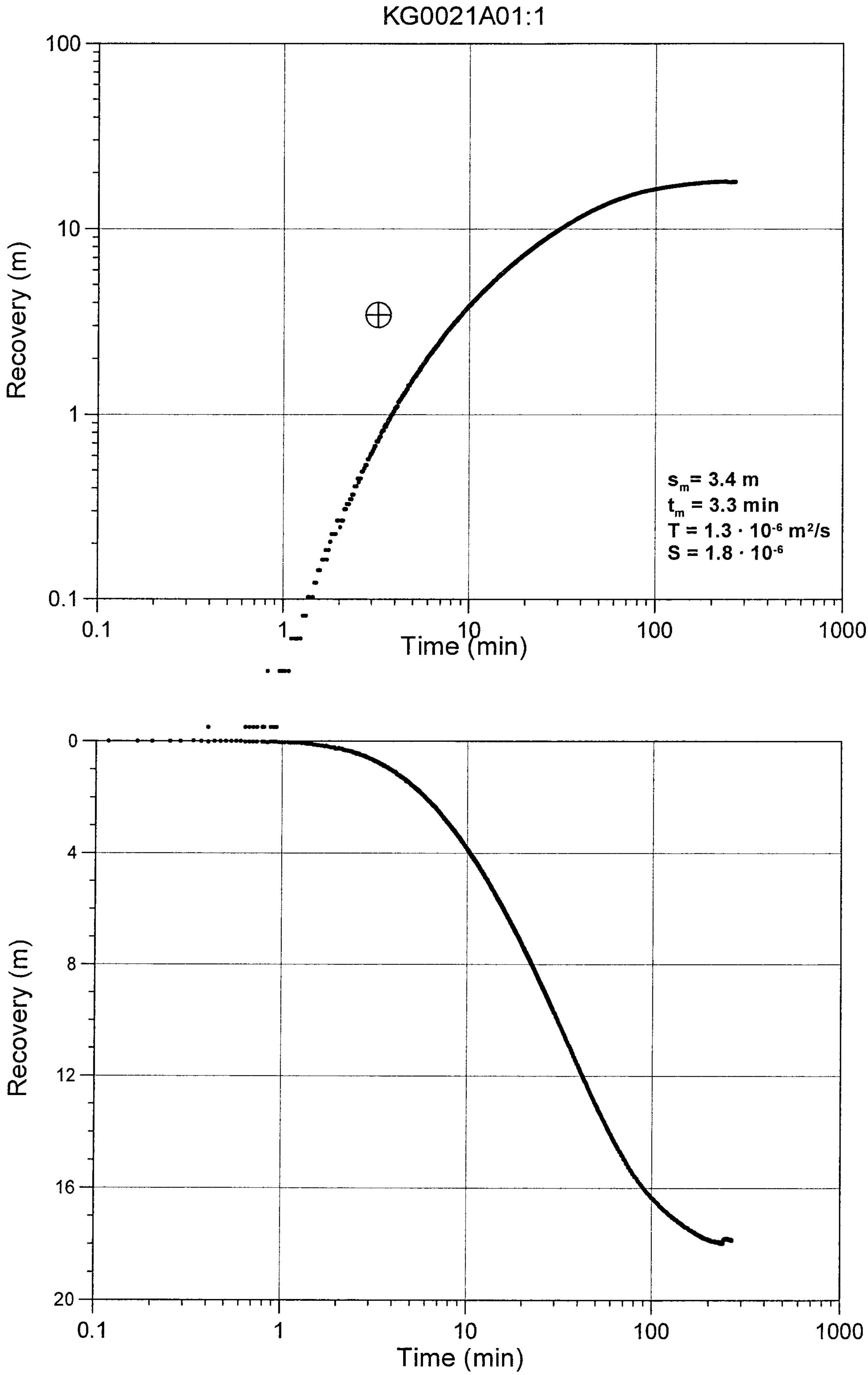

KA3600F:1
Recovery (m)
Time (min)
1
0.1
0.01
0.001
0.1
1
10
100
1000
s_m= 0.275 m
t_m = 66 min
T = 1.6 · 10^{-5} m^2/s
S = 3.3 · 10^{-5}

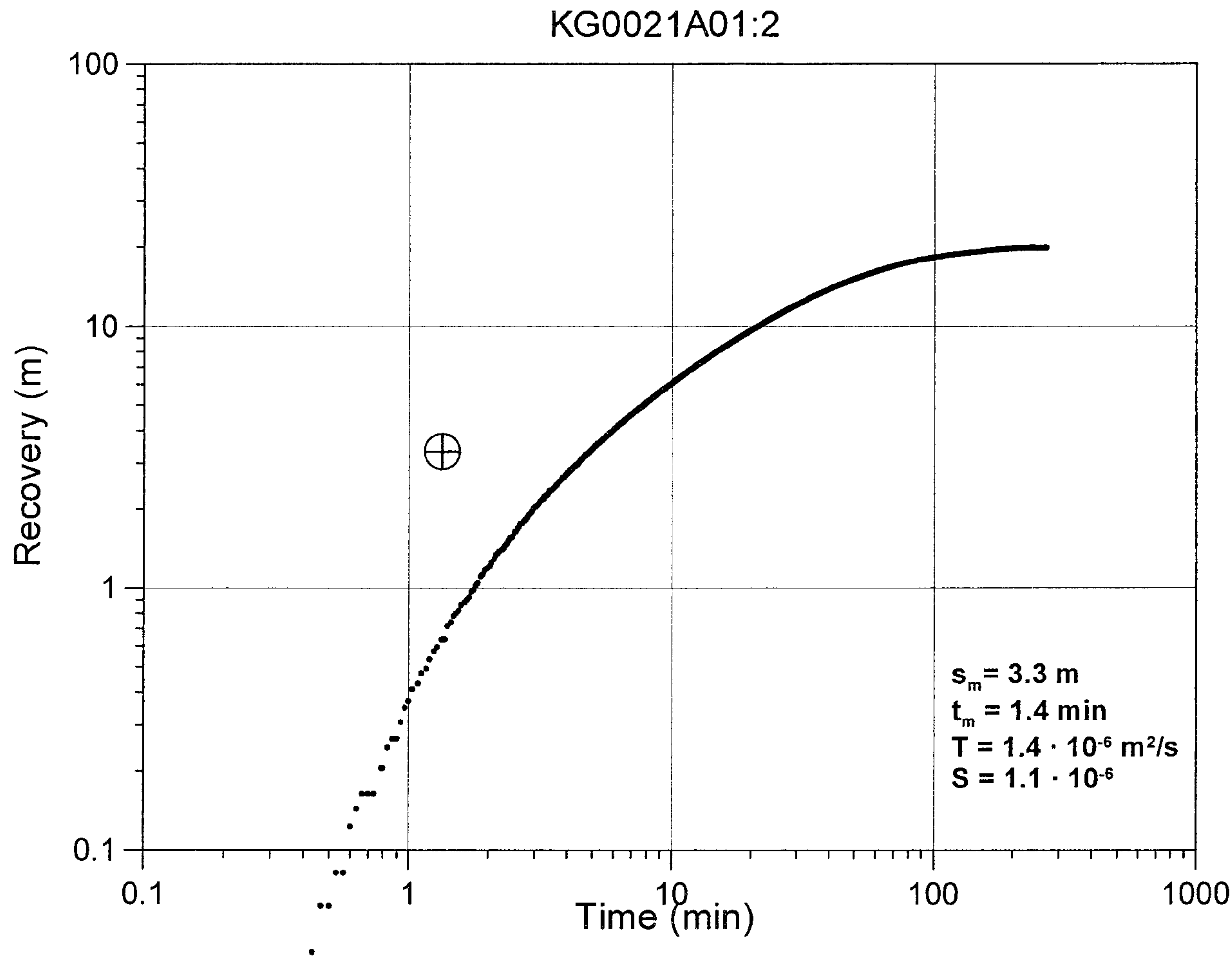

Recovery (m)
Time (min)
0
0.2
0.4
0.6
0.8
1
0.1
1
10
100
1000

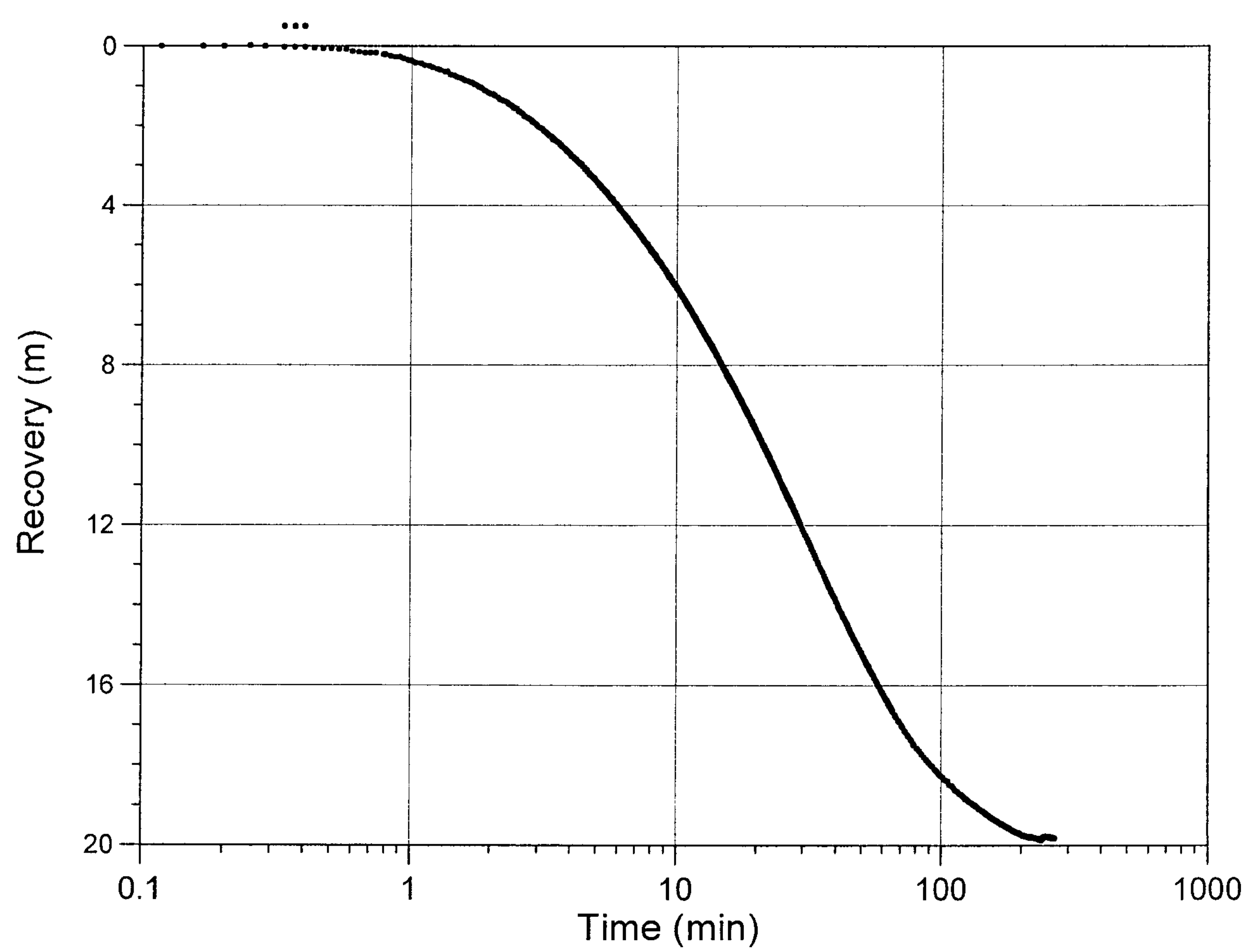




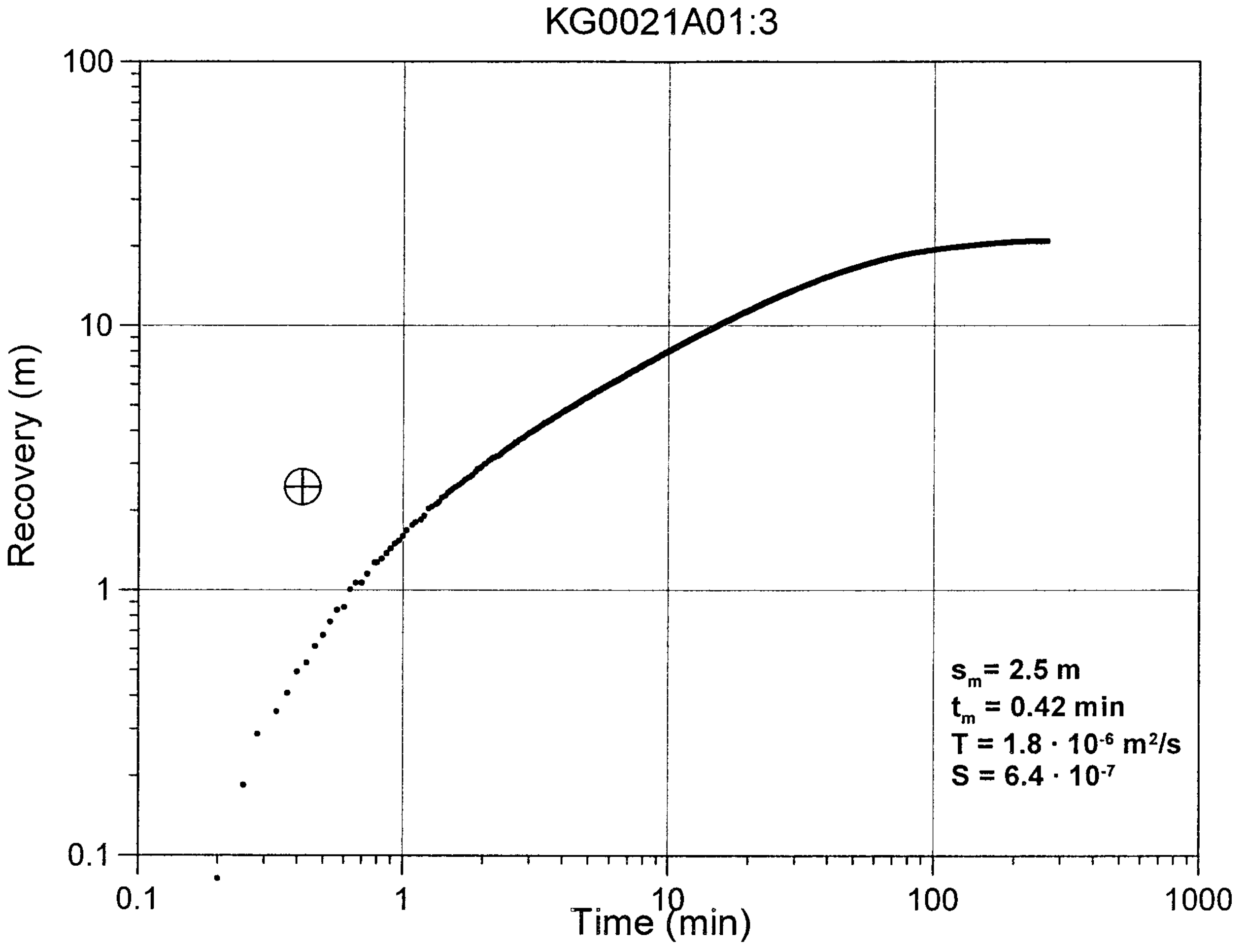
11_KA3600F2.GRF 25-okt-99

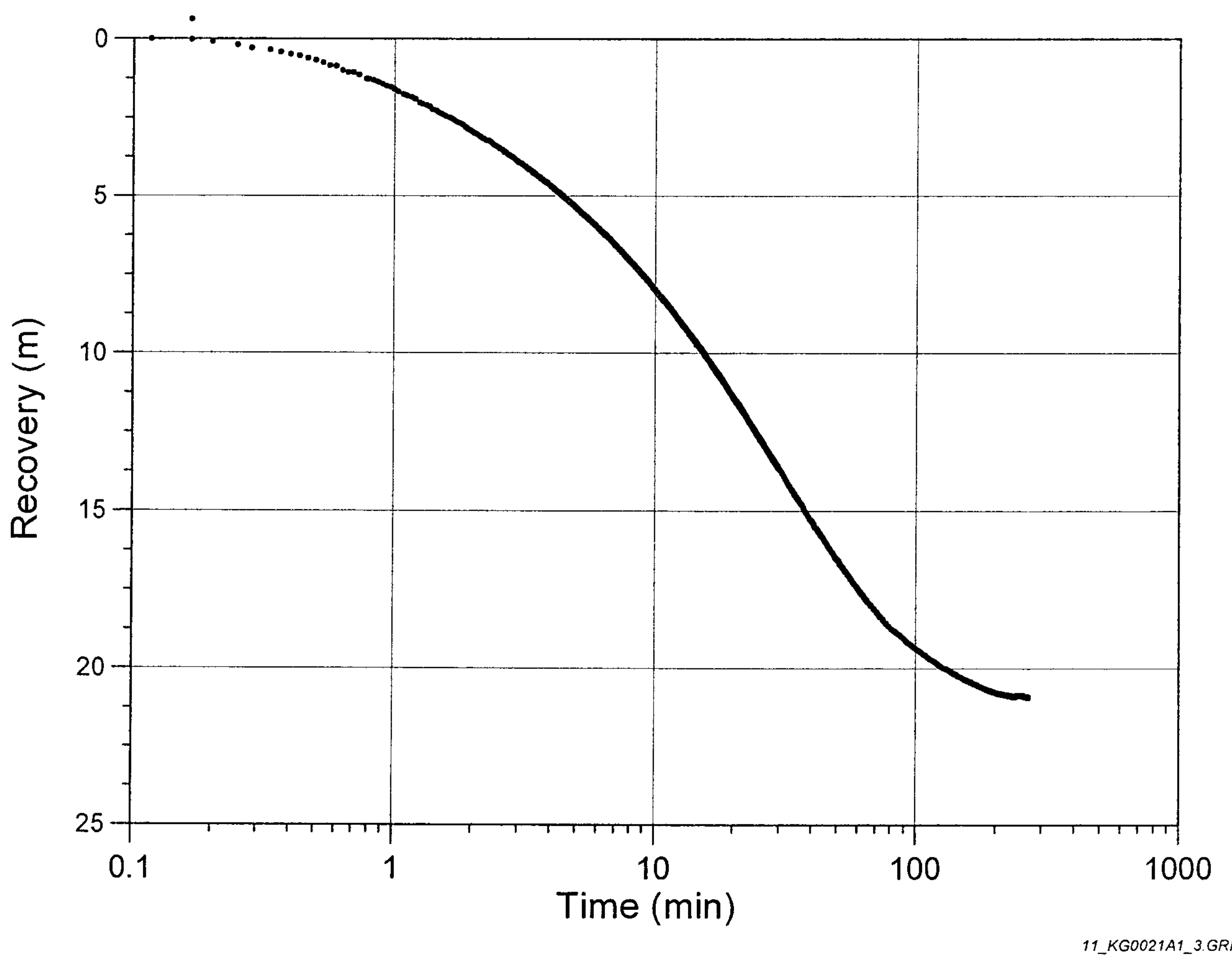

KG0021A01:1
Recovery (m)
Time (min)
s_m= 3.4 m
t_m = 3.3 min
T = 1.3 · 10^{-6} m²/s
S = 1.8 · 10^{-6}
100
10
1
0.1
0.1
1
10
100
1000
Recovery (m)
Time (min)
0
4
8
12
16
20
0.1
1
10
100
1000



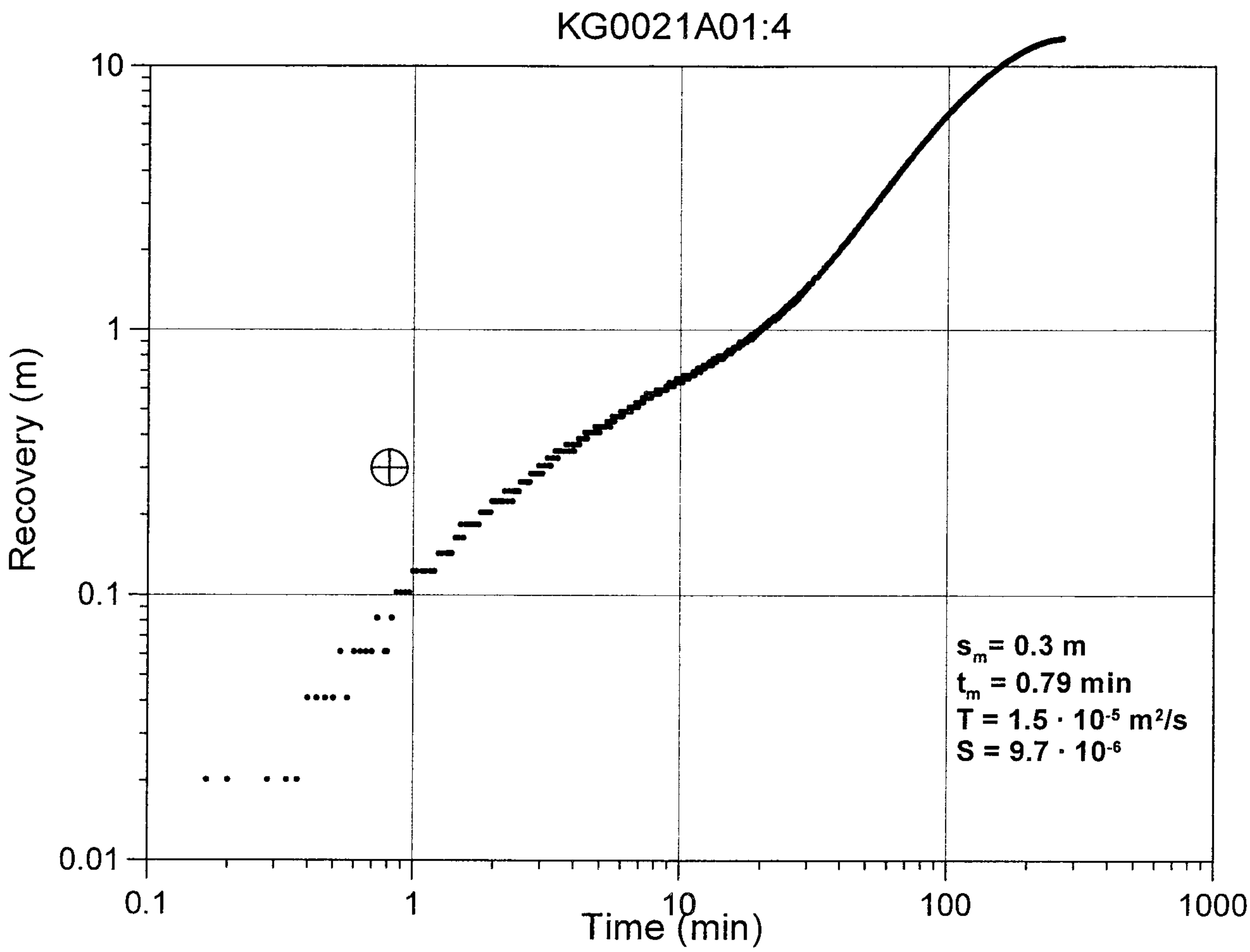


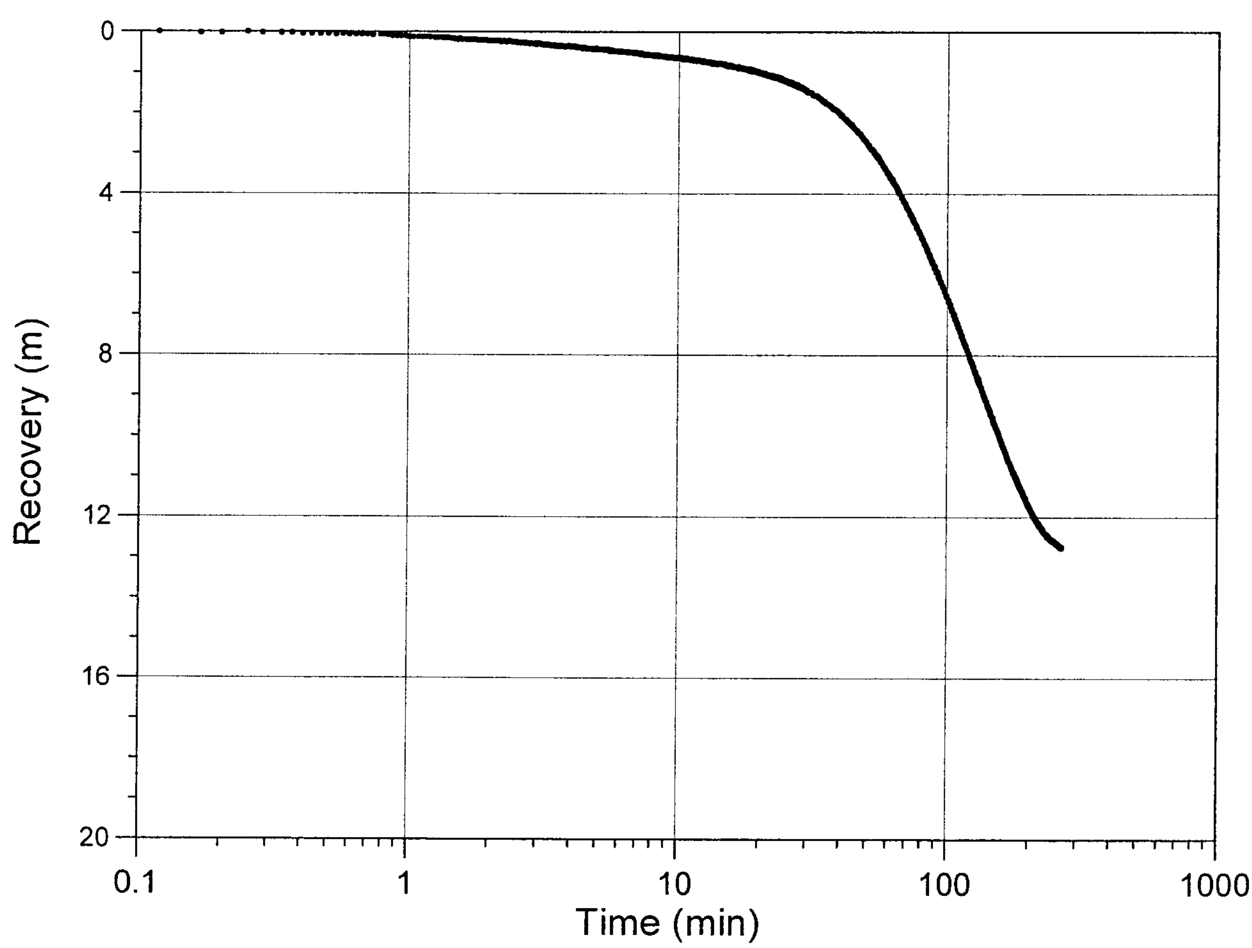
11_KG0021A1_2.GRF 25-okt-99



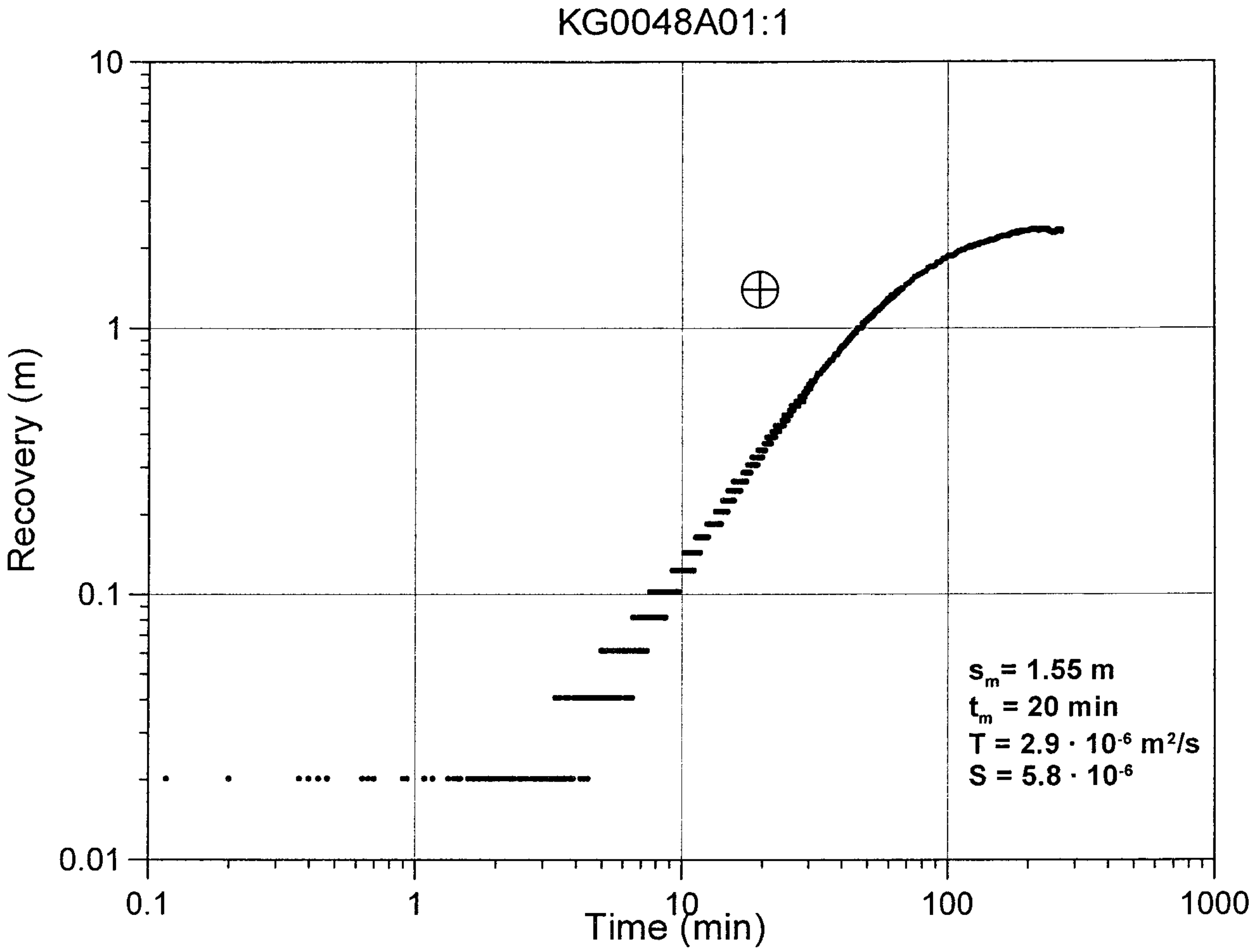


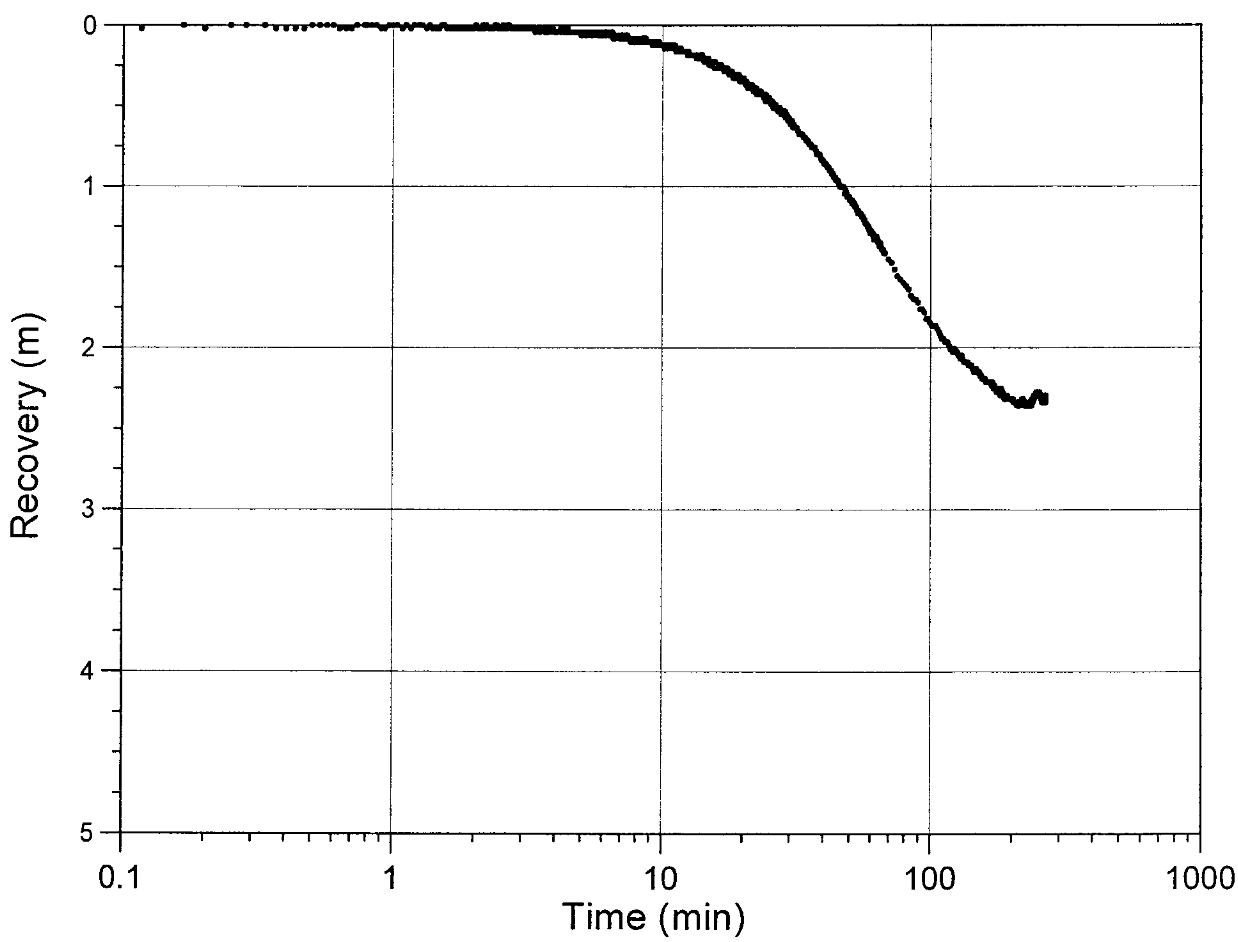
11_KG0021A1_3.GRF 25-okt-99





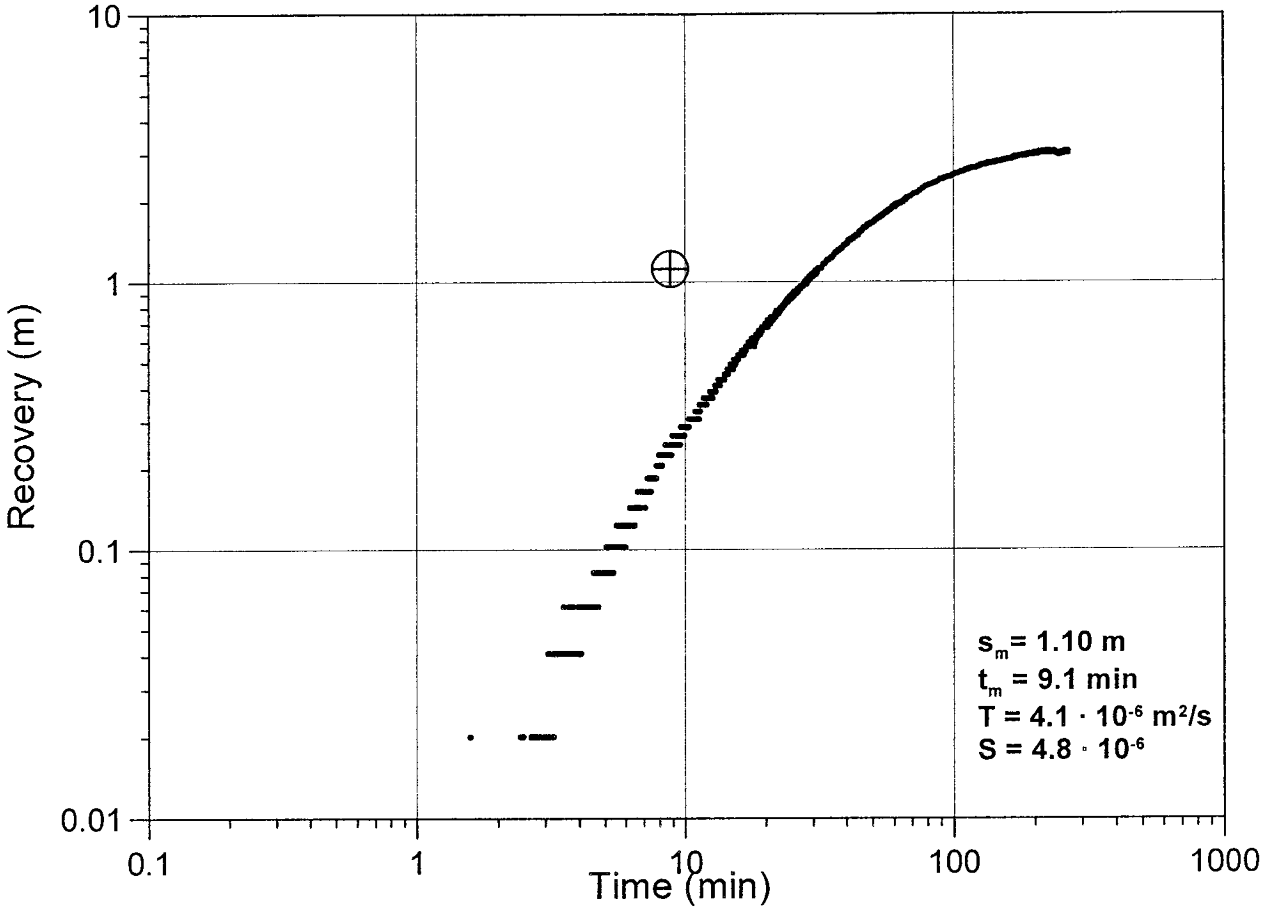
11_KG0021A1_4.GRF 25-okt-99

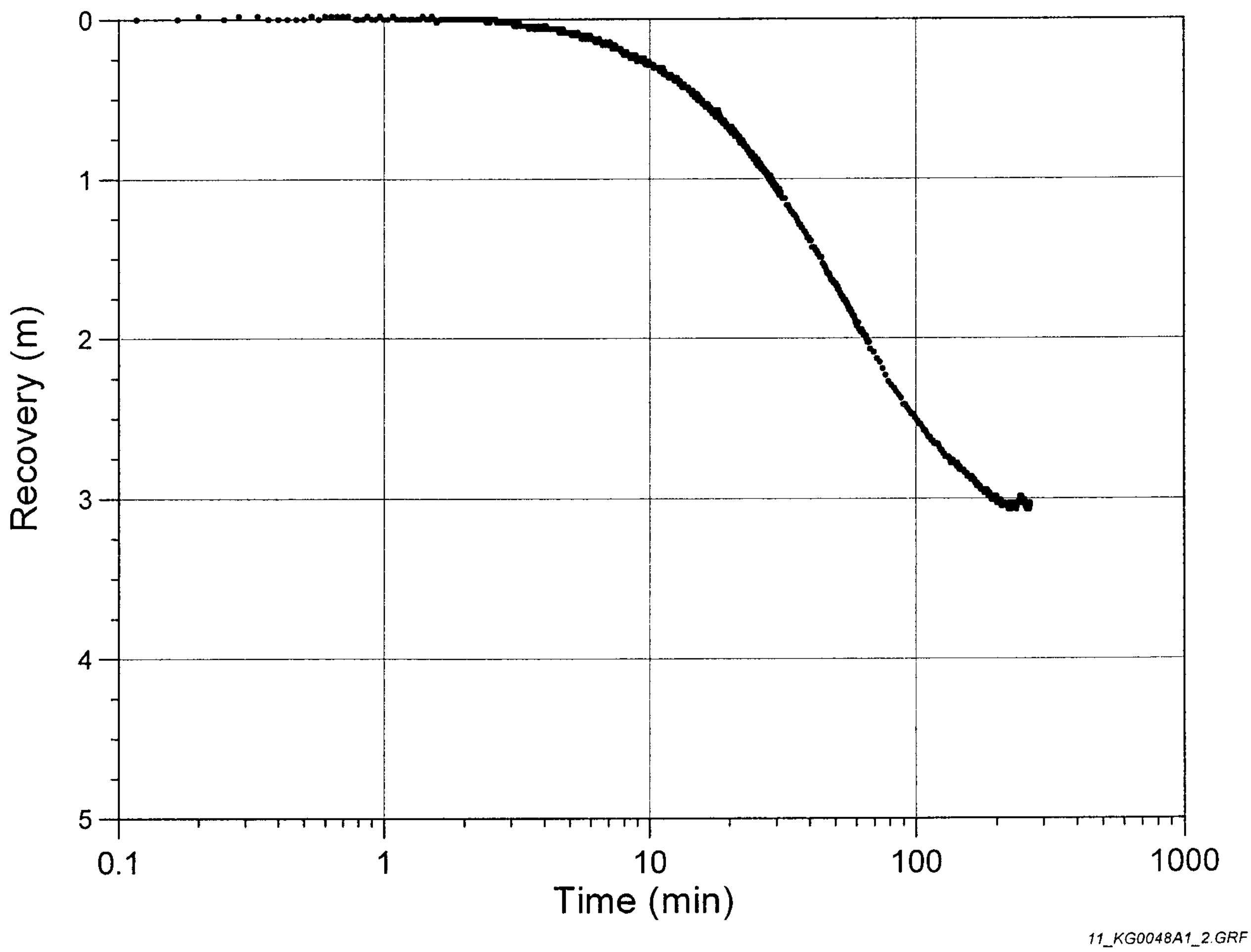




11_KG0048A1_1.GRF 25-okt-99

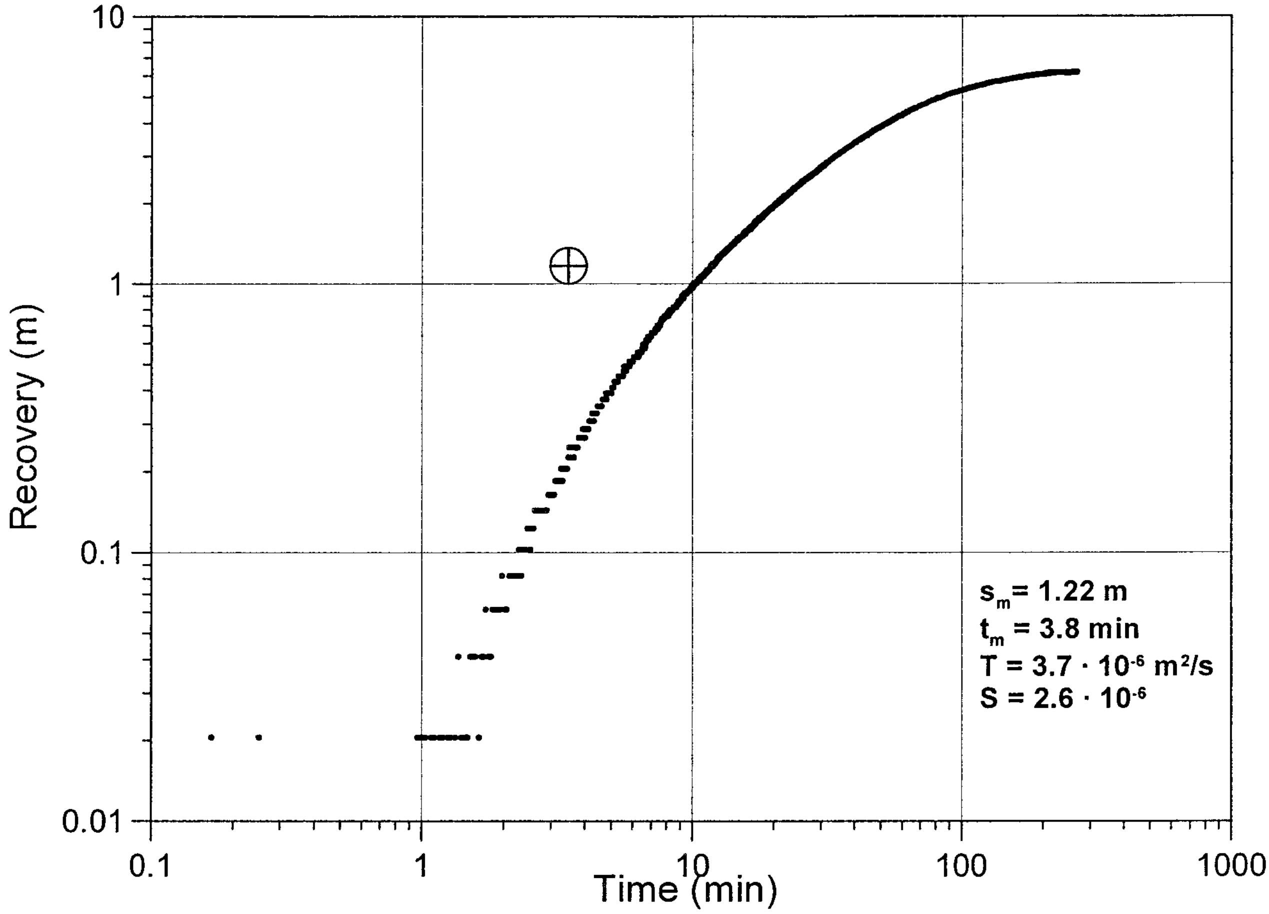
KG0048A01:2

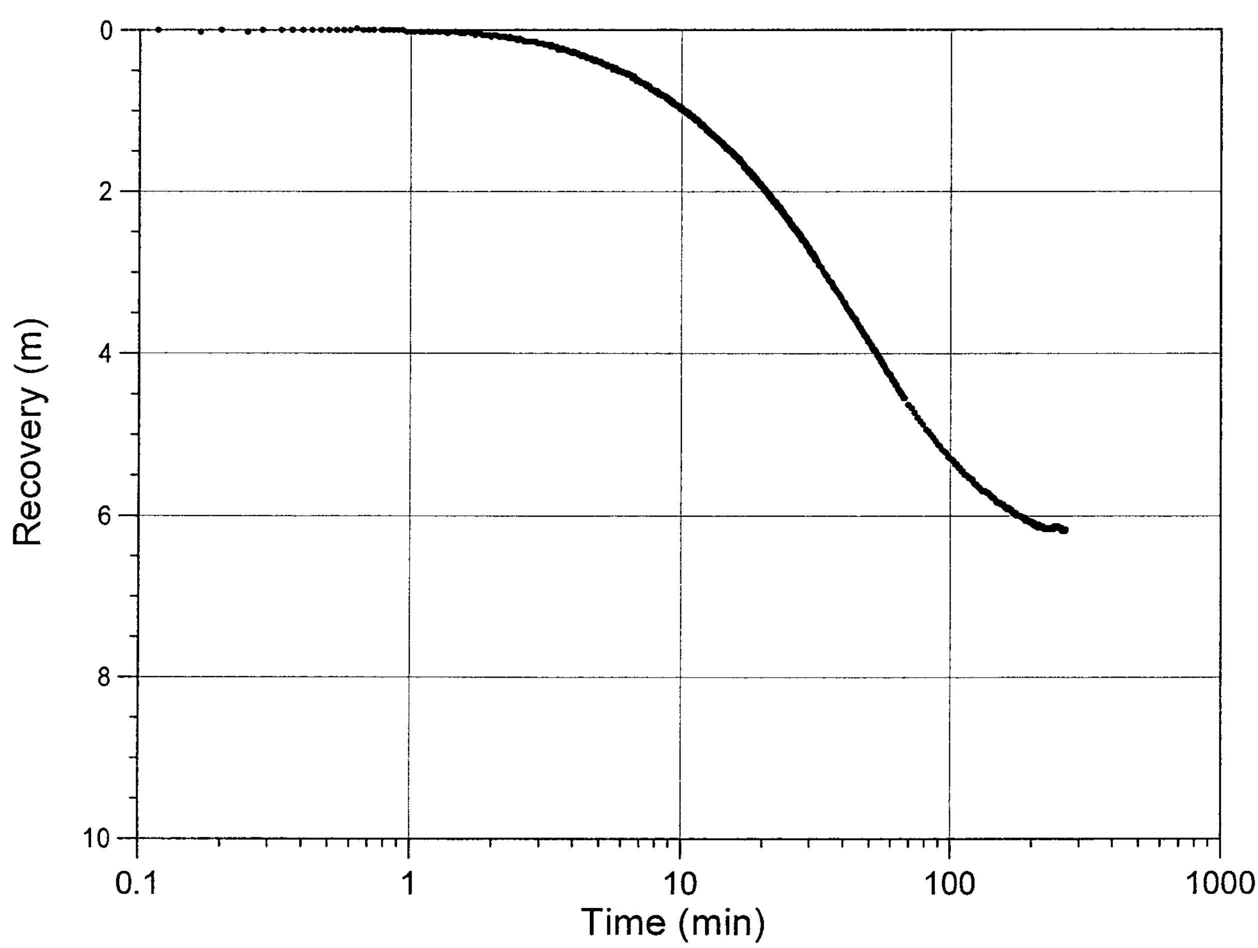




11_KG0048A1_2.GRF 25-okt-99

KG0048A01:3





11_KG0048A1_3.GRF 25-okt-99

APPENDIX 7

Interference test 2:12 in borehole KA3539G, section 9.80 m – 18.30 m

Date: 99-08-22 Field Crew: Bengt Gentzschein
Borehole length: 30.01 m Borehole diameter: 76 mm
Flowing borehole: KA3539G, section #2: 9.80 – 18.30 m

Valve opened: 990822 08:00.07 Valve closed: 990822 09:11.05
End of Test: 990822 18:00

Total flowing time : 61 min Tot. Pr. Build-up time 529 min.

The test was performed as an Interference test. Pressure responses were monitored in 61 borehole sections.

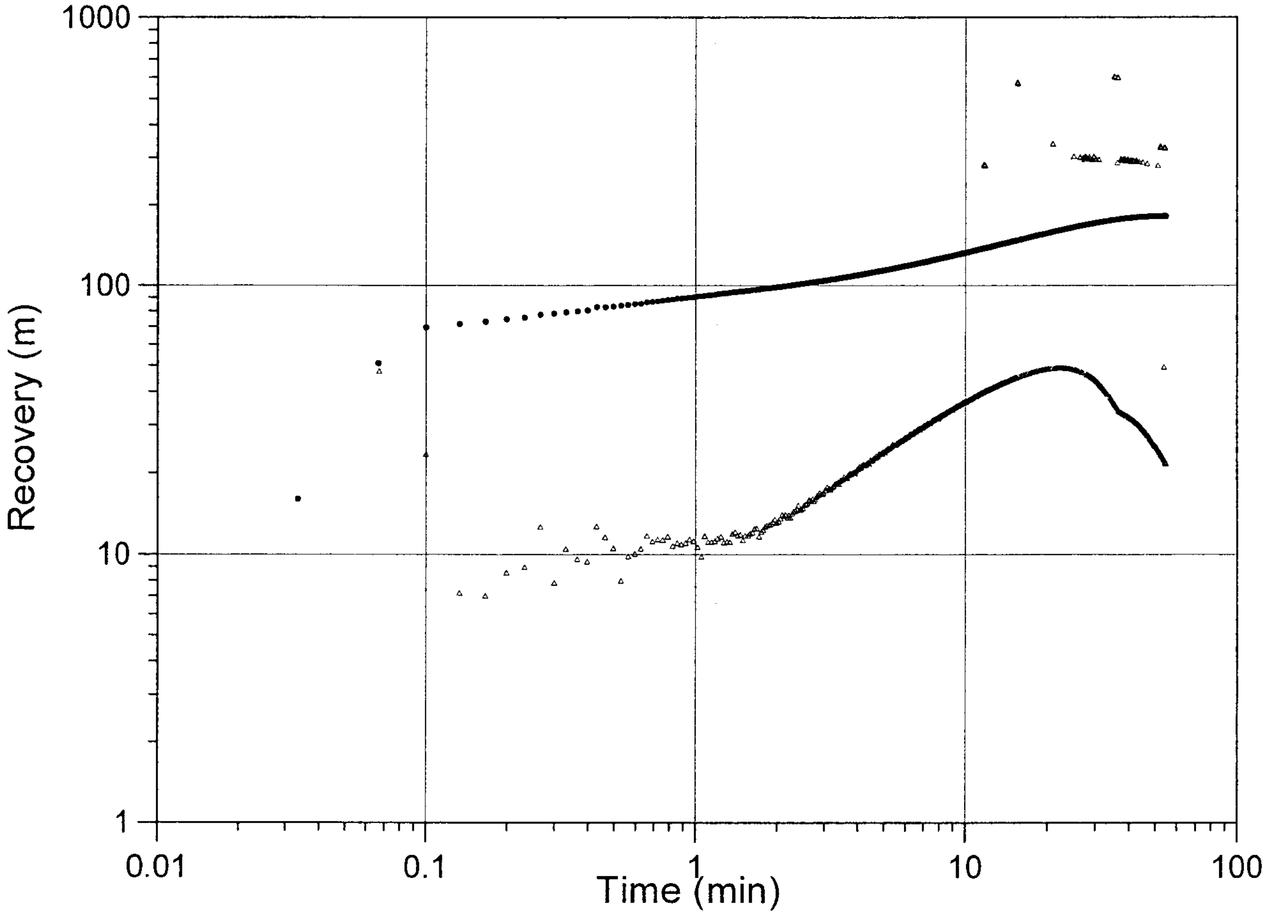
Flow data

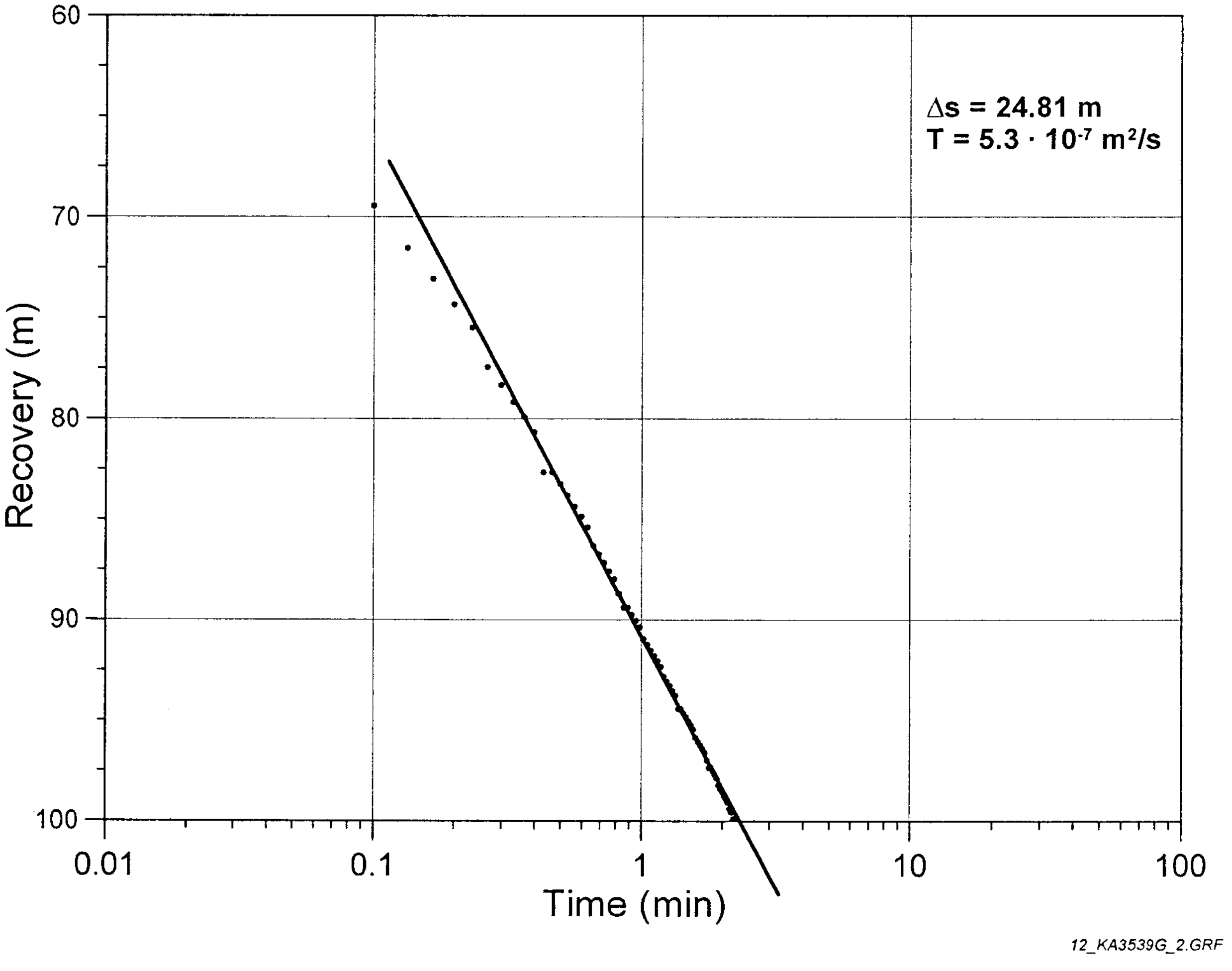
Manually measured flow rates of KA3539G, section 9.80 – 18.30 m are presented in the table below:

Table Manually measured flow rates, Interference test in KA3539G, section 9.80 – 18.30 m (test #12). Prototype repository, August 1999.

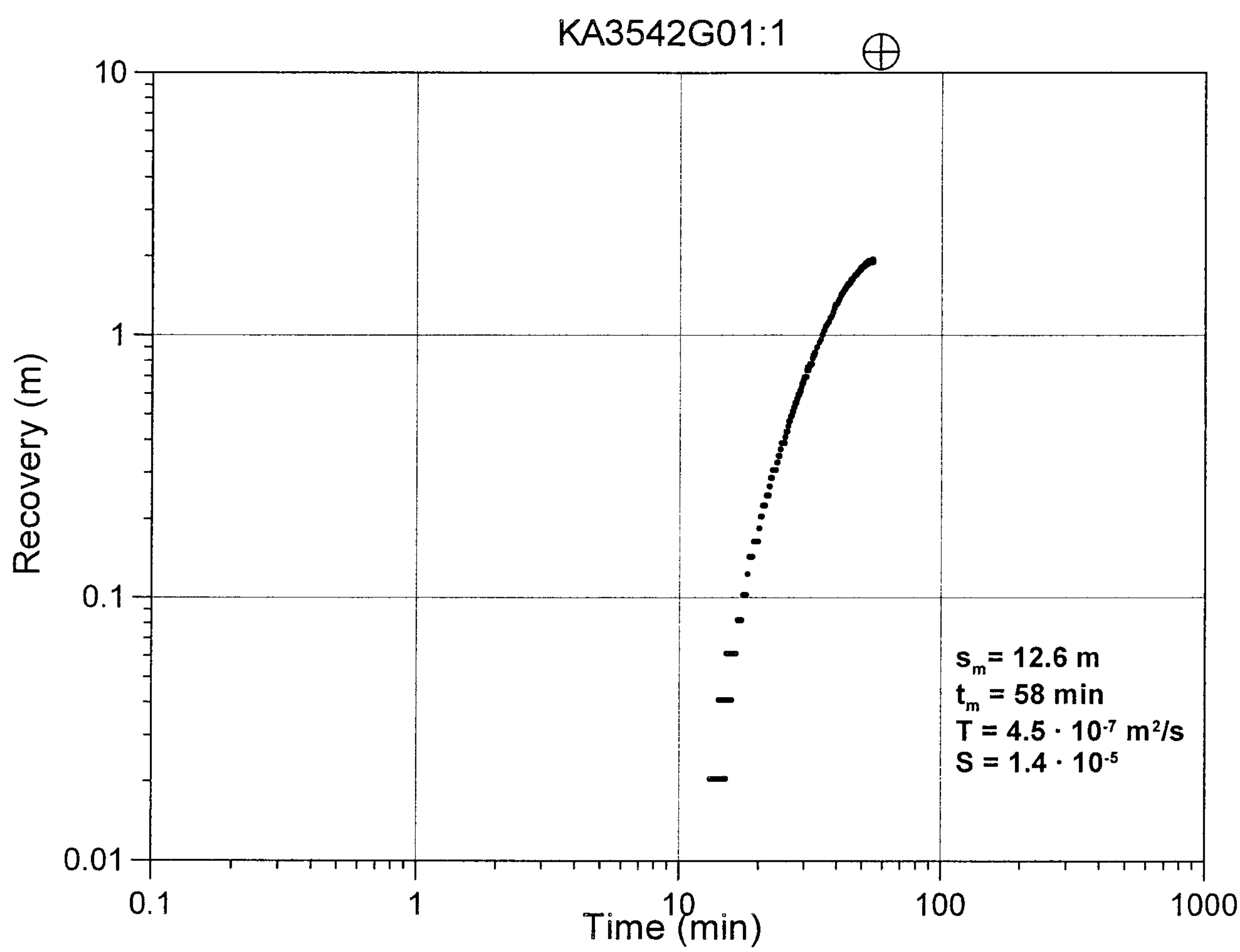
Time	Flow rate (l/min)
08:00.37	5.28
08:03.37	5.26
08:06.37	5.095
08:16	4.73
08:30	4.462
08:40	4.37
08:50	4.348
09:01	4.32
09:04	4.285
09:10	4.278

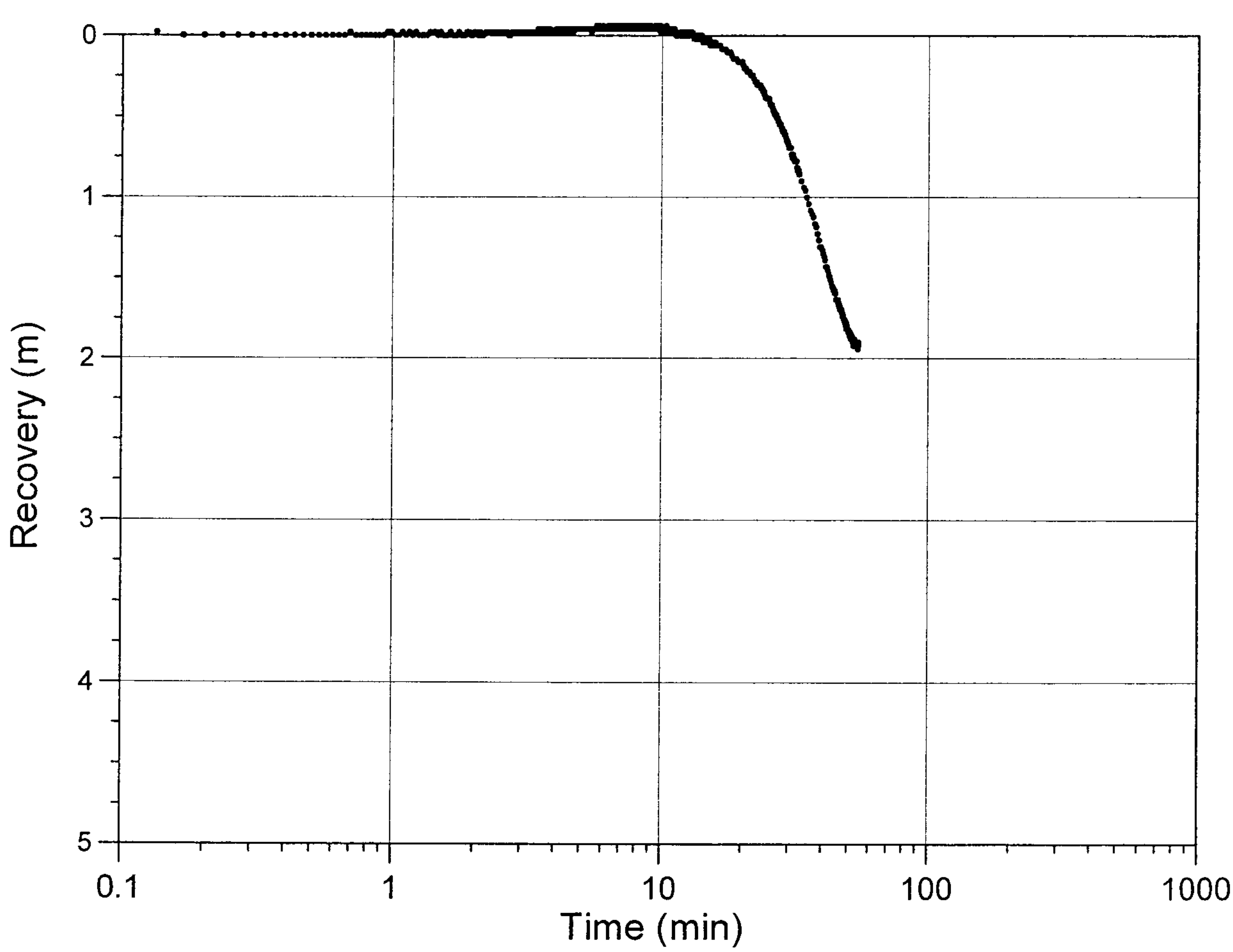
KA3539G:2



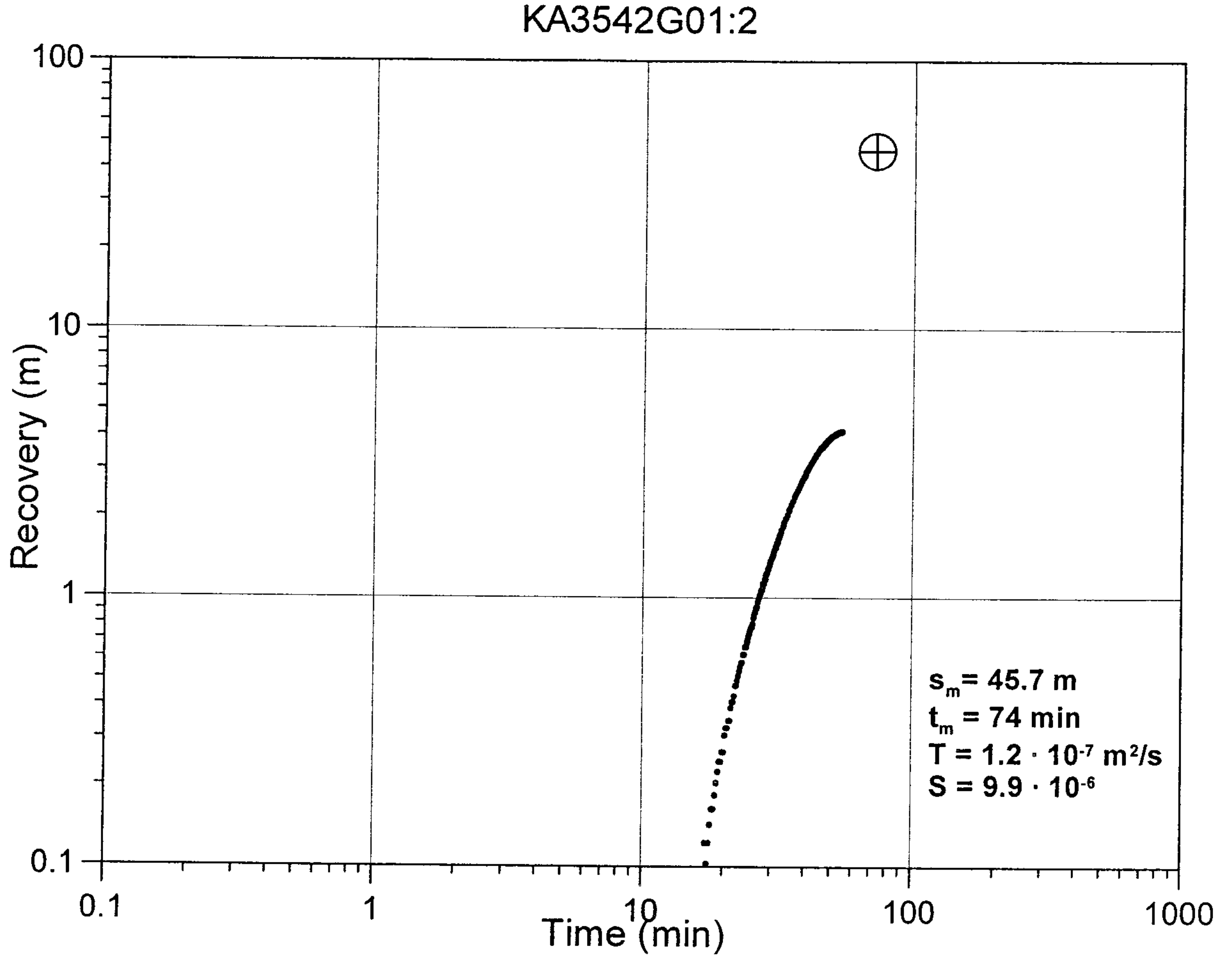


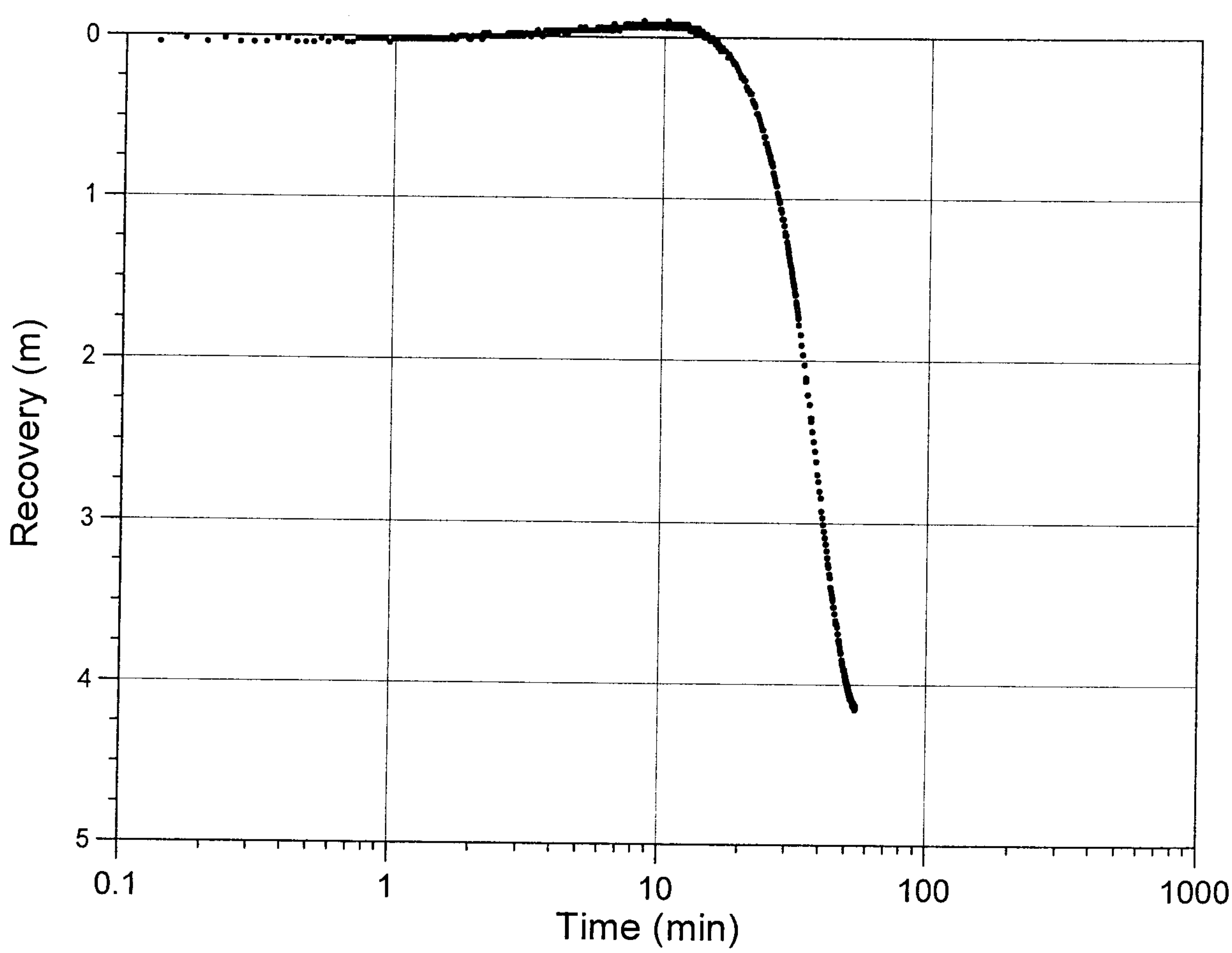
12_KA3539G_2.GRF 27-okt-99



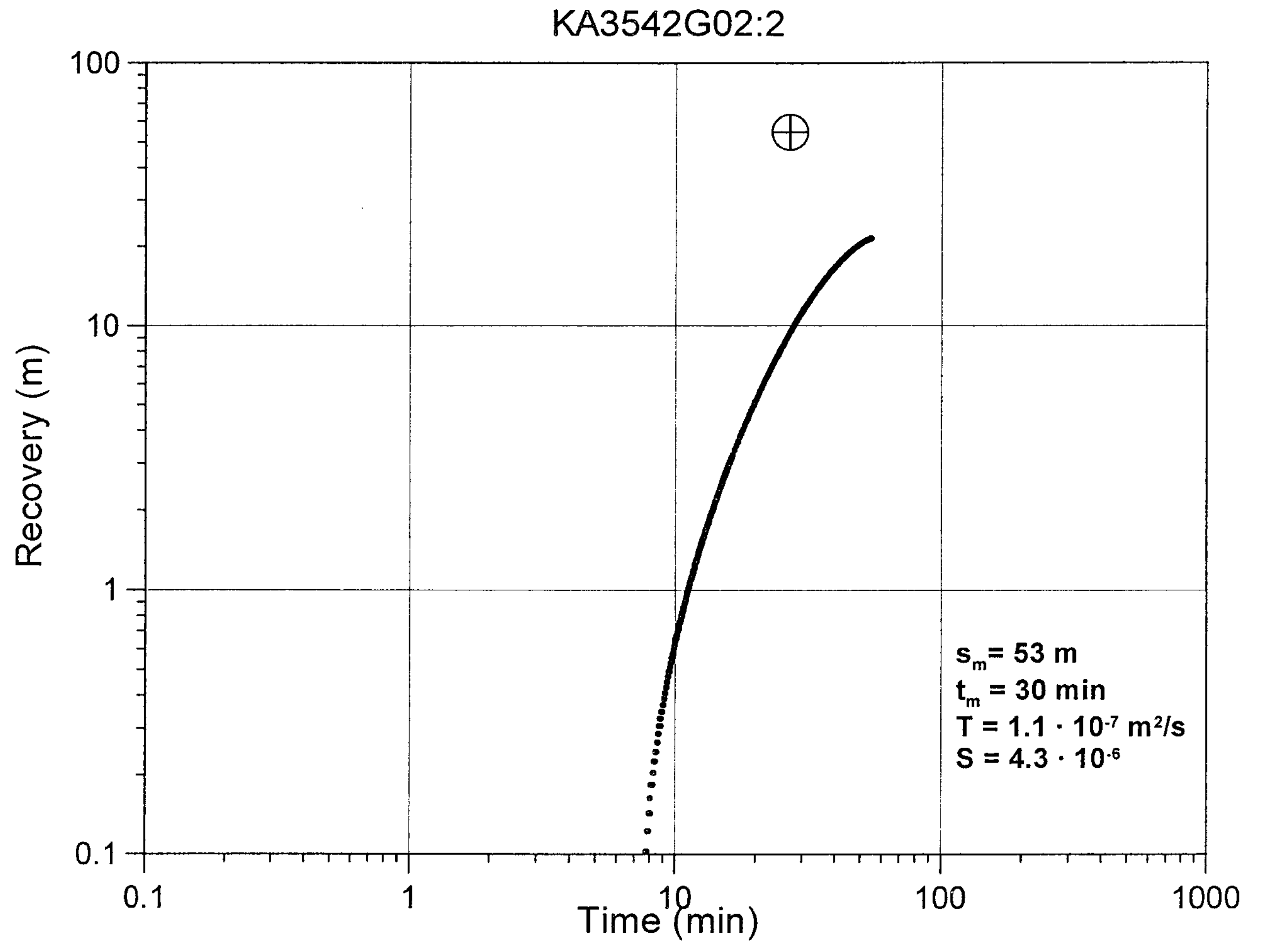


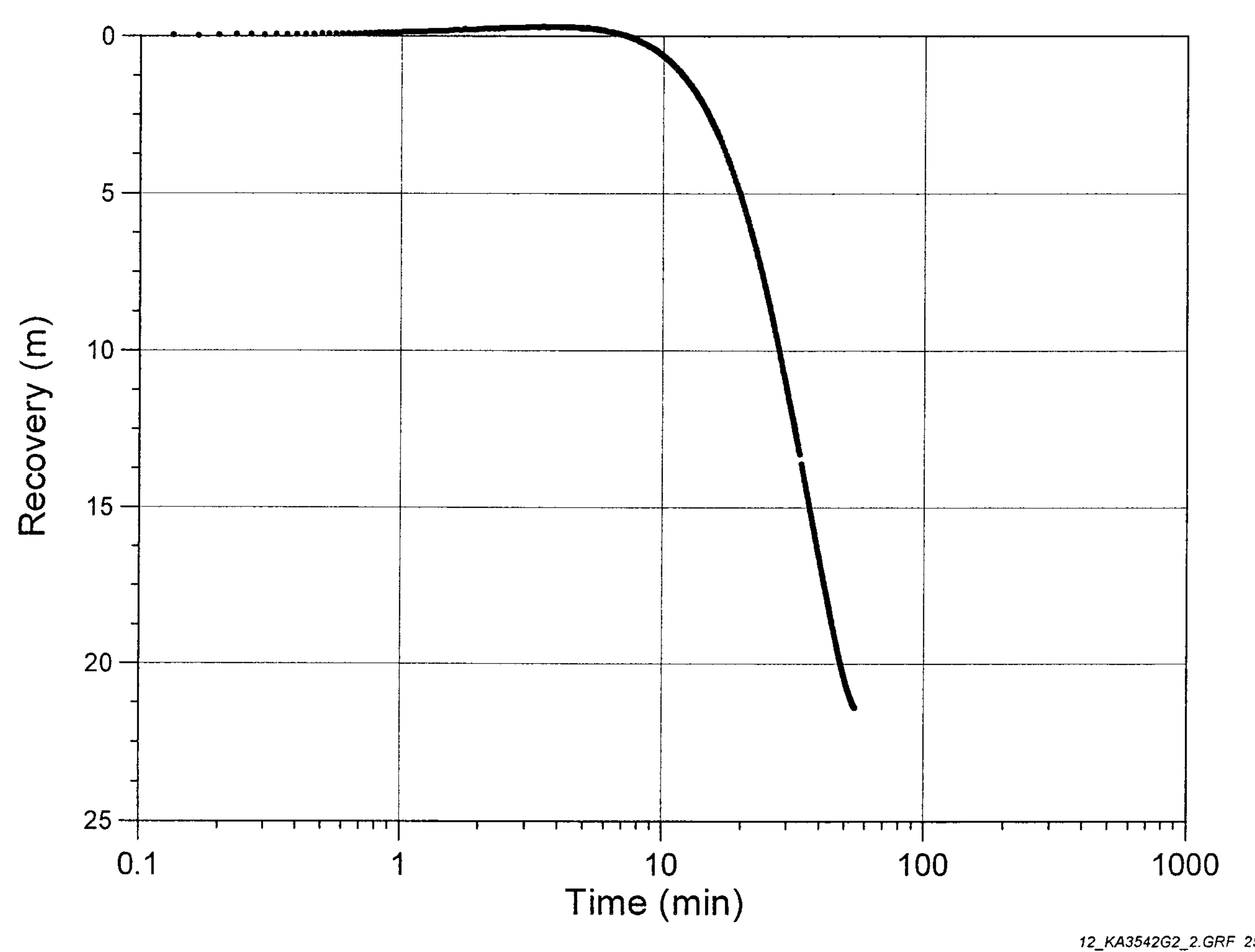
12_KA3542G1_1.GRF 25-okt-99



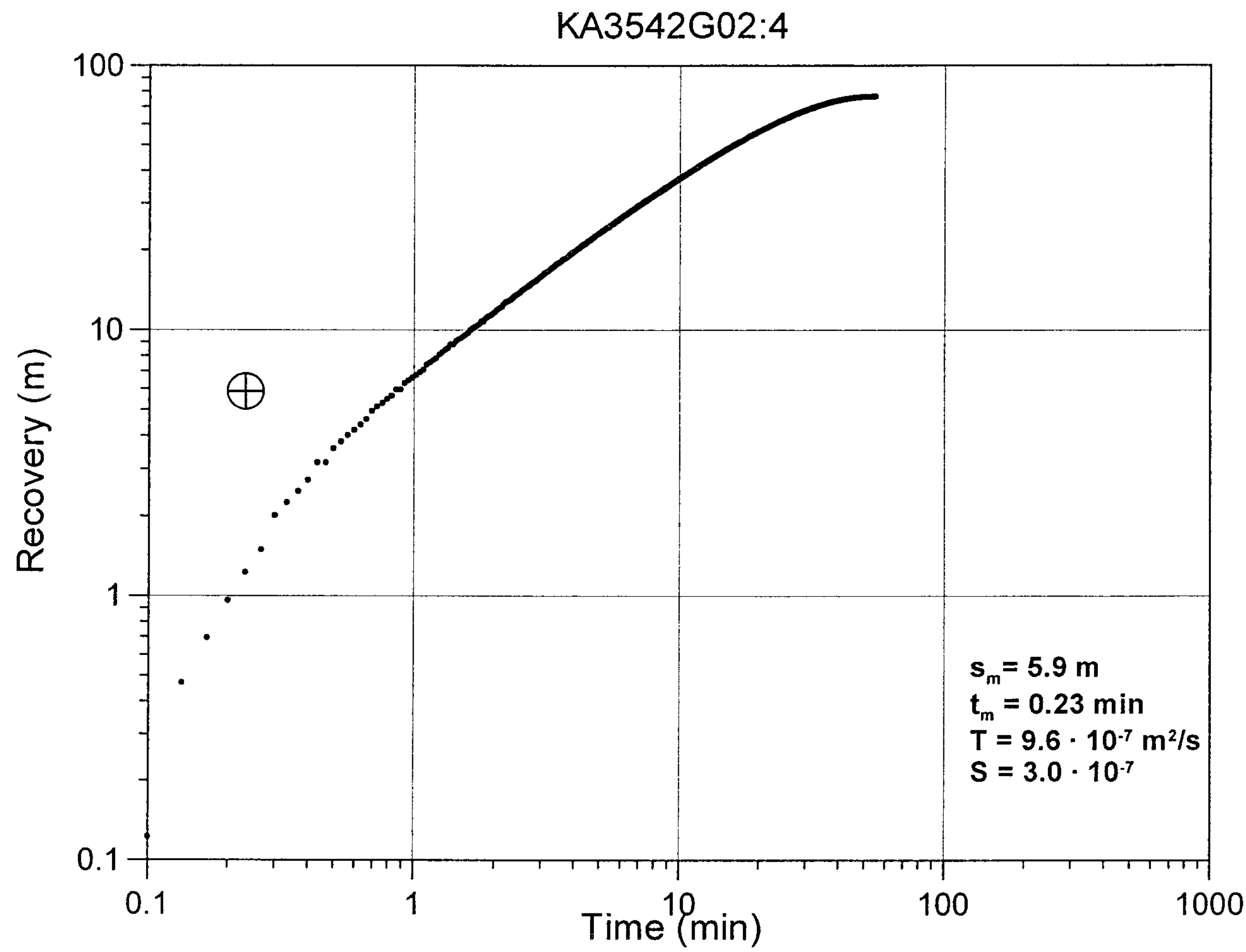


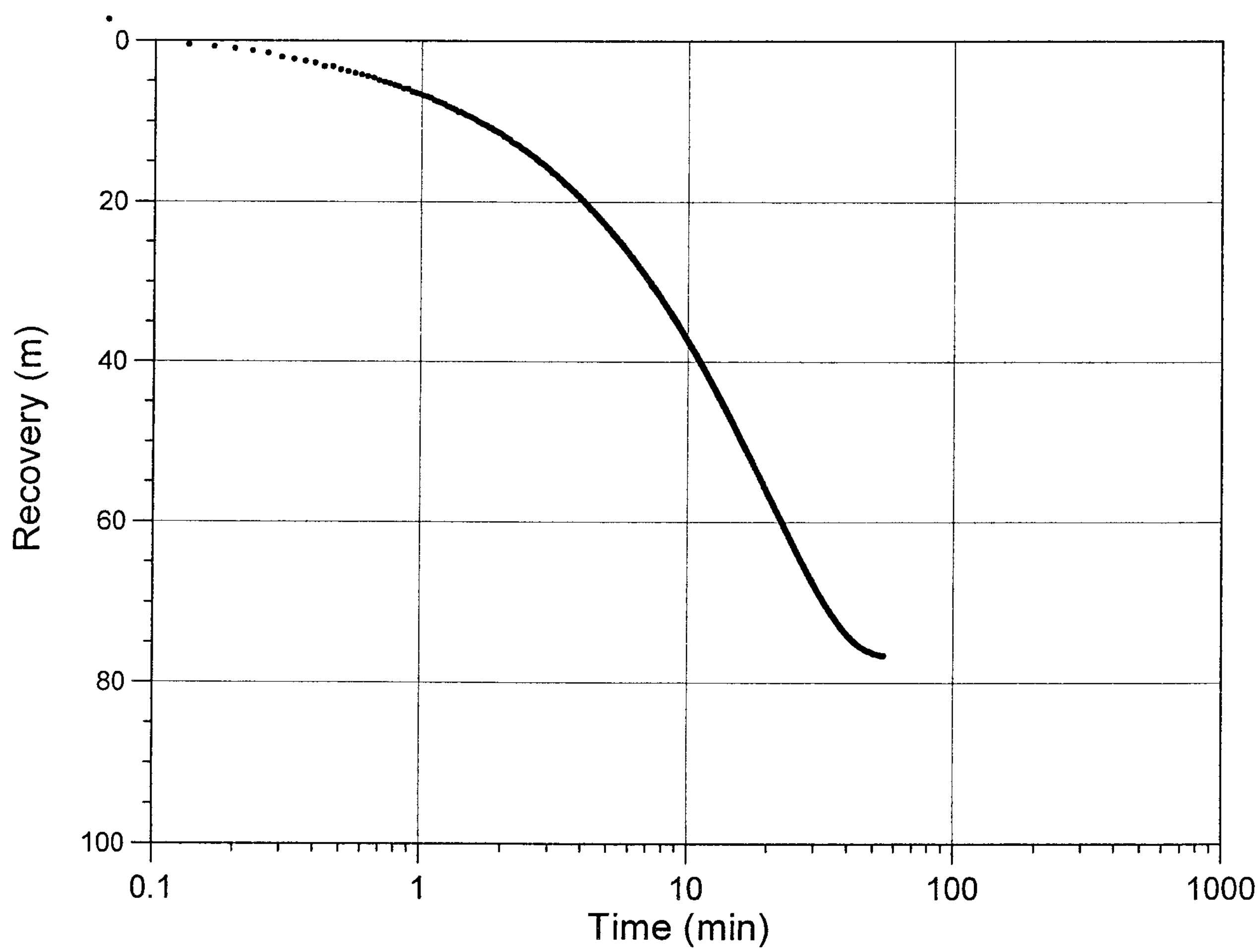
12_KA3542G1_2.GRF 25-okt-99



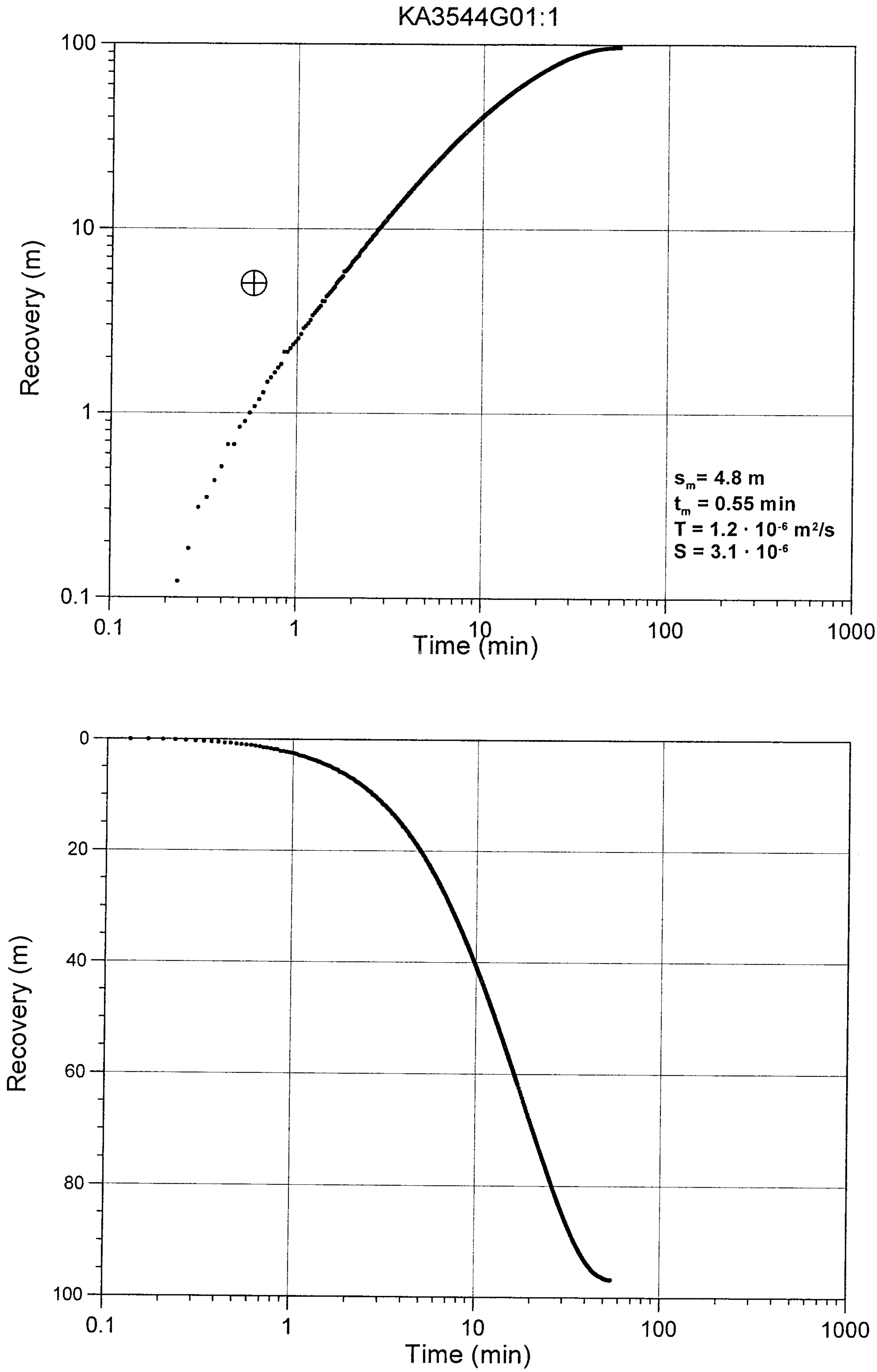


12_KA3542G2_2.GRF 25-okt-99



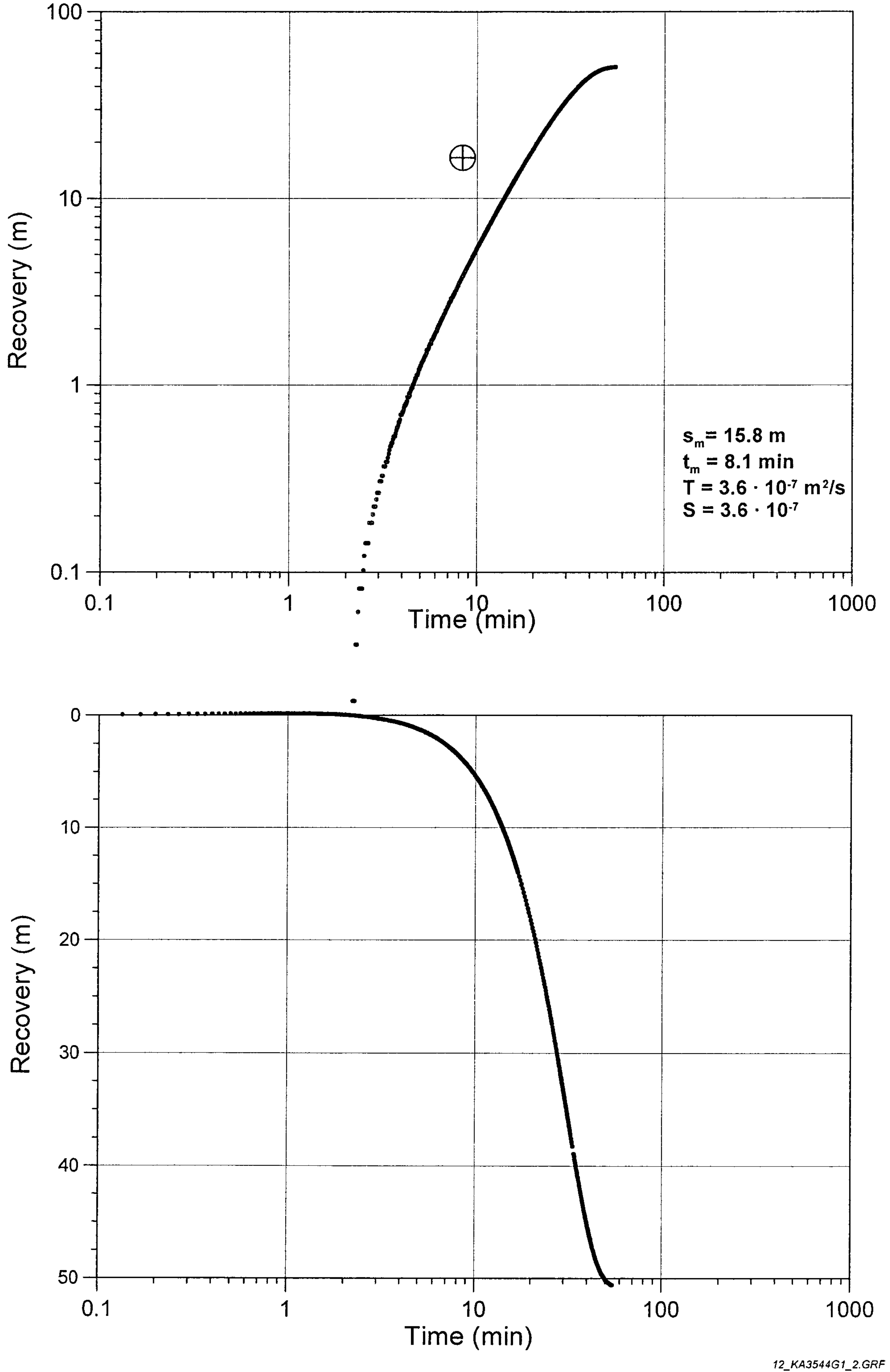


12_KA3542G2_4.GRF 25-okt-99

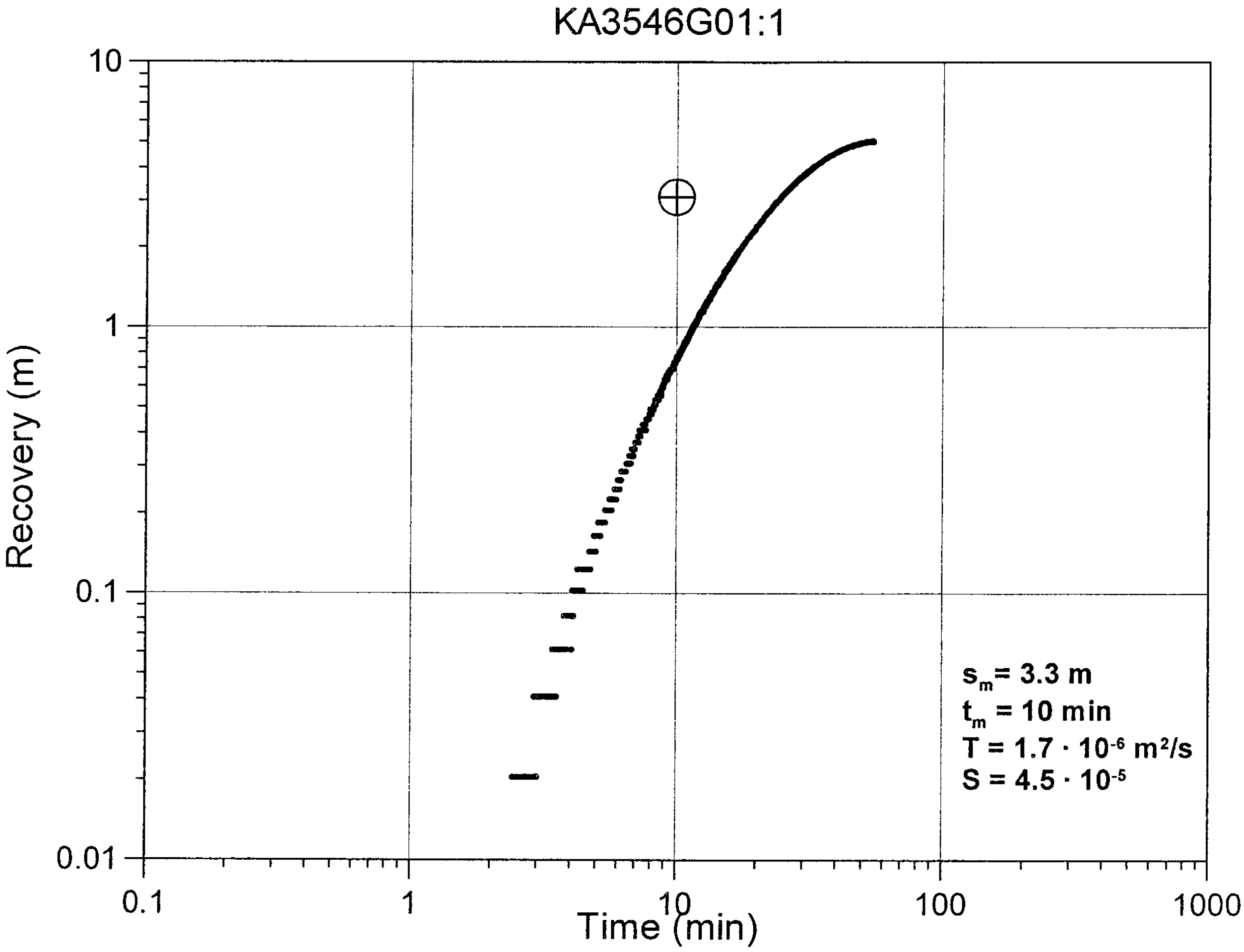


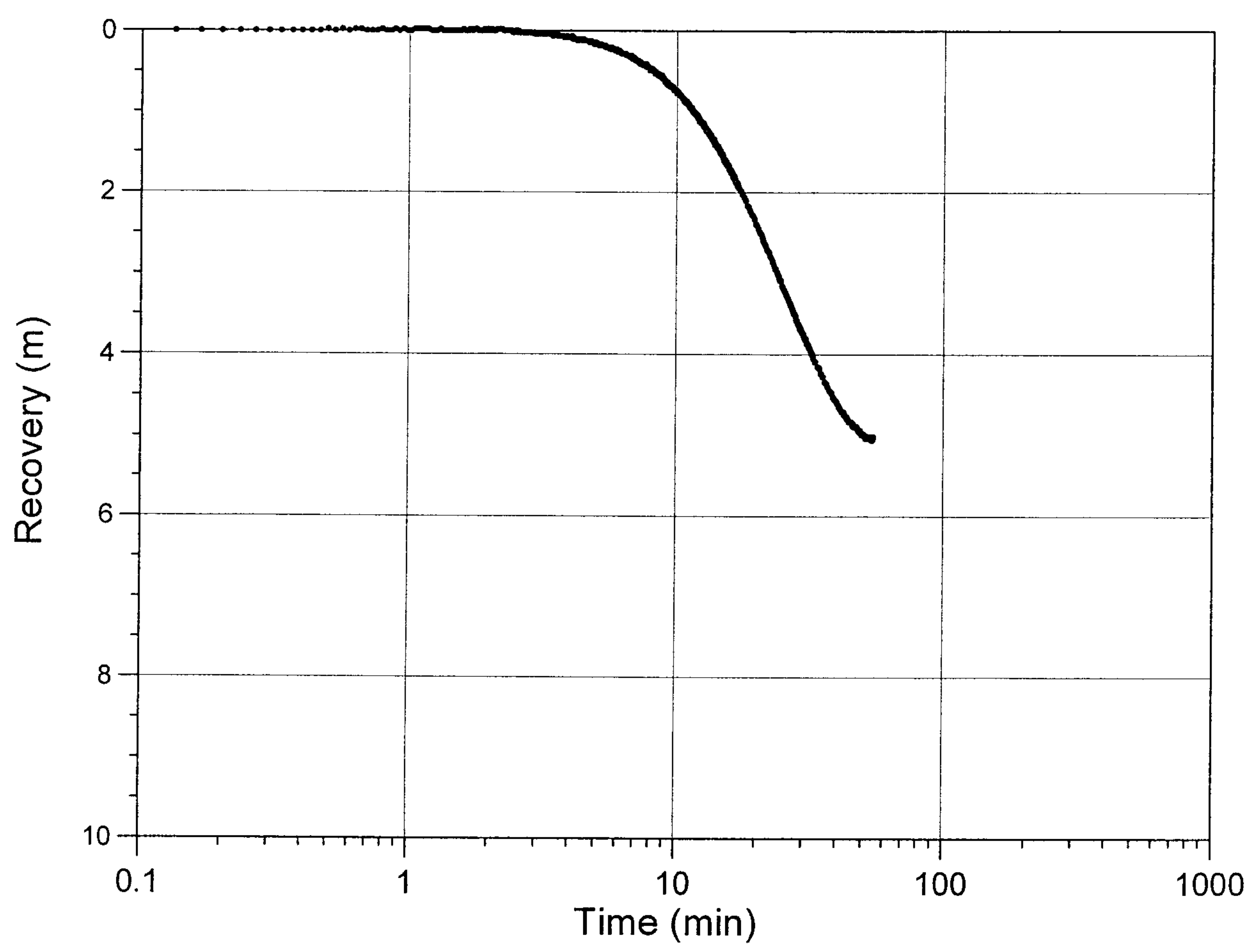
12_KA3544G1_1.GRF 25-okt-99

KA3544G01:2

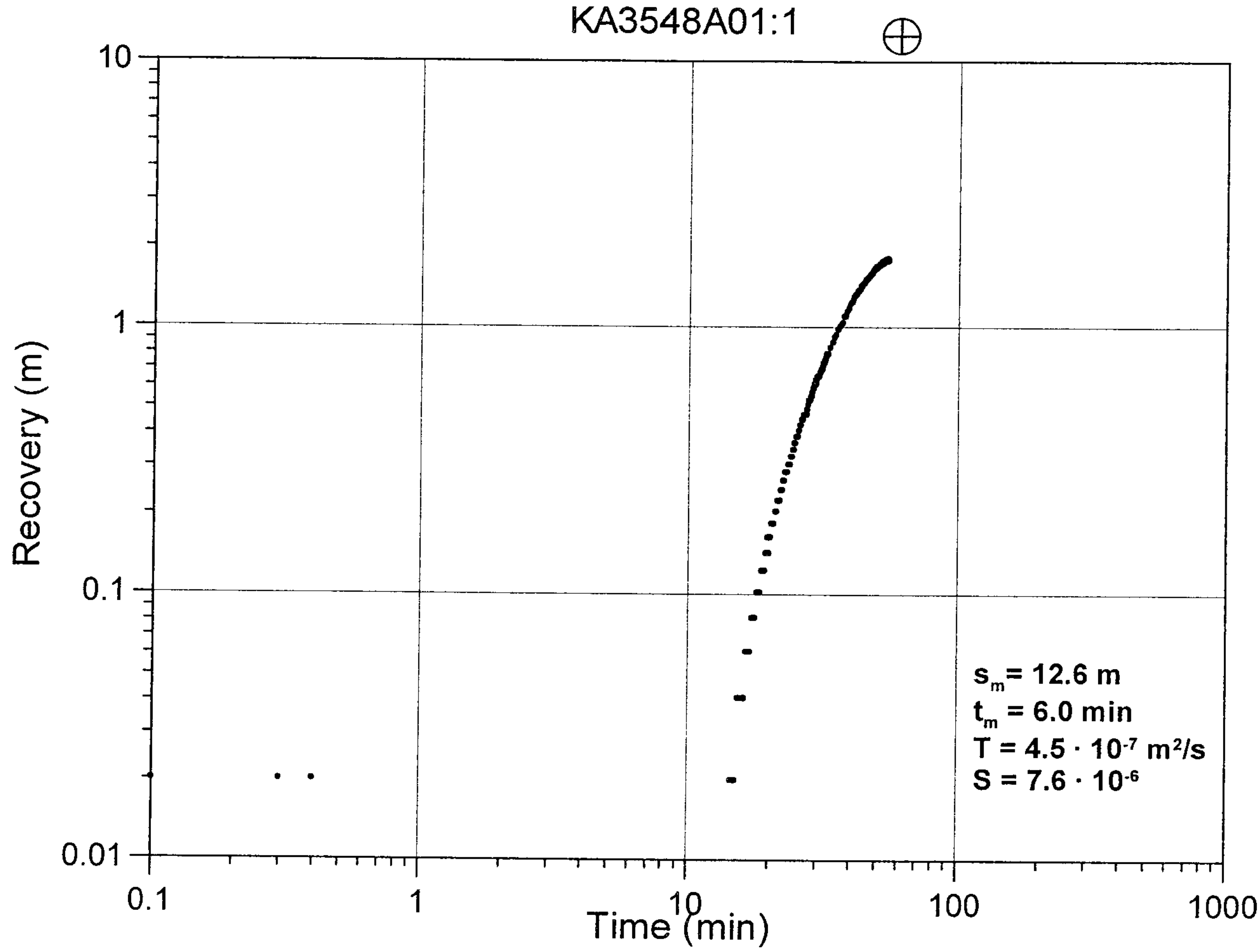


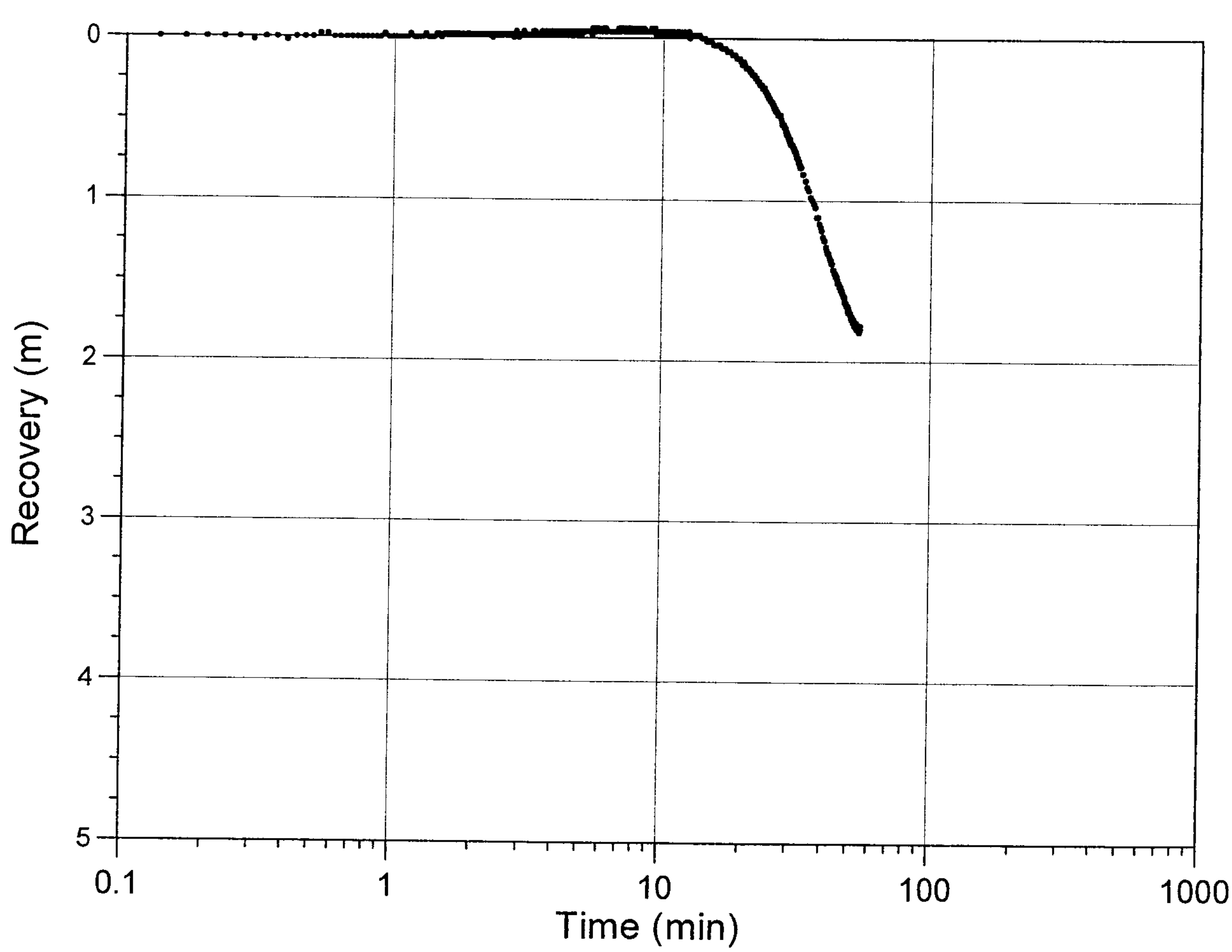
12_KA3544G1_2.GRF 25-okt-99



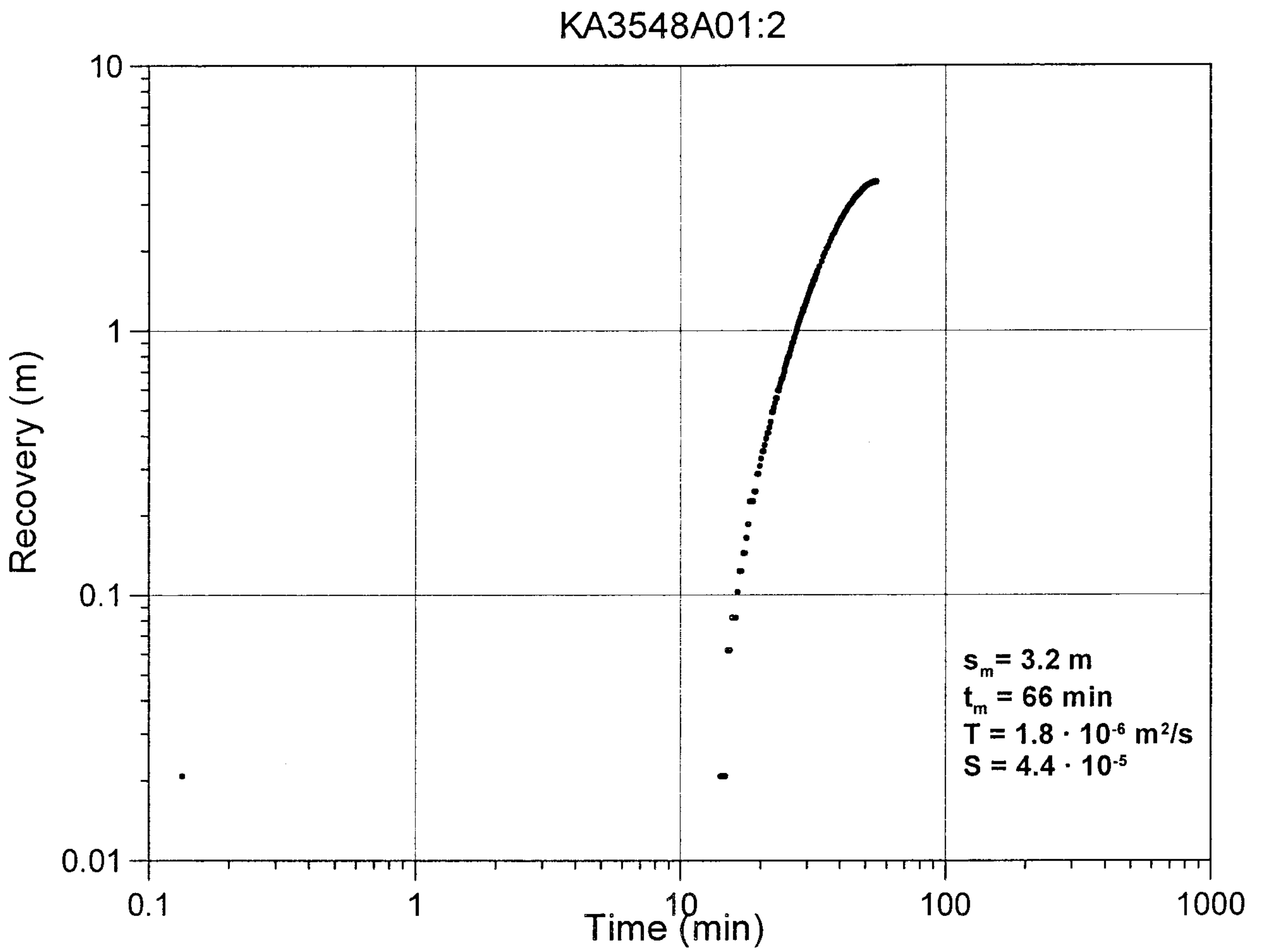


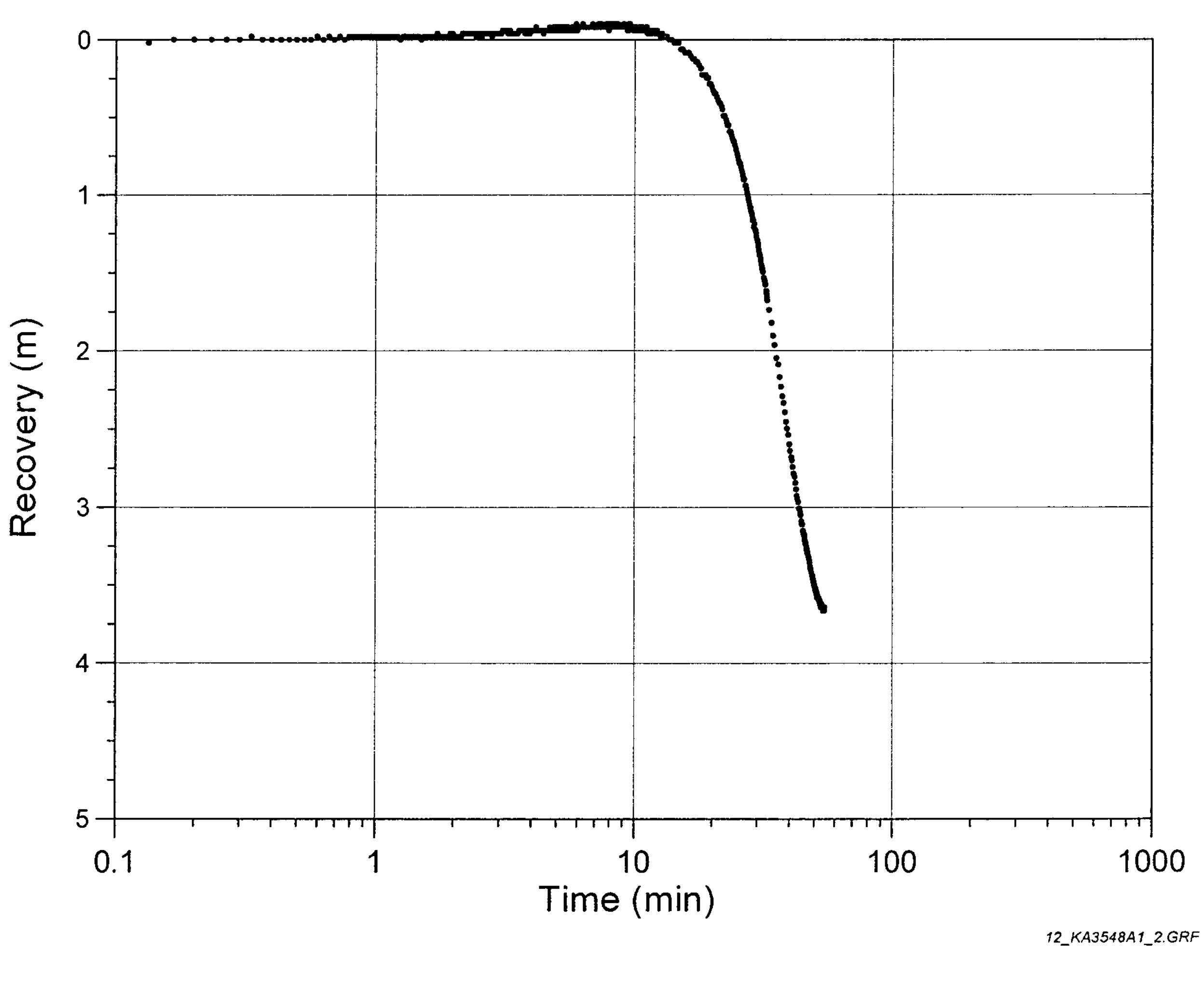
12_KA3546G1_1.GRF 25-okt-99





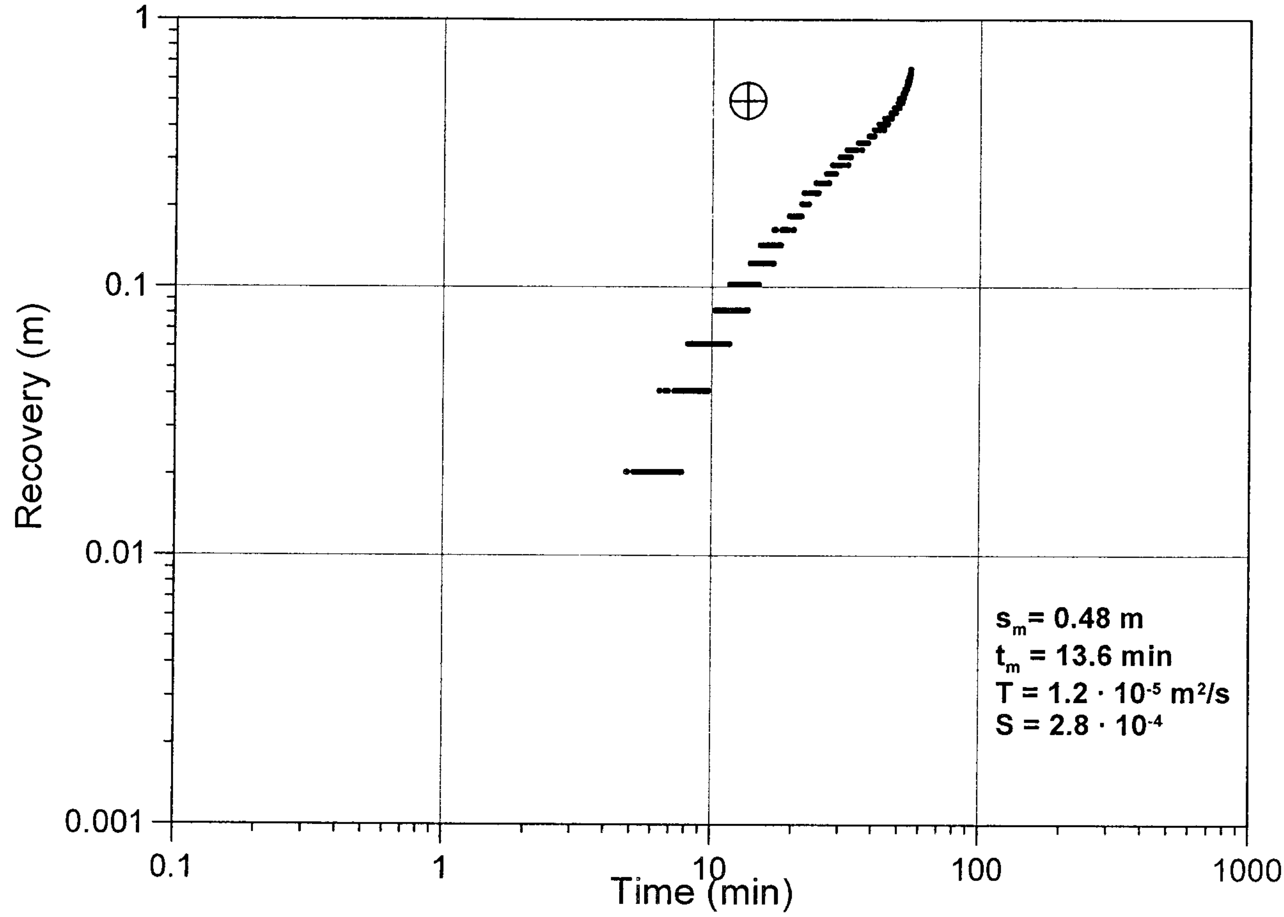
12_KA3548A1_1.GRF 25-okt-99

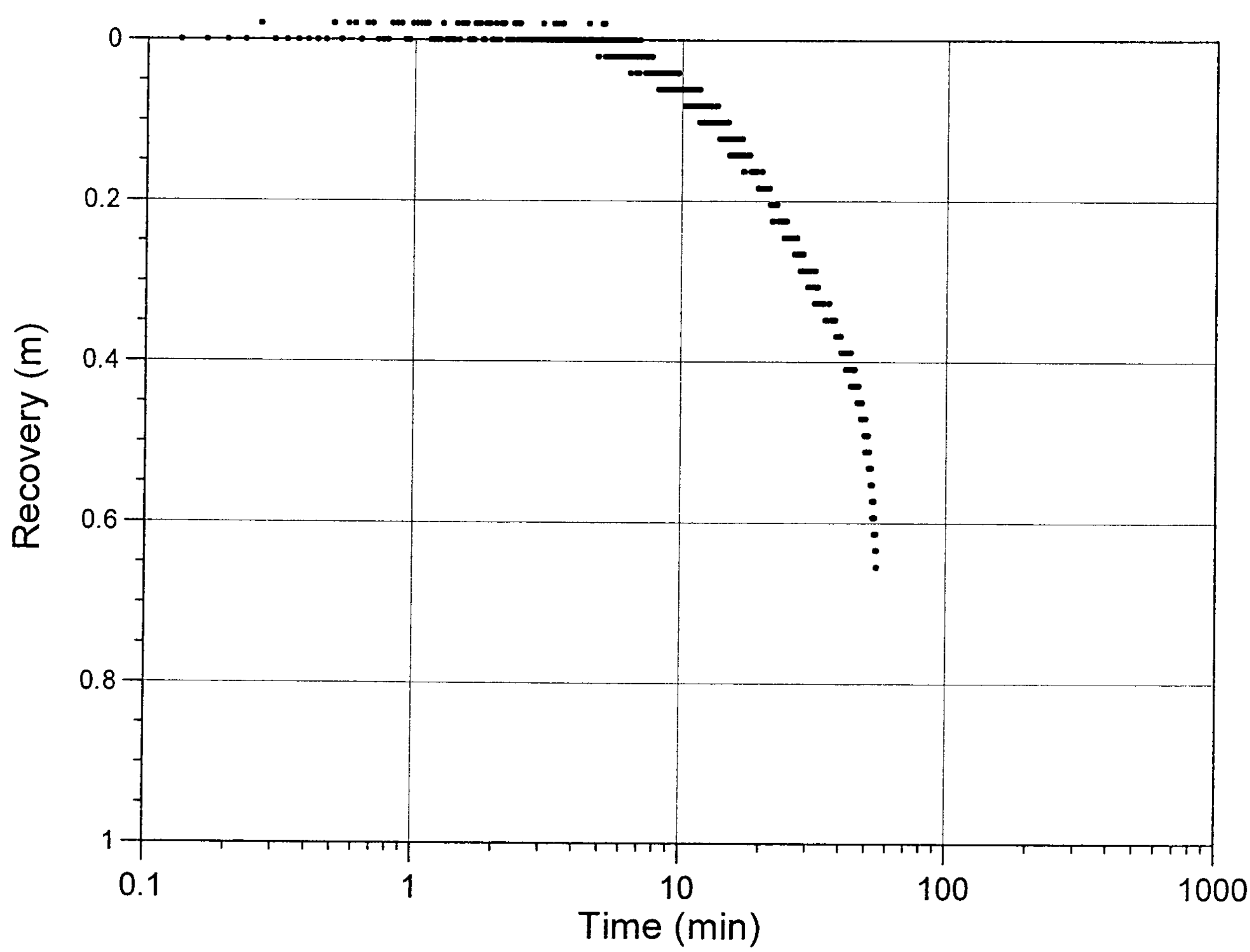




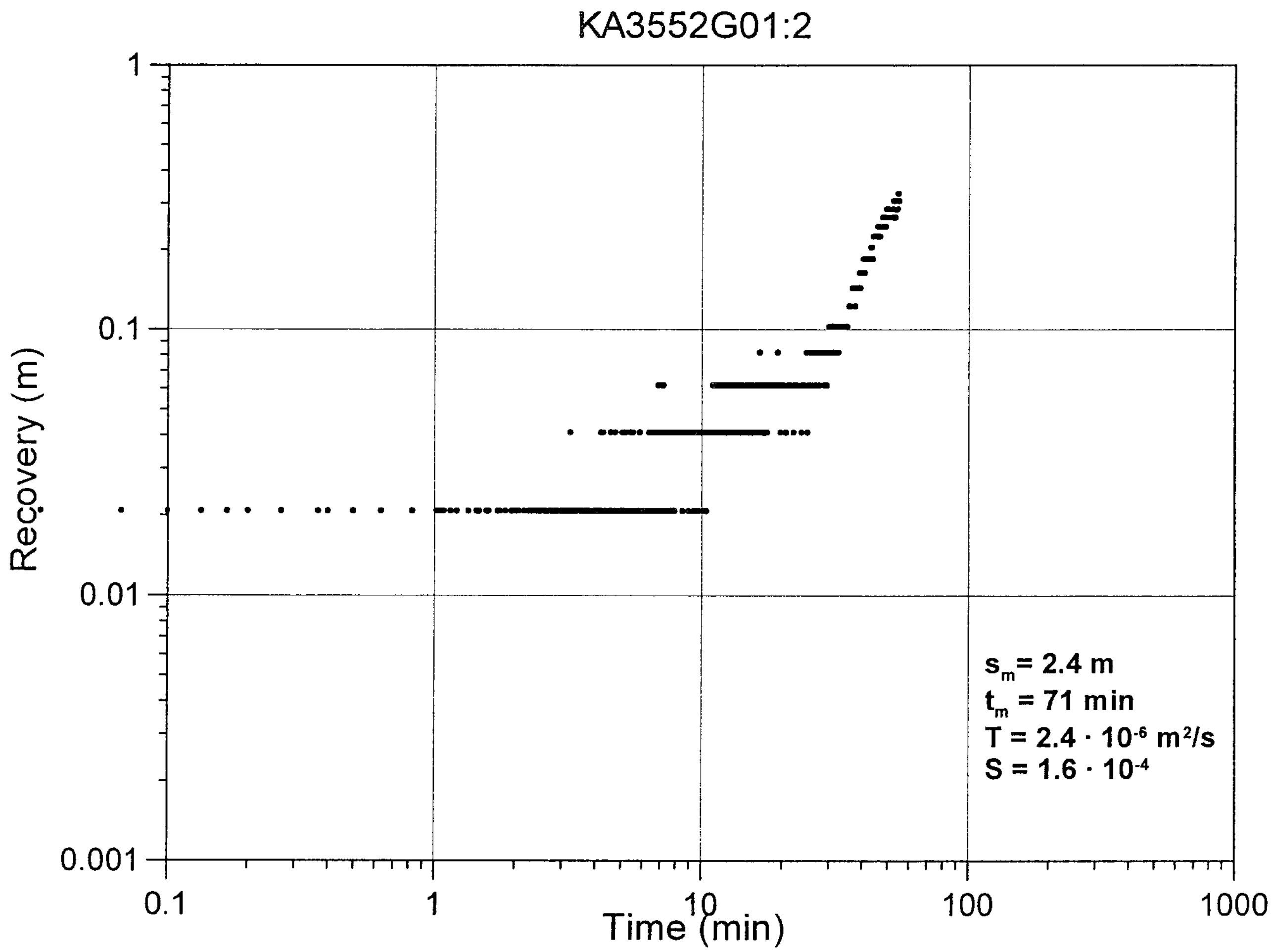
12_KA3548A1_2.GRF 25-okt-99

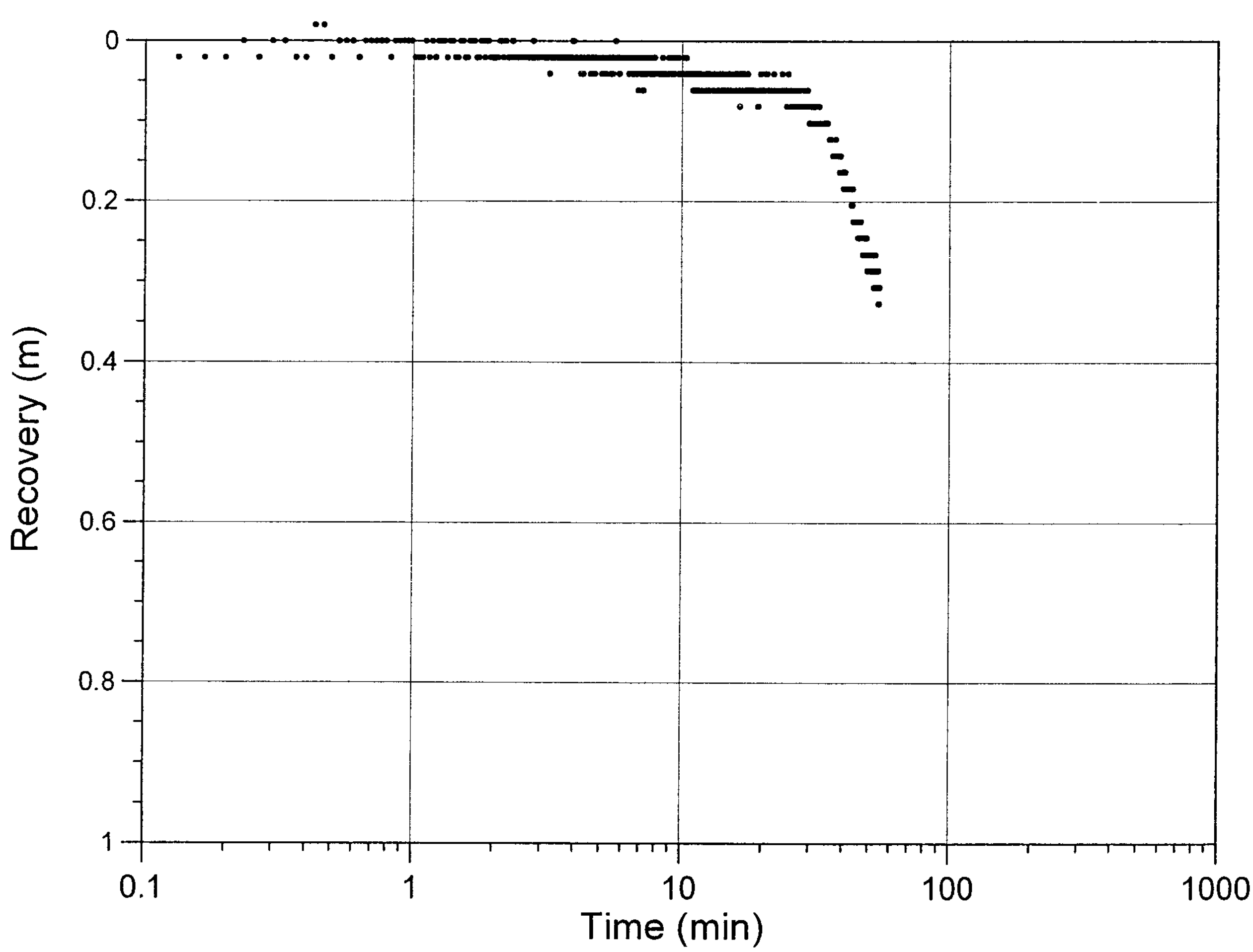
KA3550G01:1



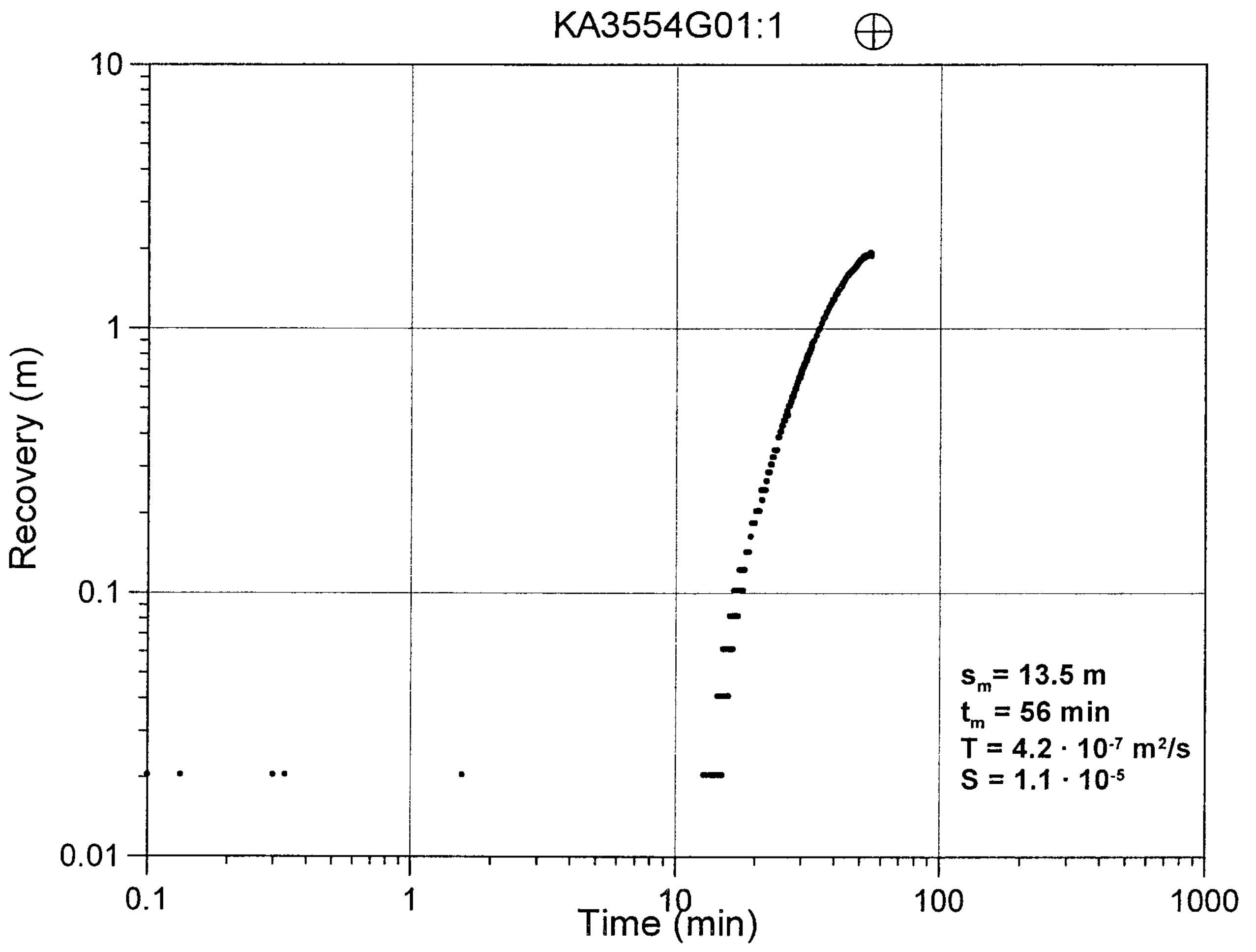


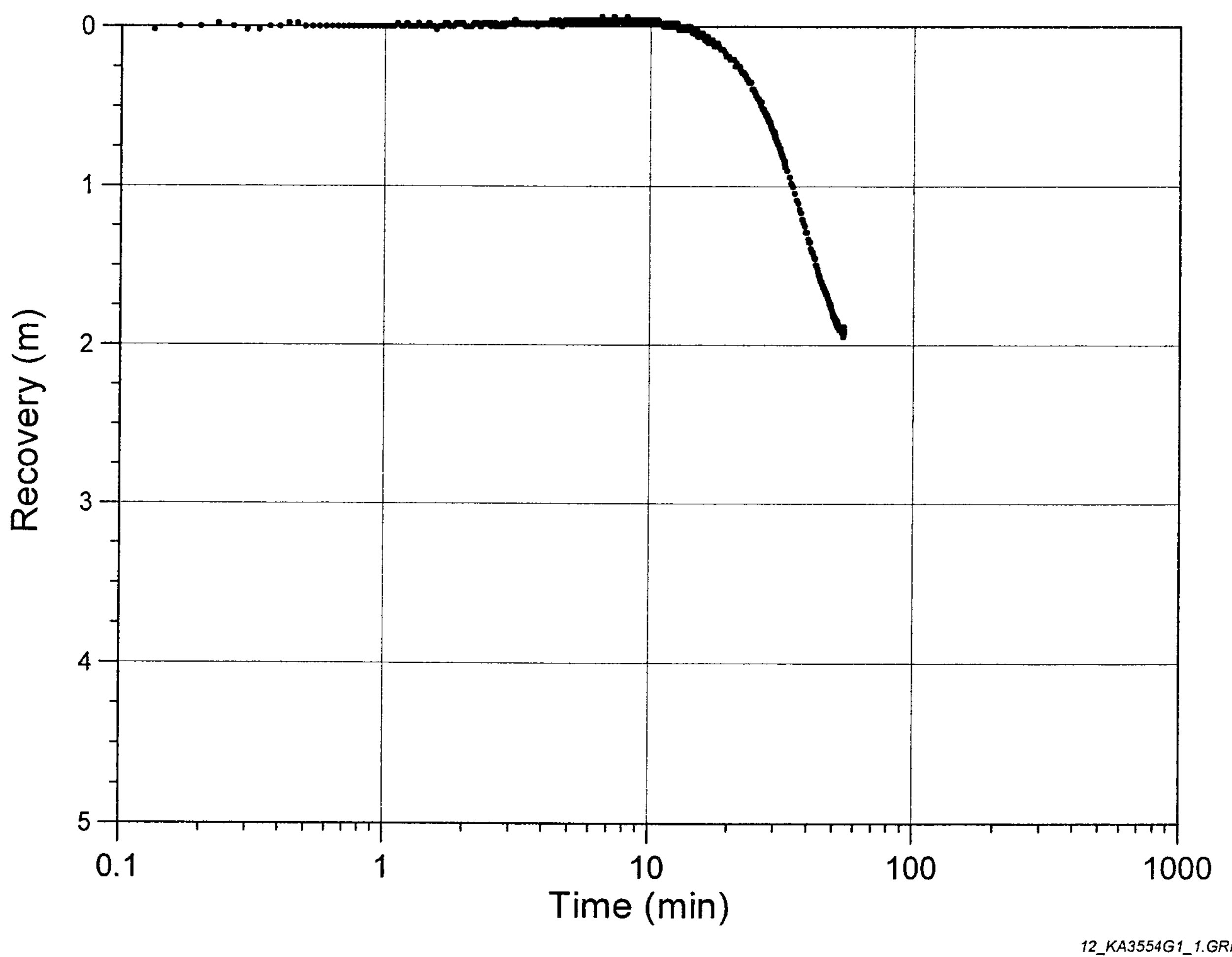
12_KA3550G1_1.GRF 25-okt-99



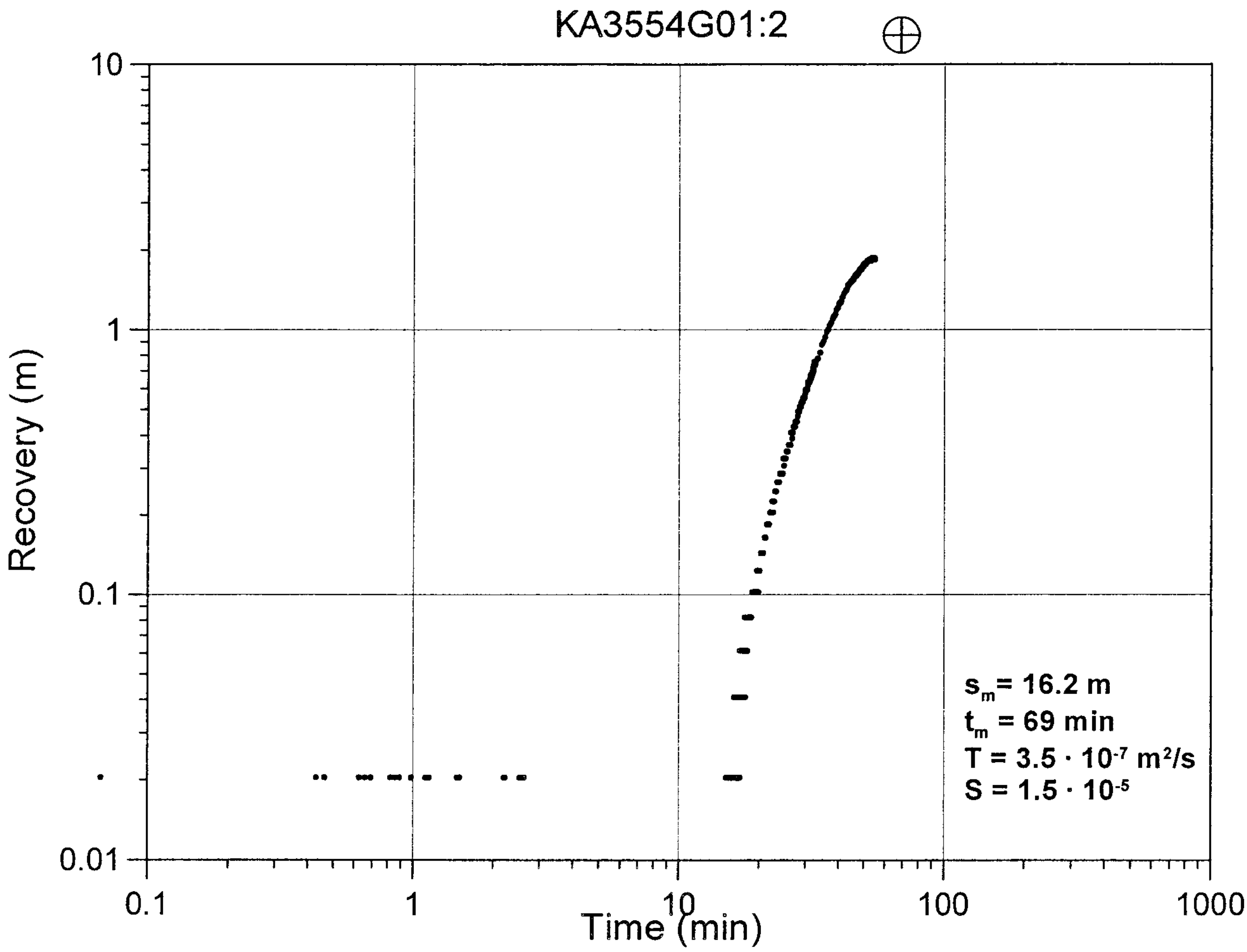


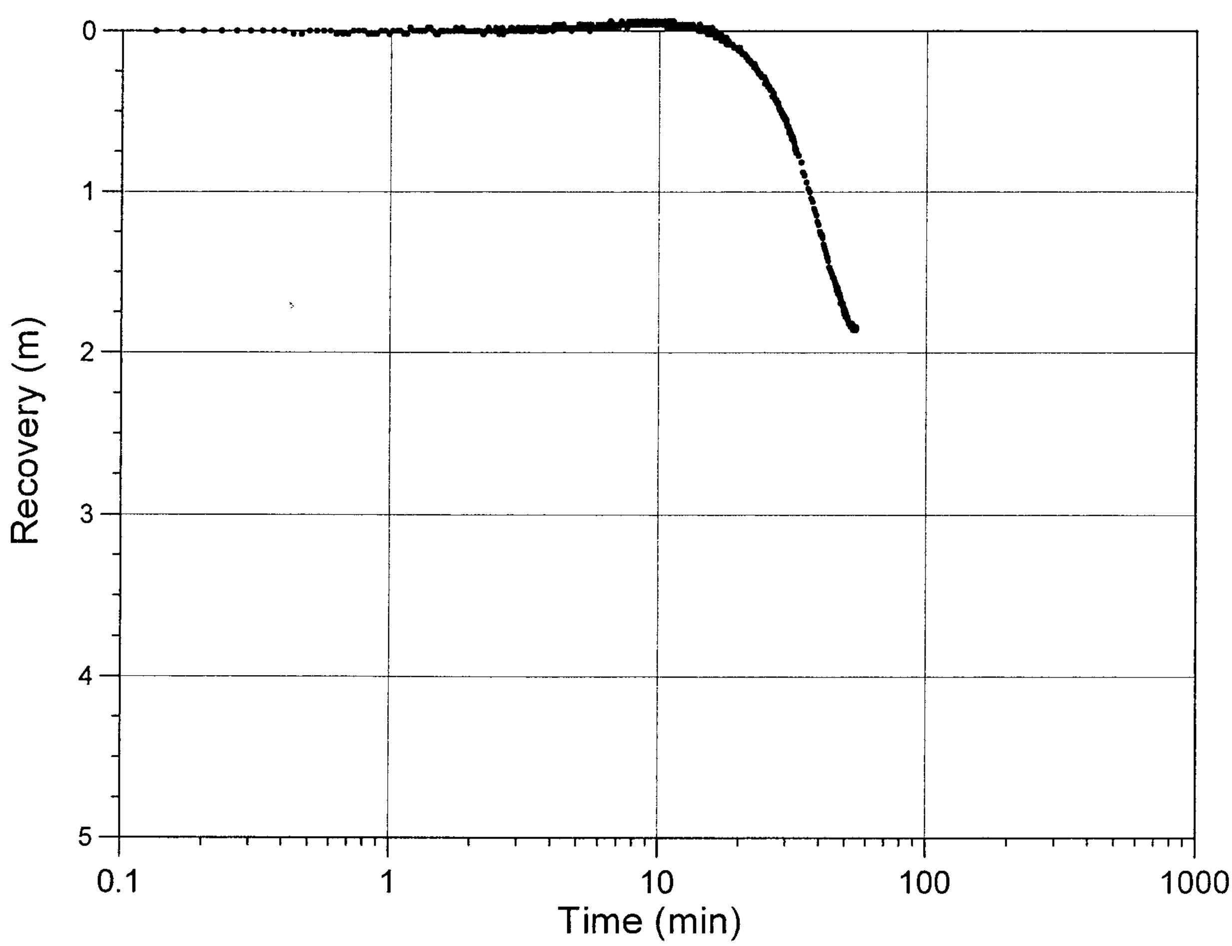
12_KA3552G1_2.GRF 25-okt-99



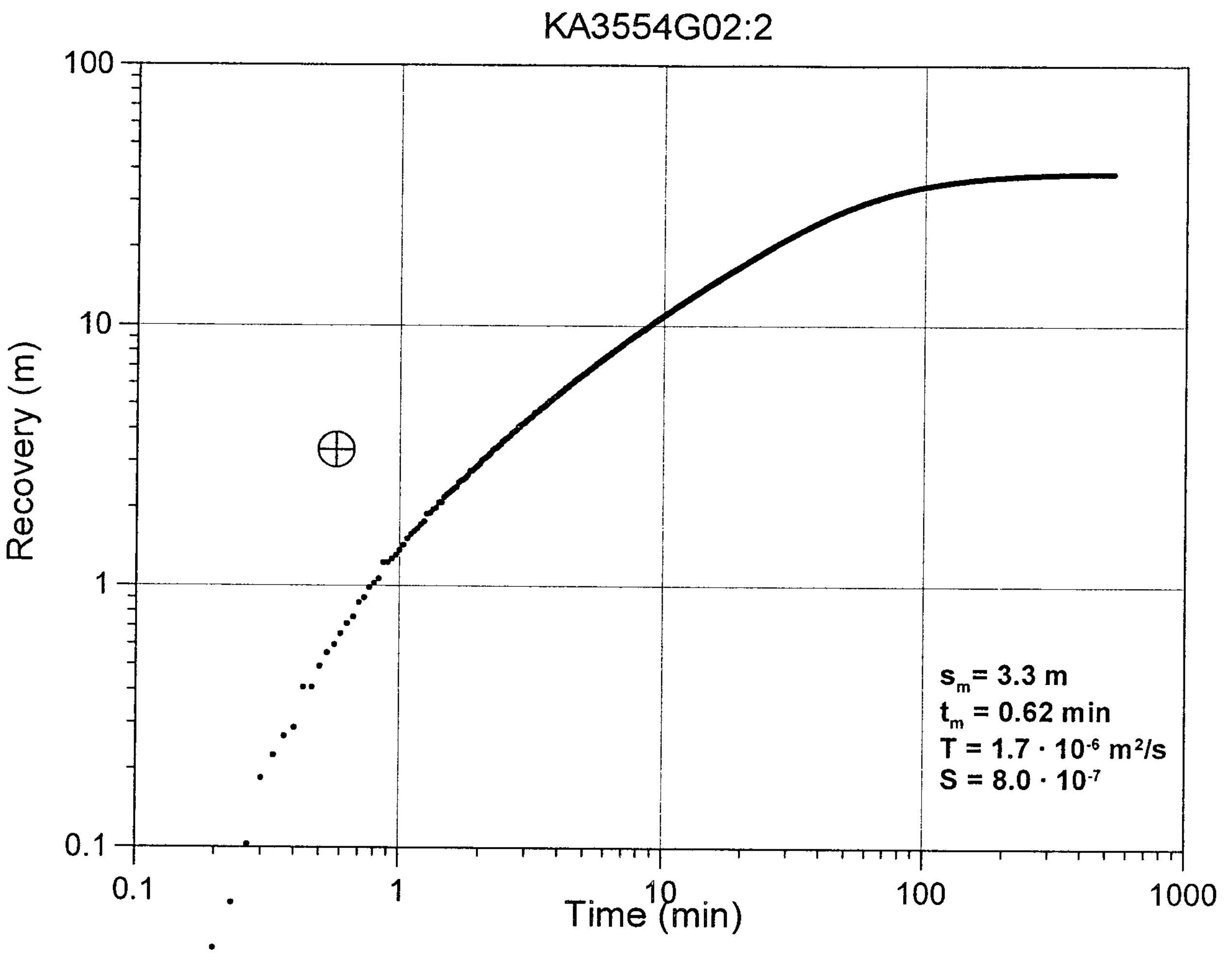


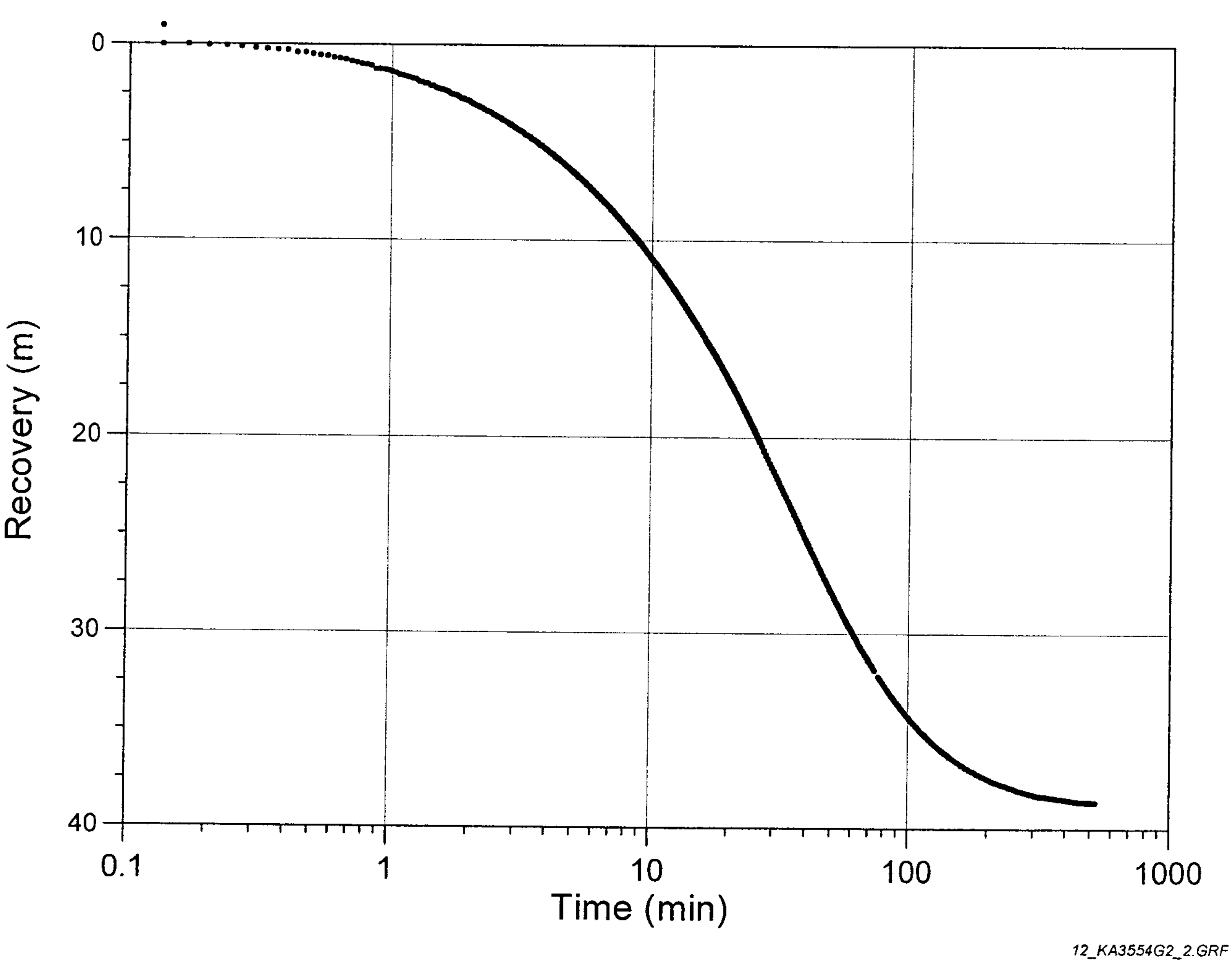
12_KA3554G1_1.GRF 25-okt-99





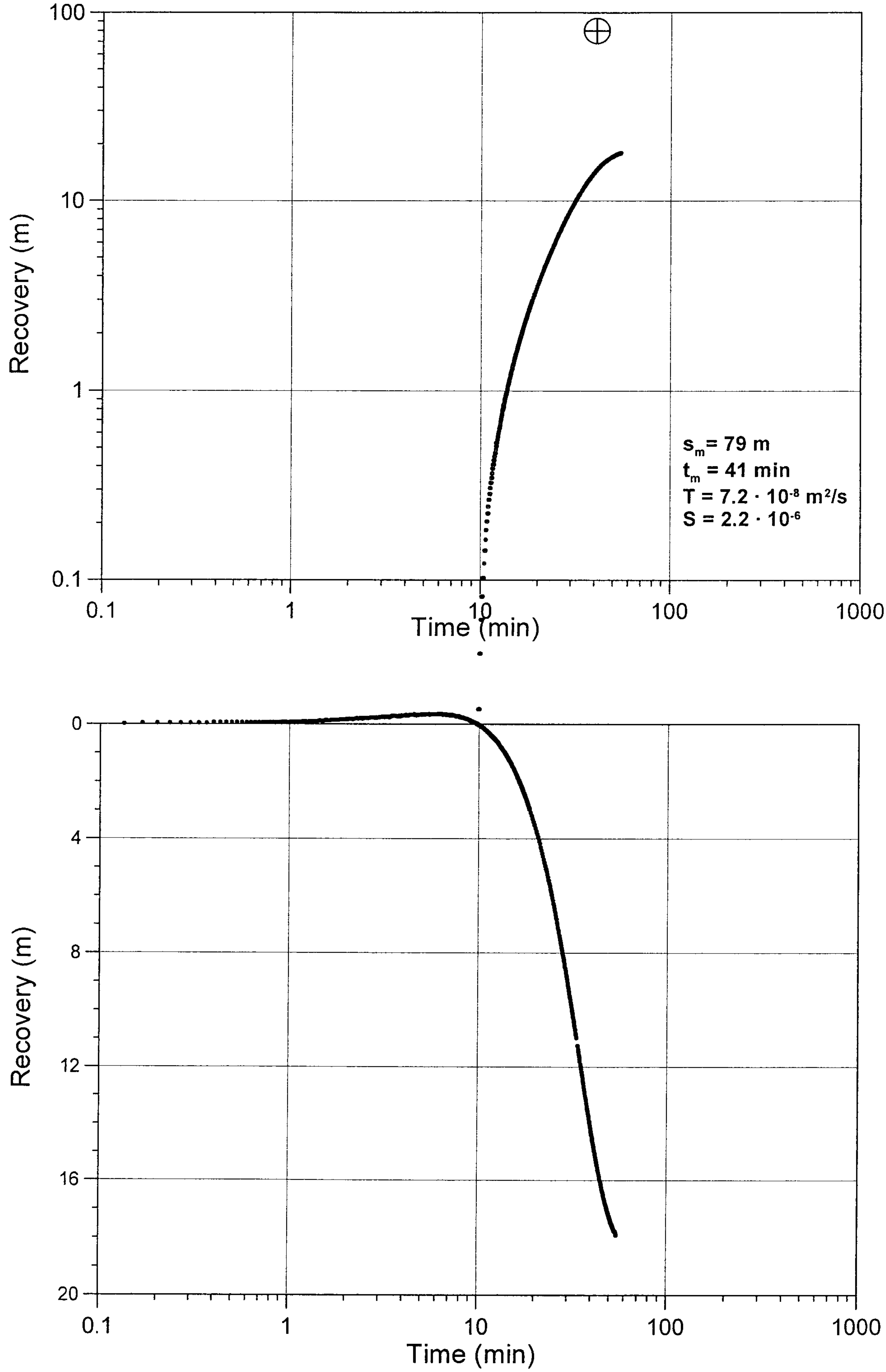
12_KA3554G1_2.GRF 25-okt-99



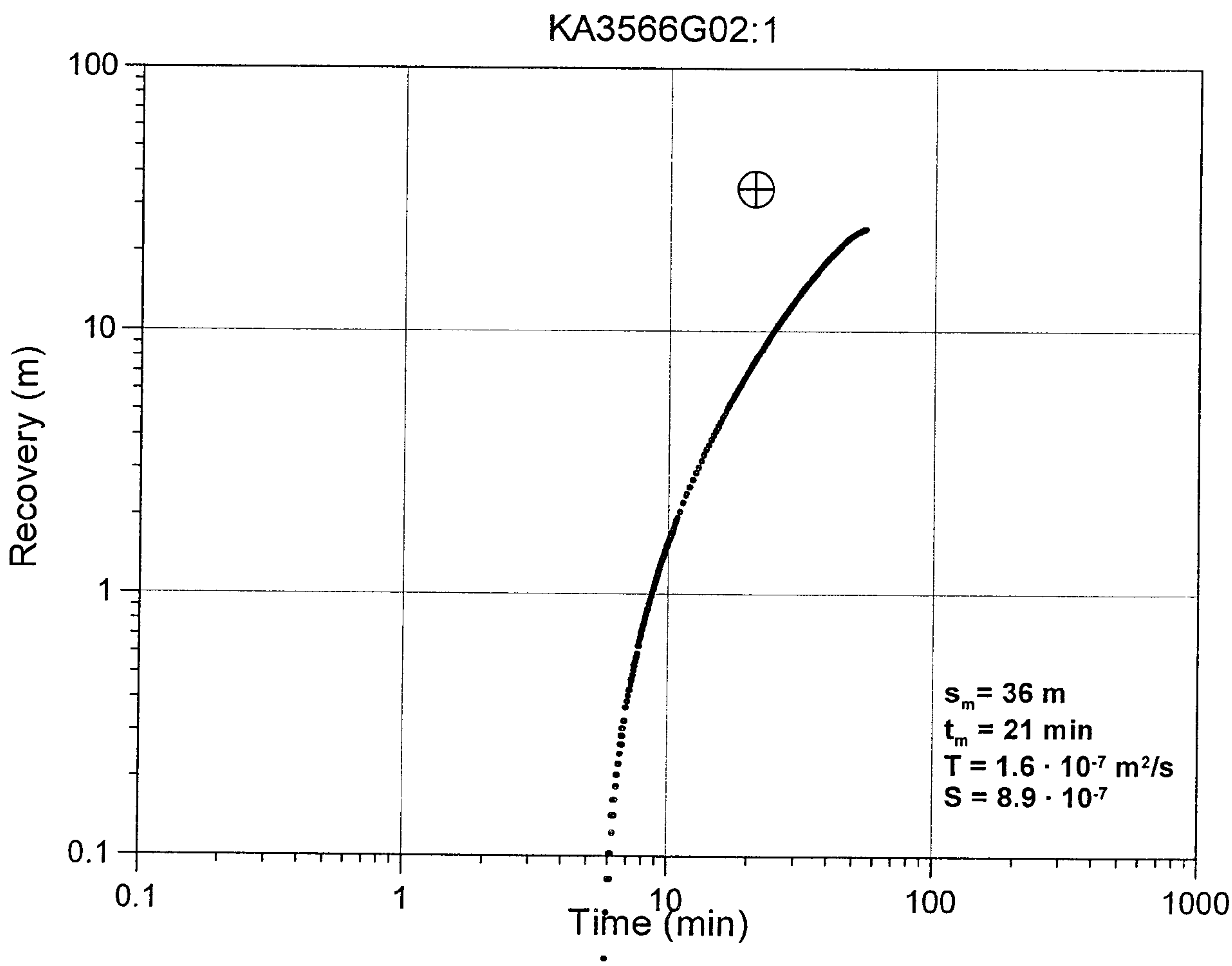


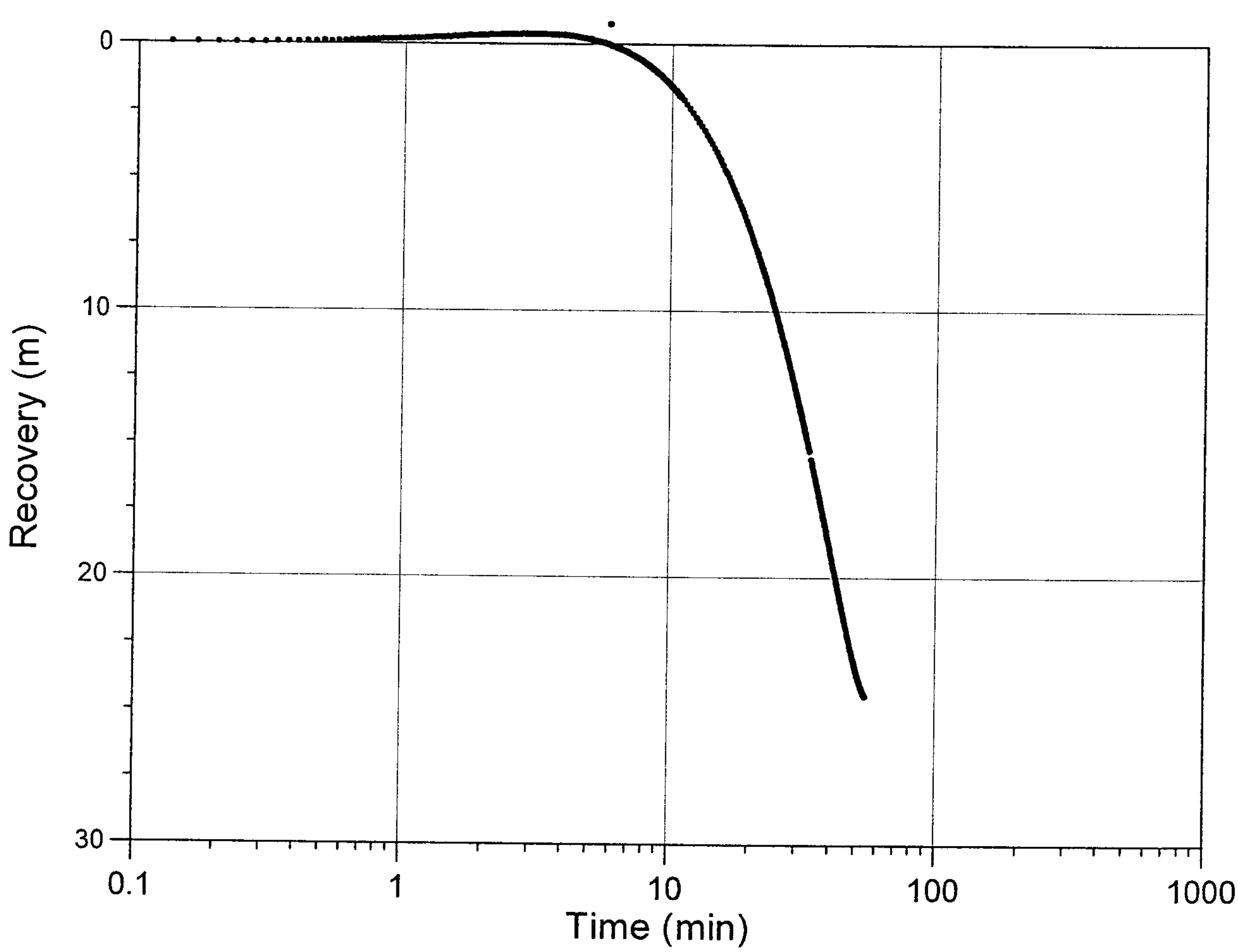
12_KA3554G2_2.GRF 25-okt-99

KA3554G02:3

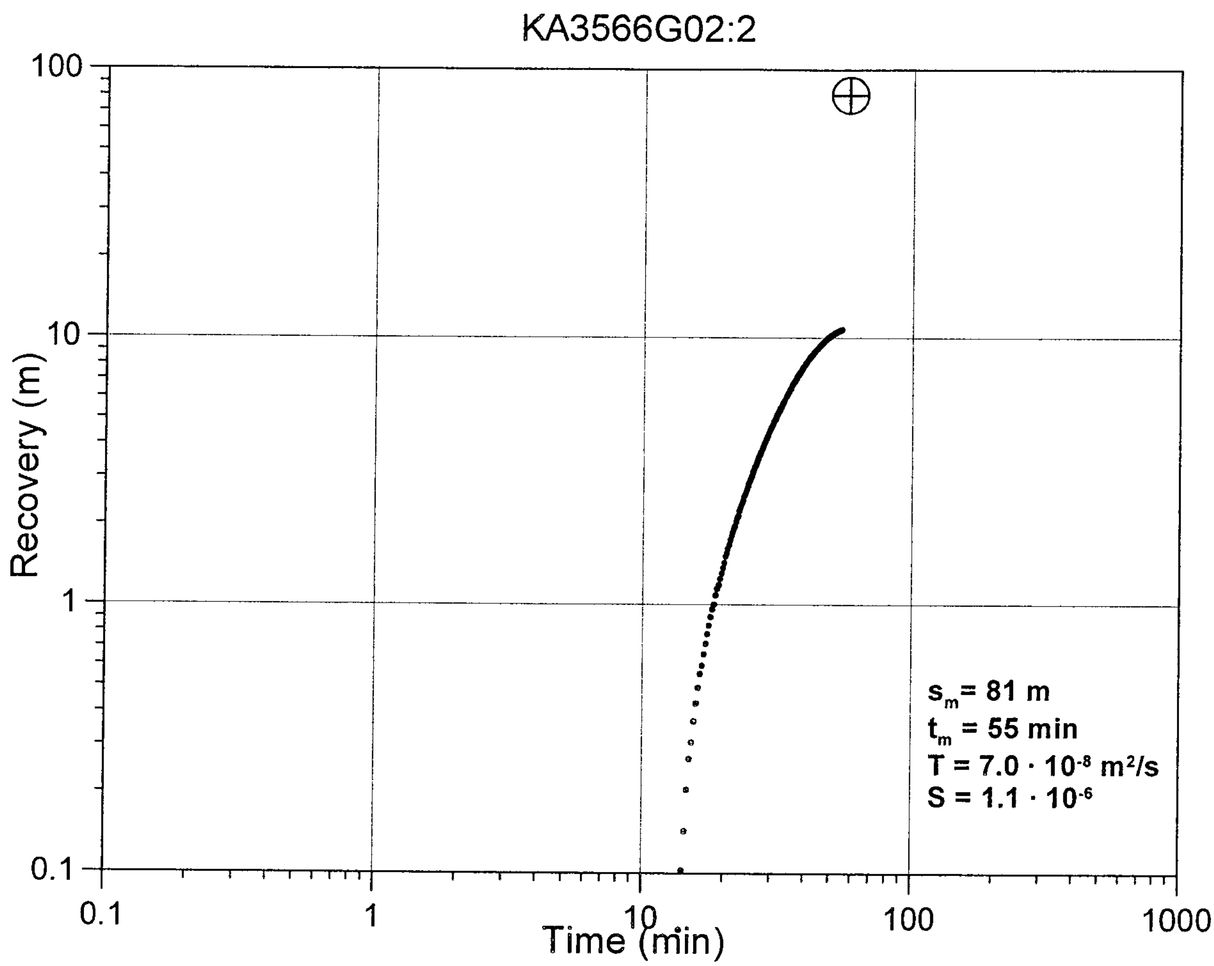


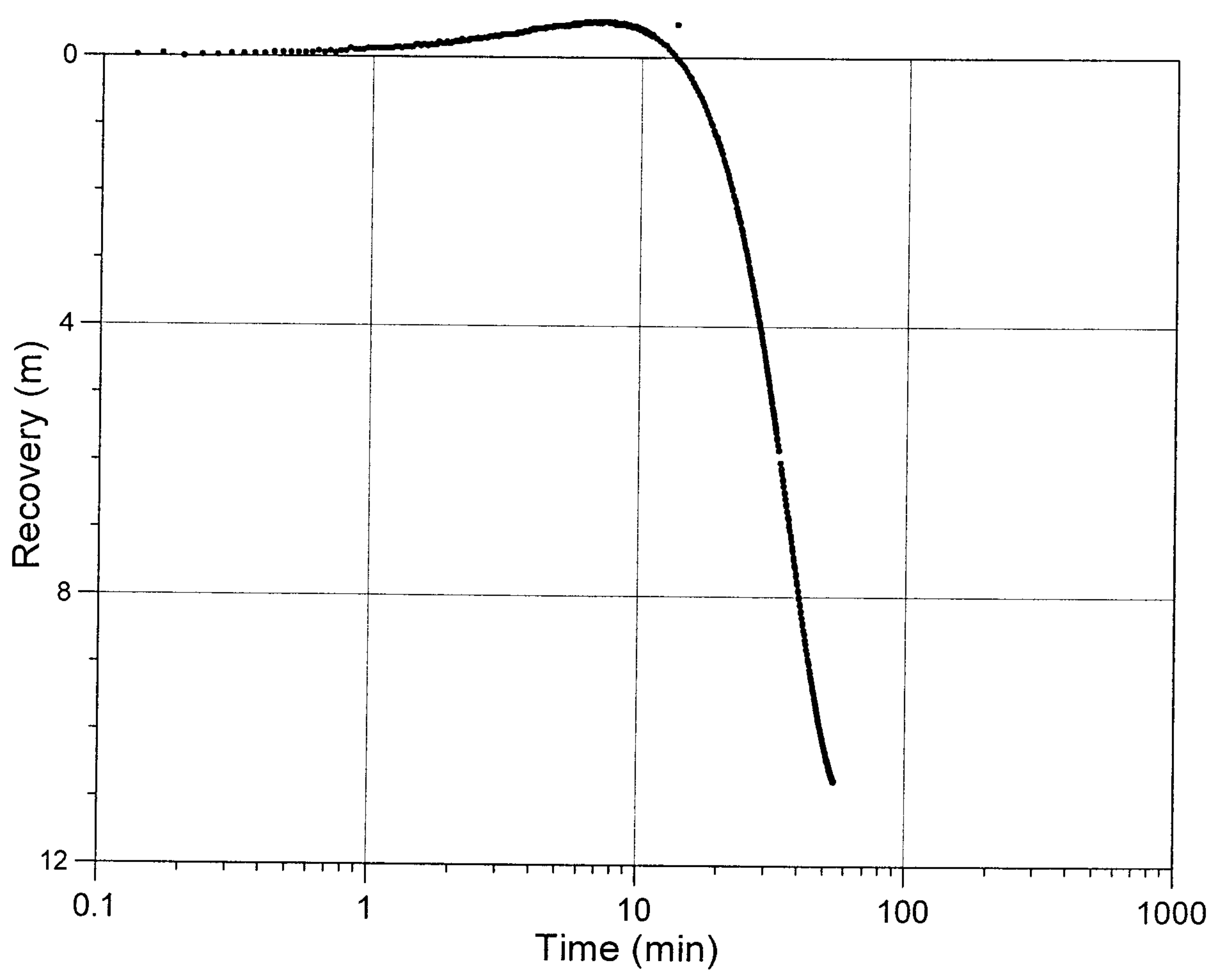
12_KA3554G2_3.GRF 25-okt-99



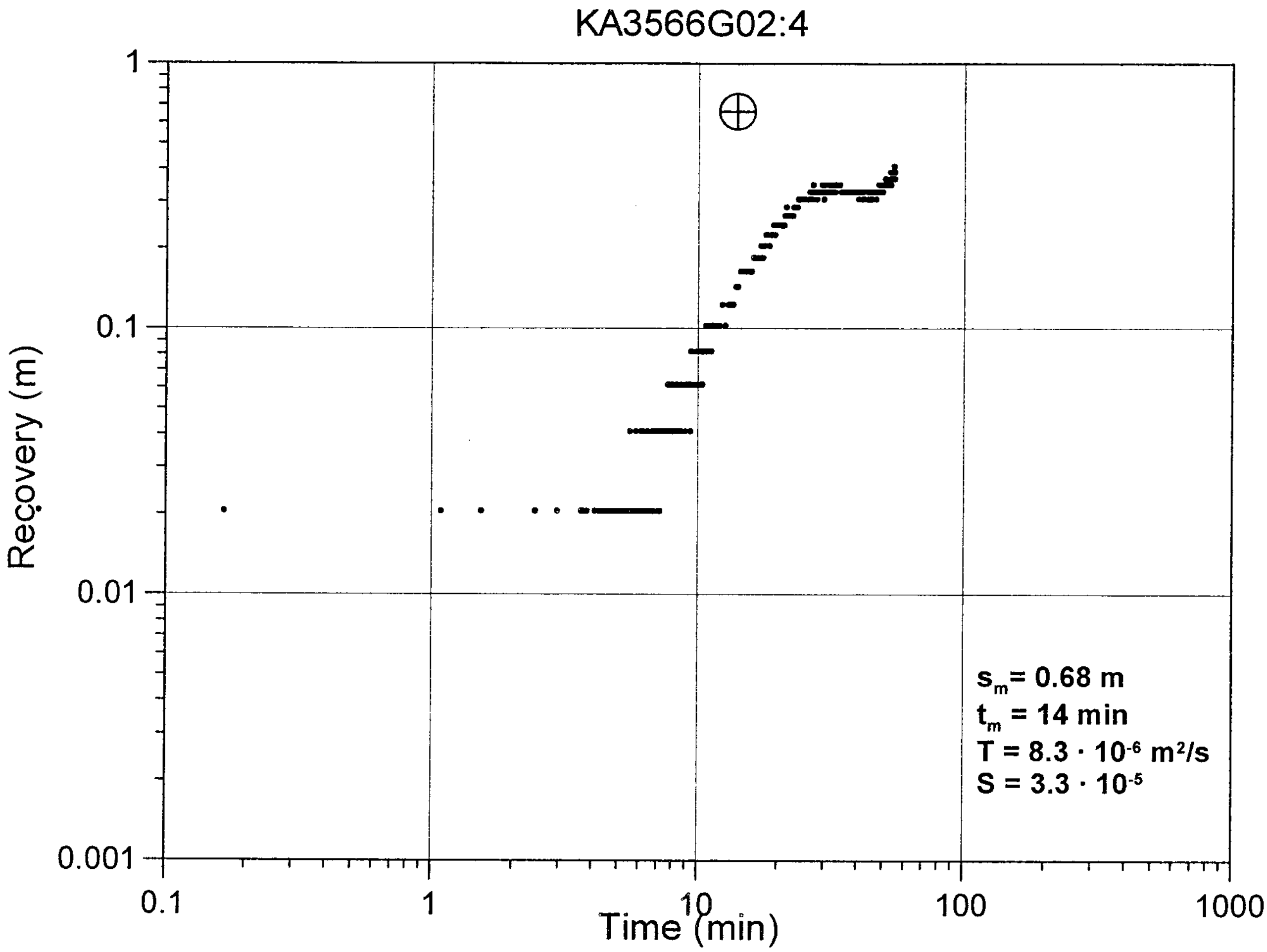


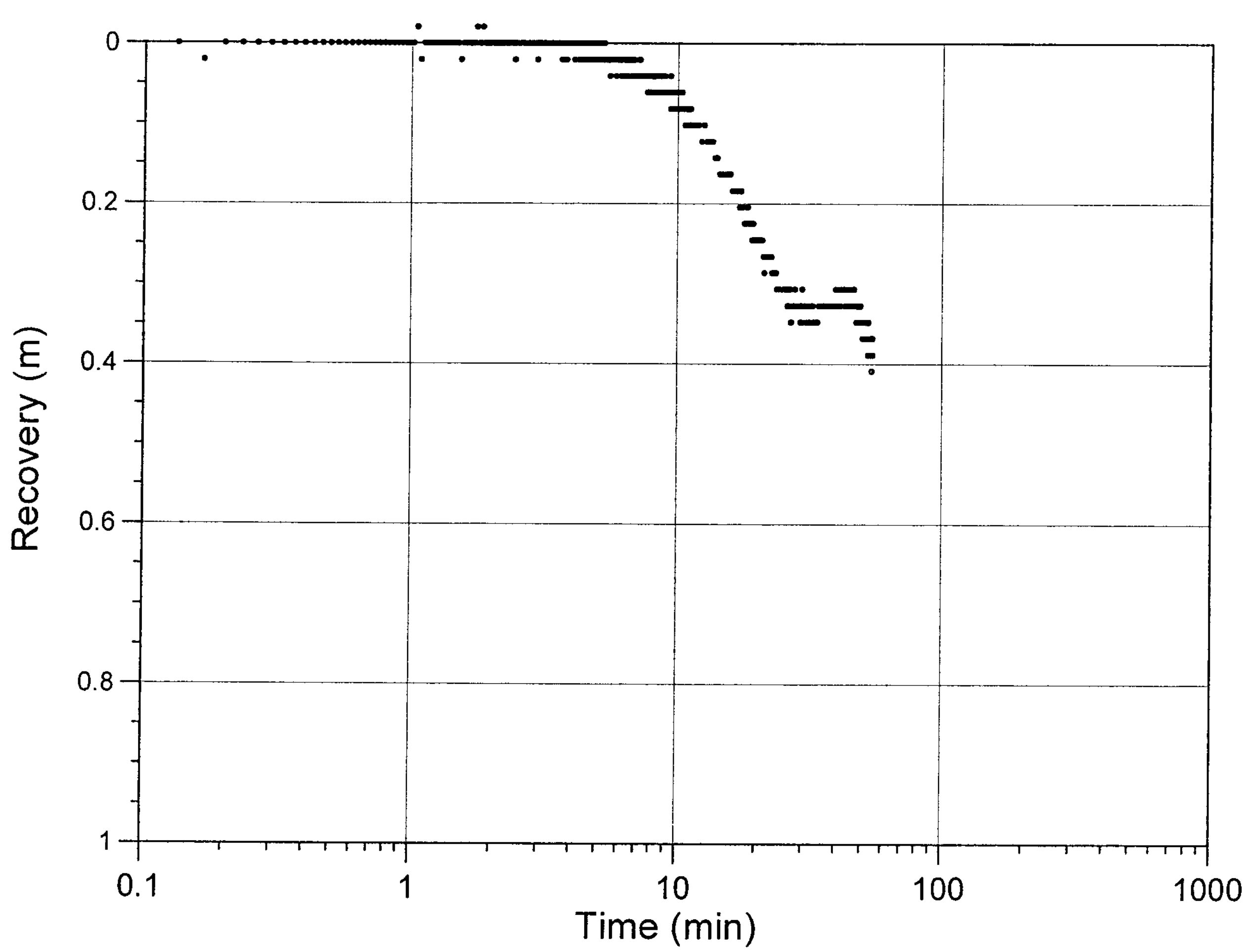
12_KA3566G2_1.GRF 25-okt-99



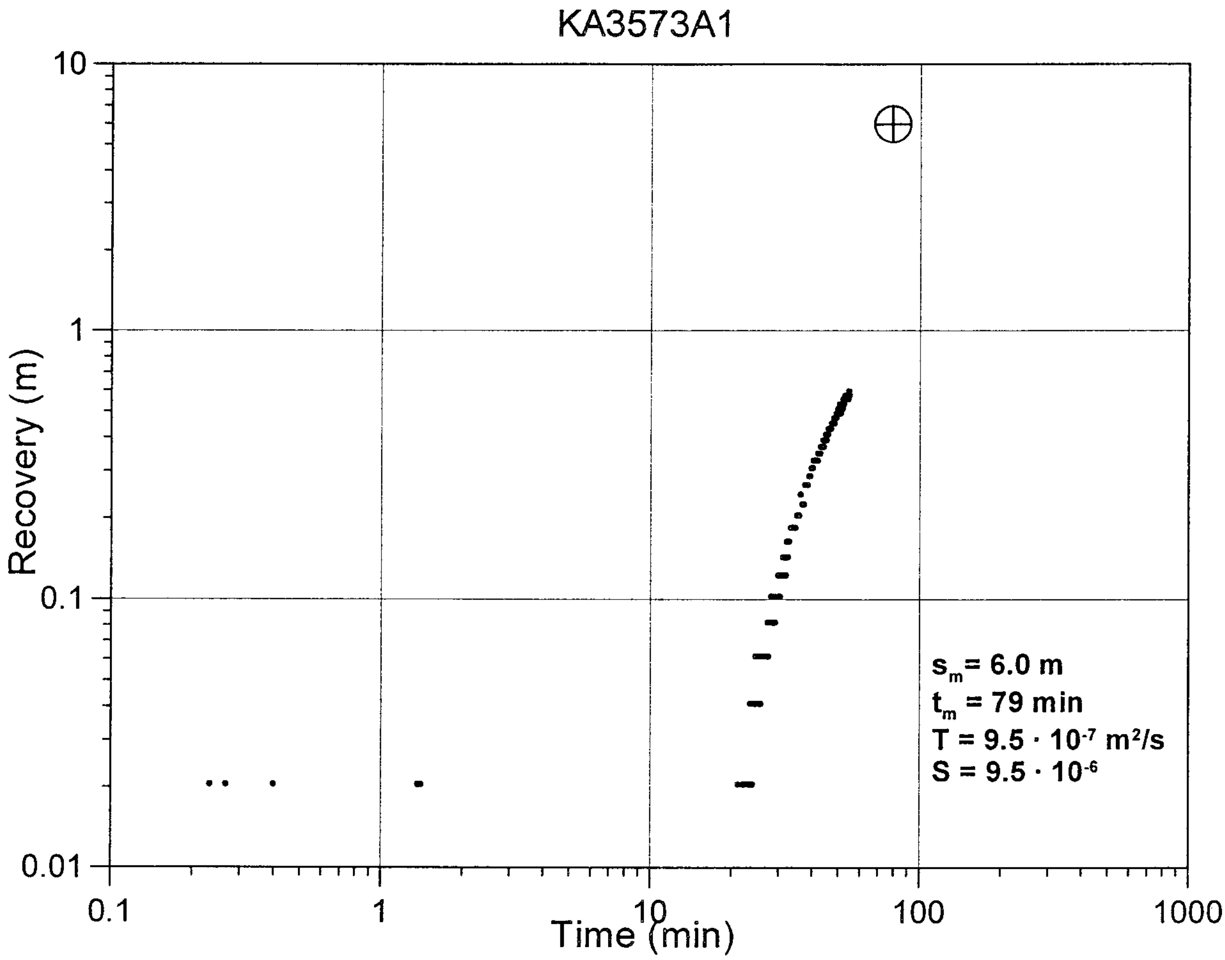


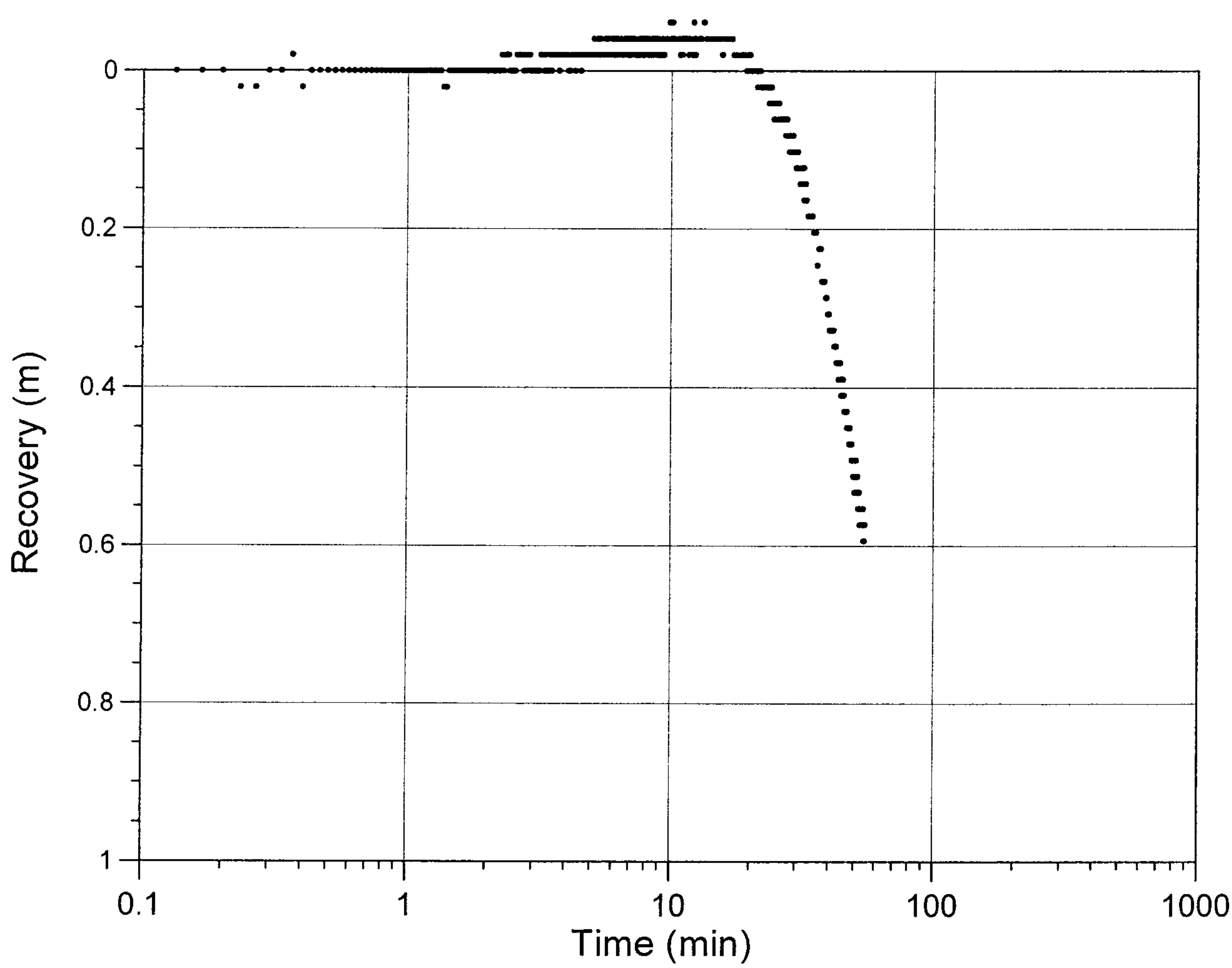
12_KA3566G2_2.GRF 25-okt-99



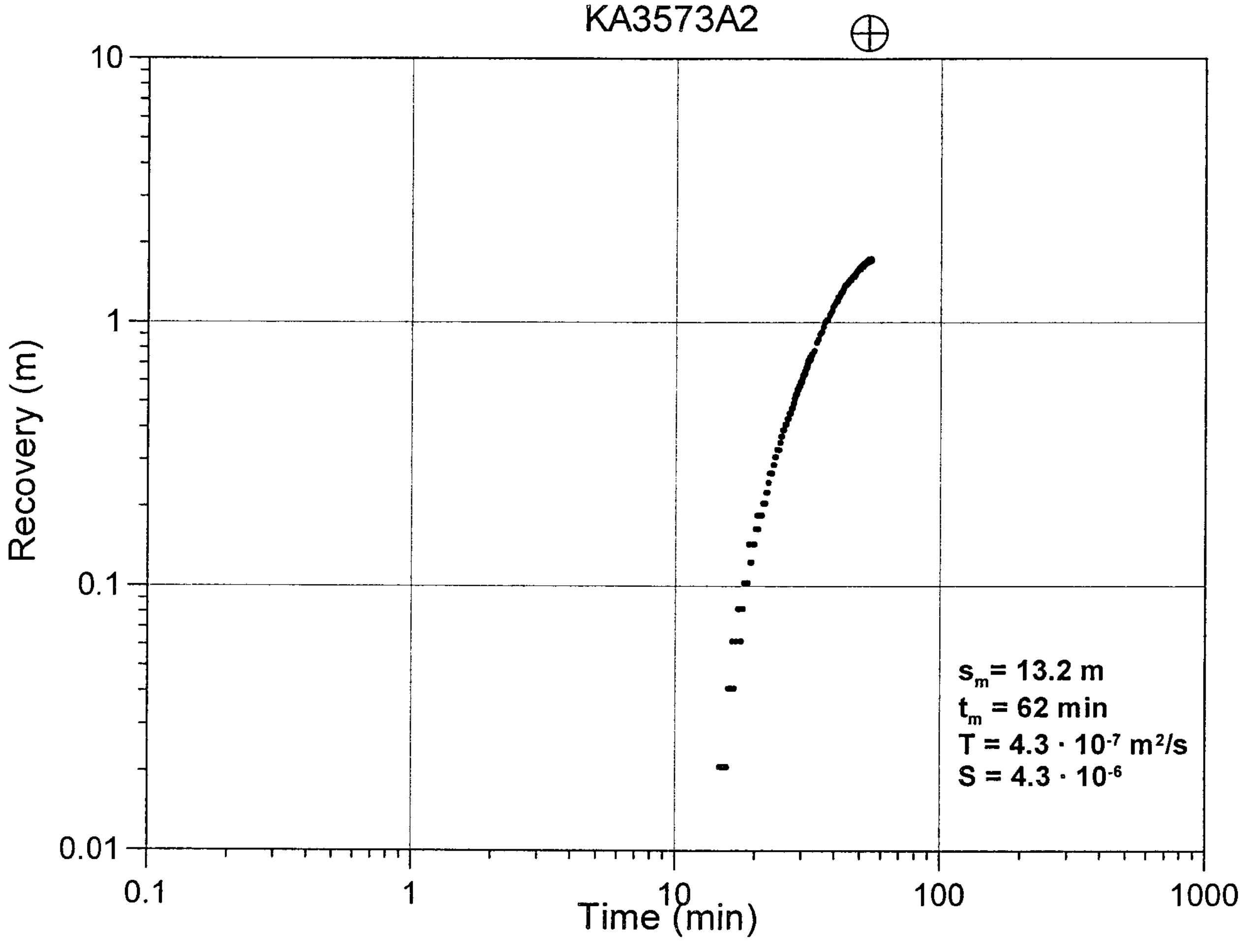


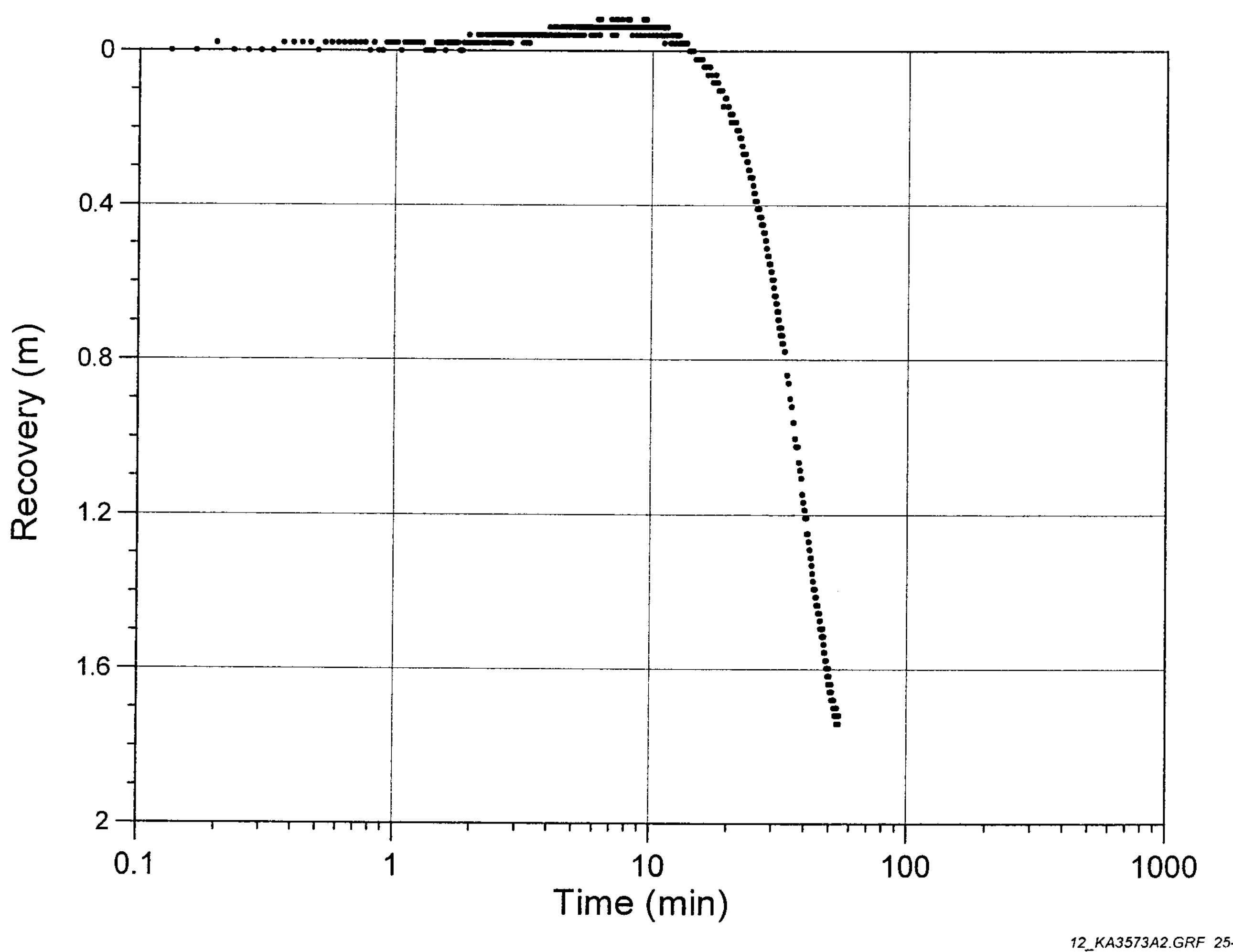
12_KA3566G2_4.GRF 25-okt-99





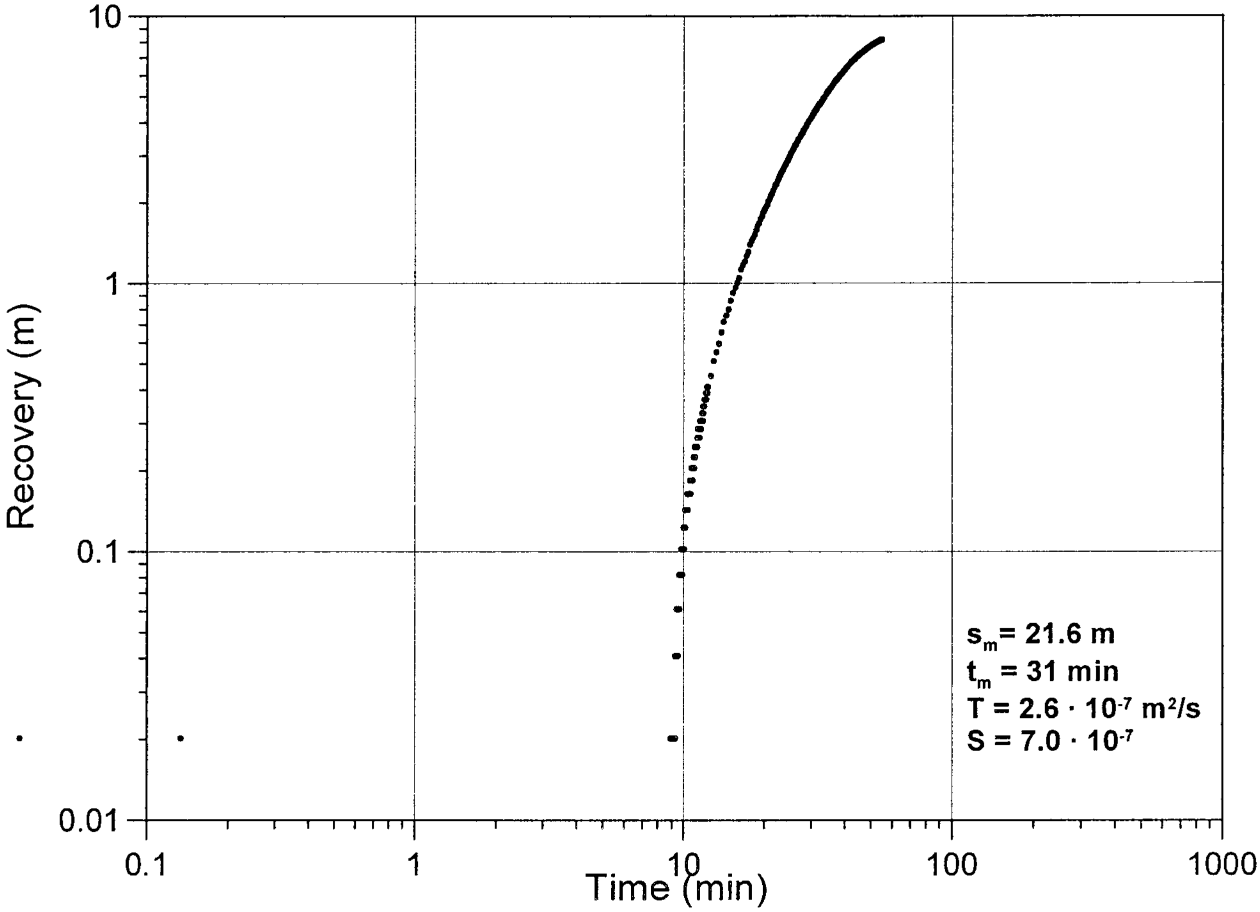
12_KA3573A1.GRF 25-okt-99

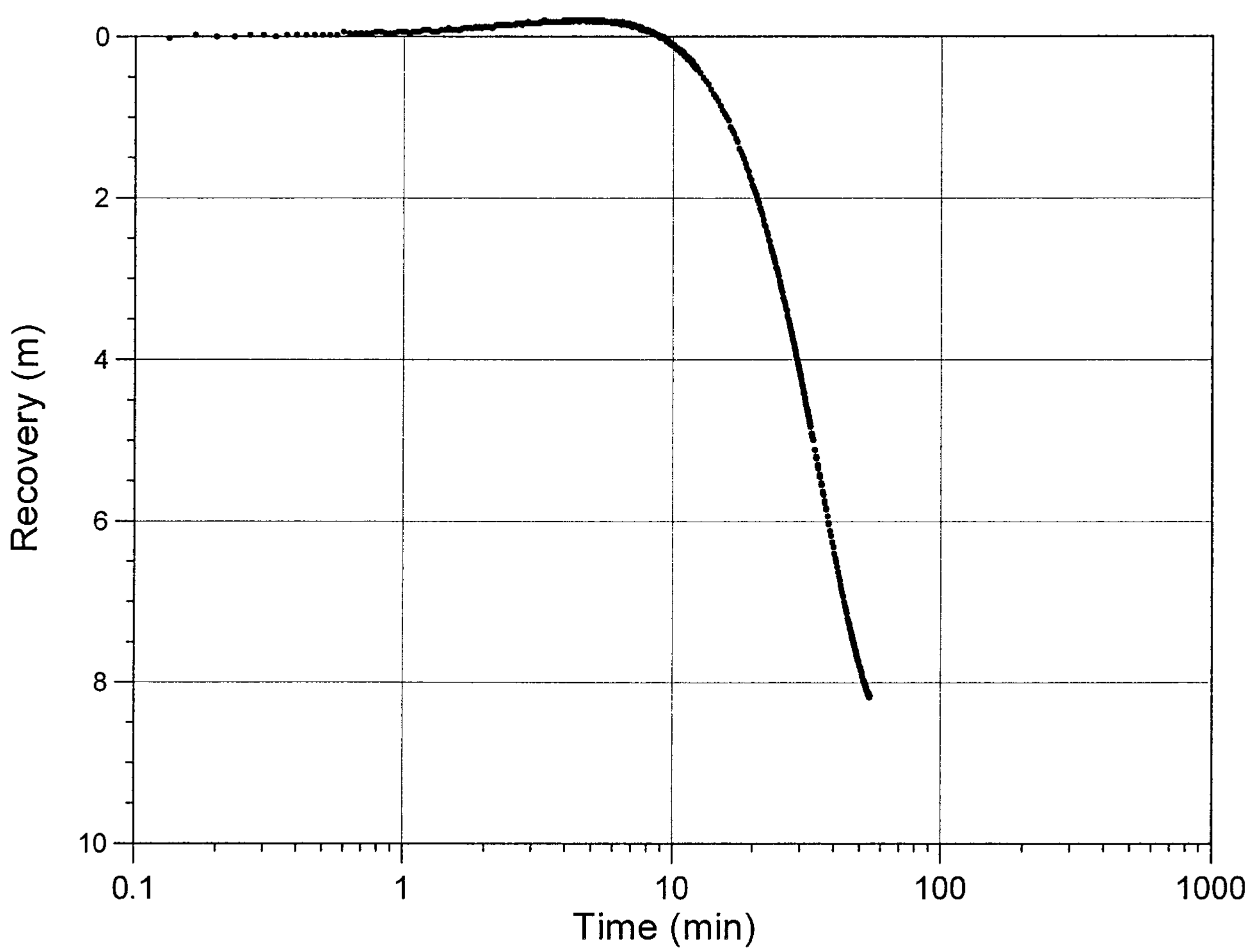




12_KA3573A2.GRF 25-okt-99

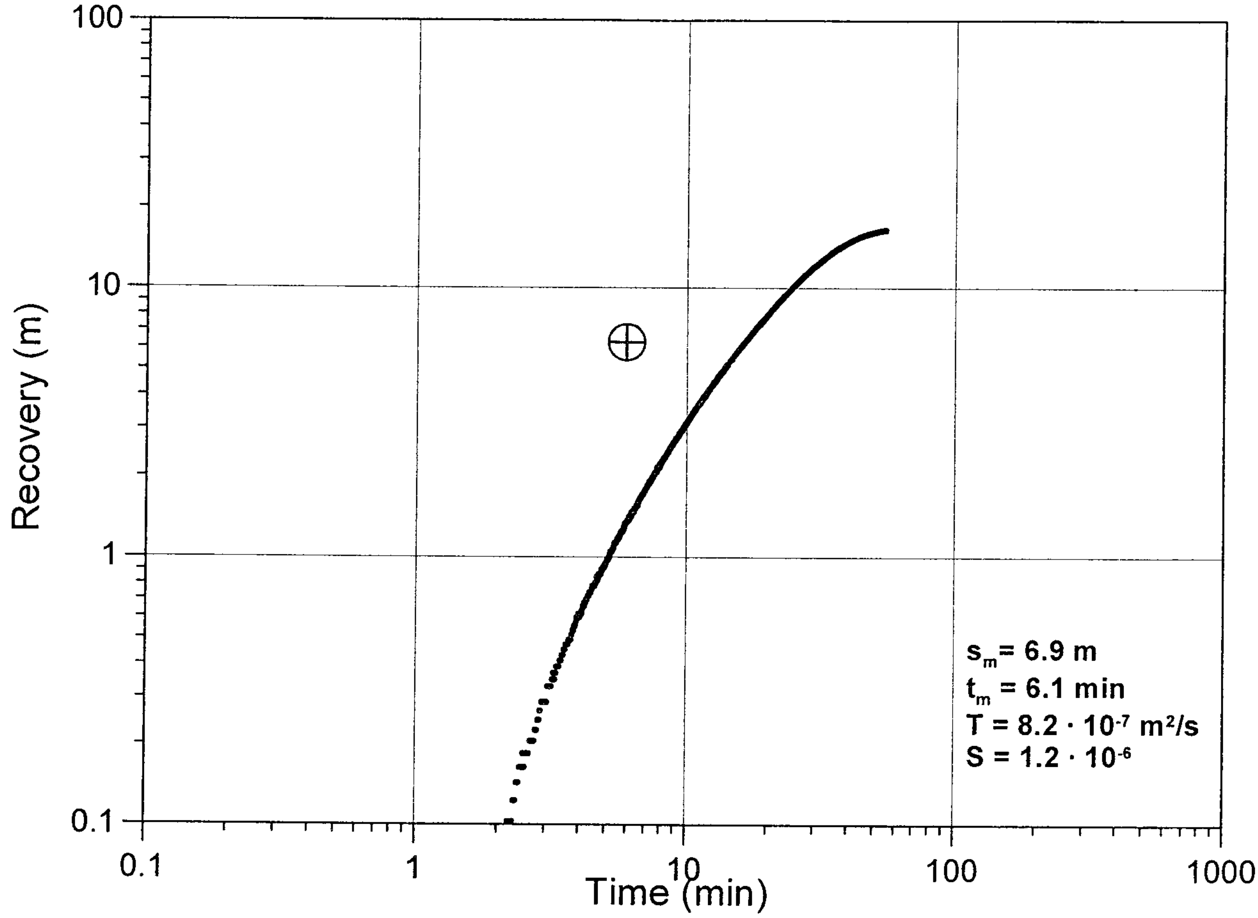
KA3590G2_1

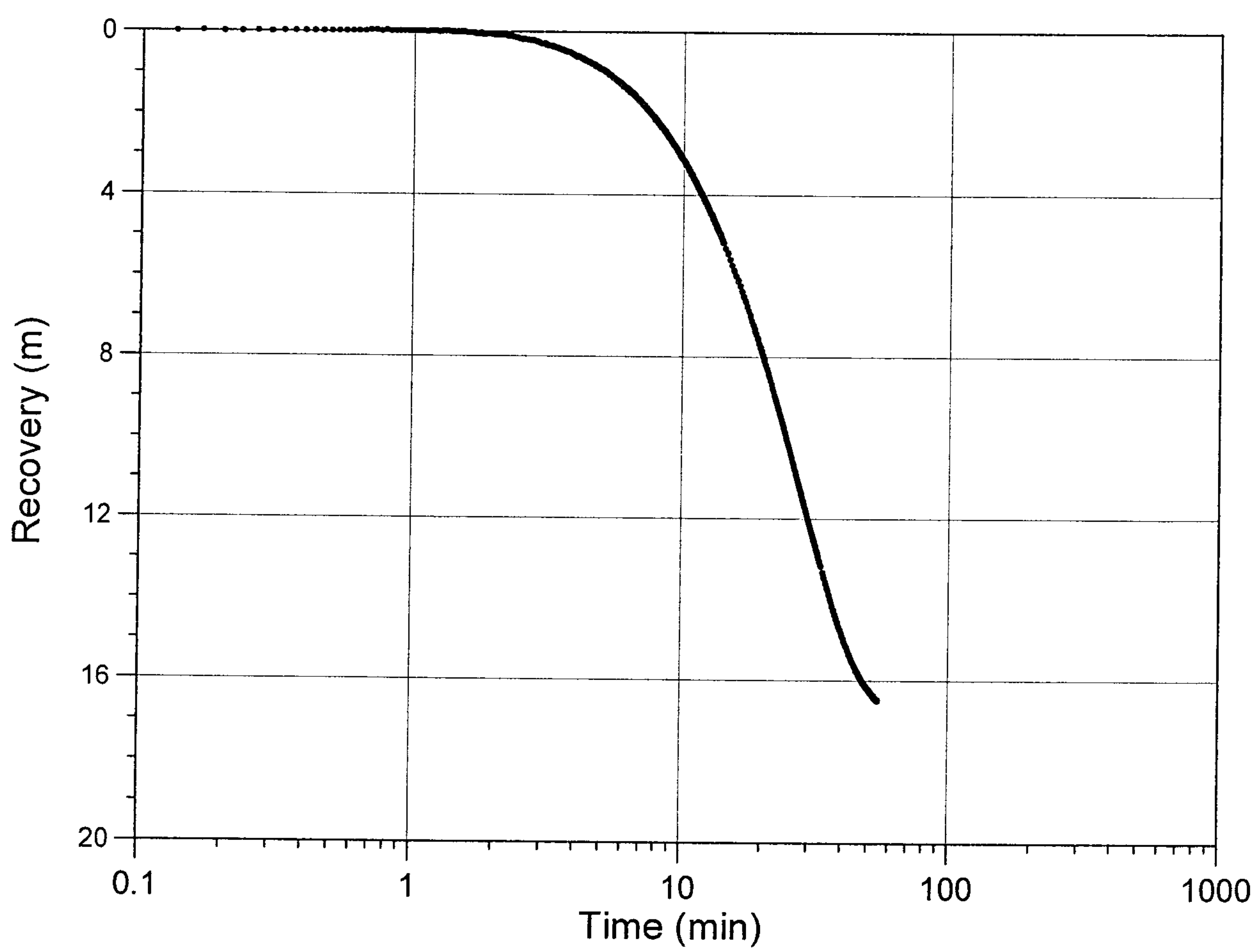




12_KA3590G2_1.GRF 25-okt-99

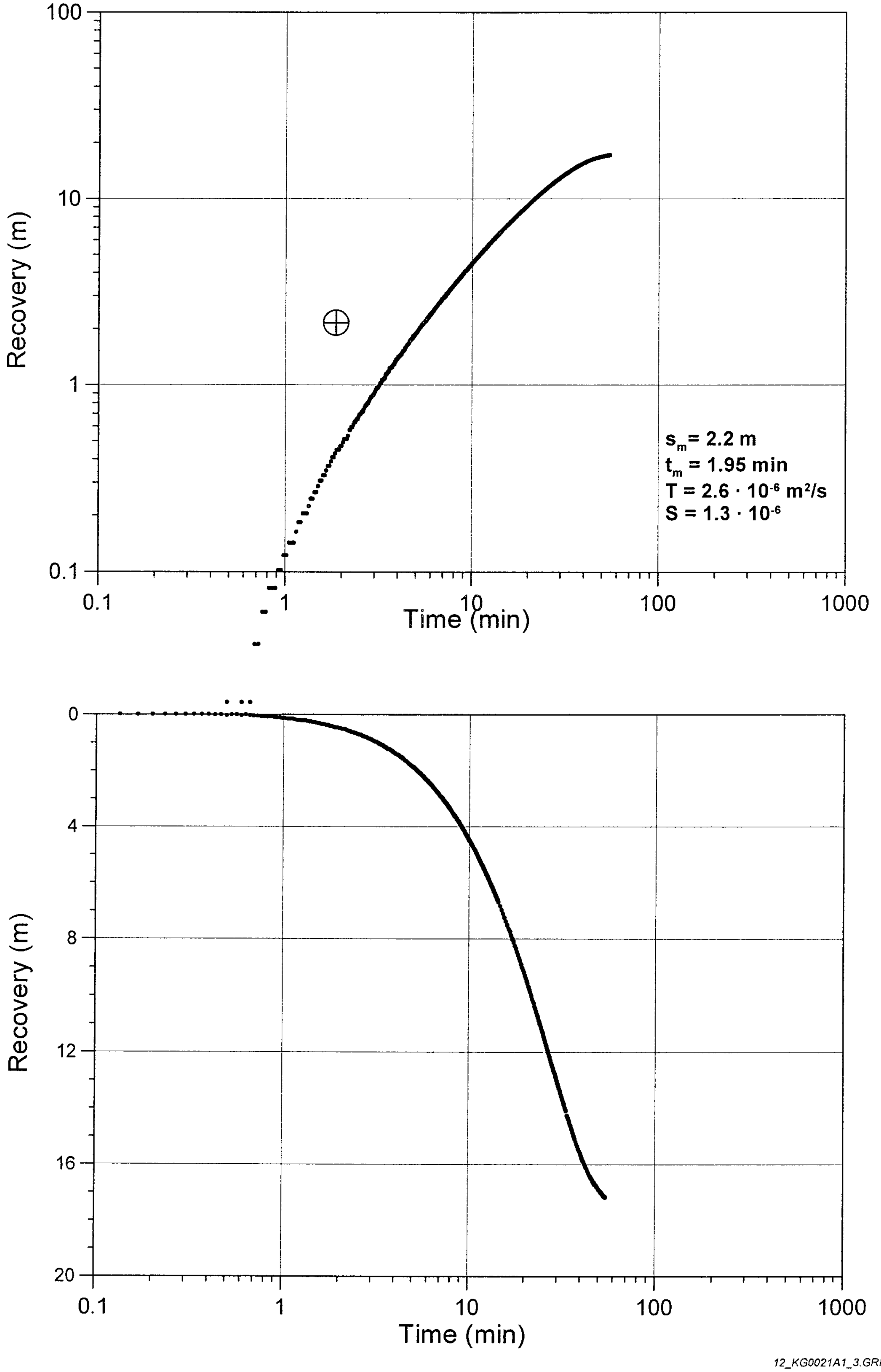
KG0021A01:2



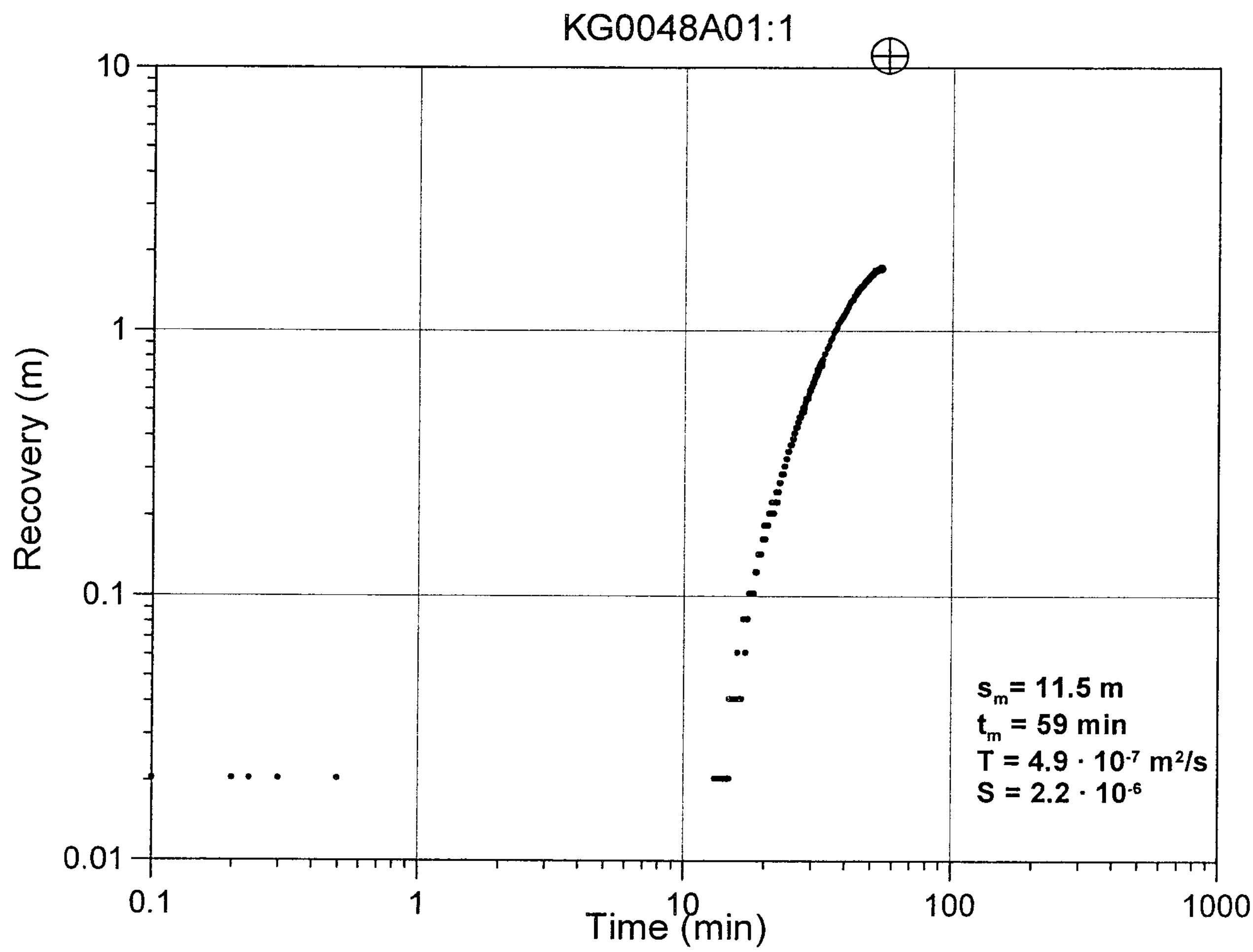


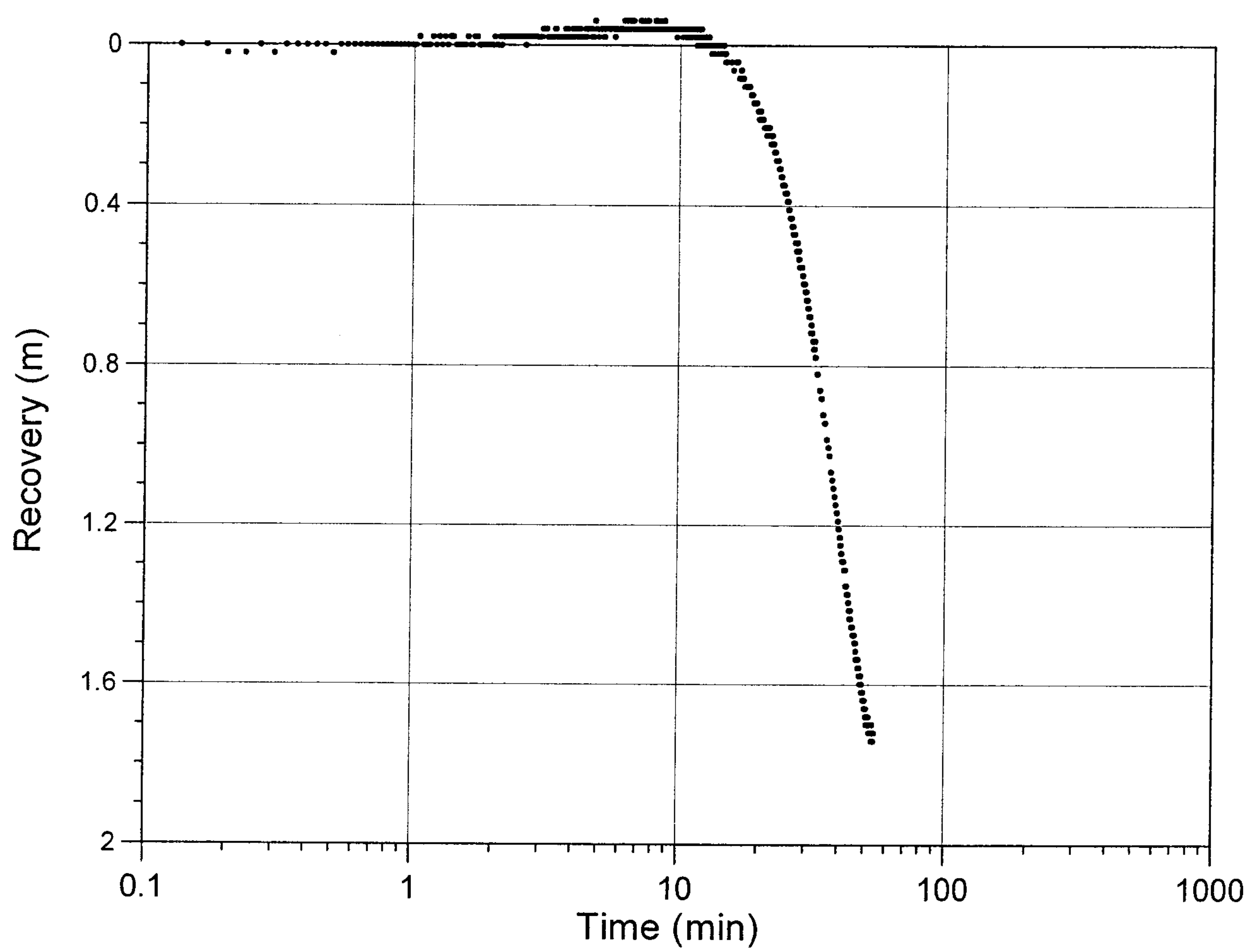
12_KG0021A1_2.GRF 25-okt-99

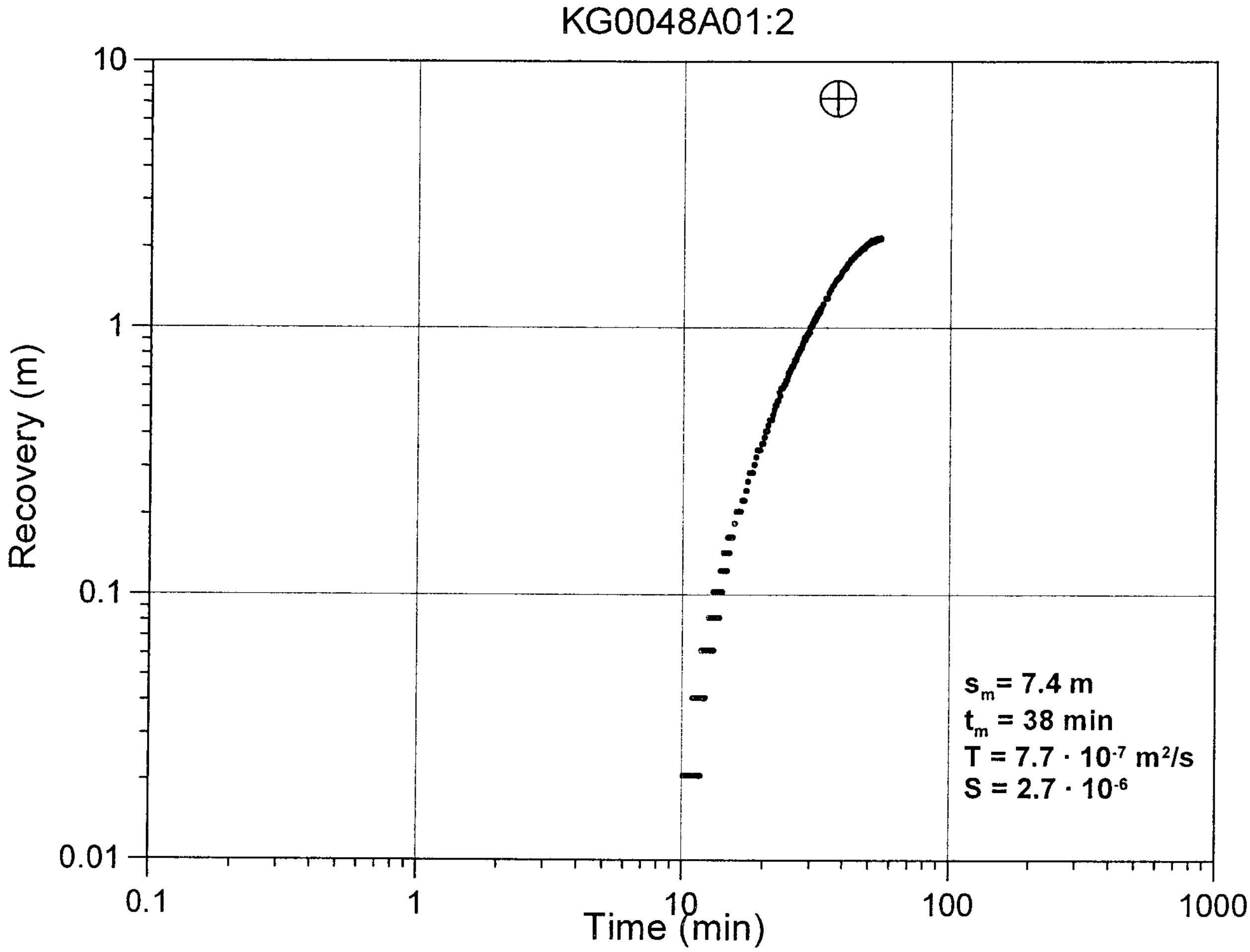
KG0021A01:3

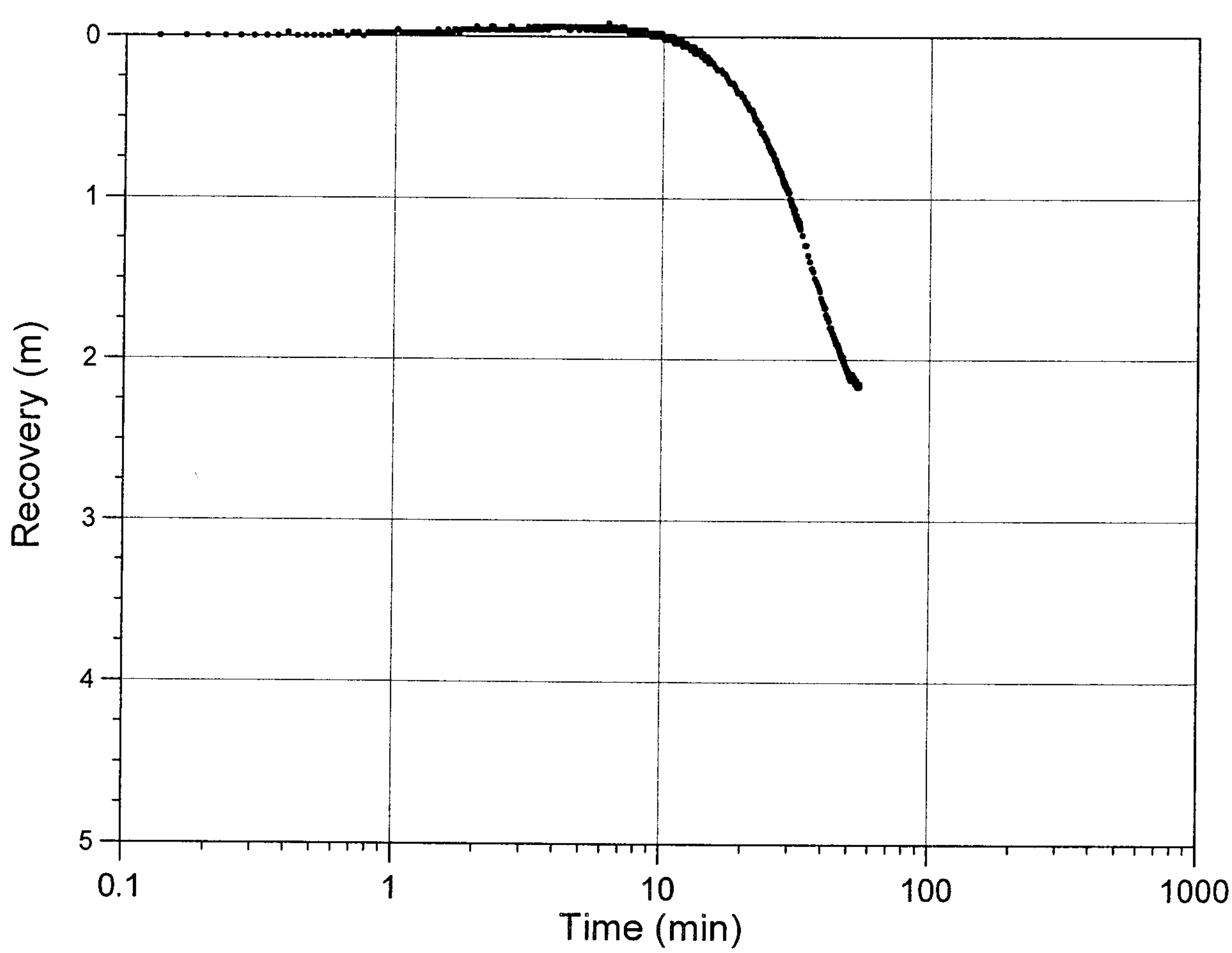


12_KG0021A1_3.GRF 25-okt-99

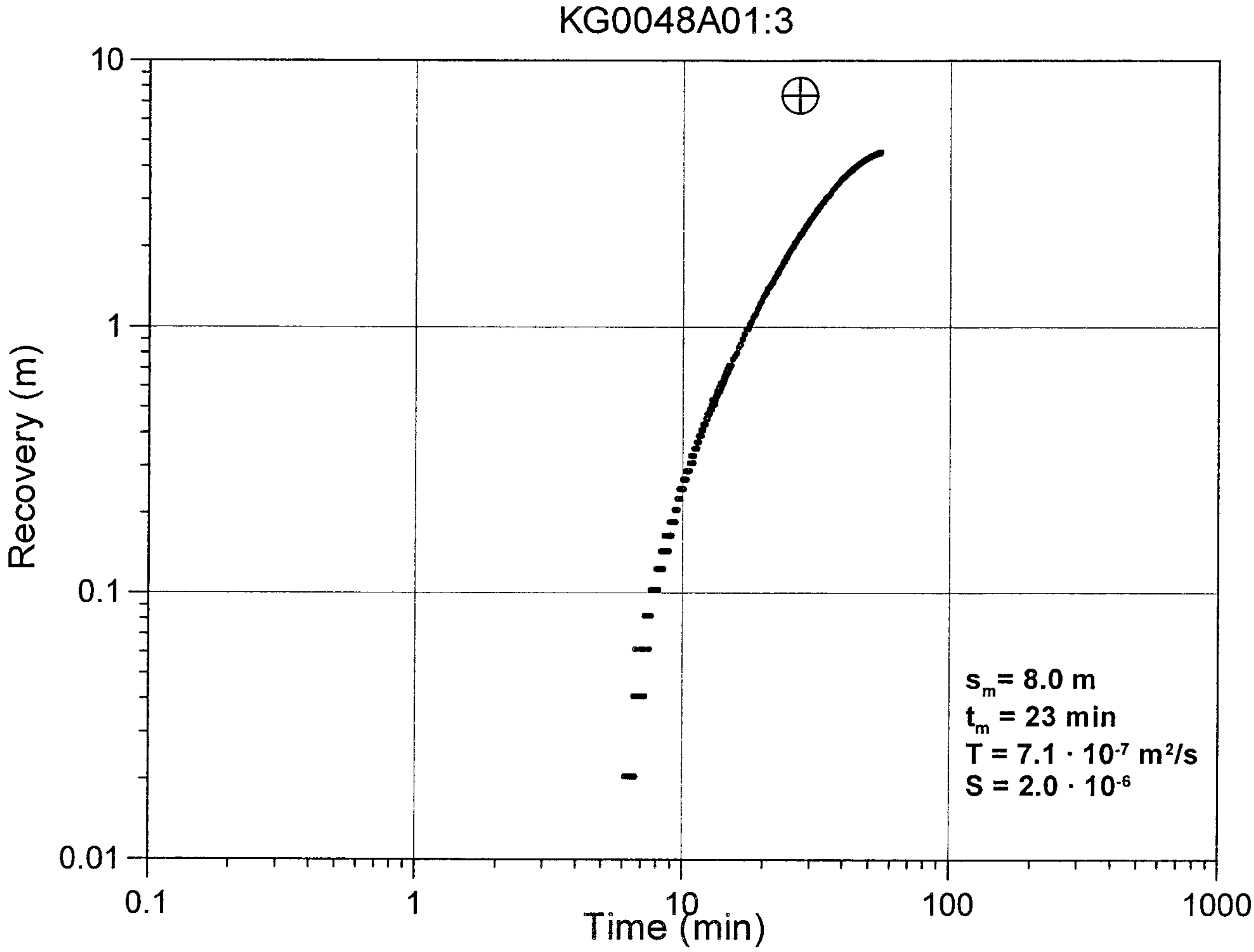

KG0048A01:1
Recovery (m)
10
1
0.1
0.01
0.1
1
10
100
1000
Time (min)
s_m= 11.5 m
t_m = 59 min
T = 4.9 · 10-7 m2/s
S = 2.2 · 10-6

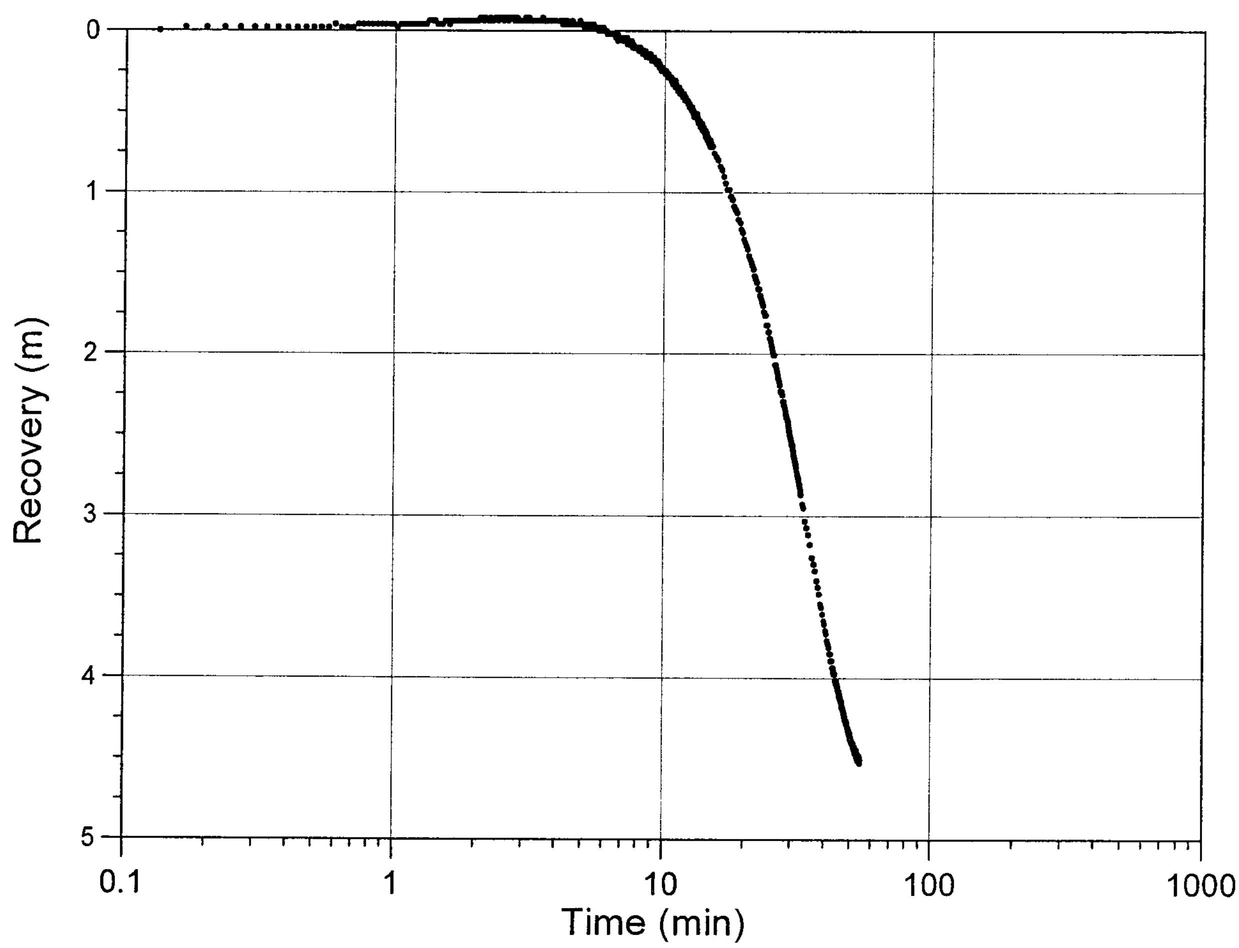

Recovery (m)
0
0.4
0.8
1.2
1.6
2
0.1
1
10
100
1000
Time (min)





12_KG0048A1_2.GRF 25-okt-99


KG0048A01:3
Recovery (m)
Time (min)
10
1
0.1
0.01
0.1
1
10
100
1000
s_m= 8.0 m
t_m = 23 min
T = 7.1 · 10^{-7} m²/s
S = 2.0 · 10^{-6}


Recovery (m)
Time (min)
0
1
2
3
4
5
0.1
1
10
100
1000

APPENDIX 8

Interference test 2:13 in borehole KG0021A01, section 42.50 m – 48.82 m

Date: 99-08-21 Field Crew: Bengt Gentzschein
Borehole length: 48.82 m Borehole diameter: 76 mm

Flowing borehole: KG0021A01, section #1: 42.50 – 48.82 m

Valve opened: 990821 09:00.05 Valve closed: 990821 15:02.10
End of Test: 990822 07:55

Total flowing time : 362 min Tot. Pr. Build-up time 1013 min.

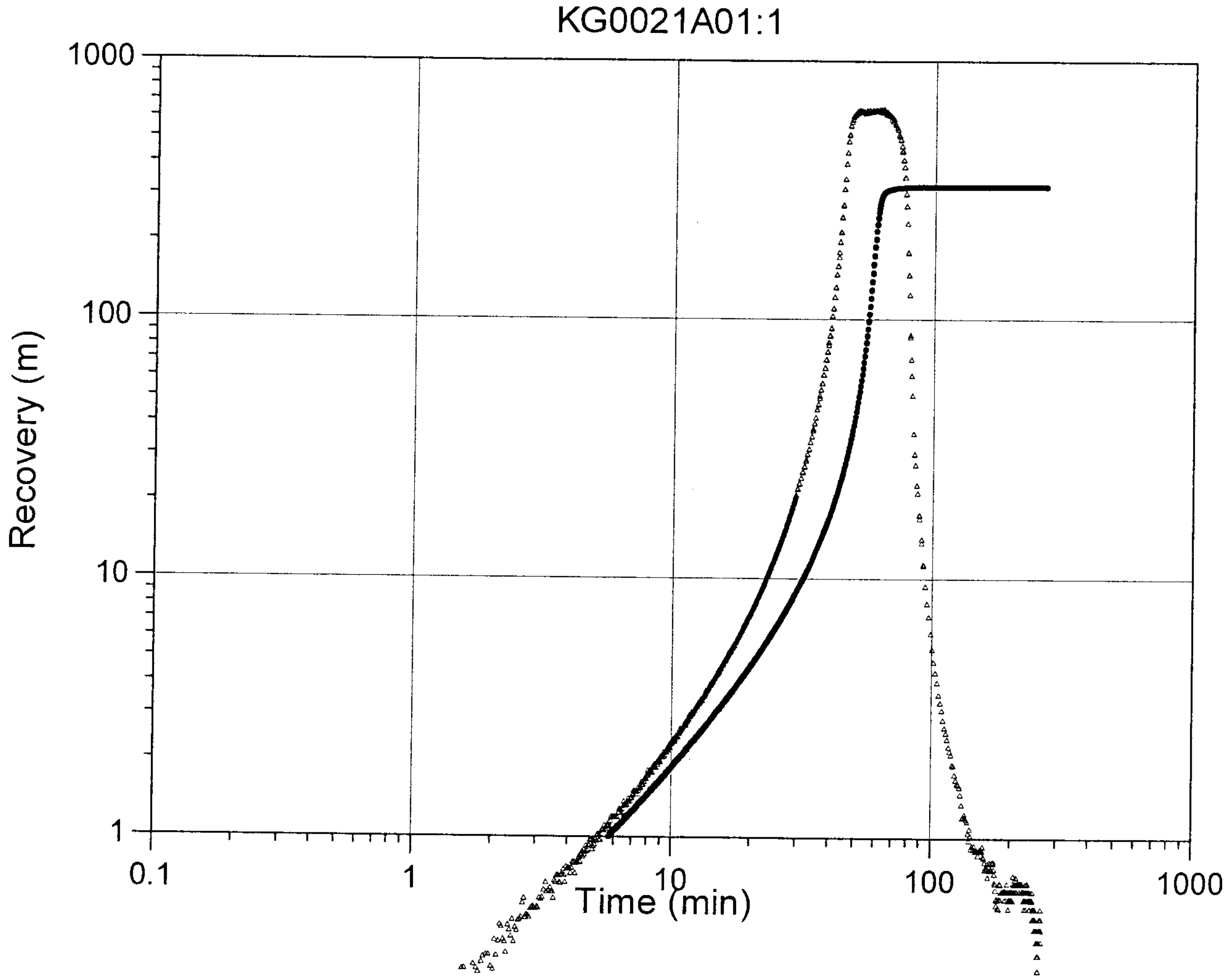
The test was performed as an Interference test. Pressure responses were monitored in 61 borehole sections.

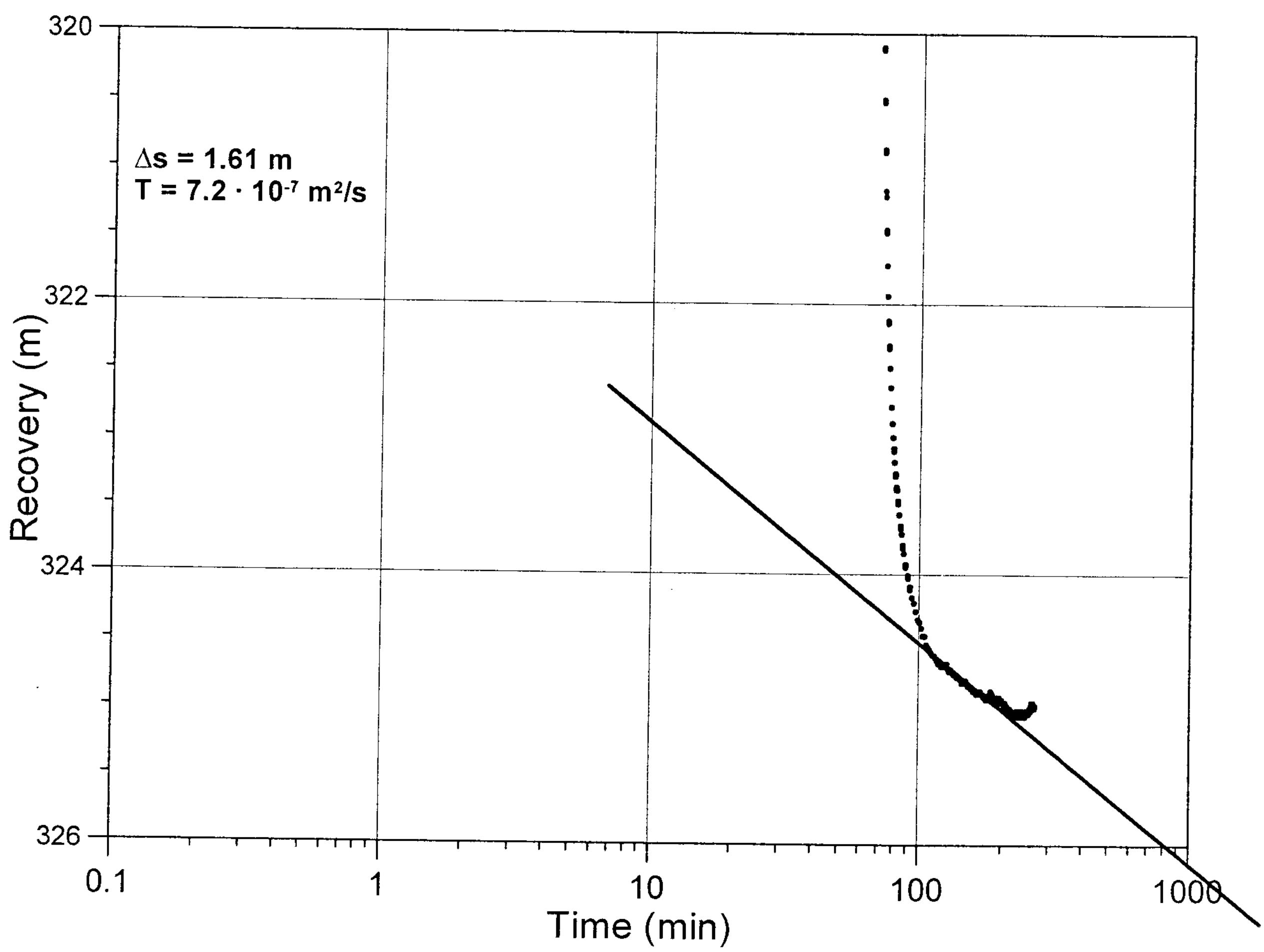
Flow data

Manually measured flow rates of KG0021A01 section 42.50 – 48.82 m are presented in the table below:

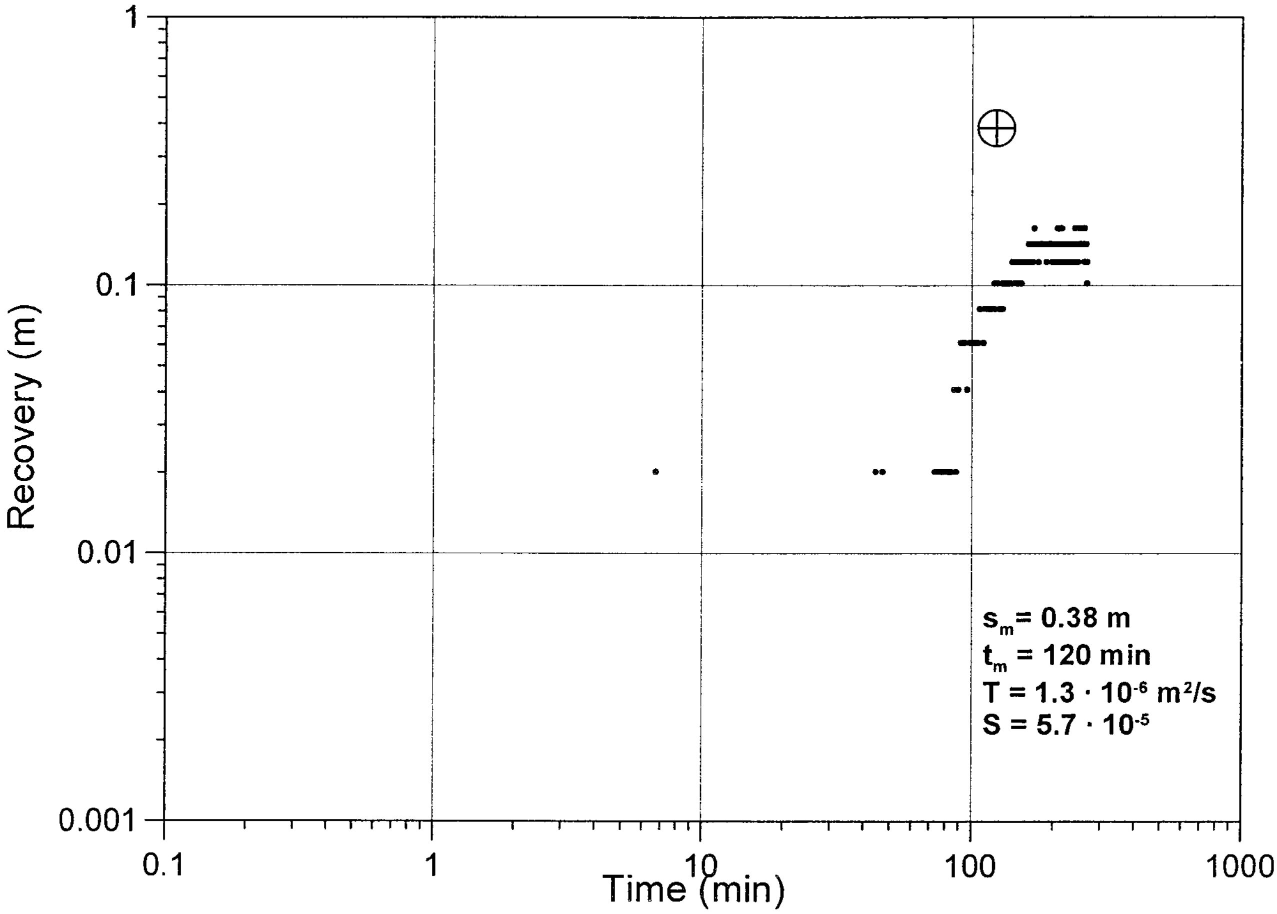
Table Manually measured flow rates, Interference test in KG0021A01, section 42.50 - 48.82 m (test #13). Prototype repository, August 1999.

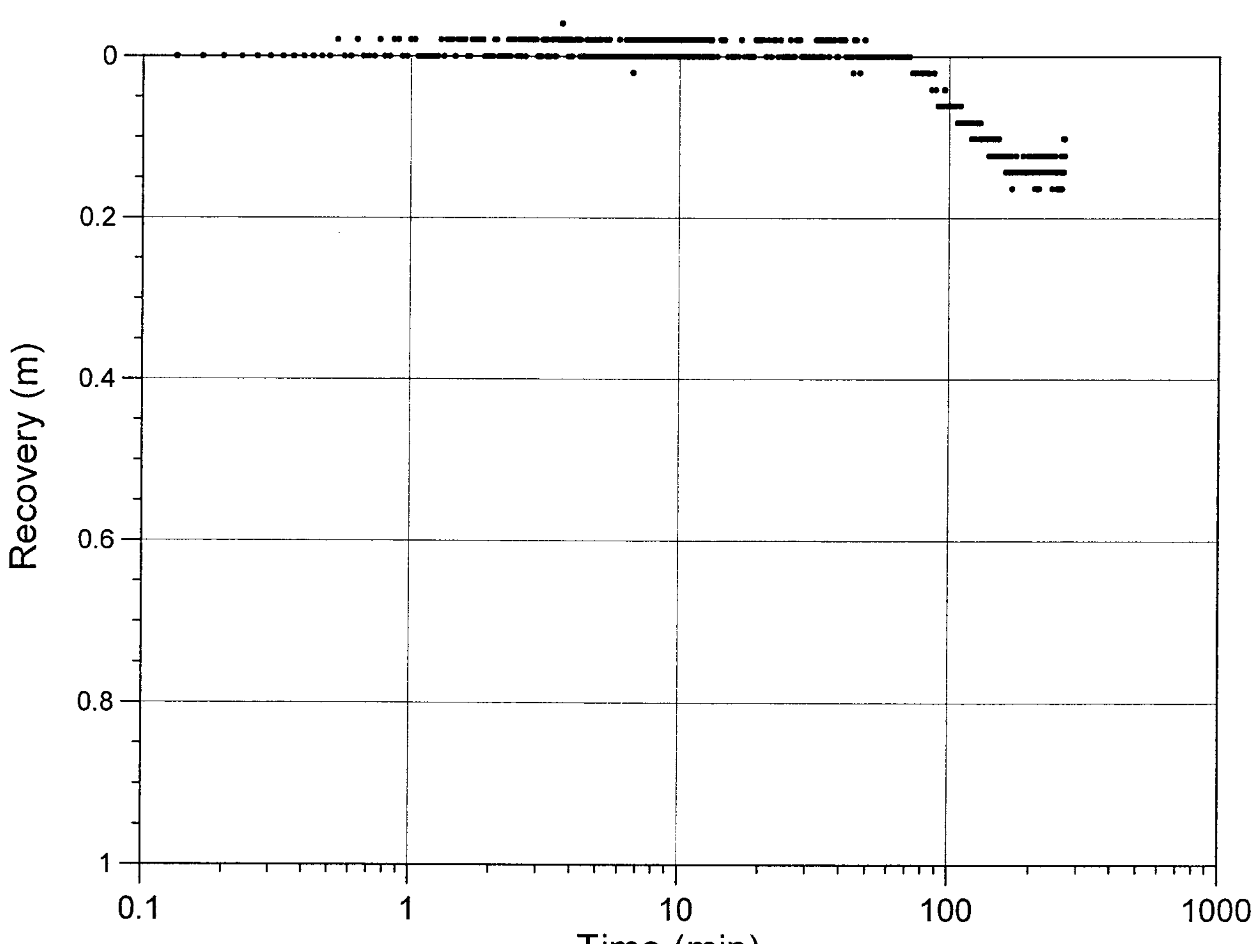
Time	Flow rate (l/min)
09:00.35	2.179
09:02.35	0.647
09:05.35	0.628
09:15	0.620
09:30	0.620
09:45	0.612
10:00	0.606
14:51.30	0.380
14:54.30	0.379
15:00.30	0.380


KG0021A01:1
1000
100
10
1
Recovery (m)
0.1
1
10
100
1000
Time (min)


320
322
324
326
Recovery (m)
Δs = 1.61 m
T = 7.2 · 10-7 m2/s
0.1
1
10
100
1000
Time (min)

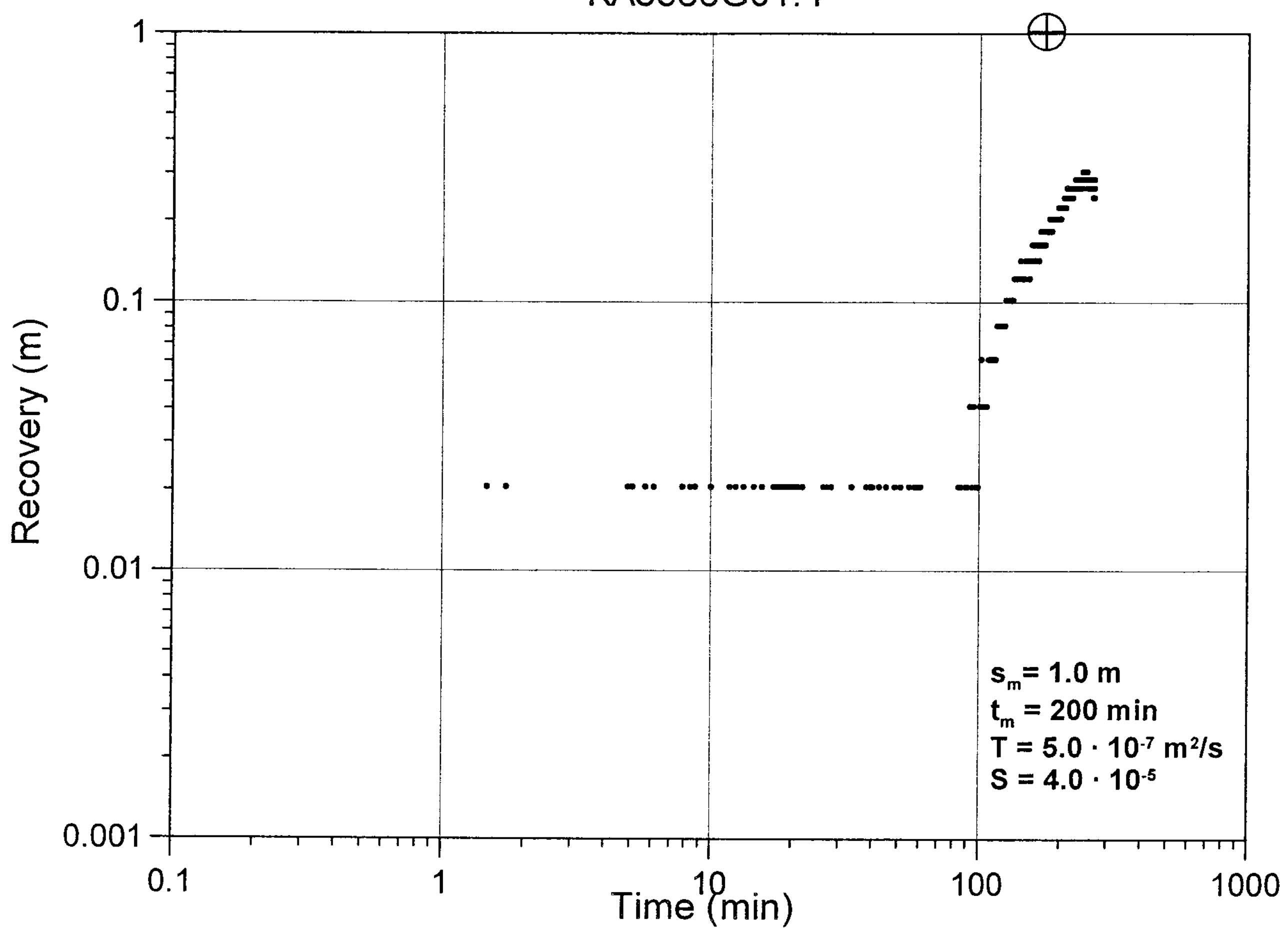
KA3563G01:1

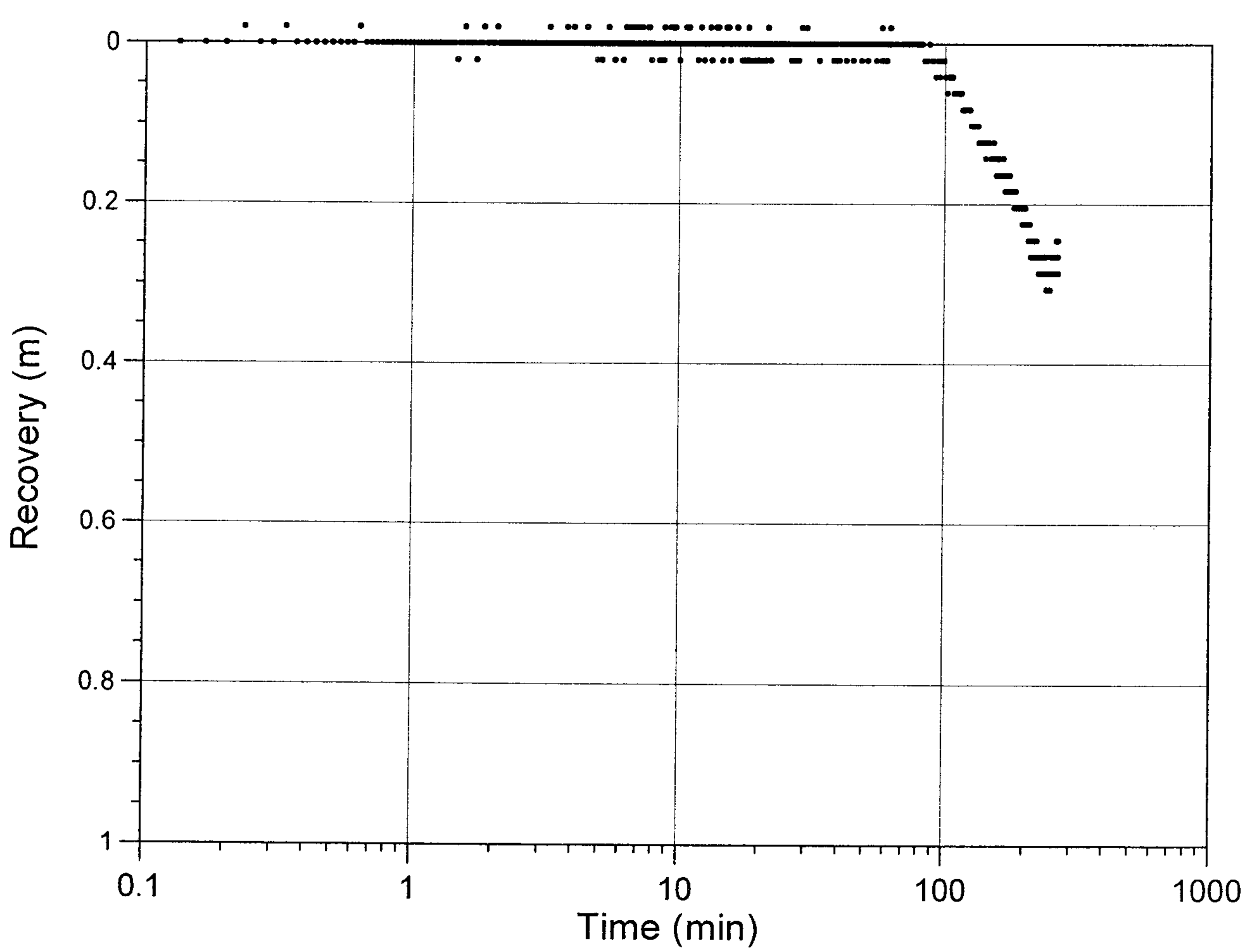




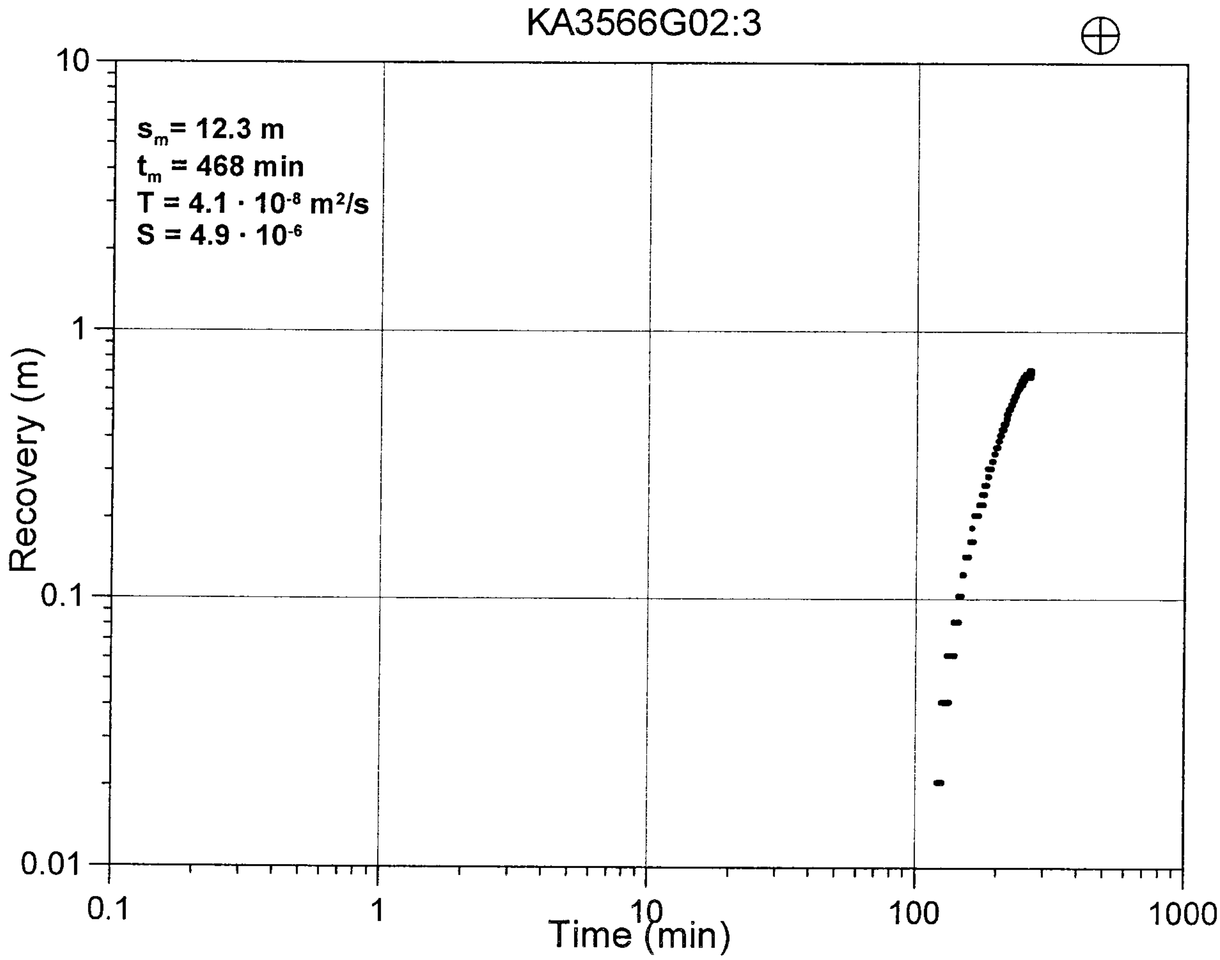
13_KA3563G1_1.GRF 26-okt-99

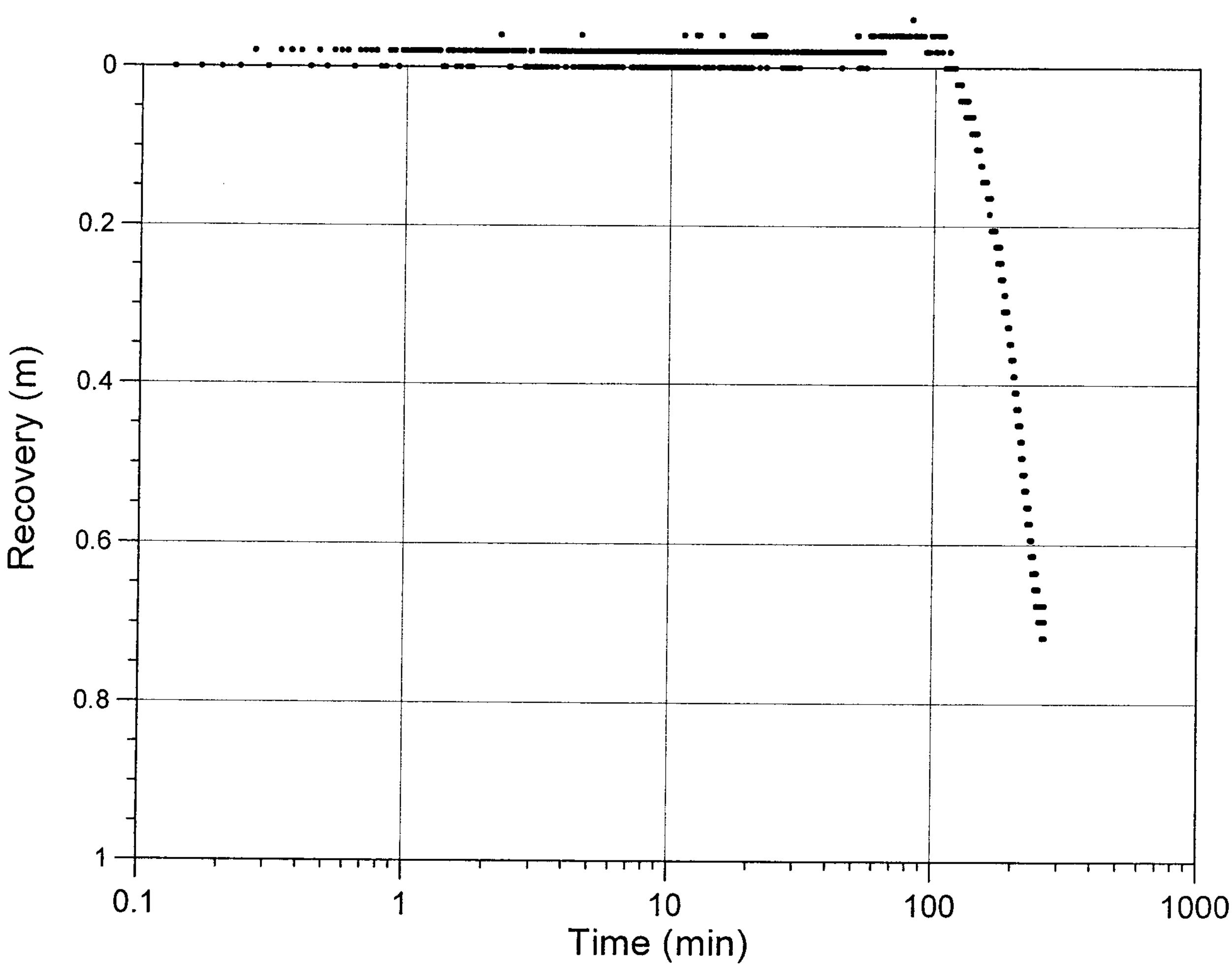
KA3566G01:4



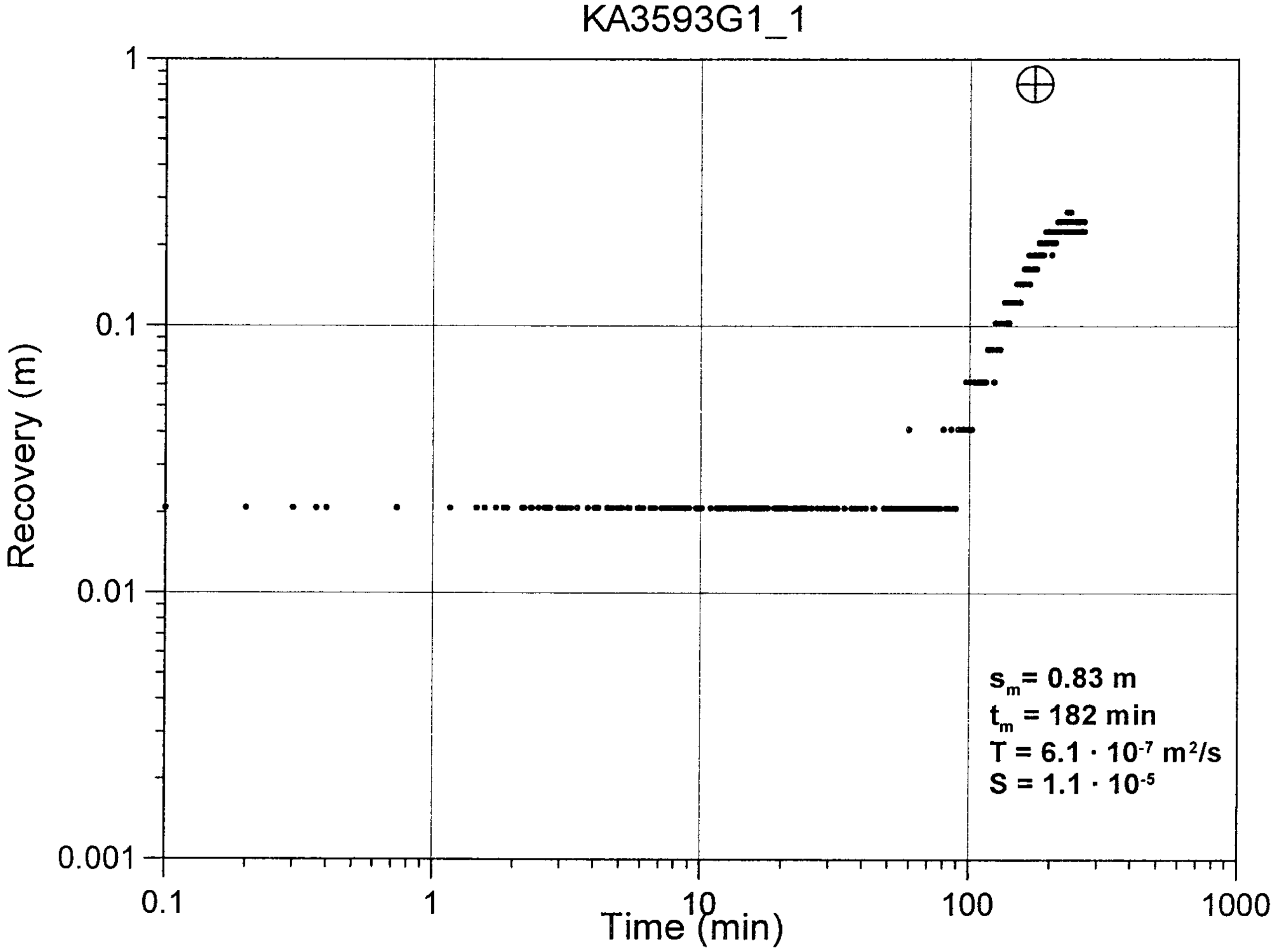


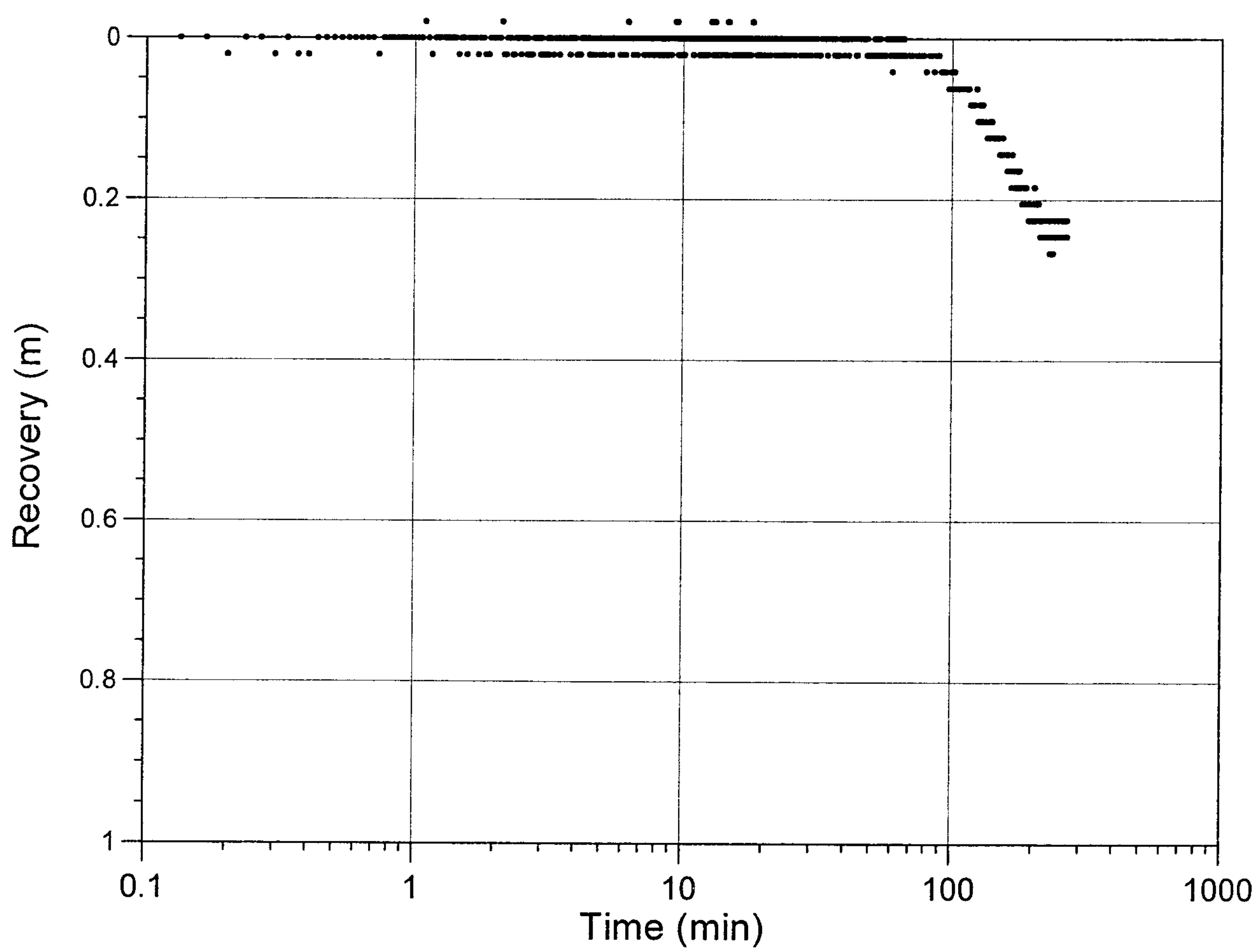
13_KA3566G1_4.GRF 26-okt-99





13_KA3566G2_3.GRF 26-okt-99





13_KA3593G1_1.GRF 26-okt-99

APPENDIX 9

Interference test 2:14 in borehole KG0021A01, section 25.00 m – 34.00 m

Date: 99-08-20 Field Crew: Bengt Gentzschein
Borehole length: 48.82 m Borehole diameter: 76 mm

Flowing borehole: KG0021A01, section #3: 25.00 – 34.00 m

Valve opened: 990820 08:00.05 Valve closed: 990820 14:00.07
End of Test: 990821 08:55
Total flowing time : 360 min Tot. Pr. Build-up time 1135 min.

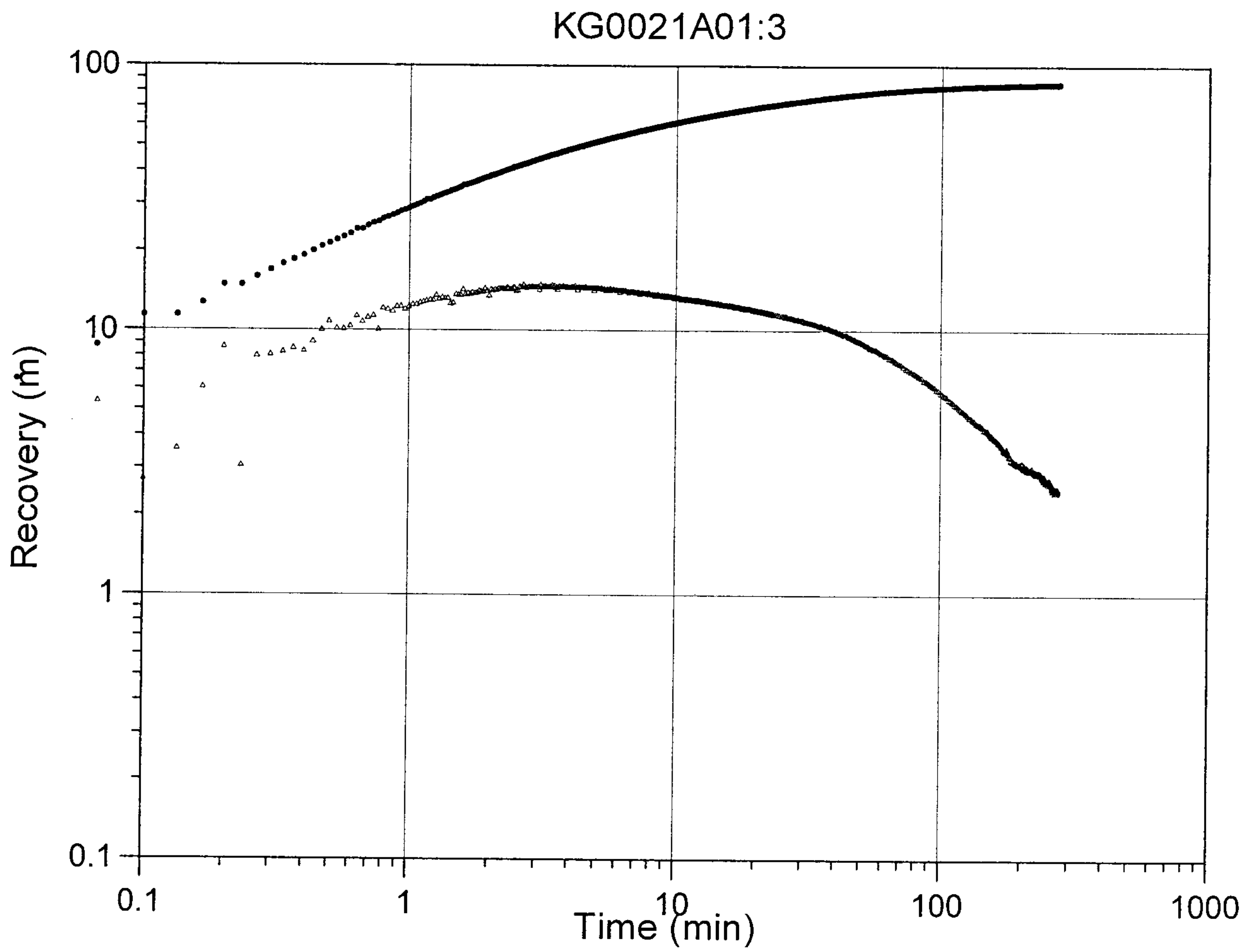
The test was performed as an Interference test. Pressure responses were monitored in 61 borehole sections.

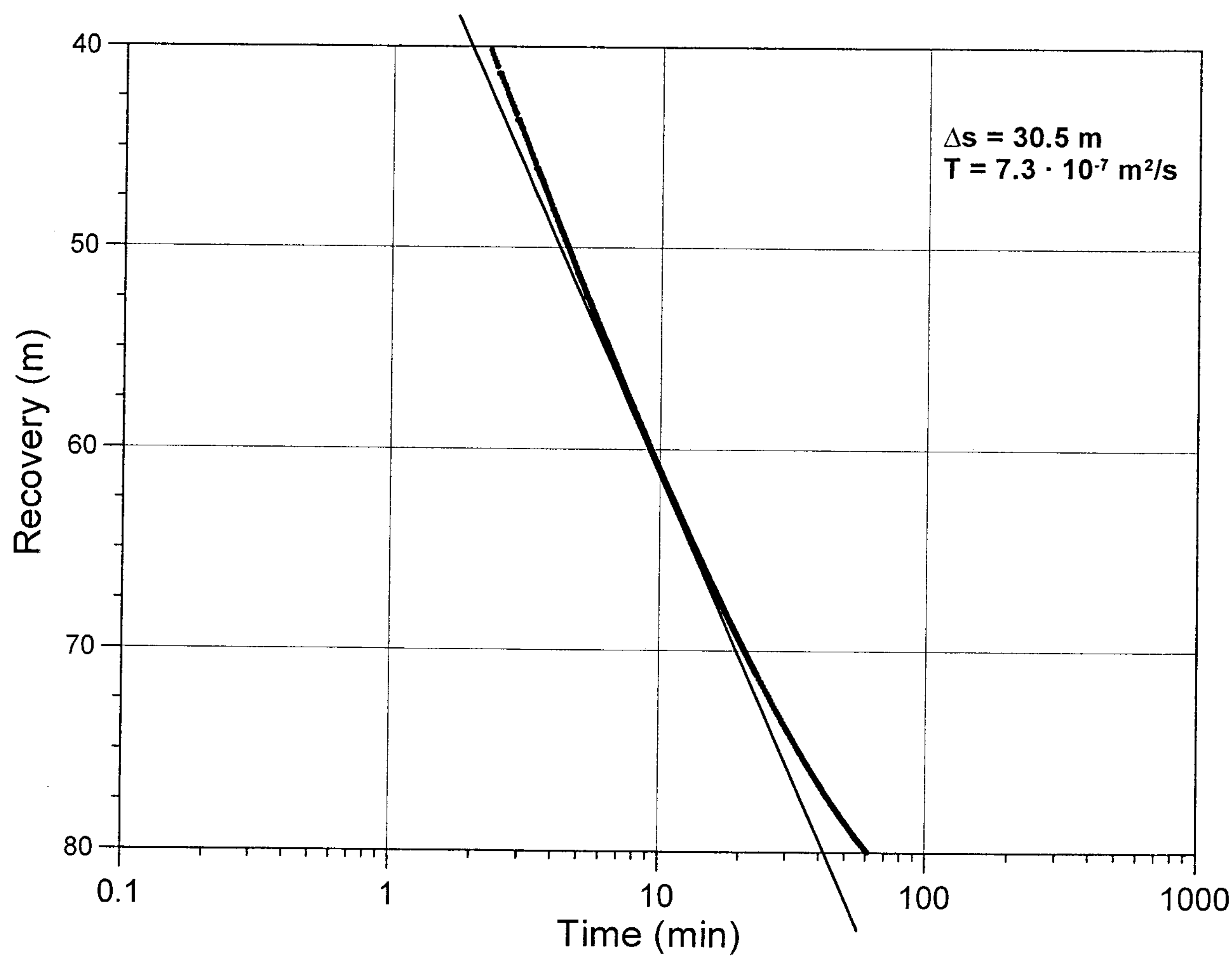
Flow data

Manually measured flow rates of KG0021A01 section 25.00 – 34.00 m are presented in the table below:

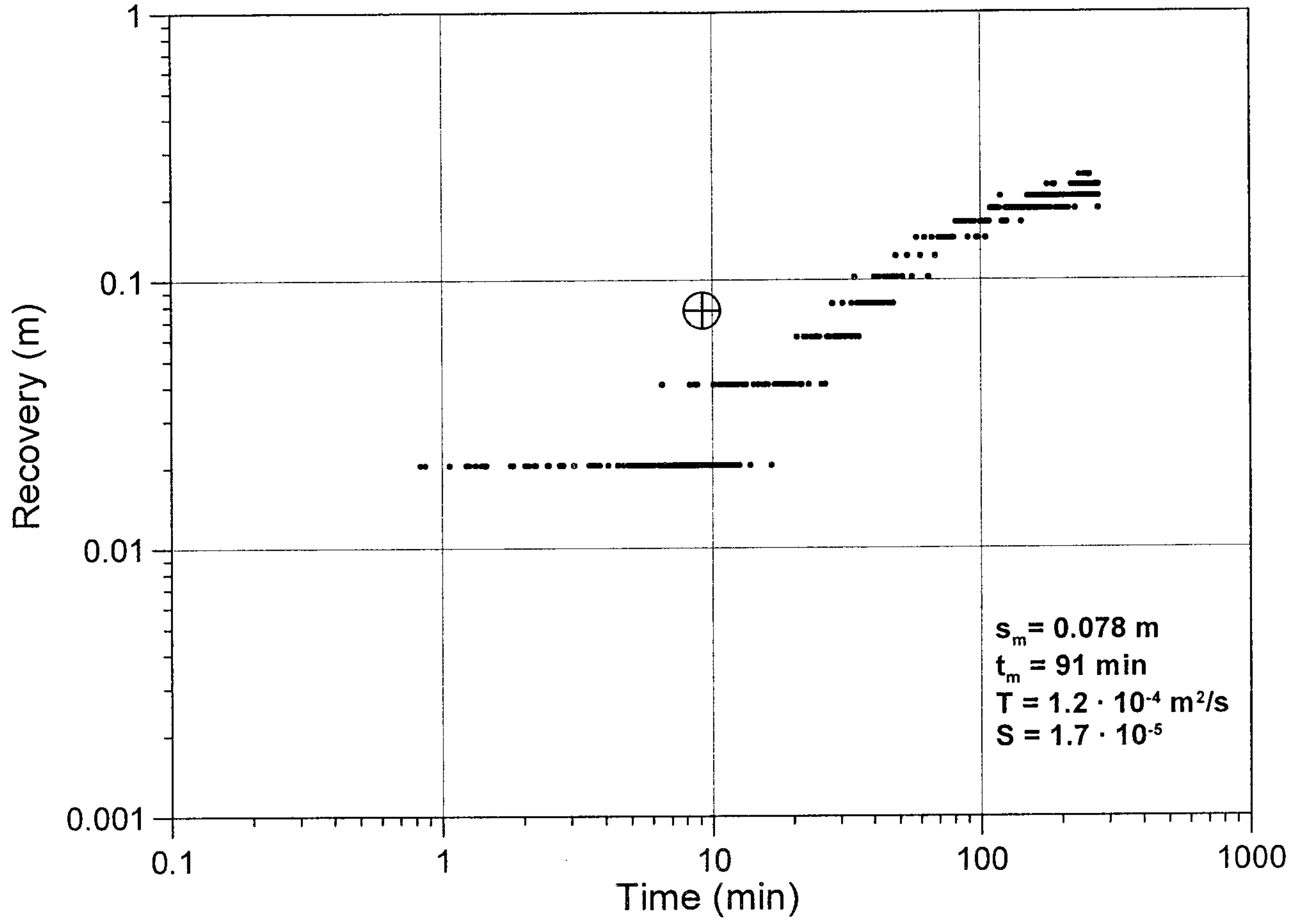
Table Manually measured flow rates, Interference test in KG0021A01, section 25.00 - 34.00 m (test #14). Prototype repository, August 1999.

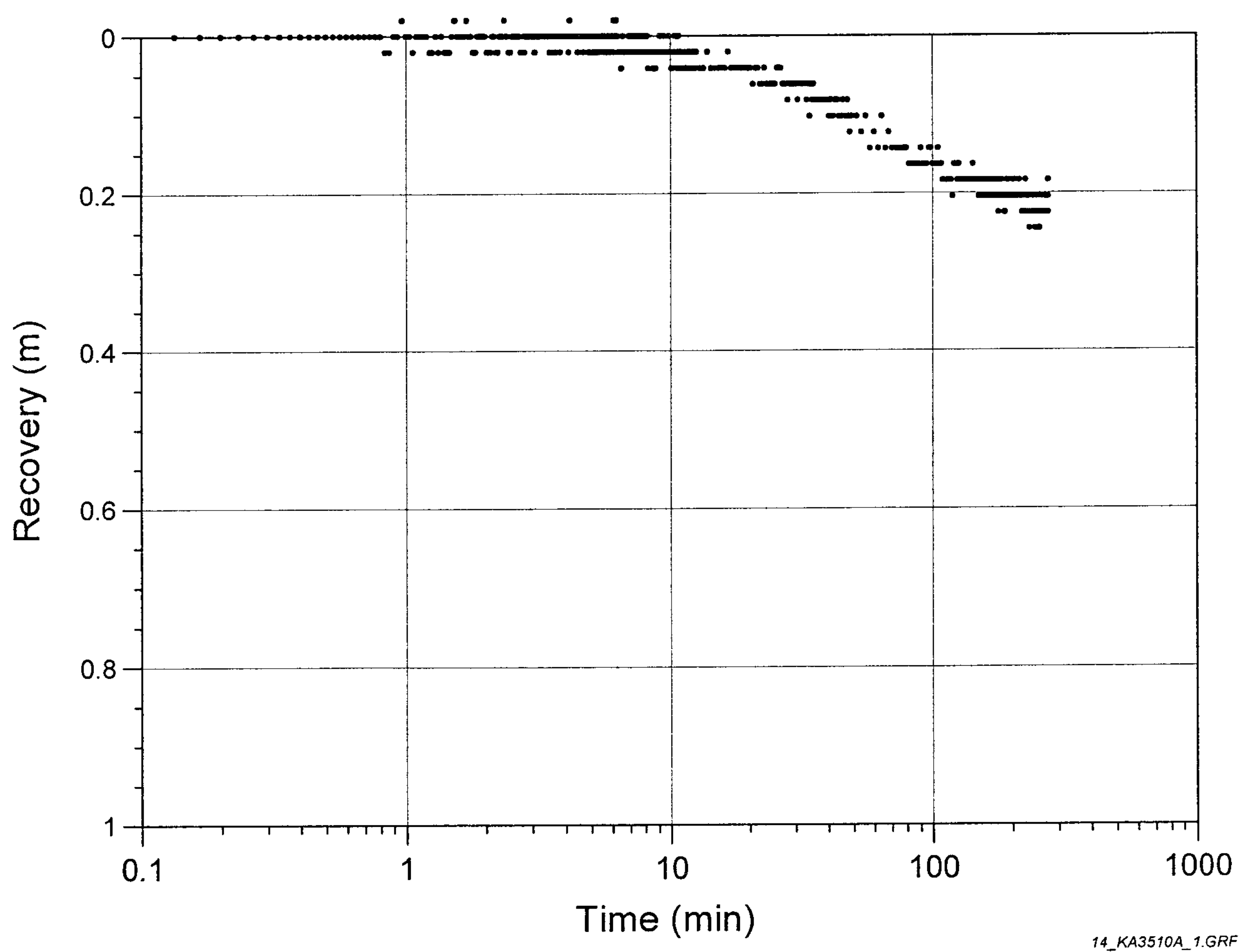
Time	Flow rate (l/min)
08:00.35	8.30
08:03.35	8.10
08:06.05	7.95
08:15	7.70
08:31	7.51
08:45	7.45
09:00	7.42
13:50	7.28
13:54	7.28
13:58	7.29


KG0021A01:3
100
10
1
0.1
Recovery (m)
0.1
1
10
100
1000
Time (min)

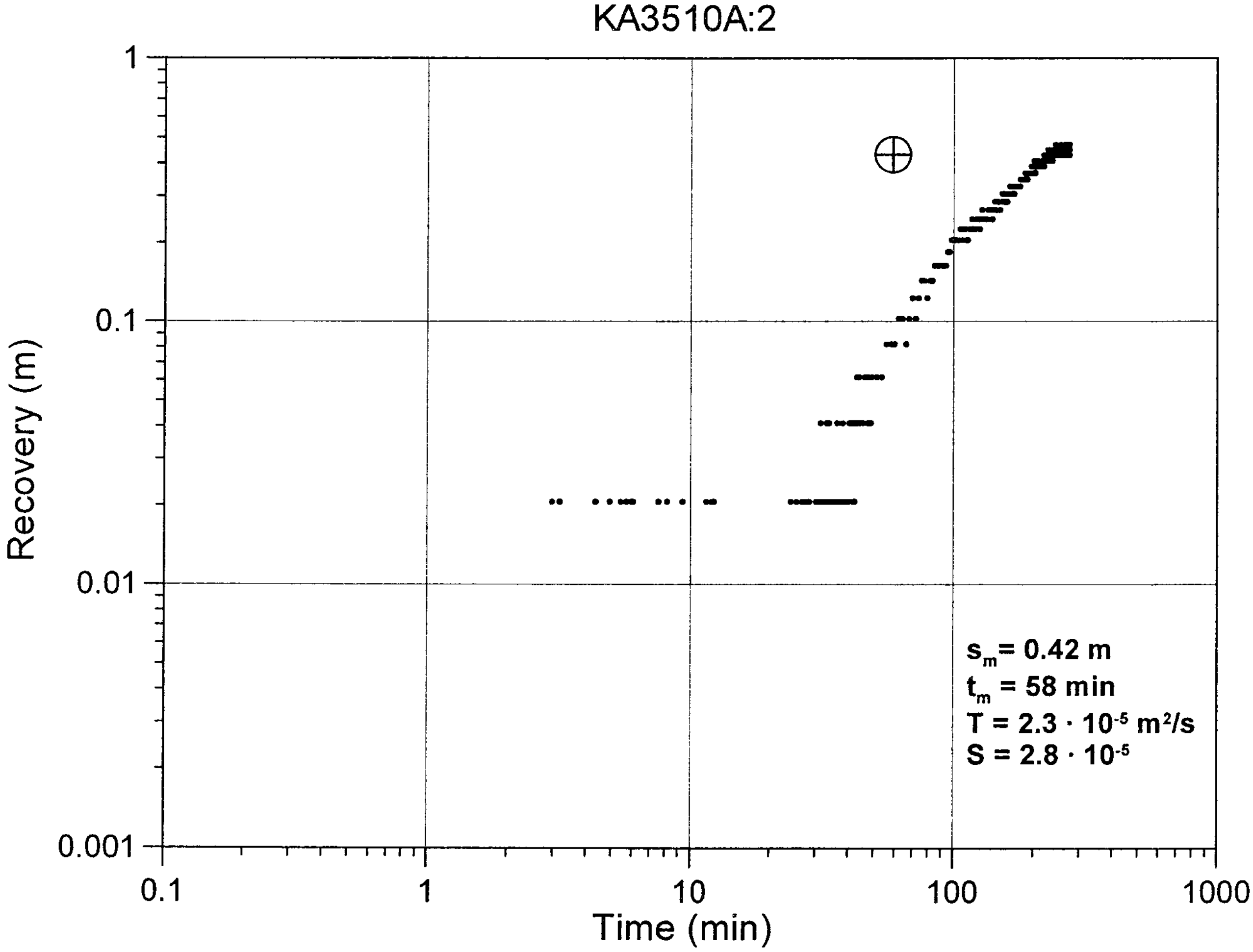

40
50
60
70
80
Recovery (m)
Δs = 30.5 m
T = 7.3 · 10-7 m²/s
0.1
1
10
100
1000
Time (min)

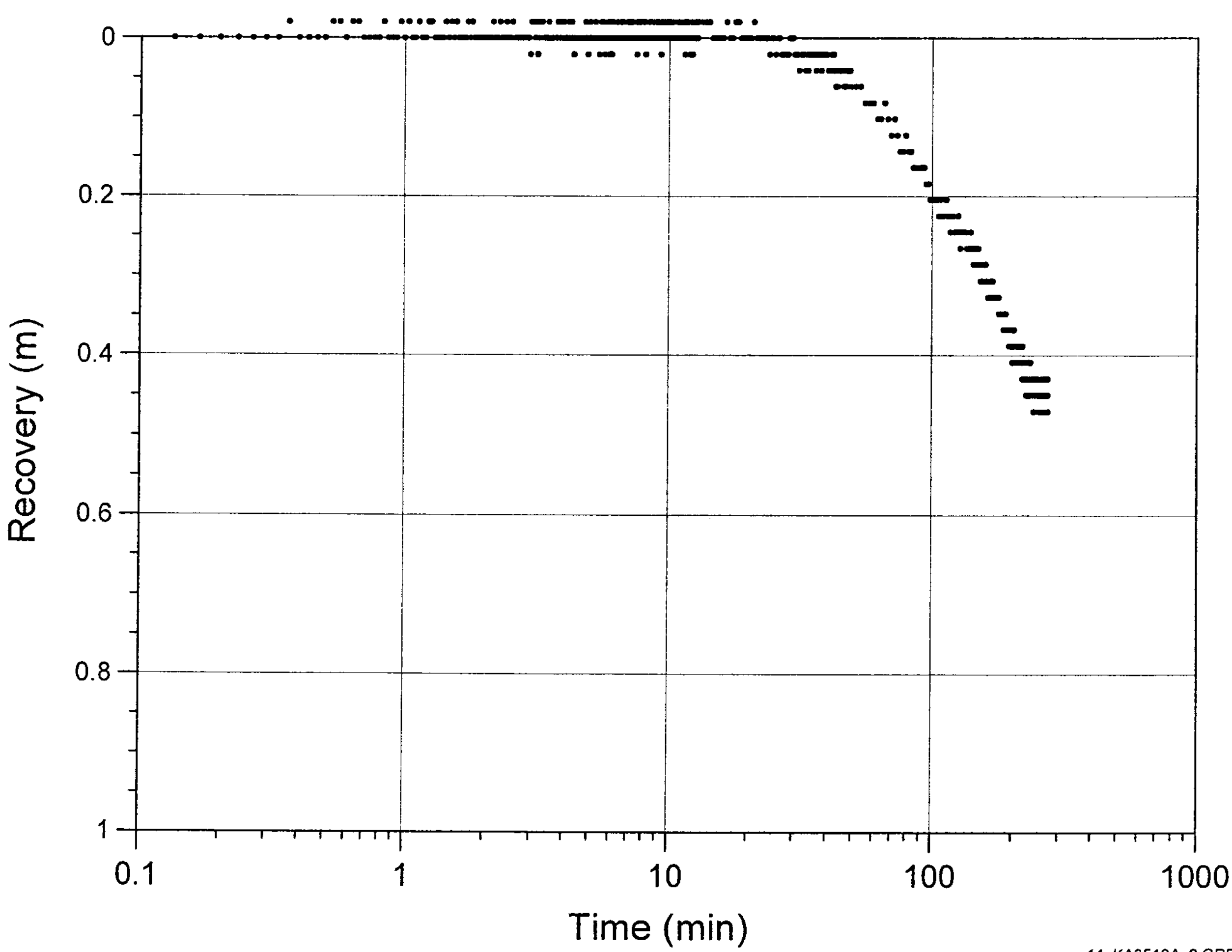
KA3510A:1



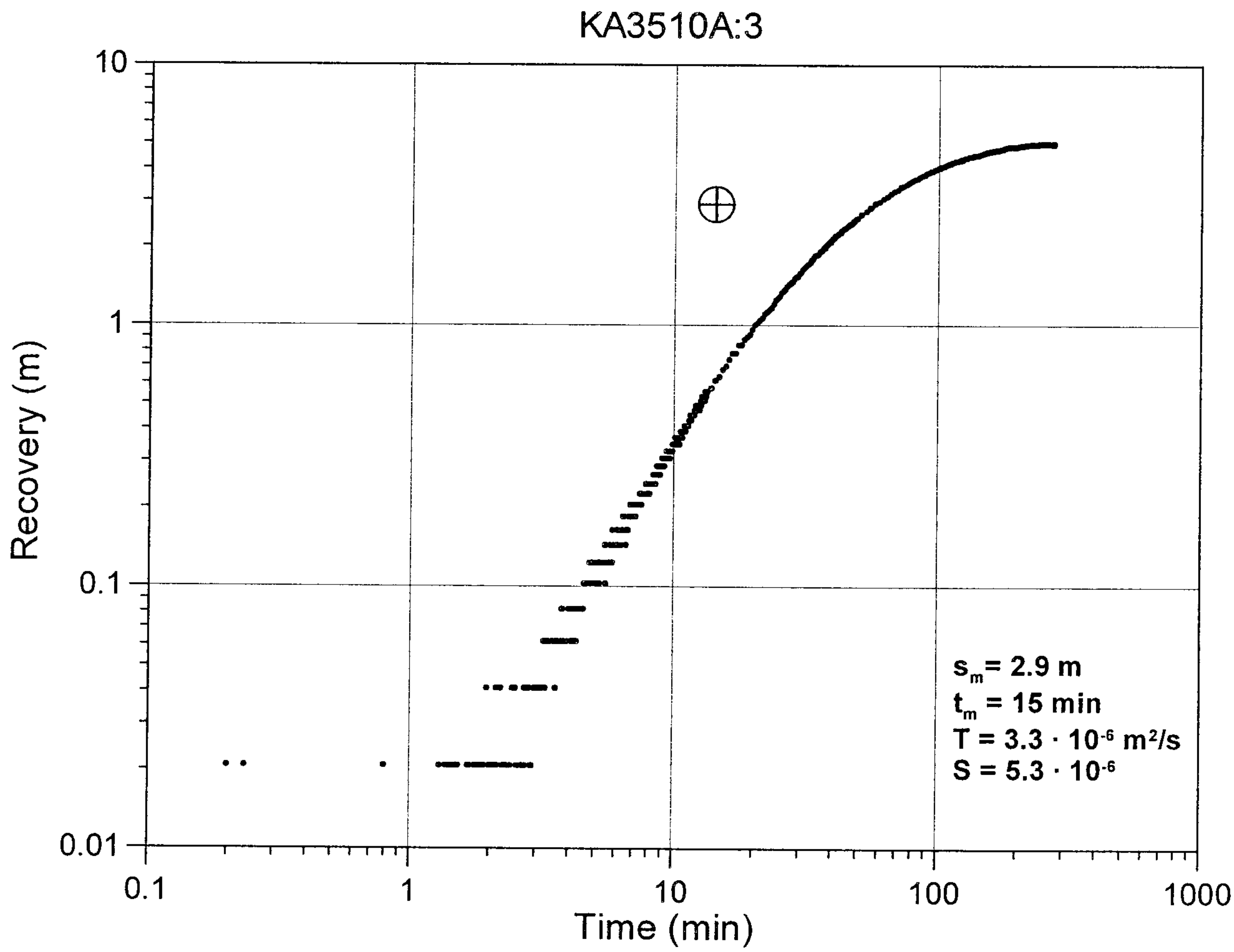


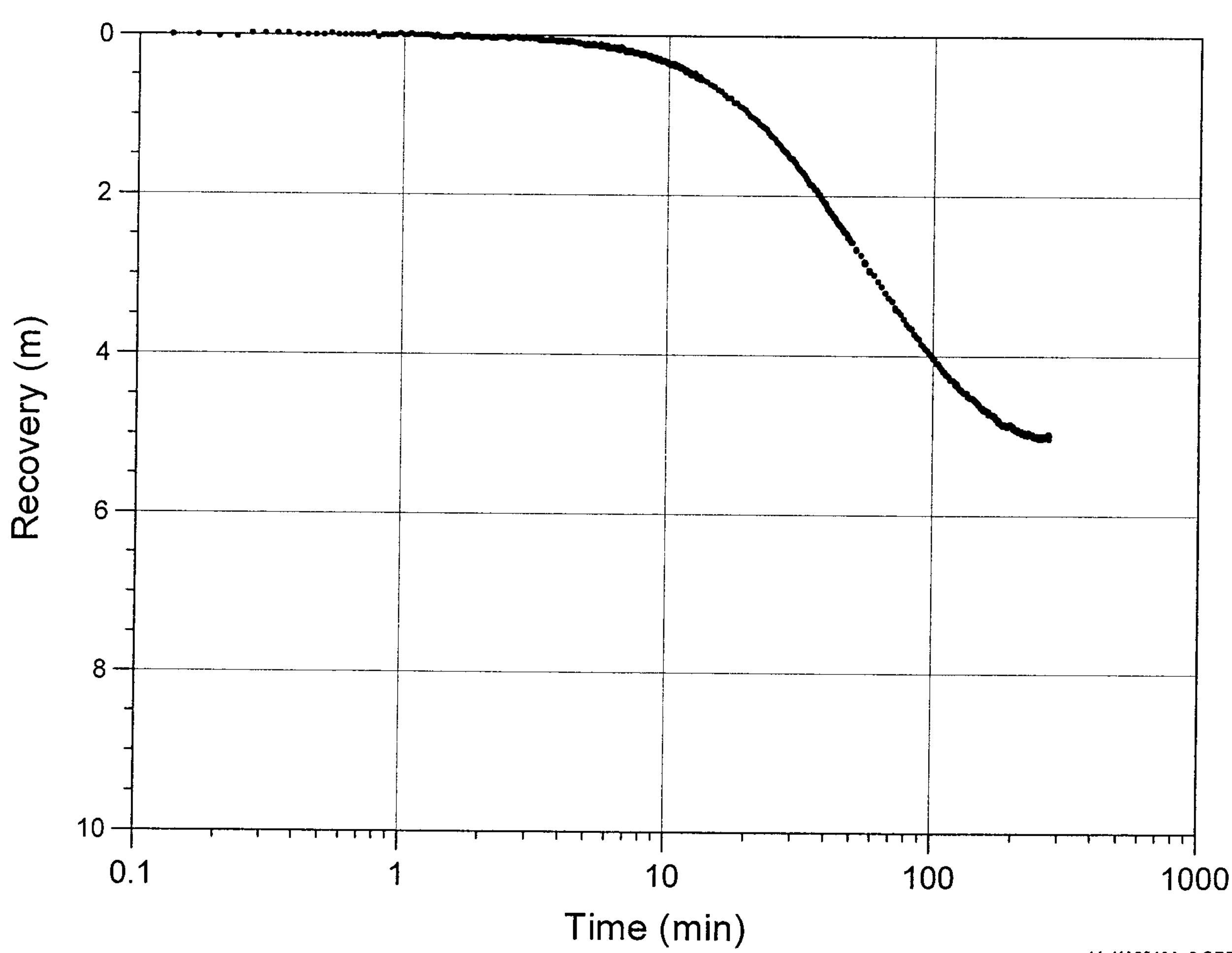
14_KA3510A_1.GRF 26-okt-99



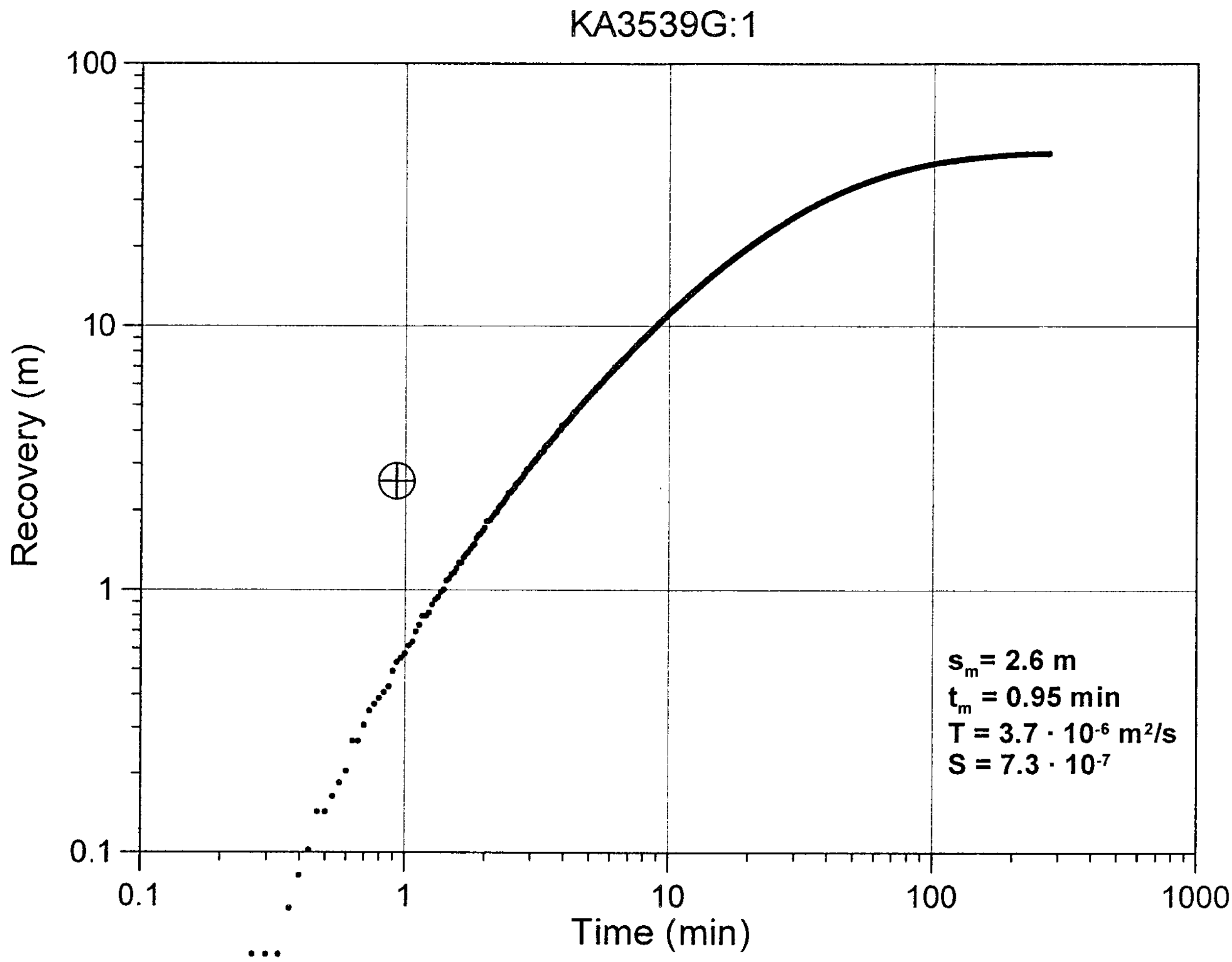


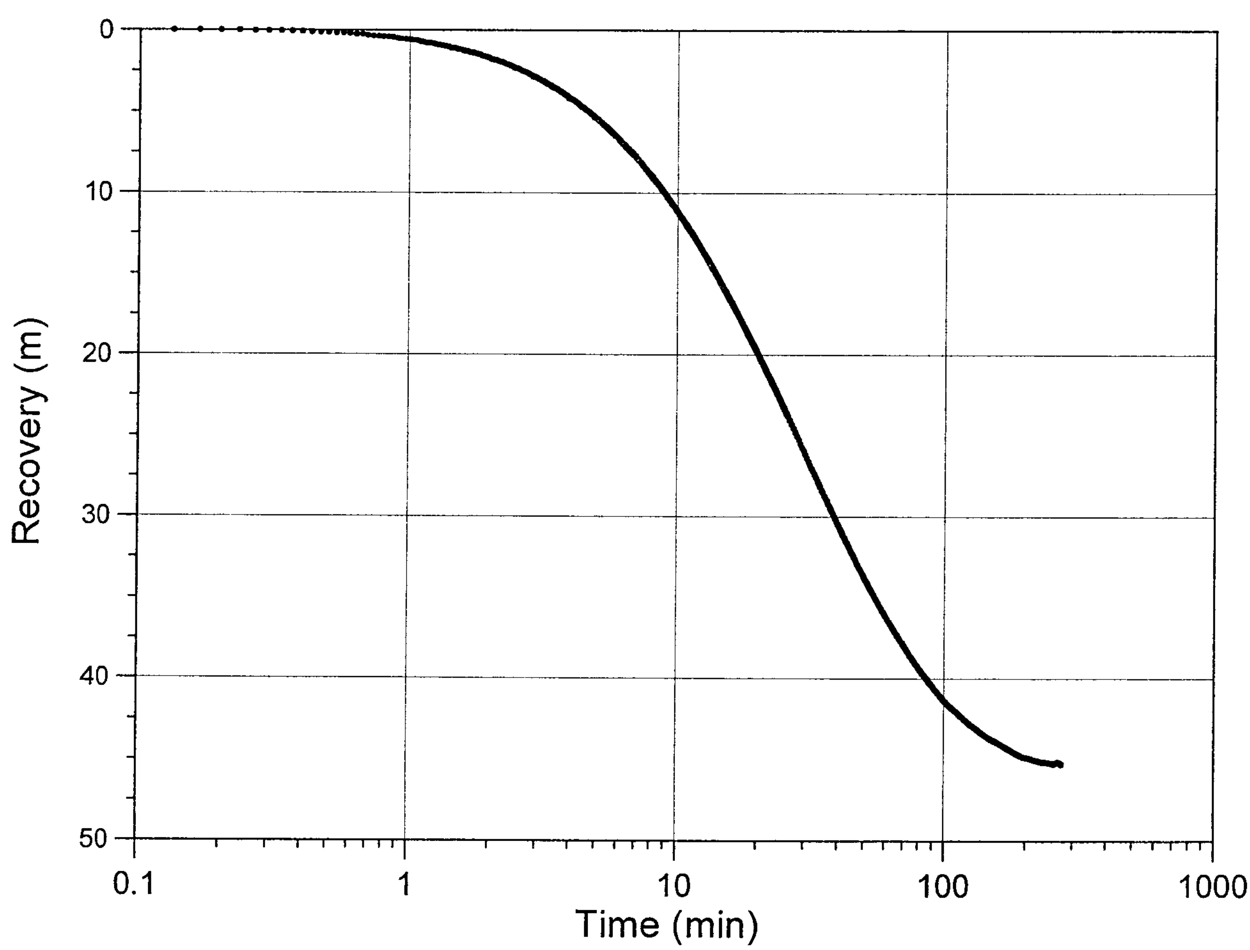
14_KA3510A_2.GRF 26-okt-99



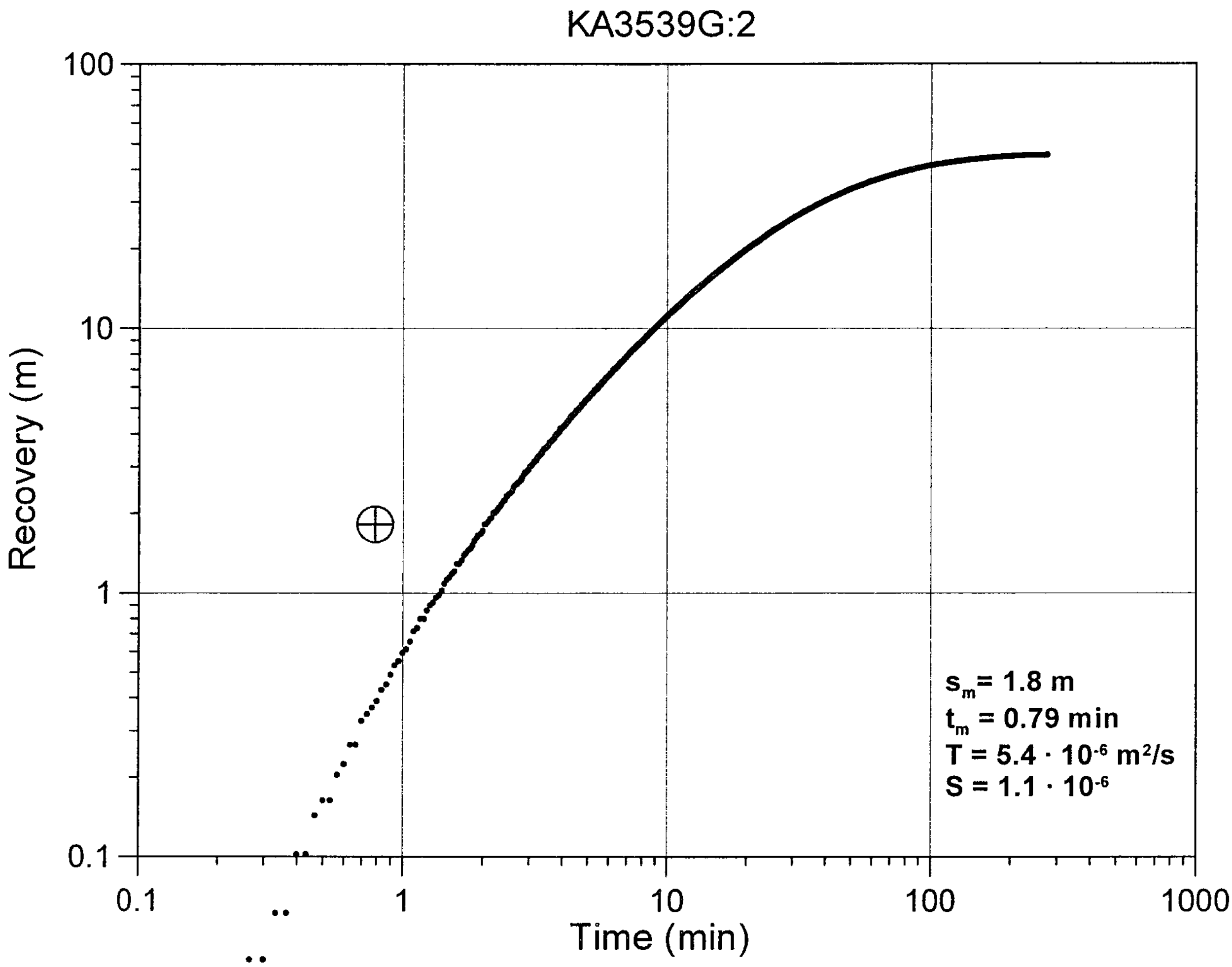


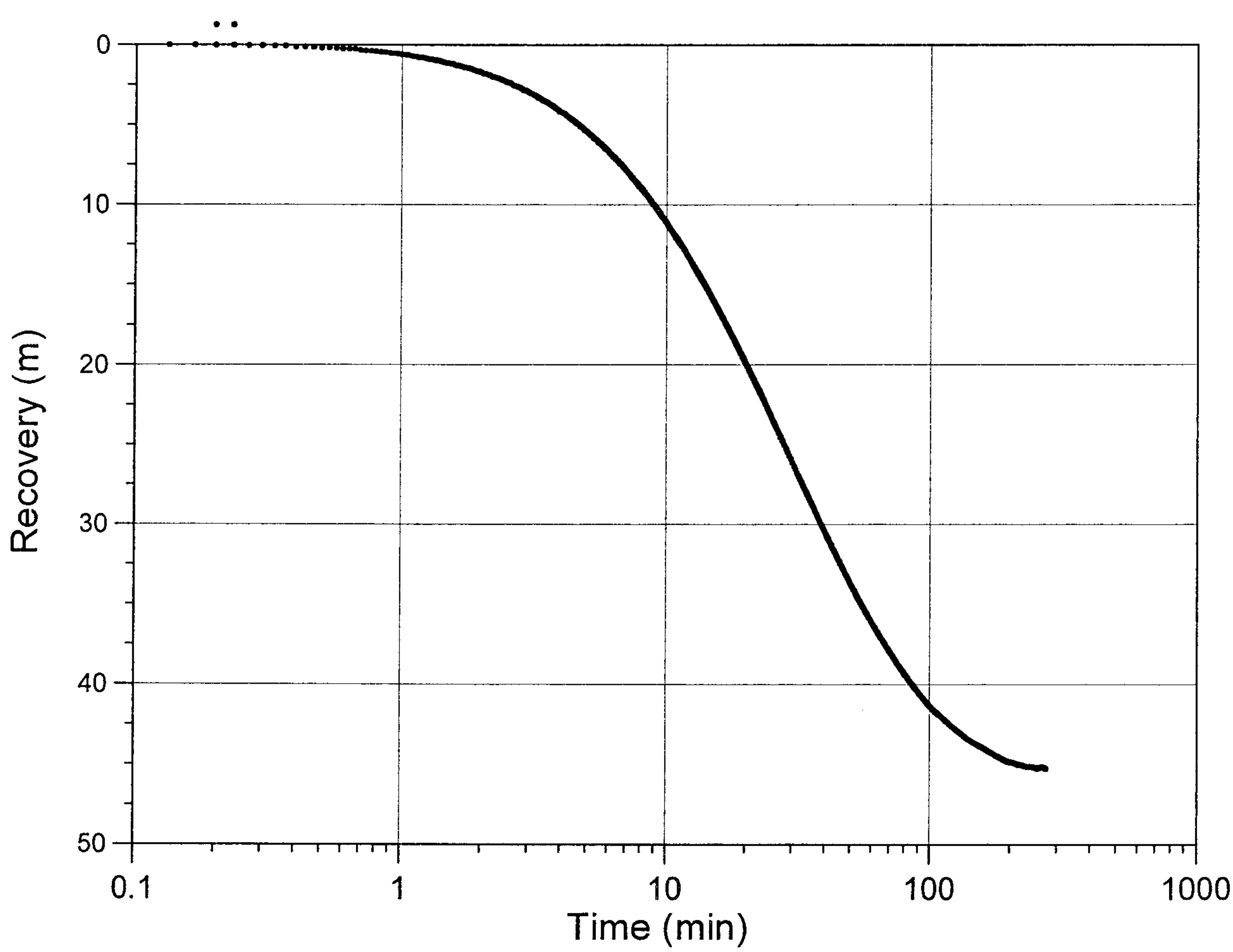
14_KA3510A_3.GRF 26-okt-99





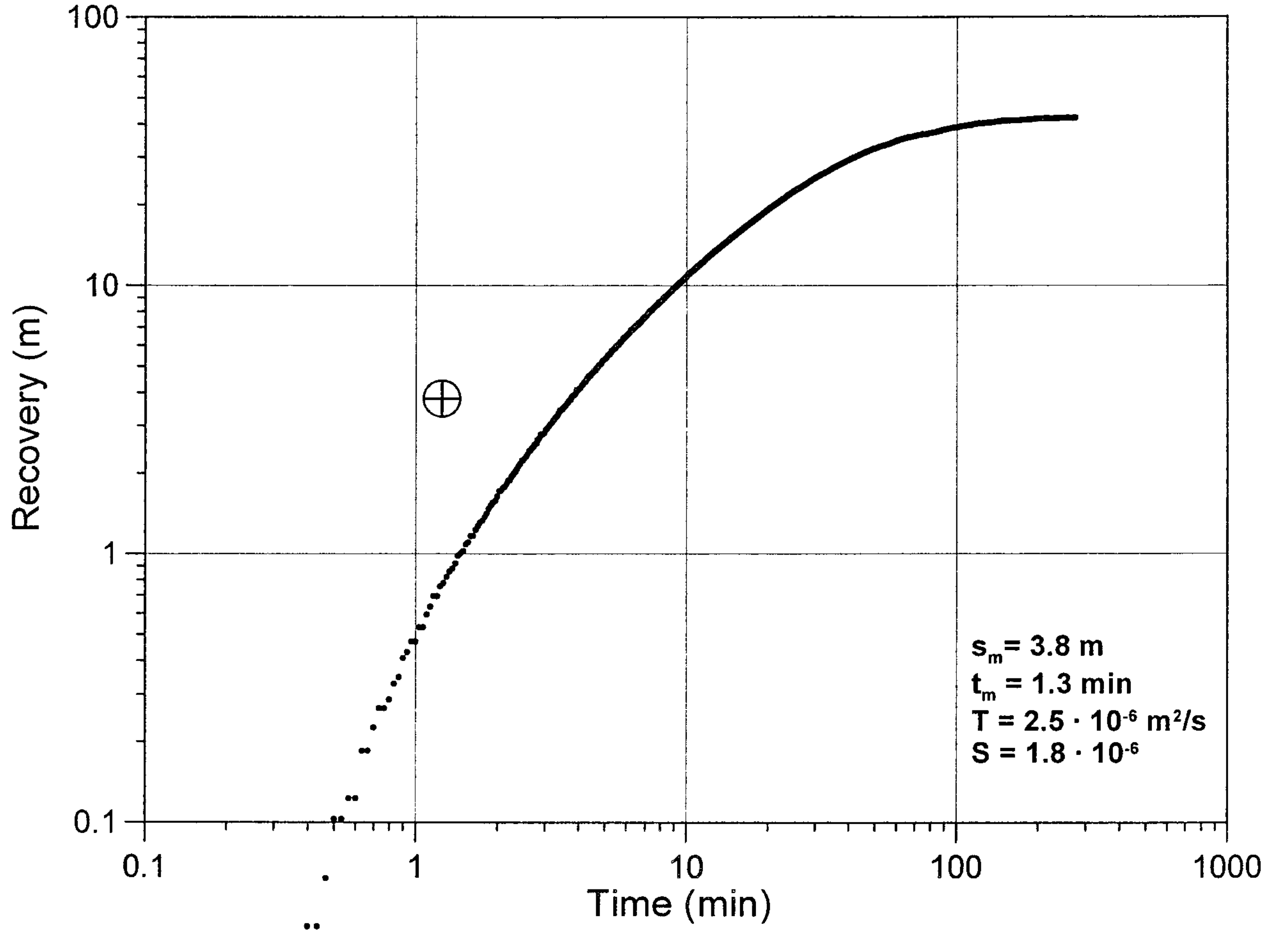
14_KA3539G_1.GRF 26-okt-99

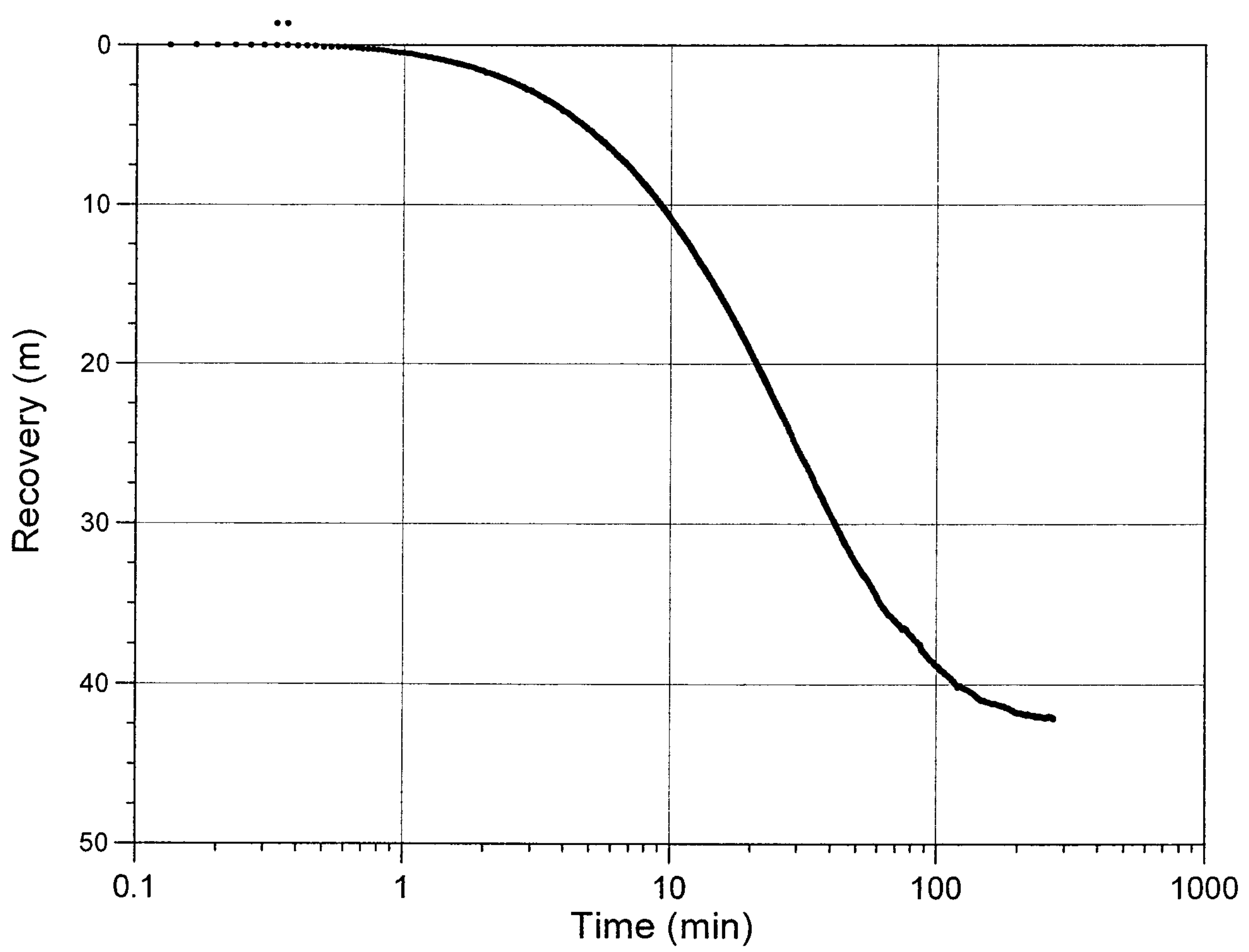




14_KA3539G_2.GRF 26-okt-99

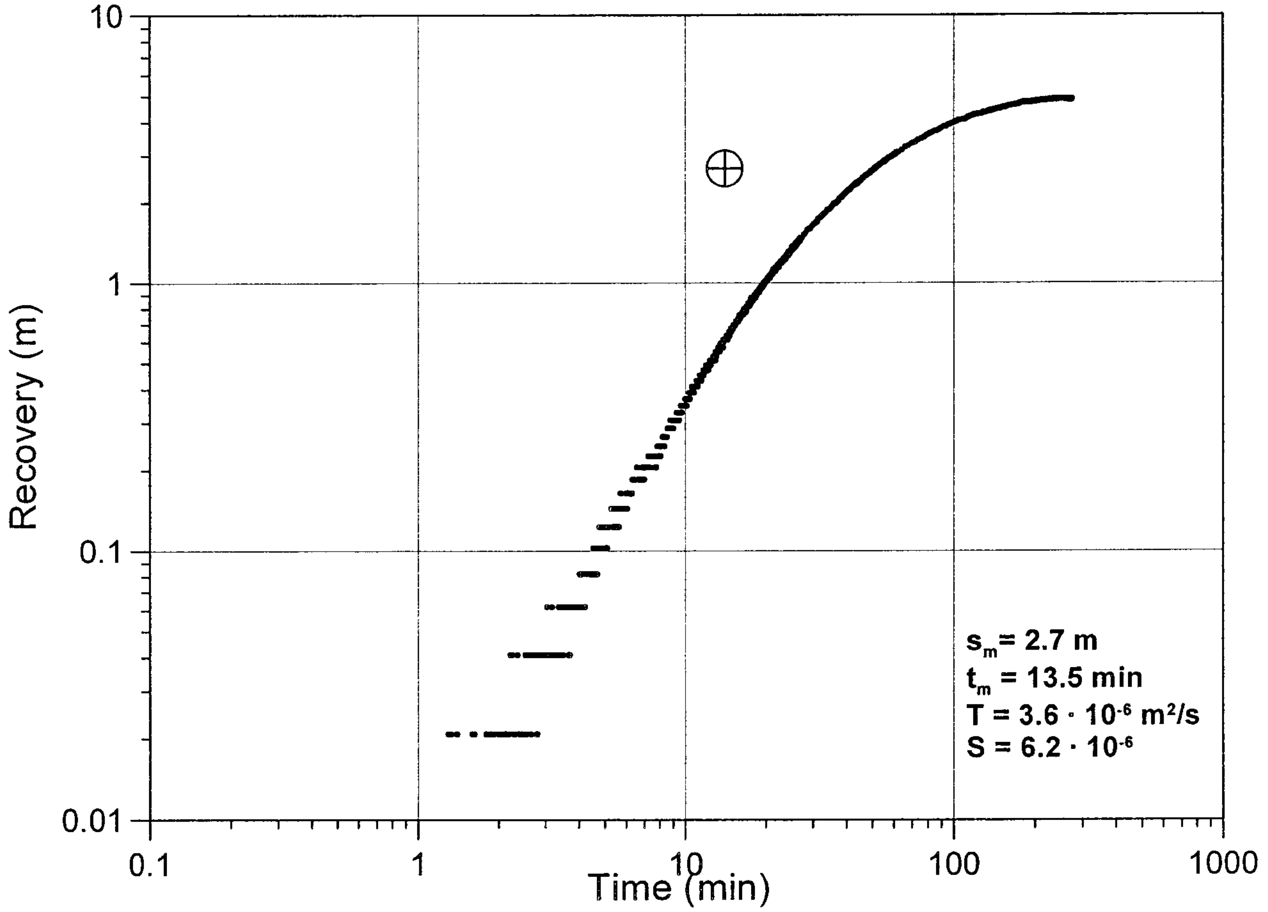
KA3539G:3

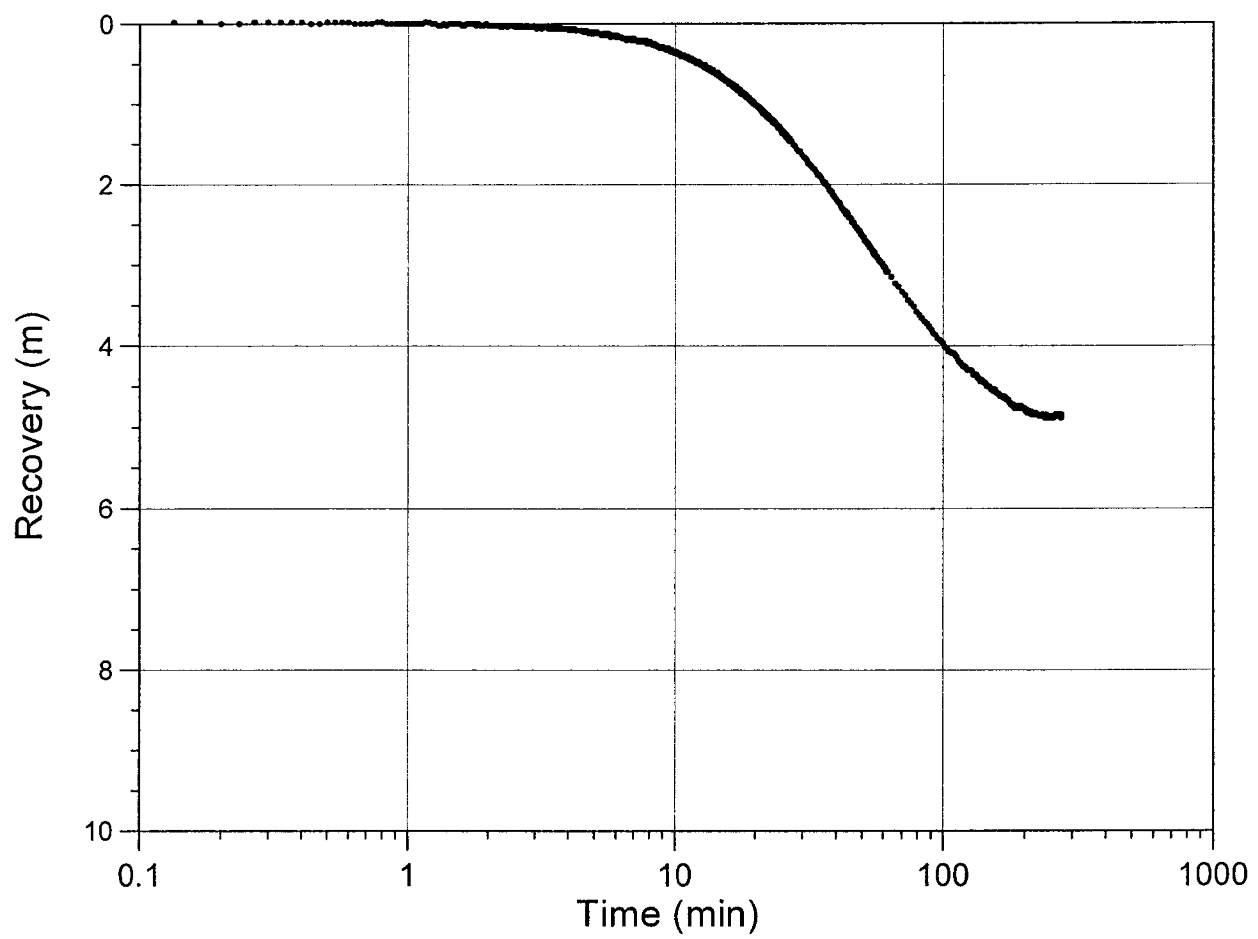




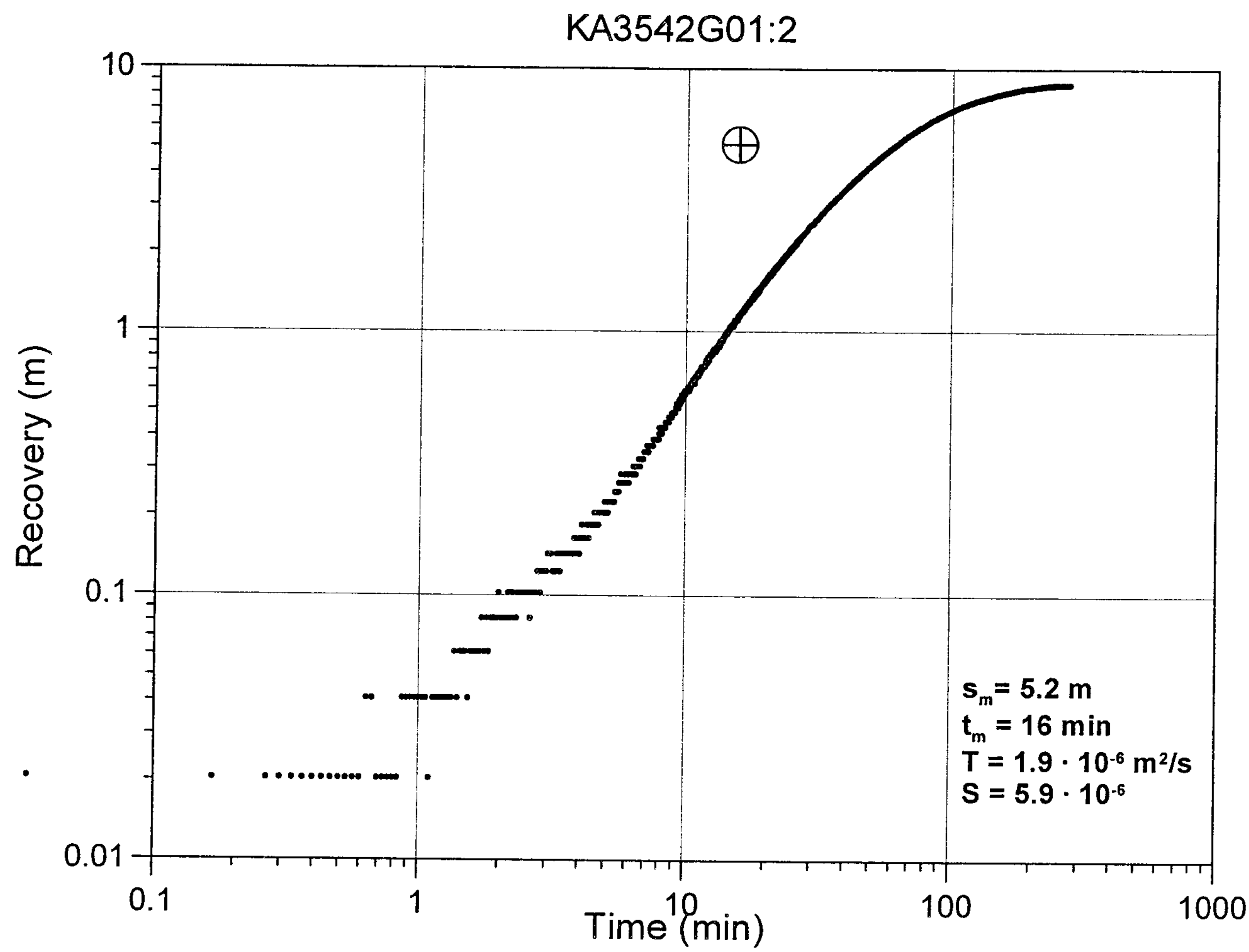
14_KA3539G_3.GRF 26-okt-99

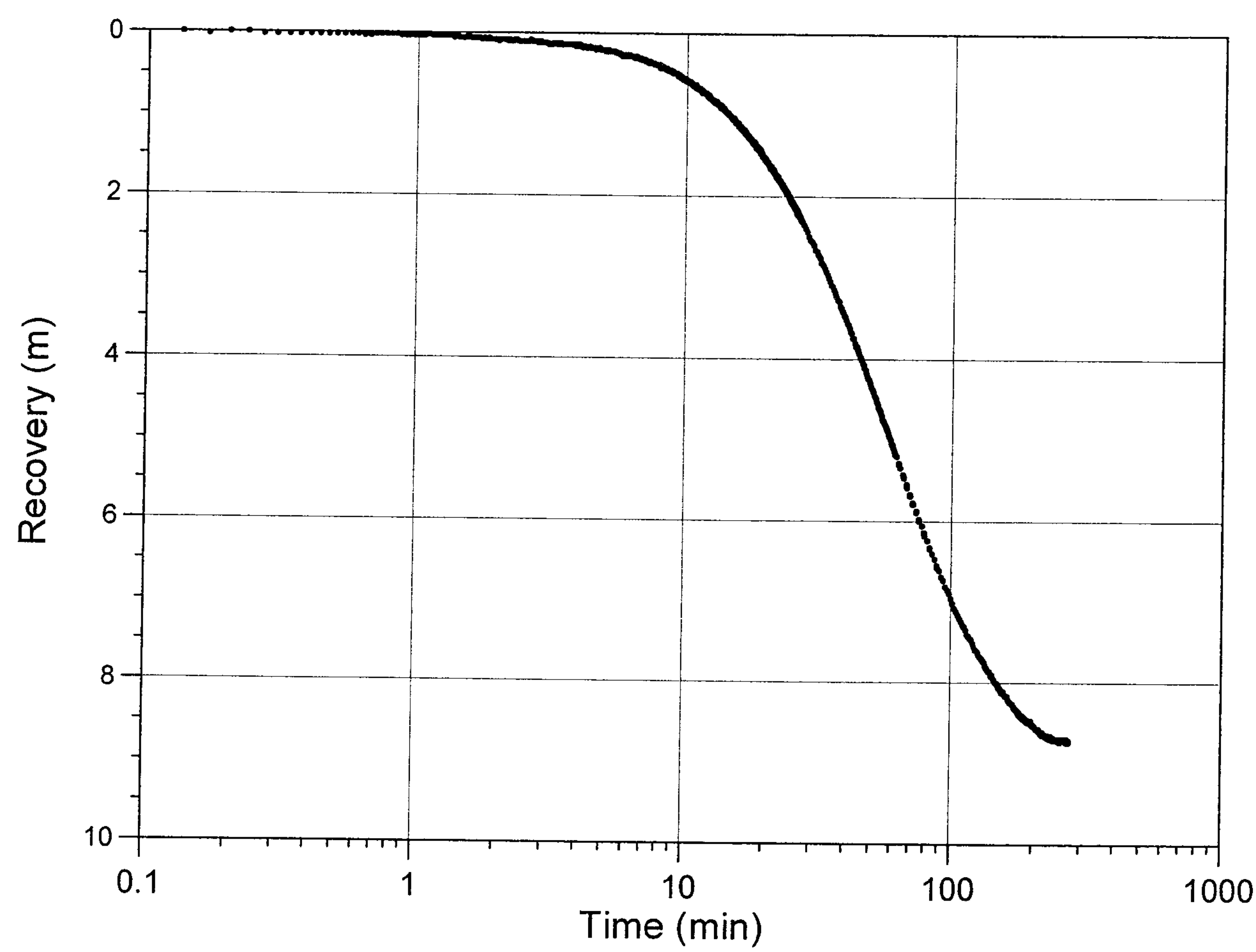
KA3542G01:1

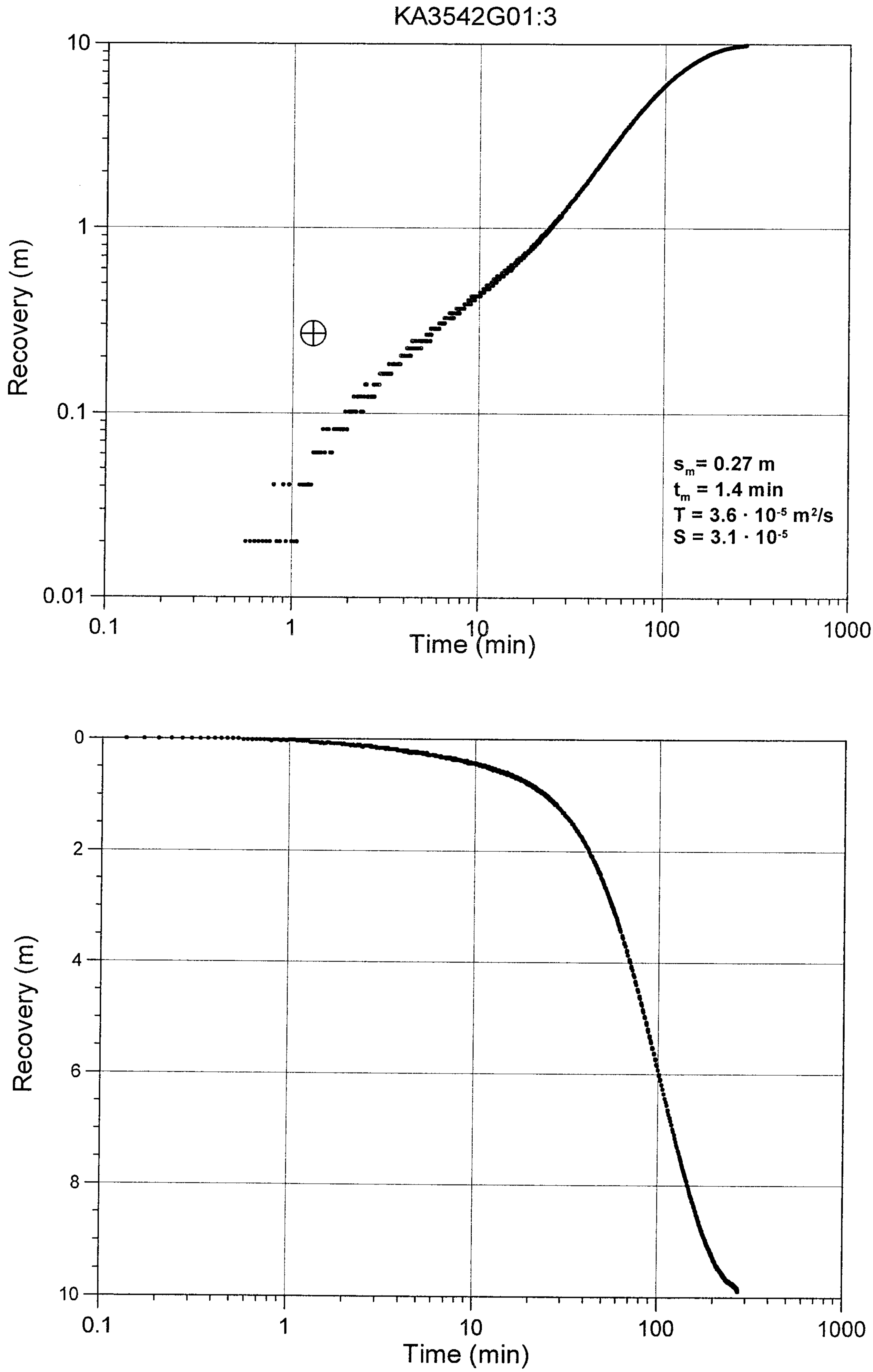




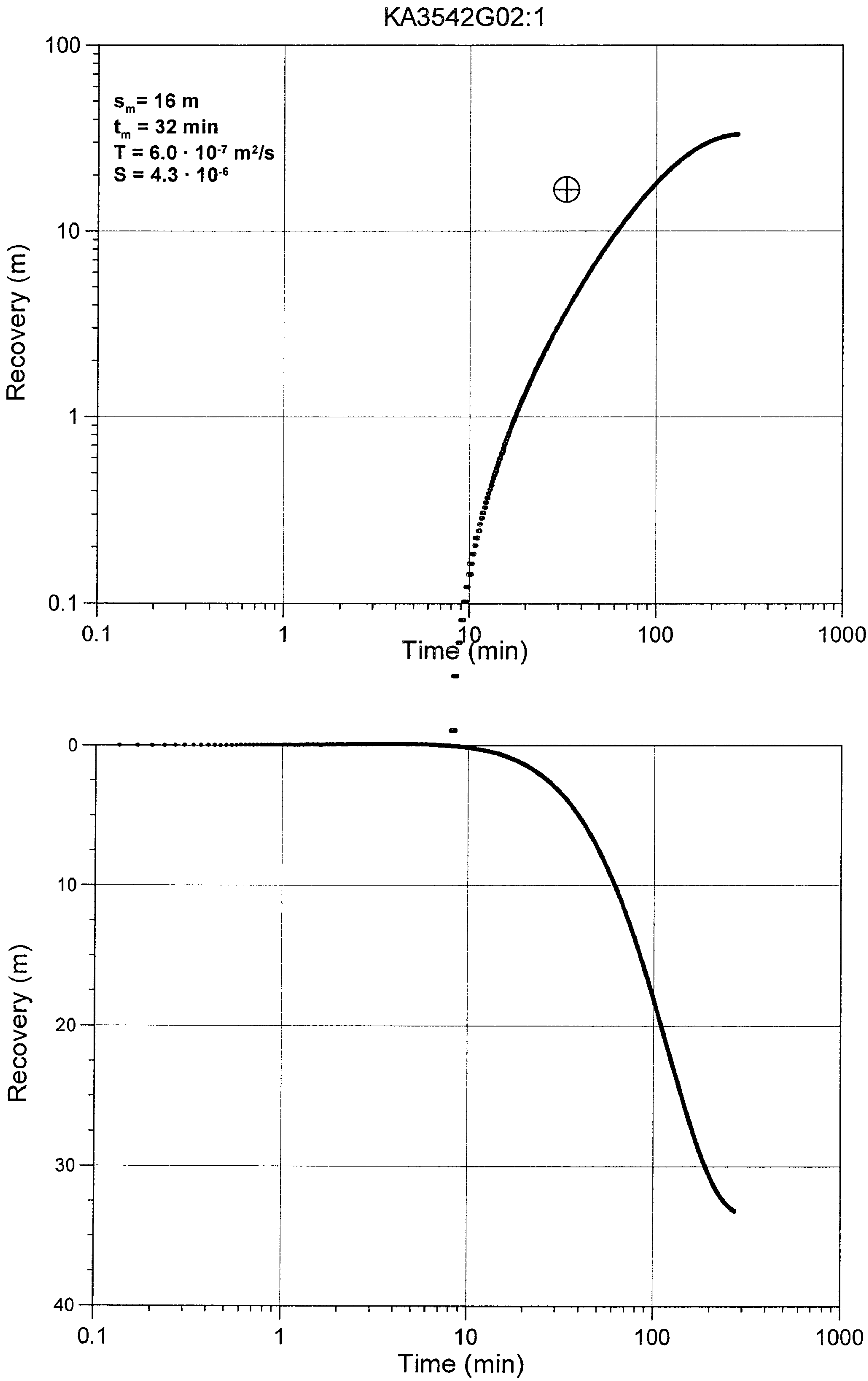
14_KA3542G1_1.GRF 26-okt-99


KA3542G01:2
Recovery (m)
Time (min)
10
1
0.1
0.01
0.1
1
10
100
1000
s_m= 5.2 m
t_m = 16 min
T = 1.9 · 10^{-6} m²/s
S = 5.9 · 10^{-6}

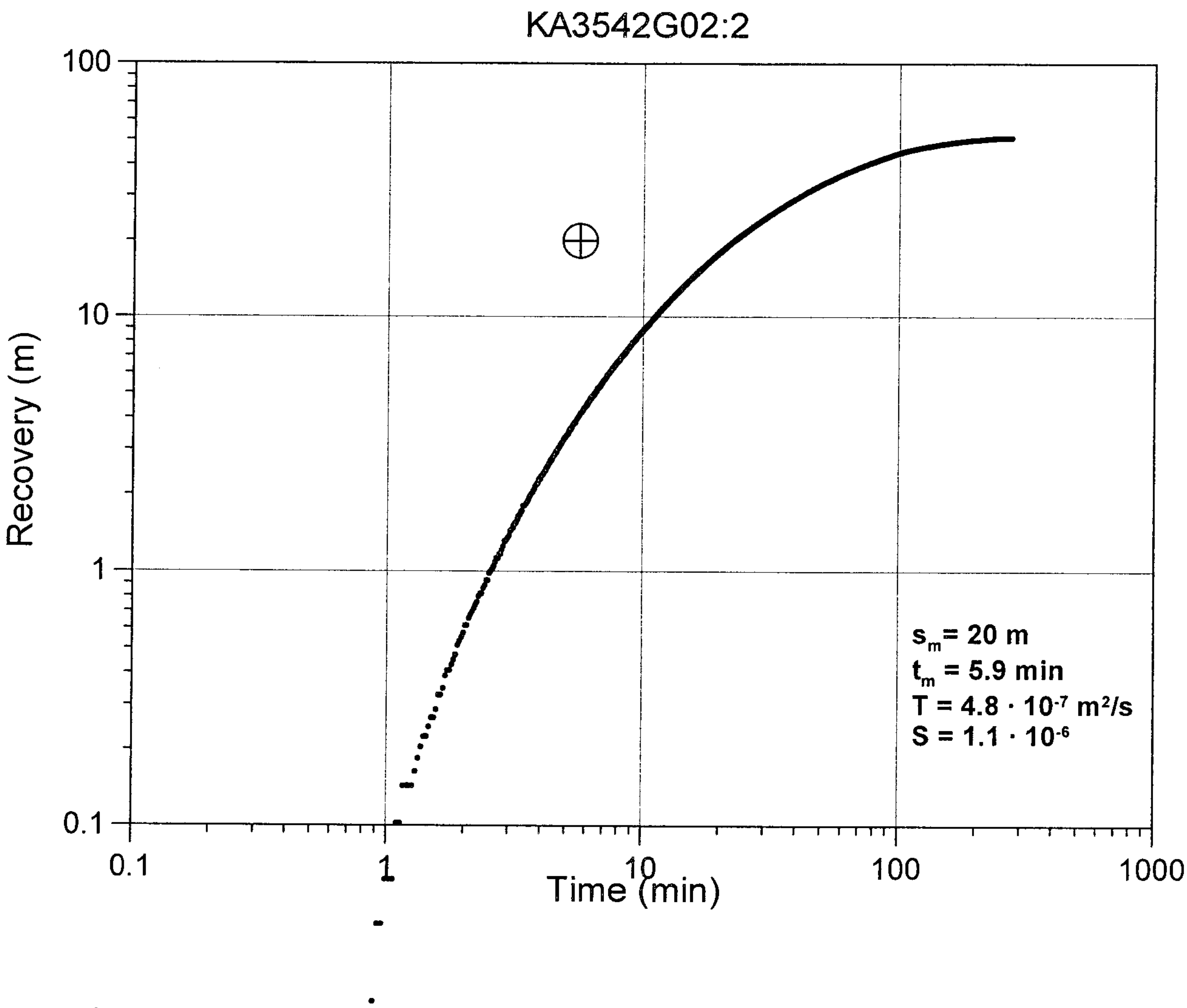

Recovery (m)
Time (min)
0
2
4
6
8
10
0.1
1
10
100
1000

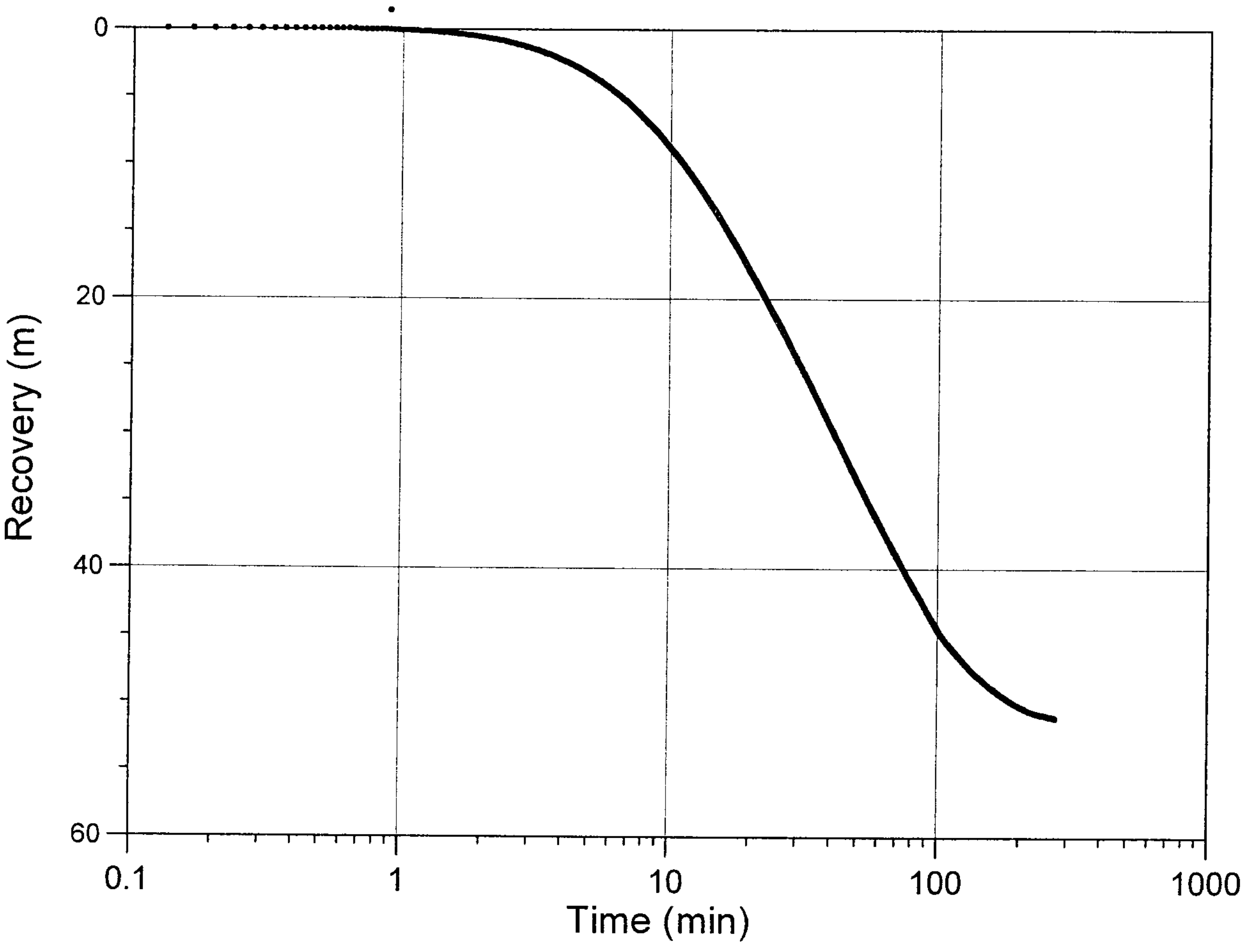


14_KA3542G1_3.GRF 26-okt-99

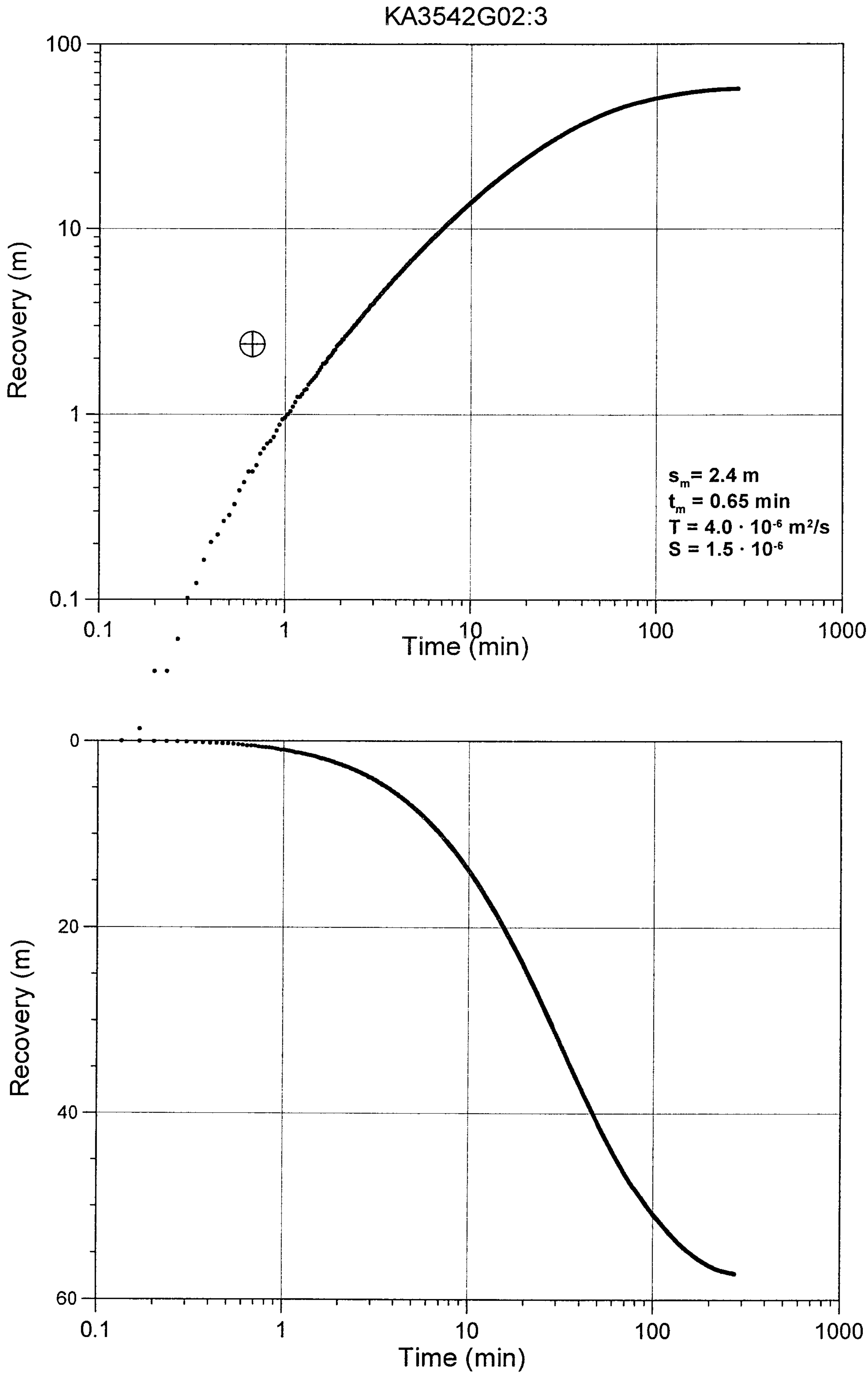


14_KA3542G2_1.GRF 26-okt-99

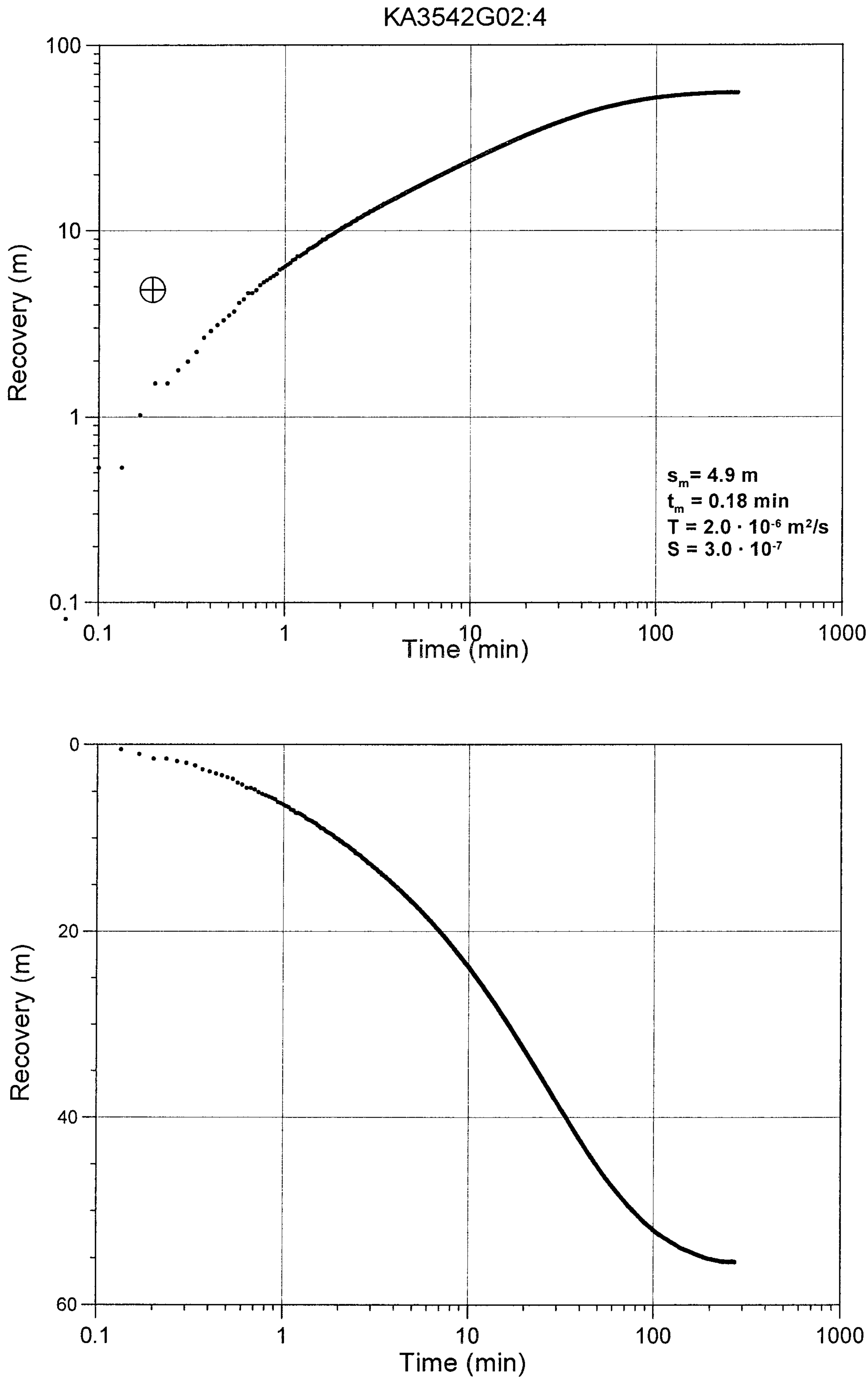




14_KA3542G2_2.GRF 26-okt-99

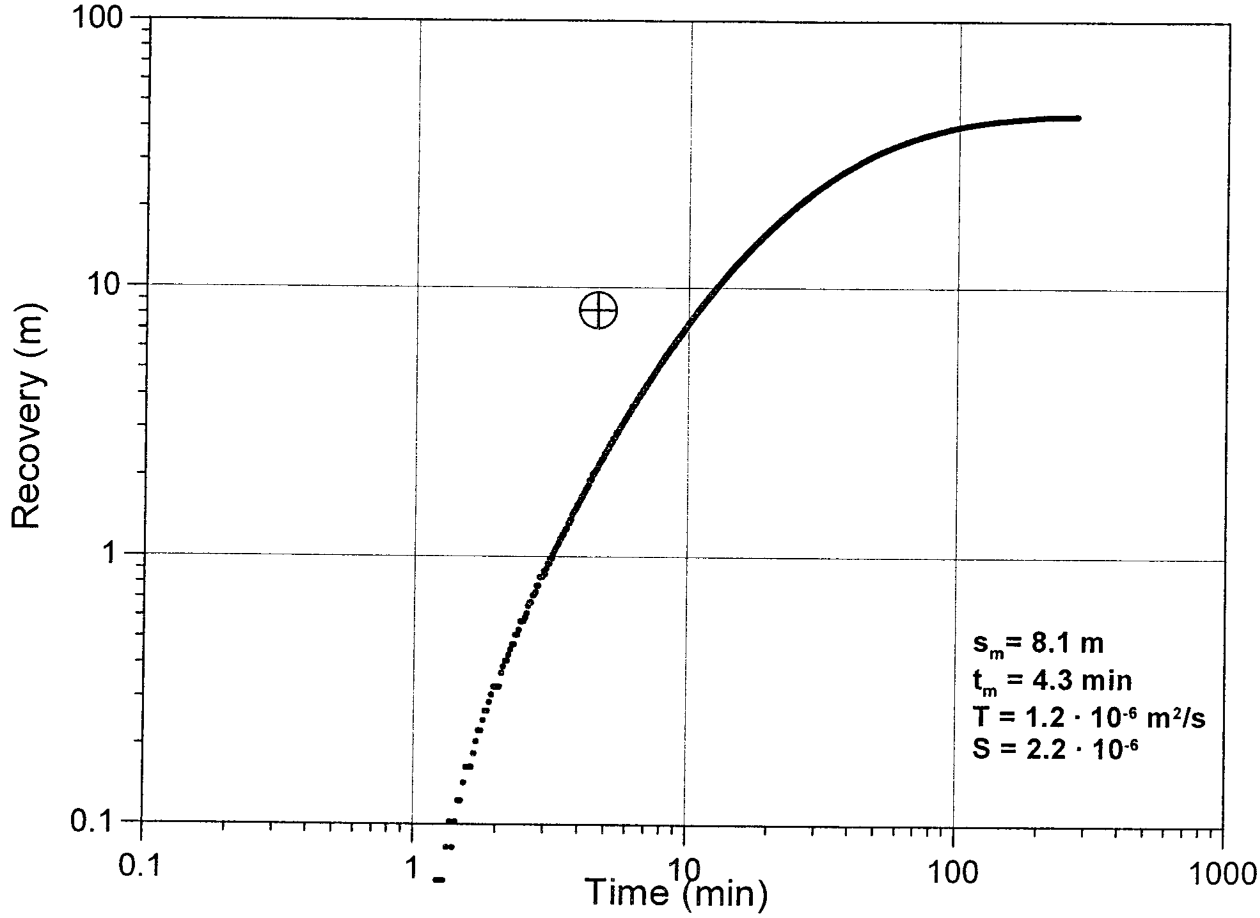


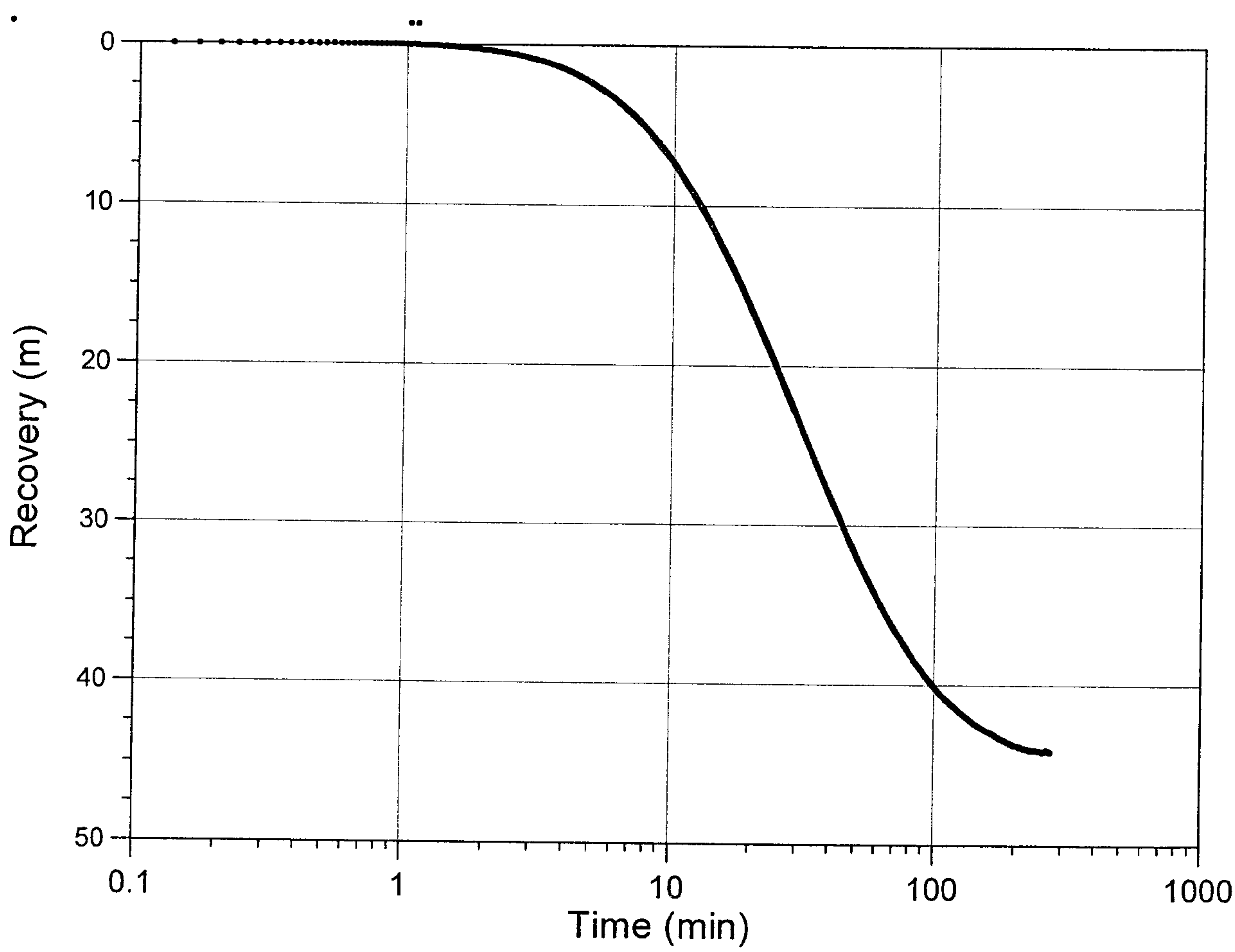
14_KA3542G2_3.GRF 26-okt-99



14_KA3542G2_4.GRF 26-okt-99

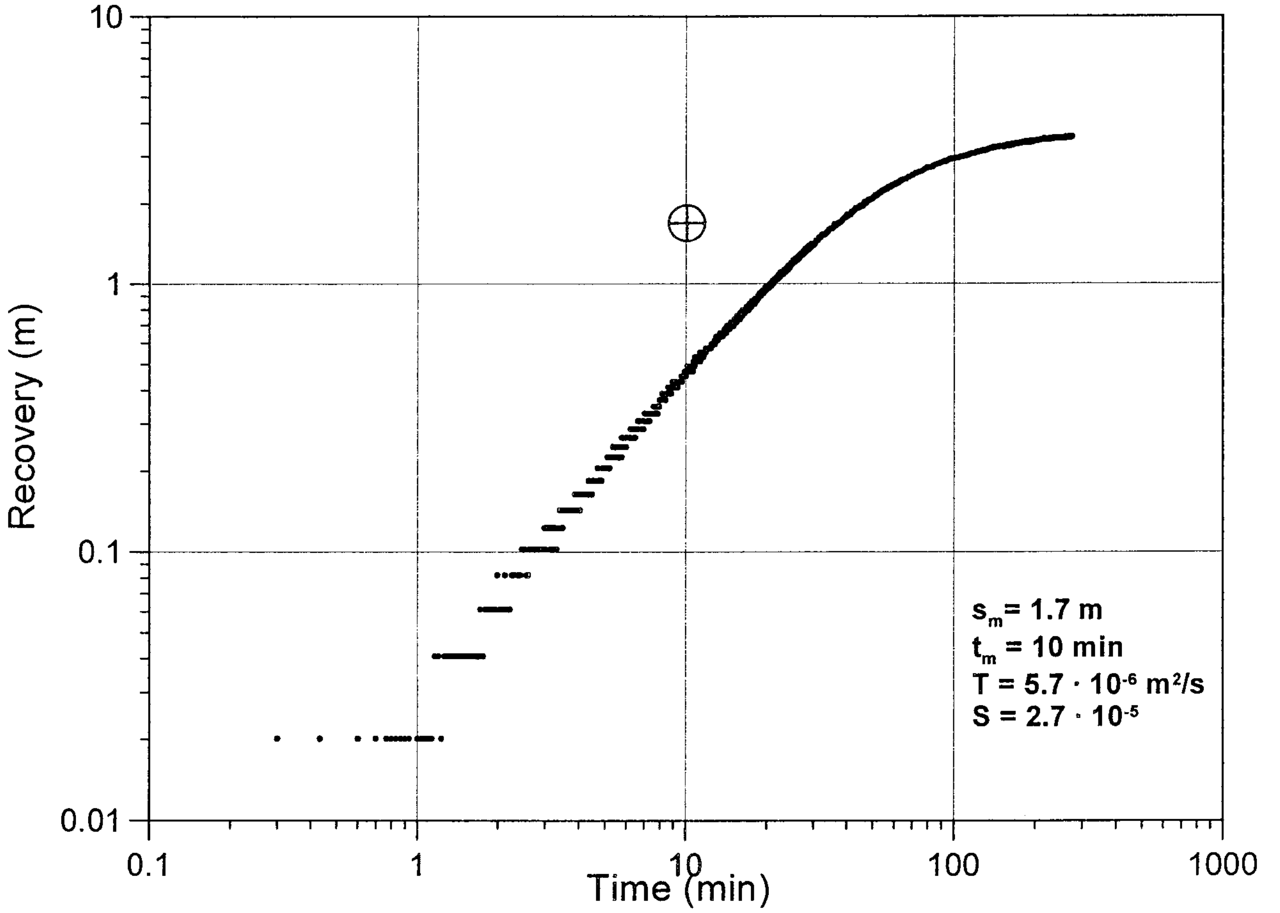
KA3544G01:1

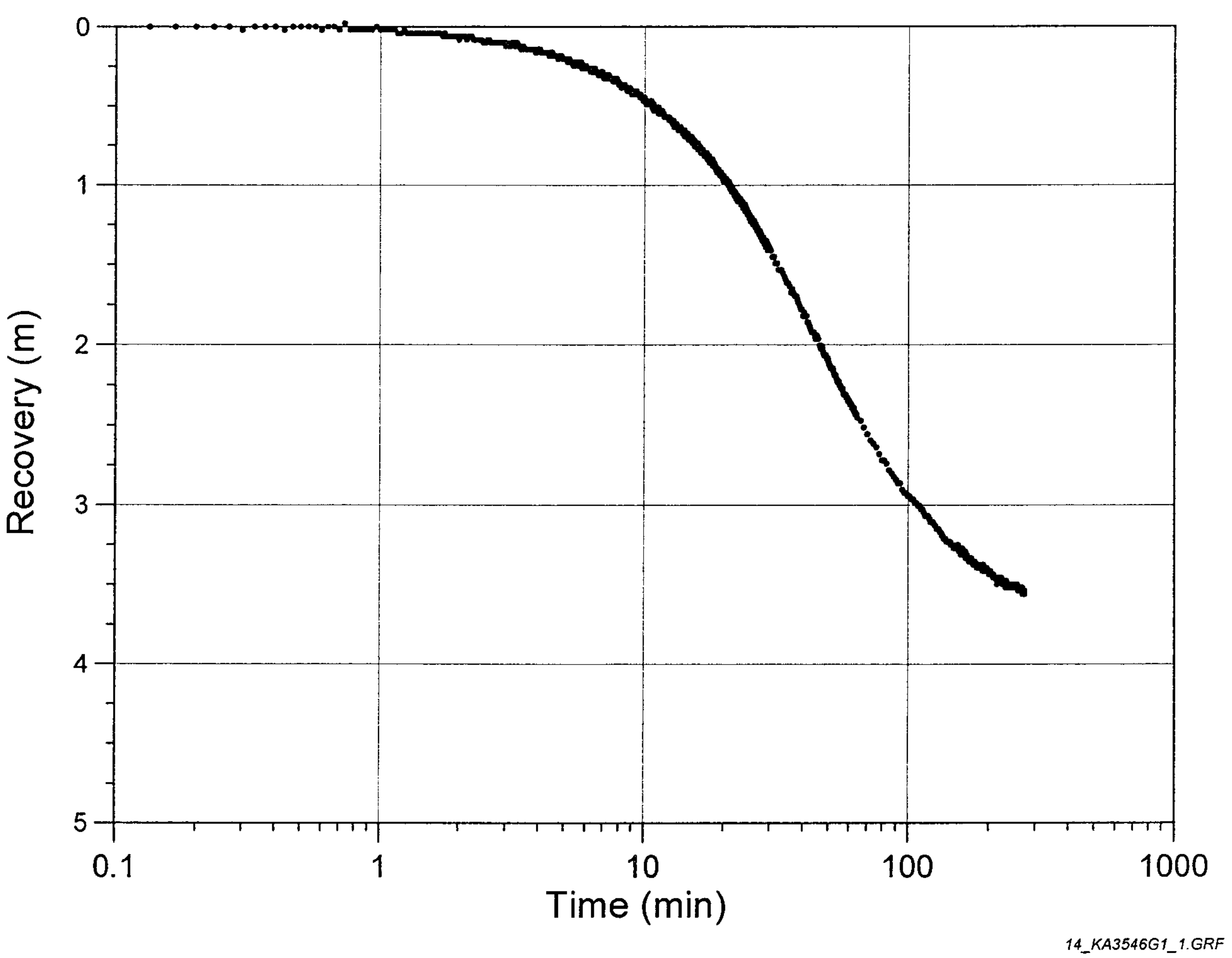




14_KA3544G1_1.GRF 26-okt-99

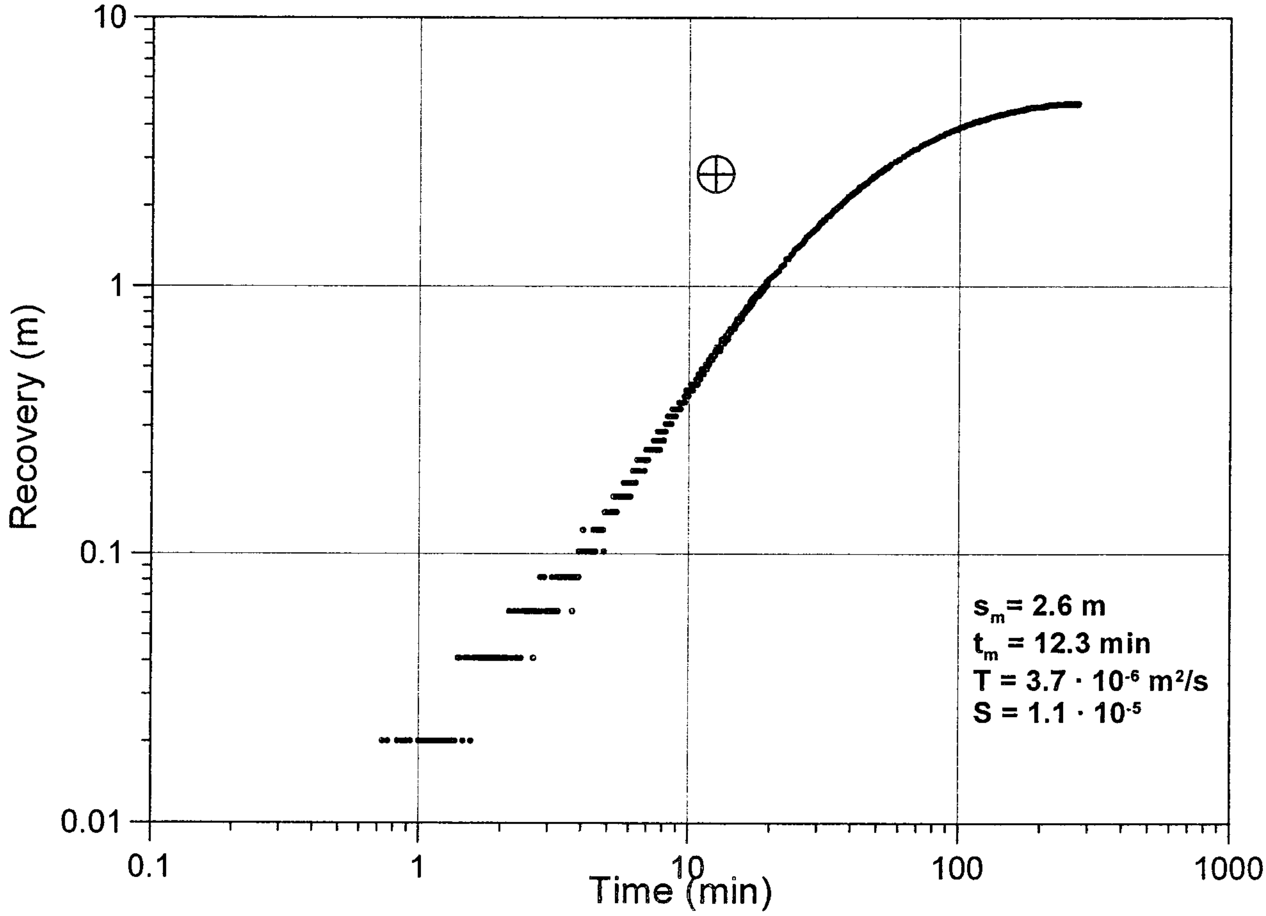
KA3546G01:1

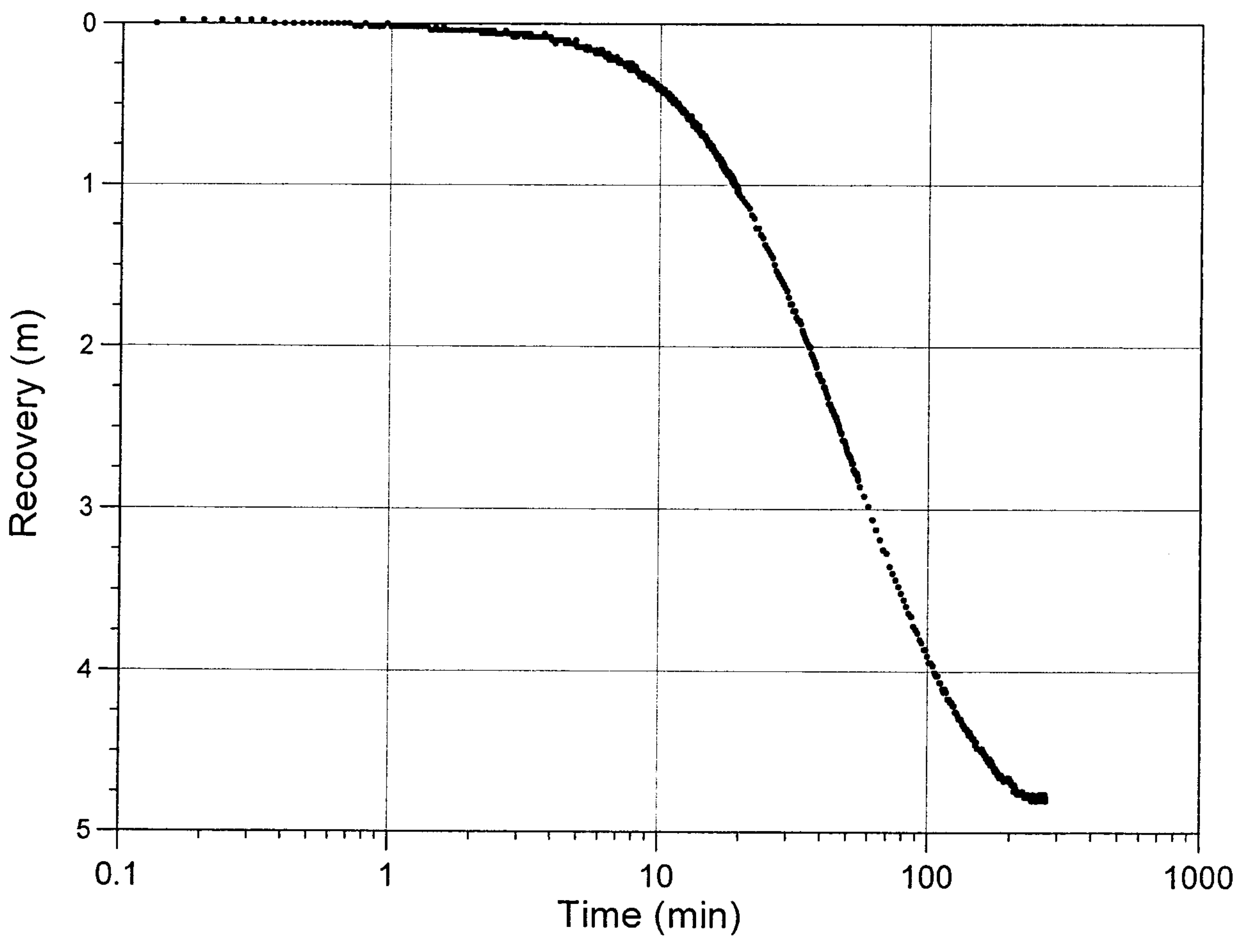




14_KA3546G1_1.GRF 26-okt-99

KA3548A01:1





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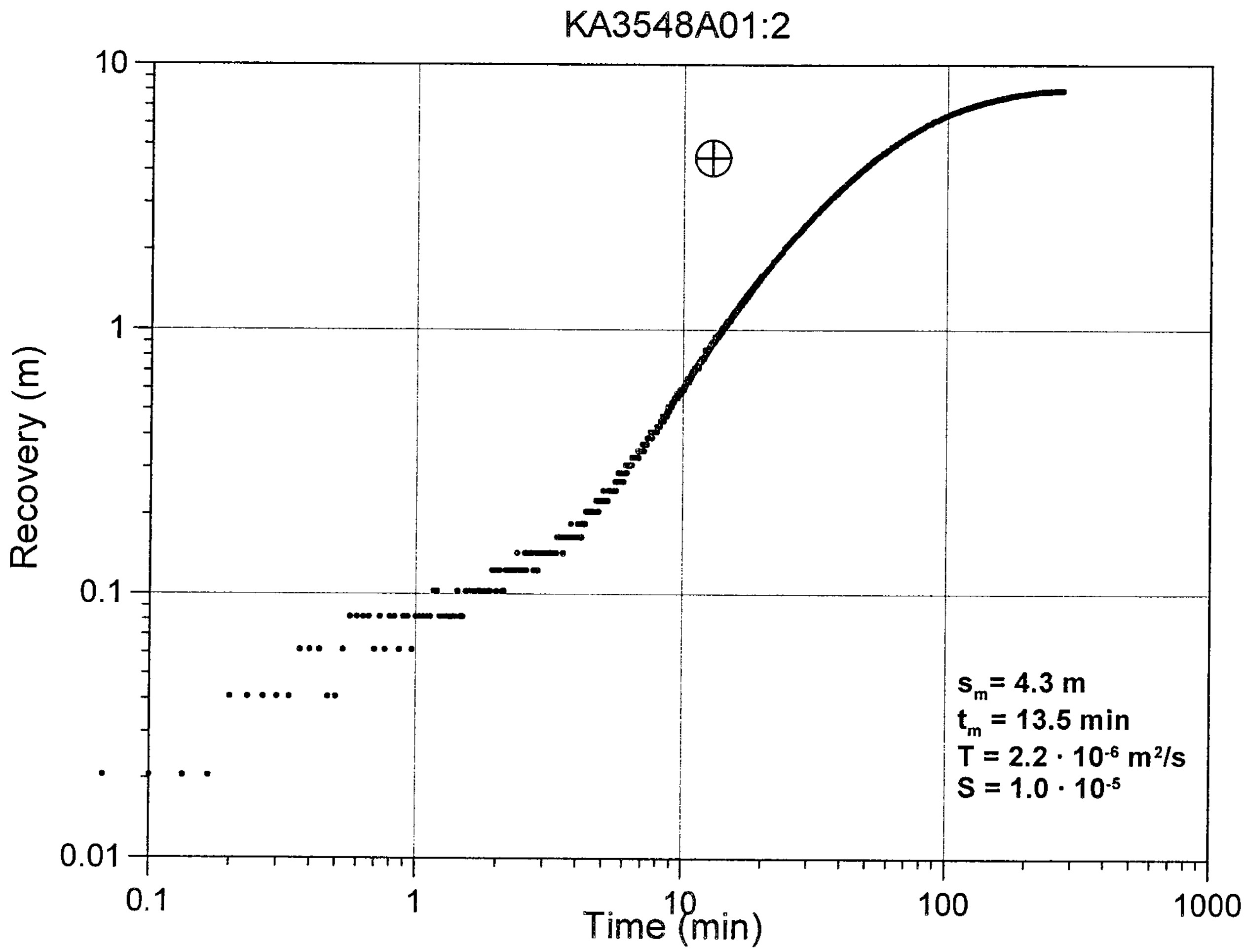
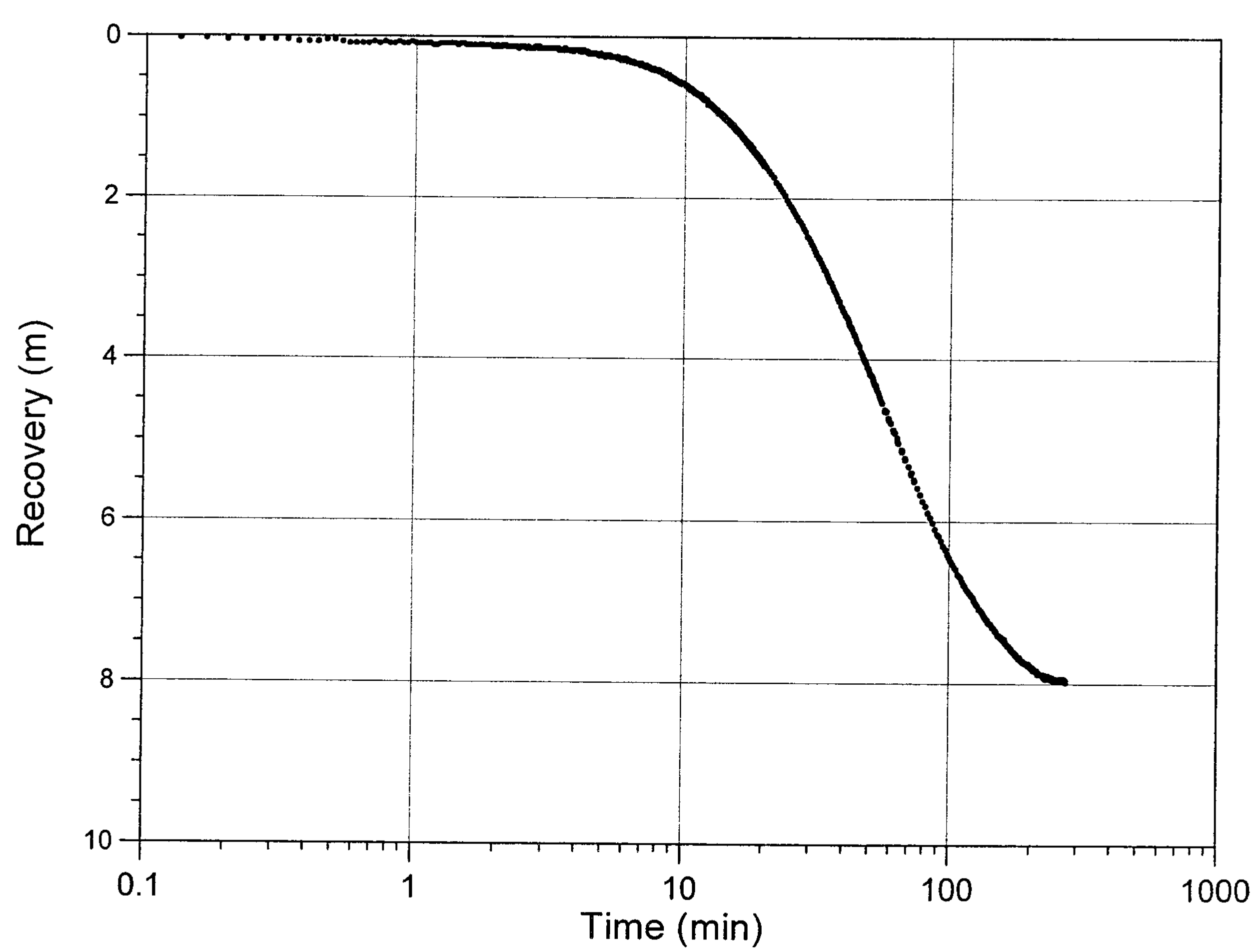
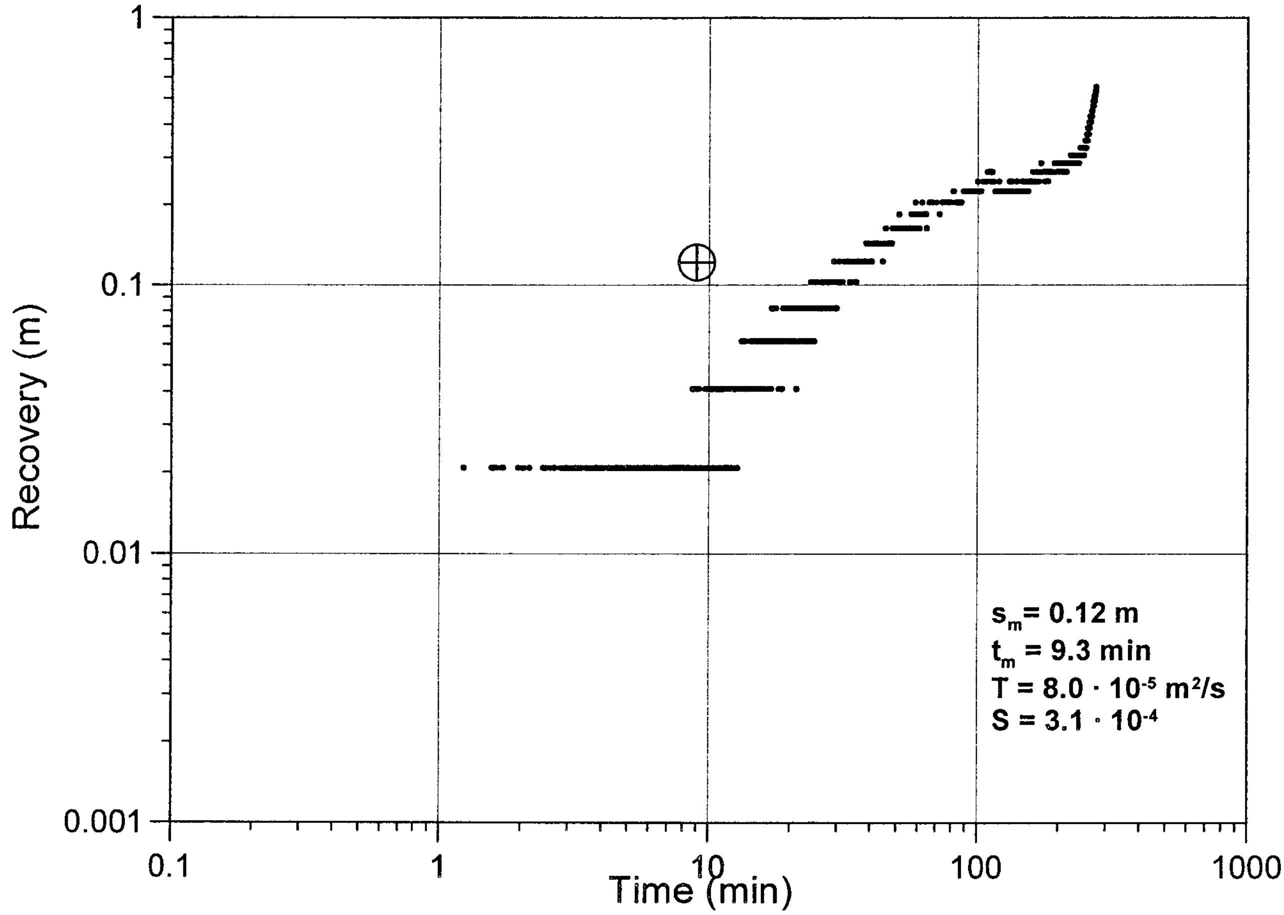
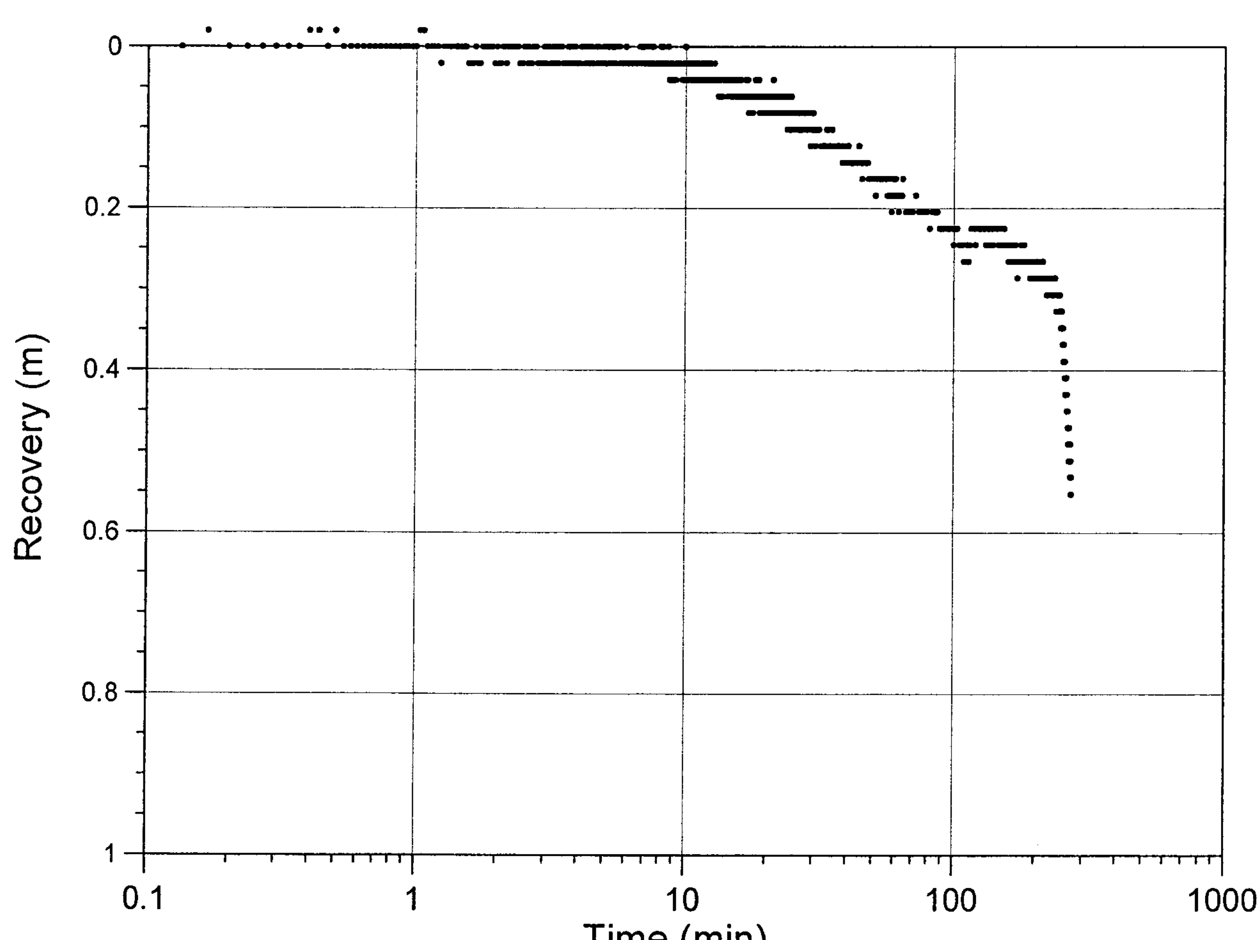




14_KA3548A1_2.GRF 26-okt-99

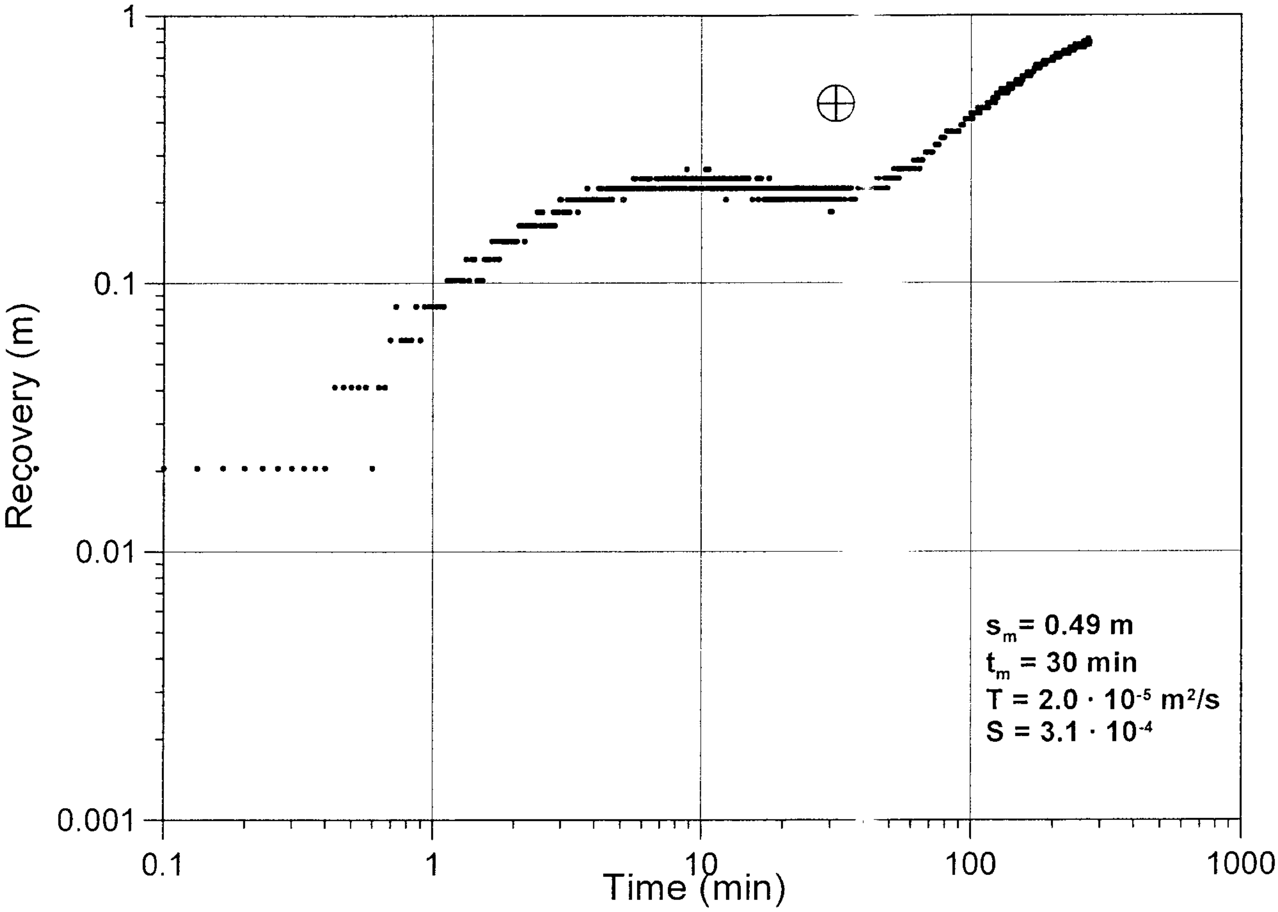
KA3550G01:1

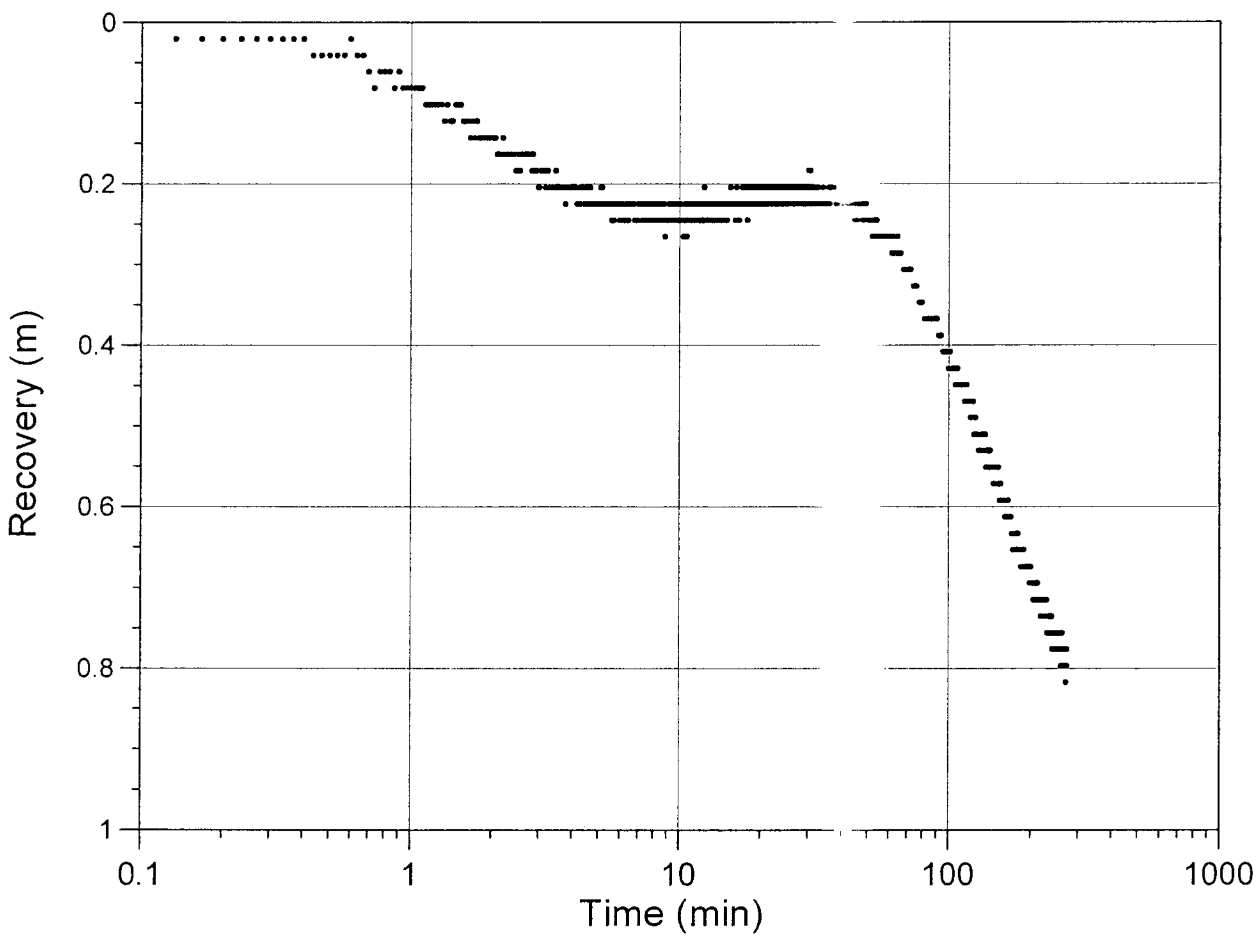




14_KA3550G1_1.GRF 26-okt-99

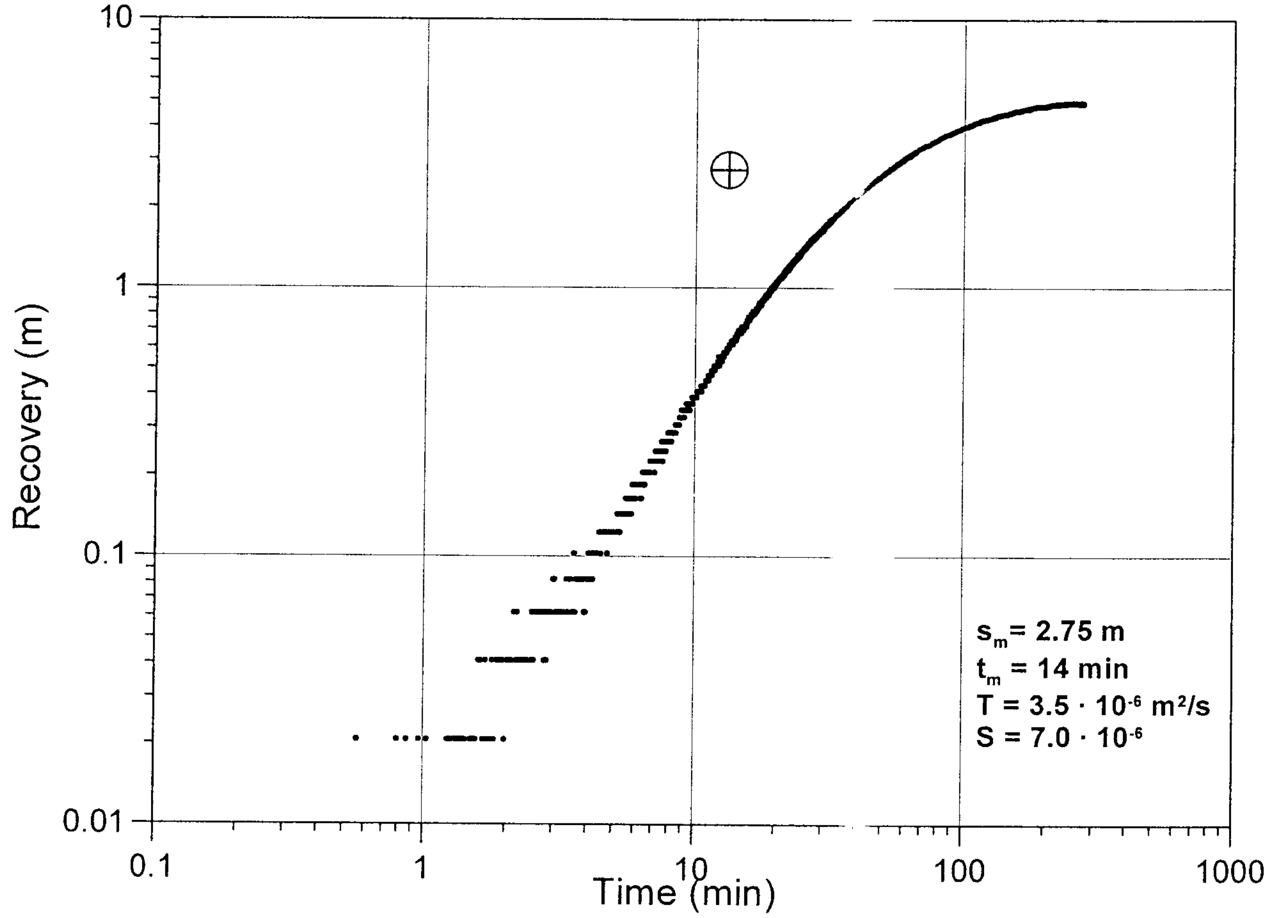
KA3552G01:2

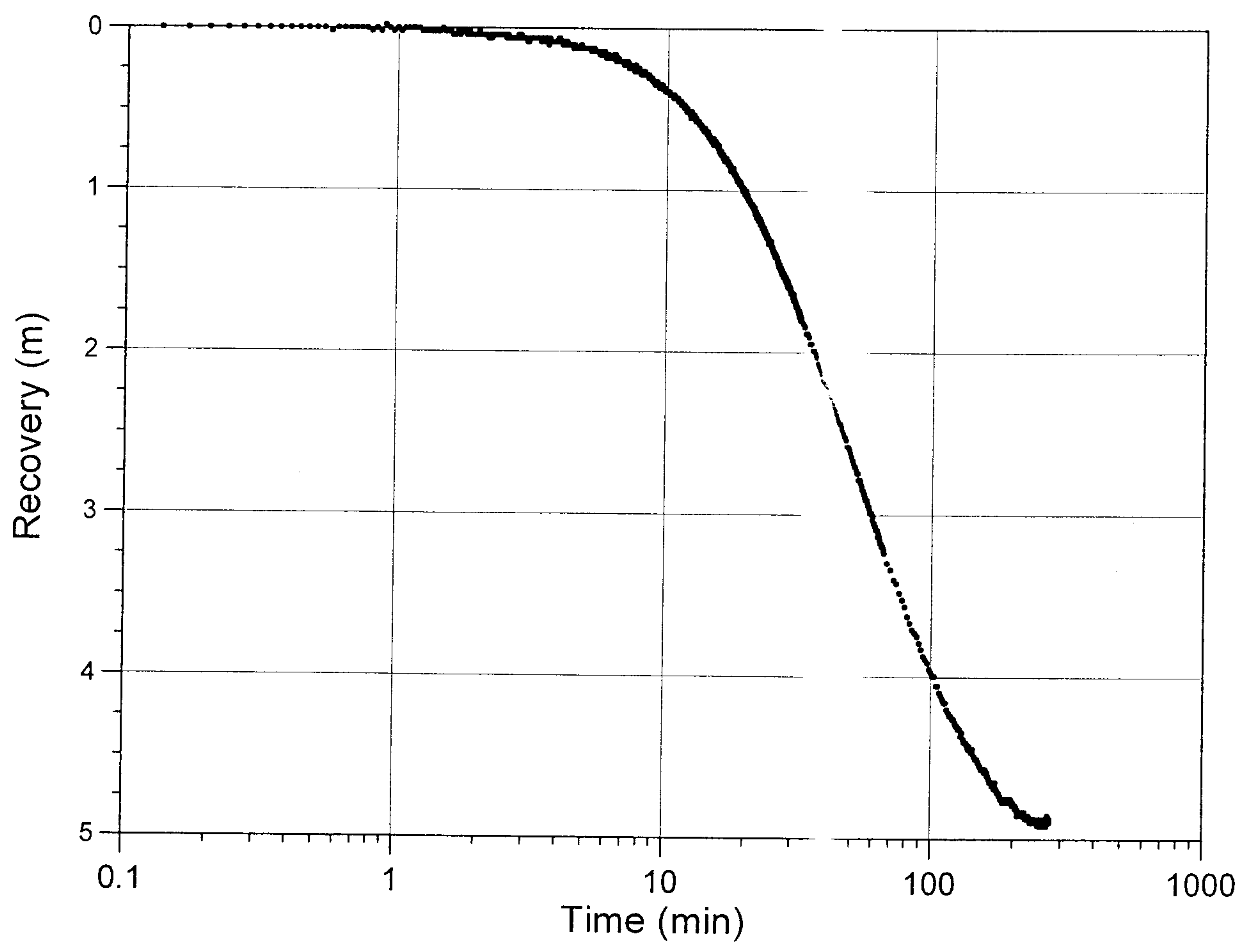




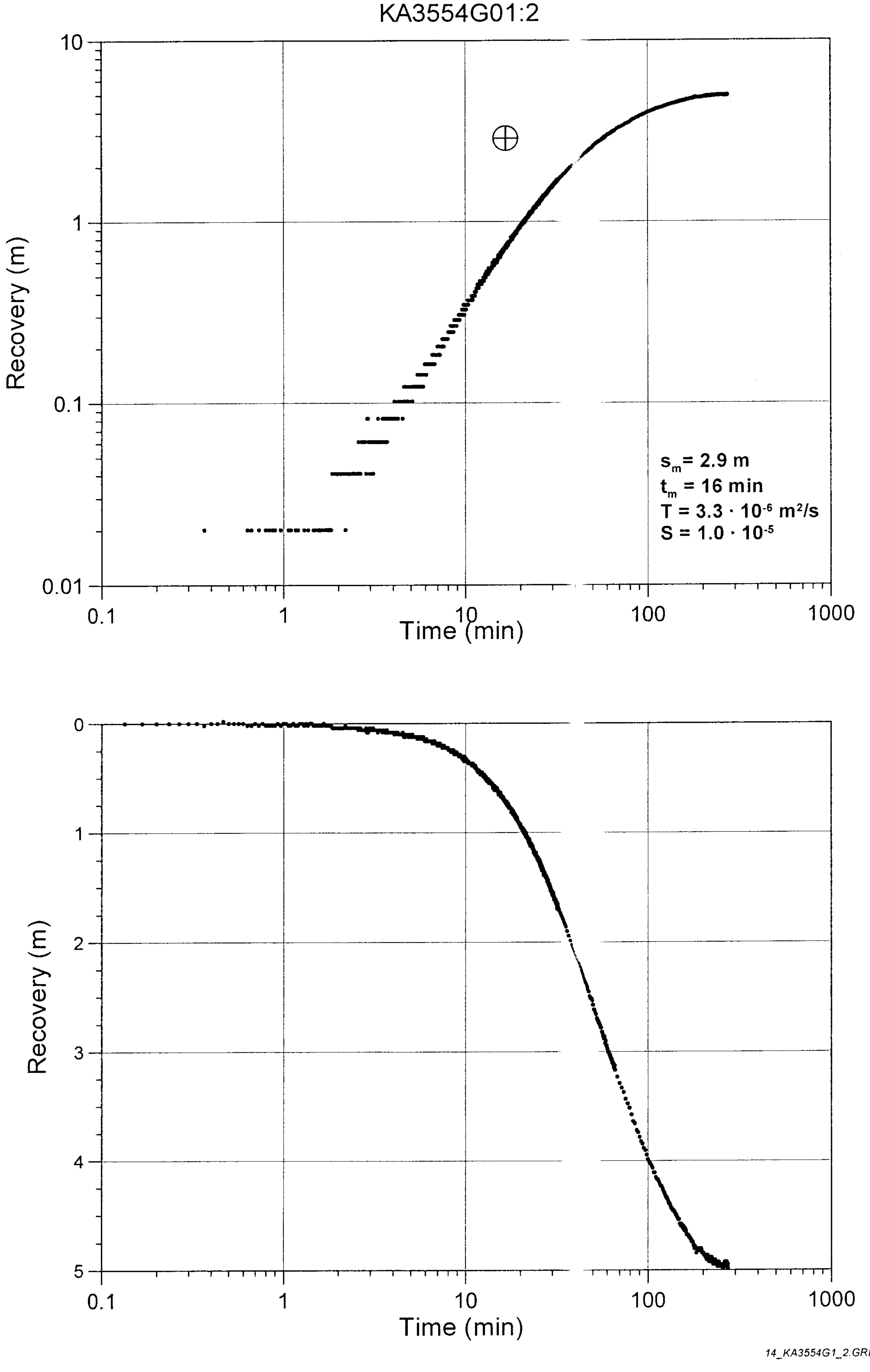
14_KA3552G1_2.GRF 27-okt-99

KA3554G01:1



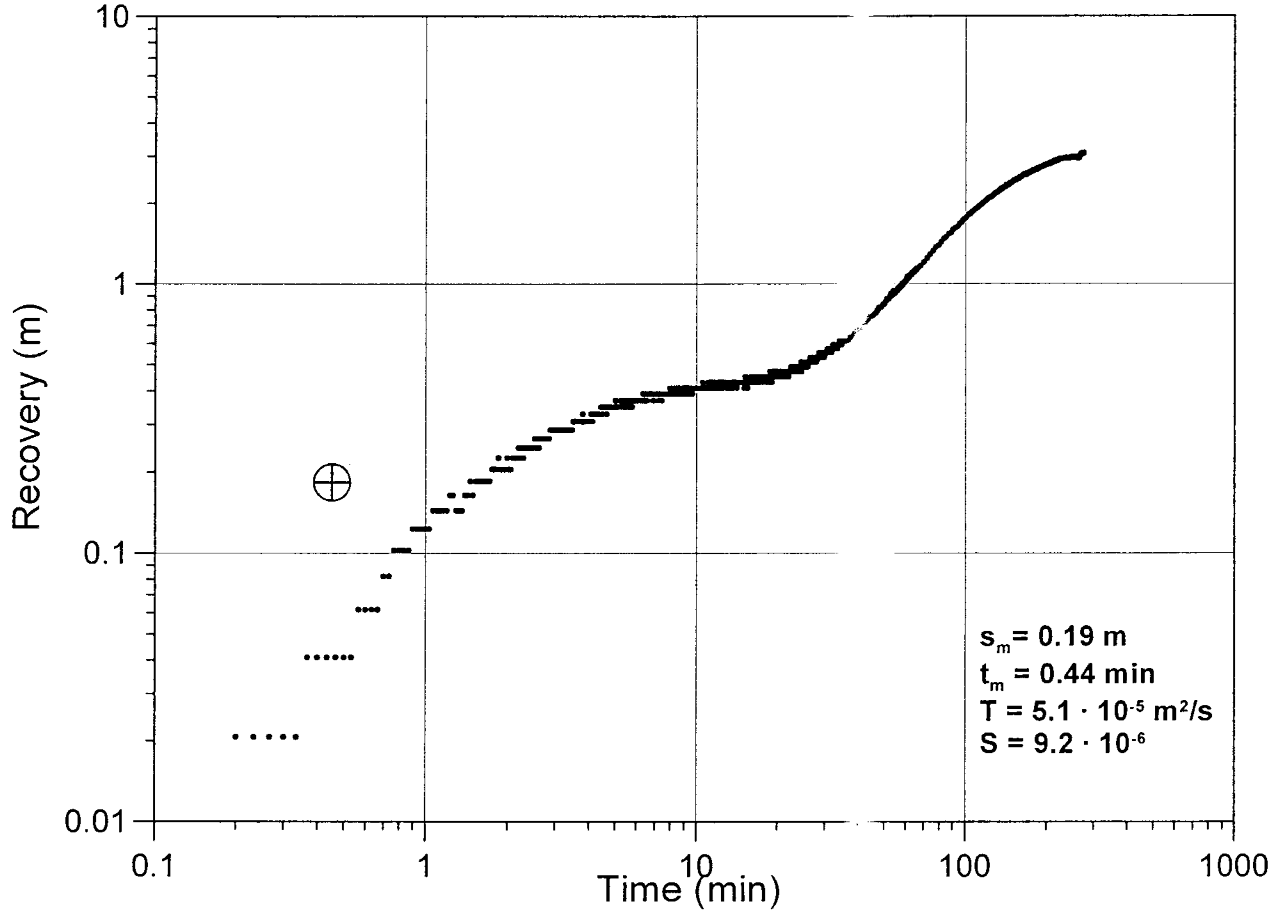


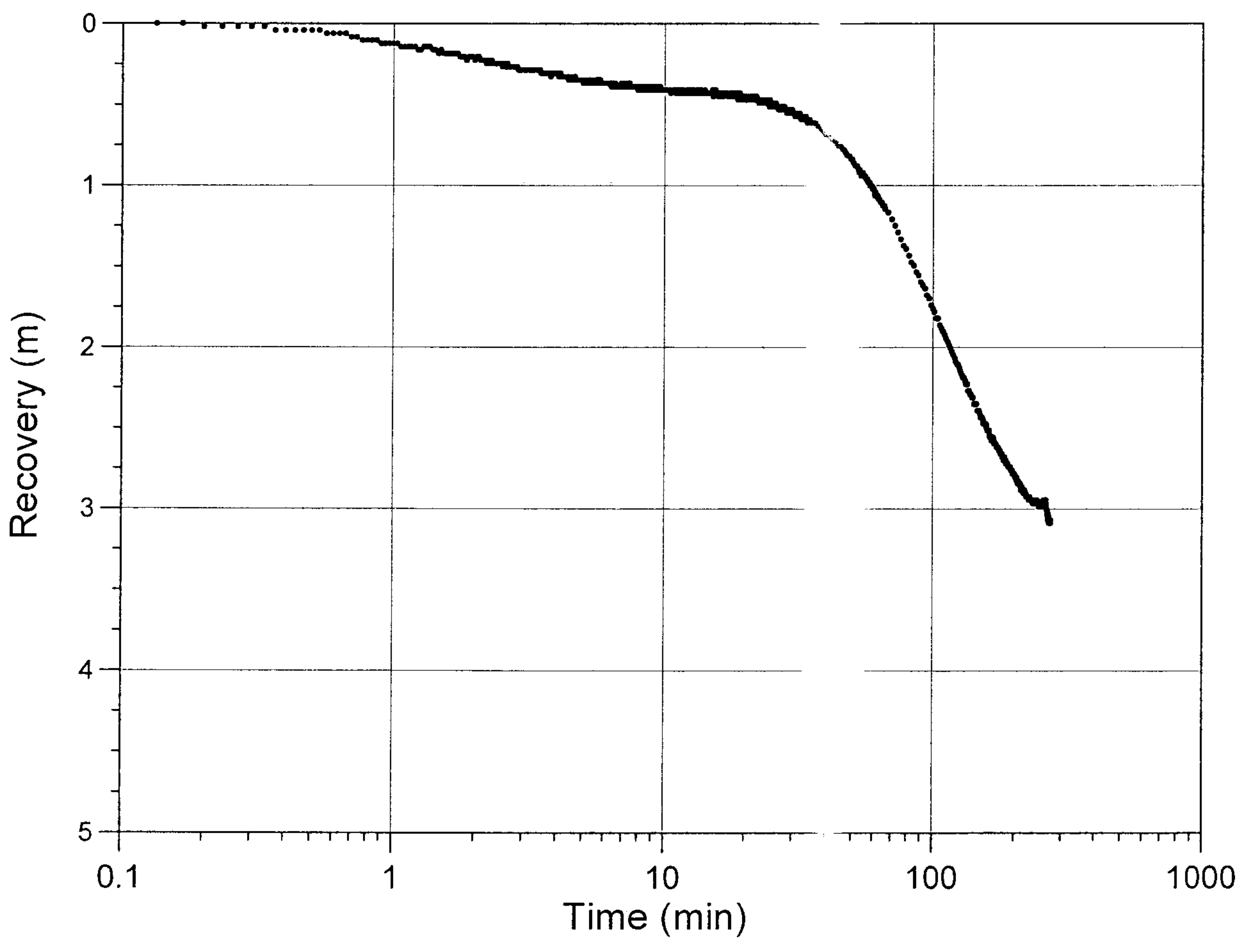
14_KA3554G1_1.GRF 27-okt-99



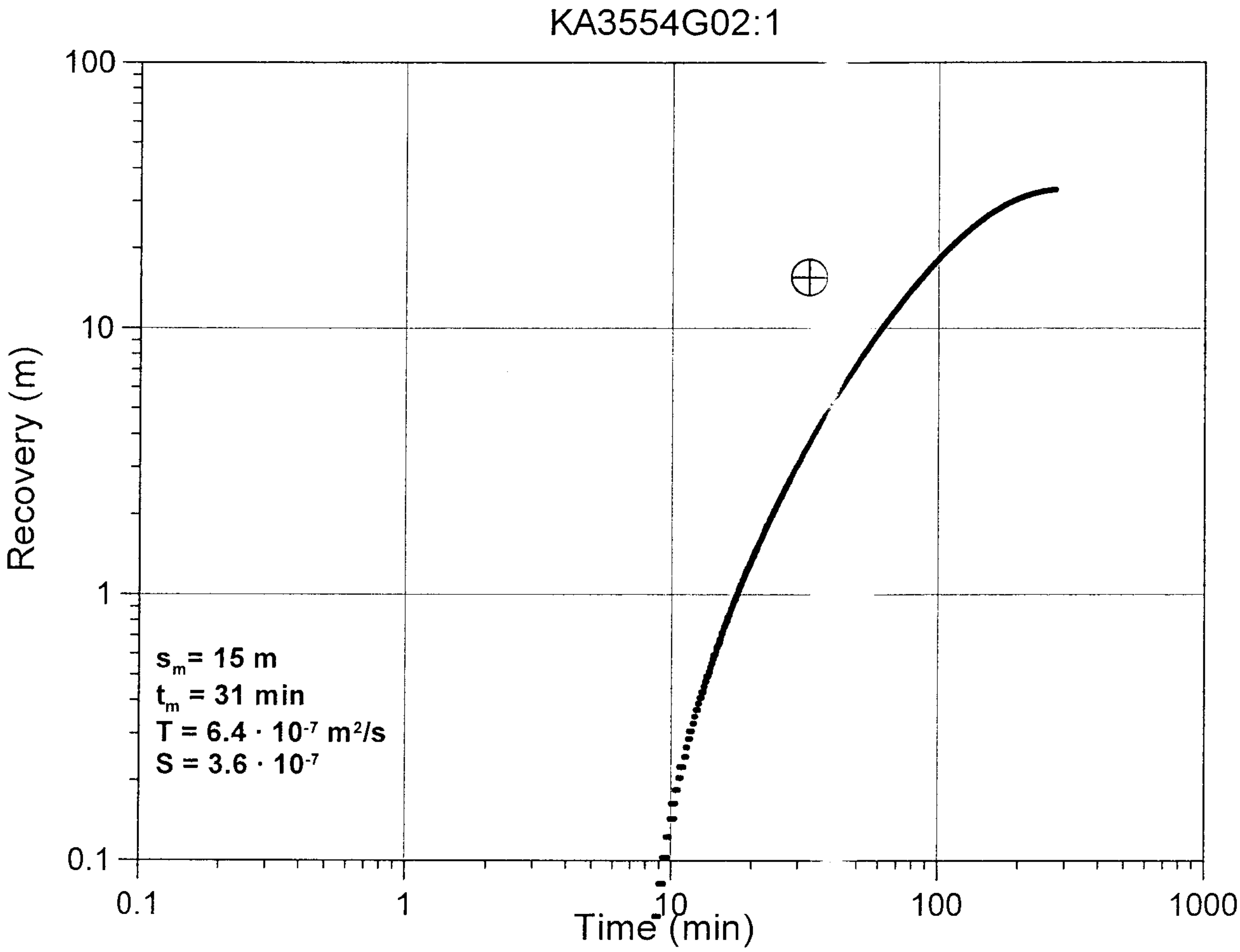
14_KA3554G1_2.GRF 27-okt-99

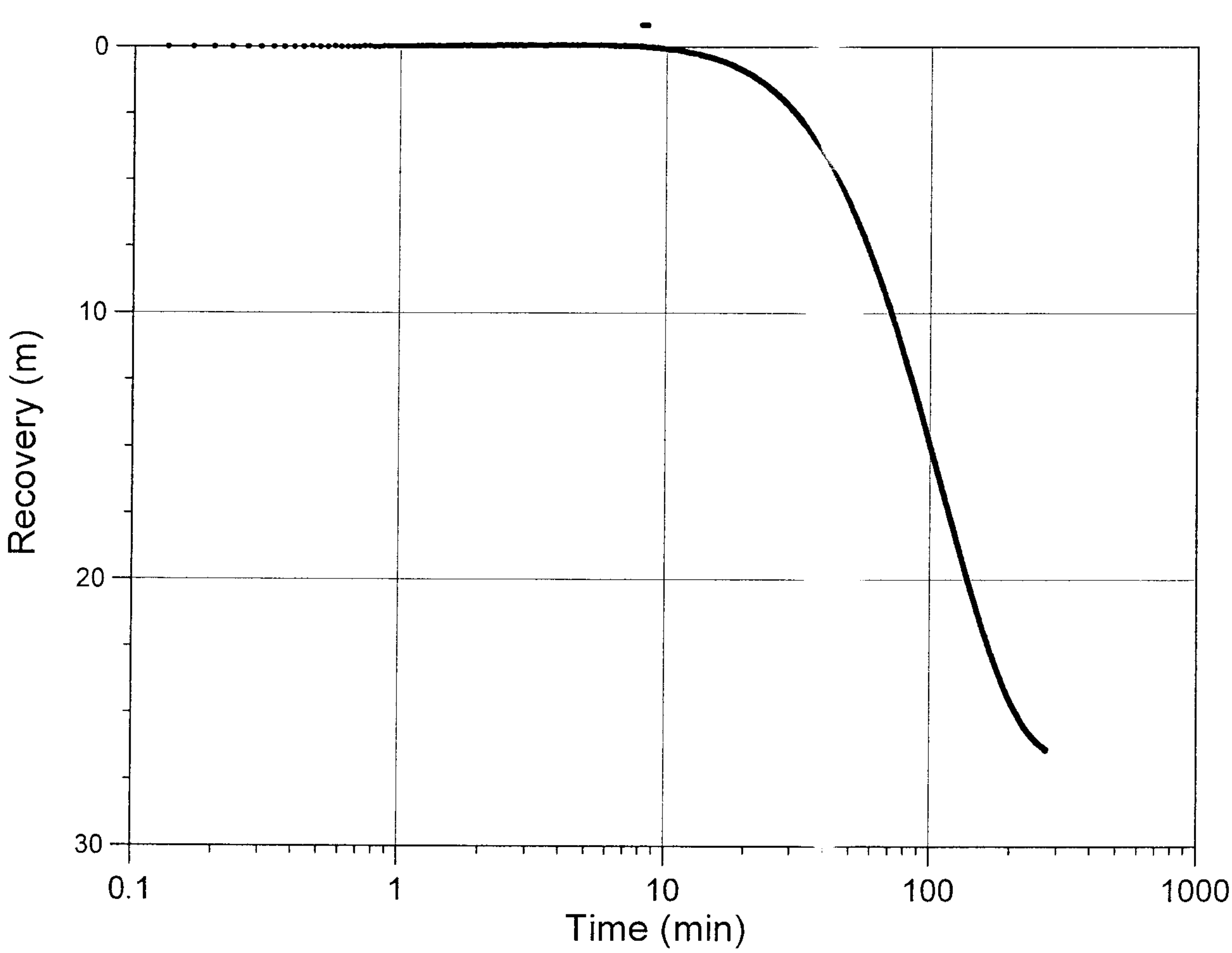
KA3554G01:3



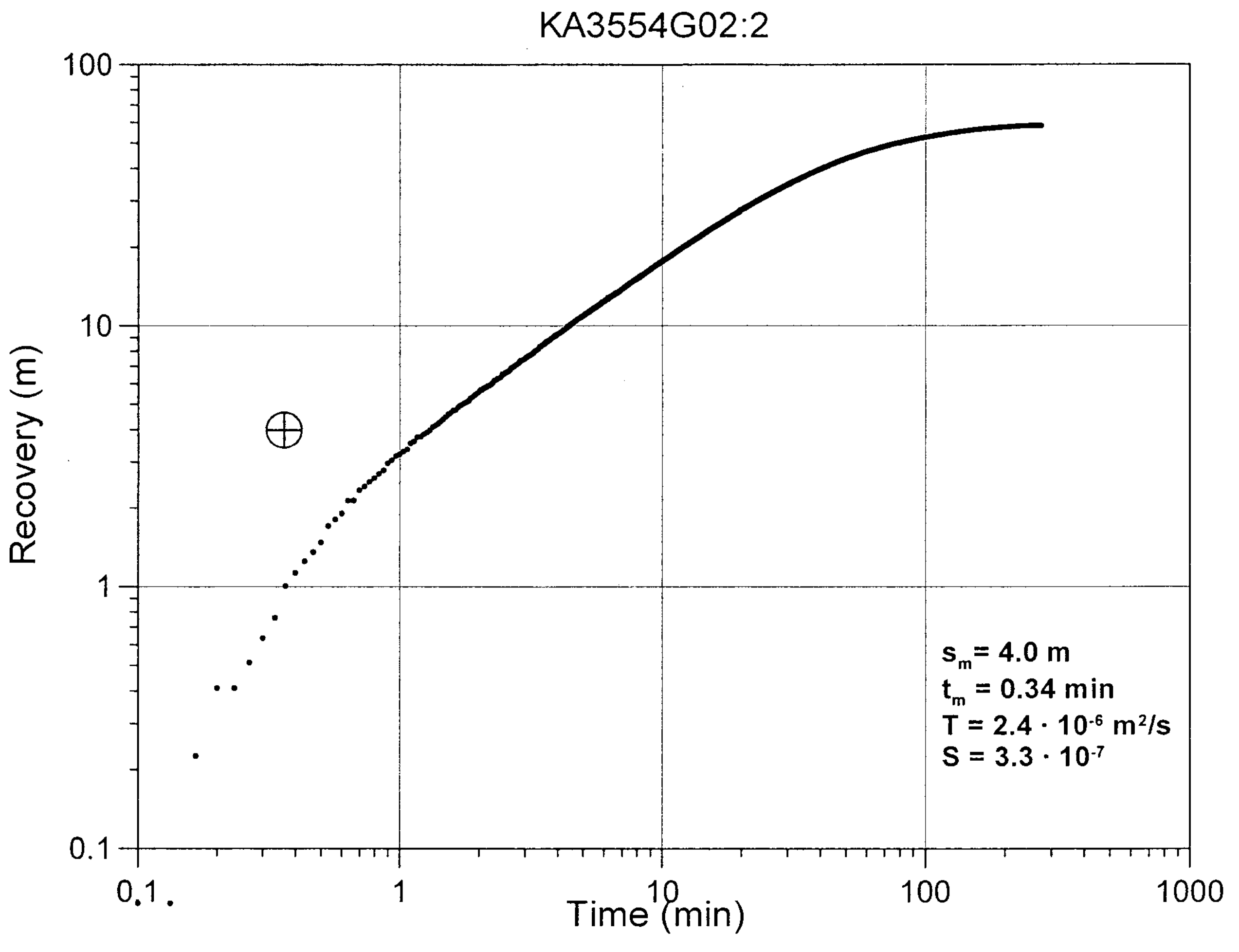


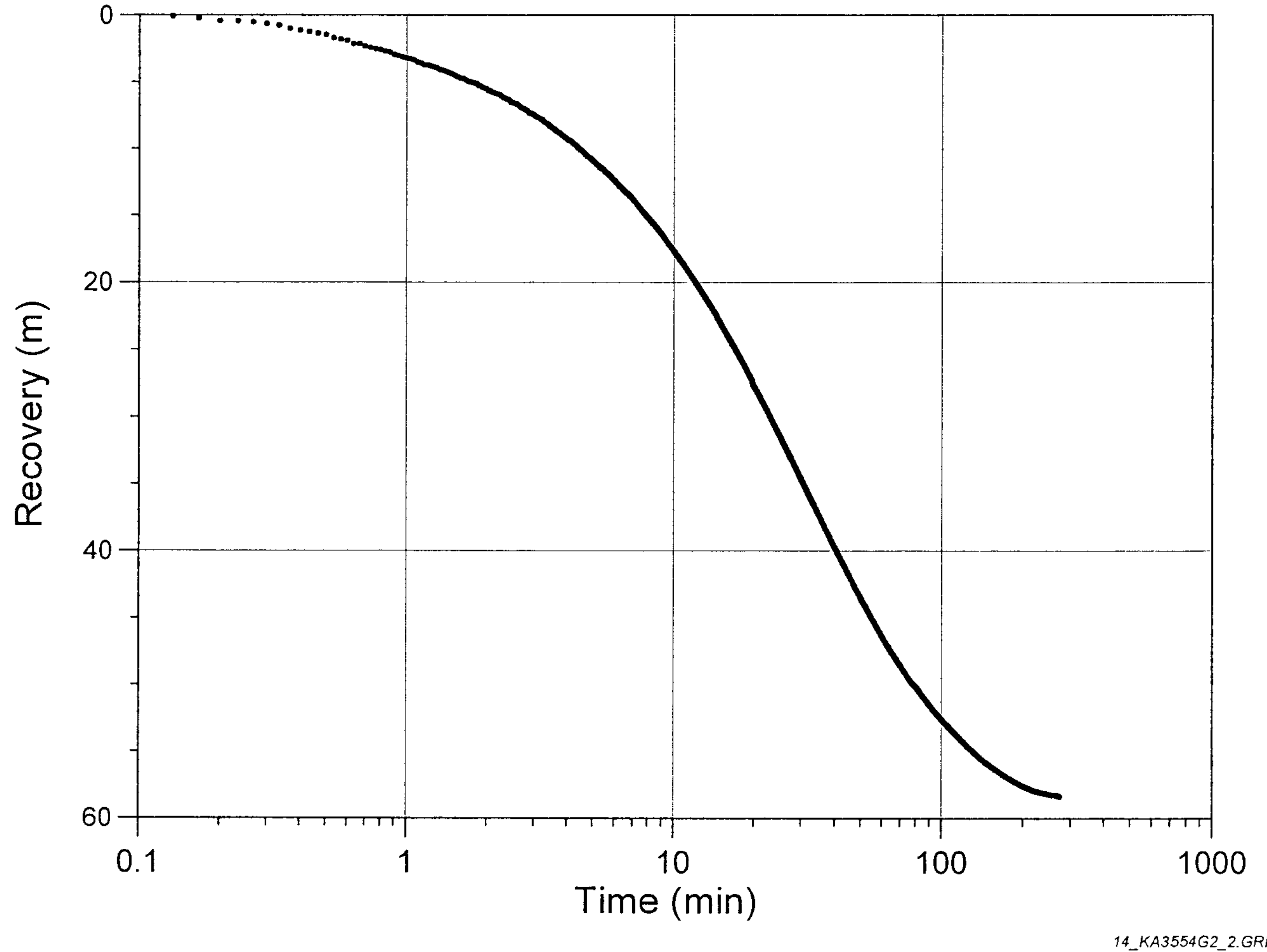
14_KA3554G1_3.GRF 27-okt-99



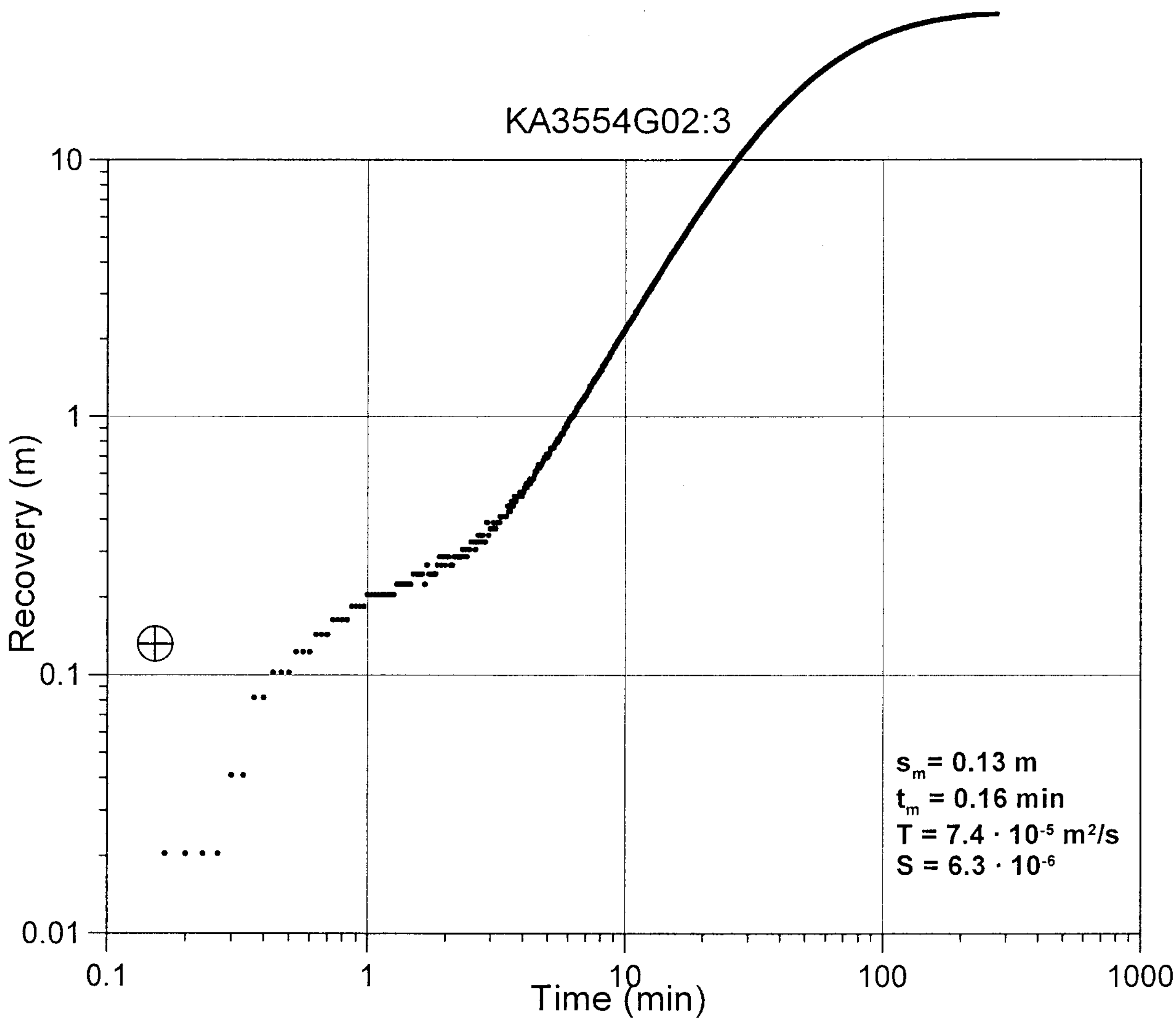


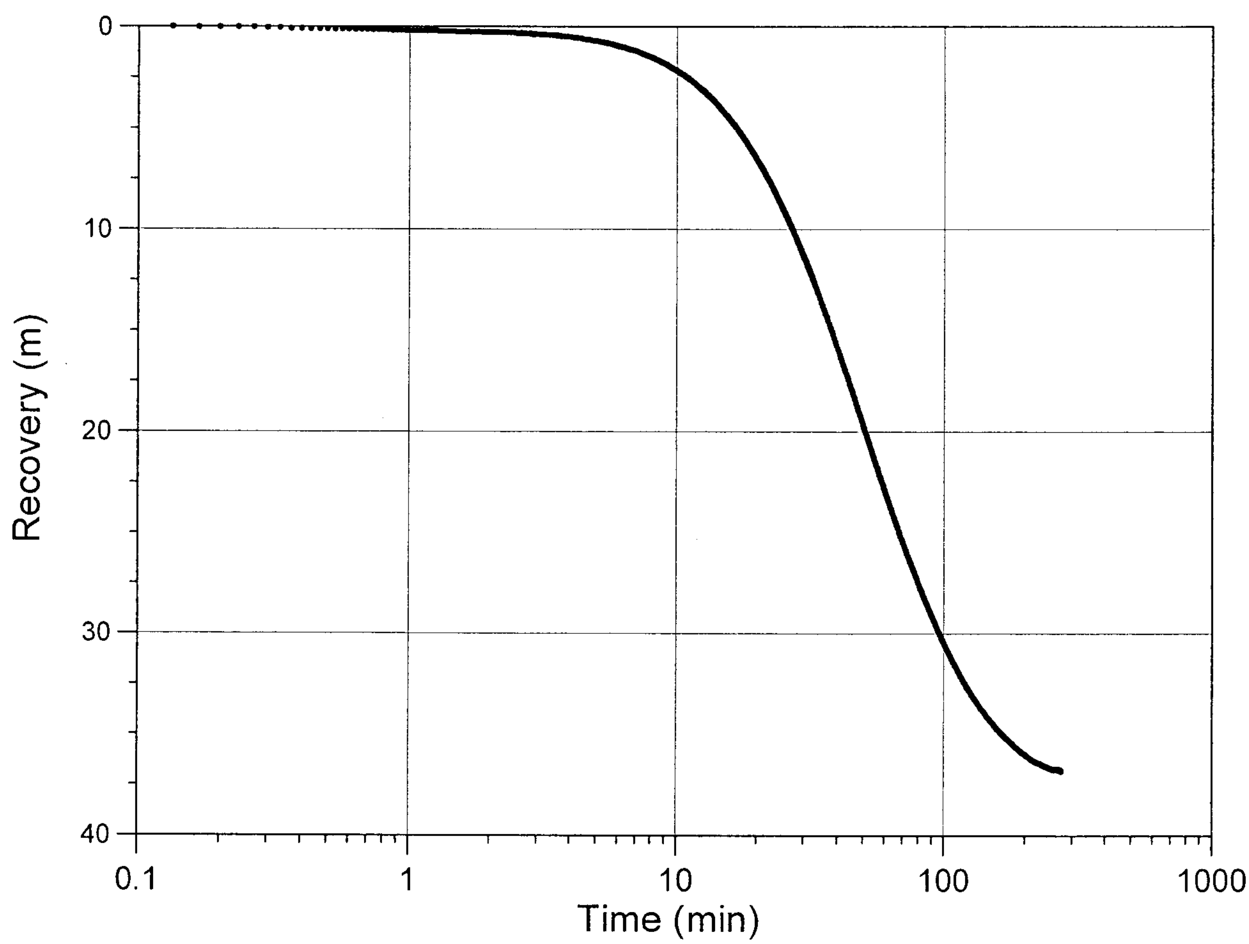
14_KA3554G2_1.GRF 27-okt-99





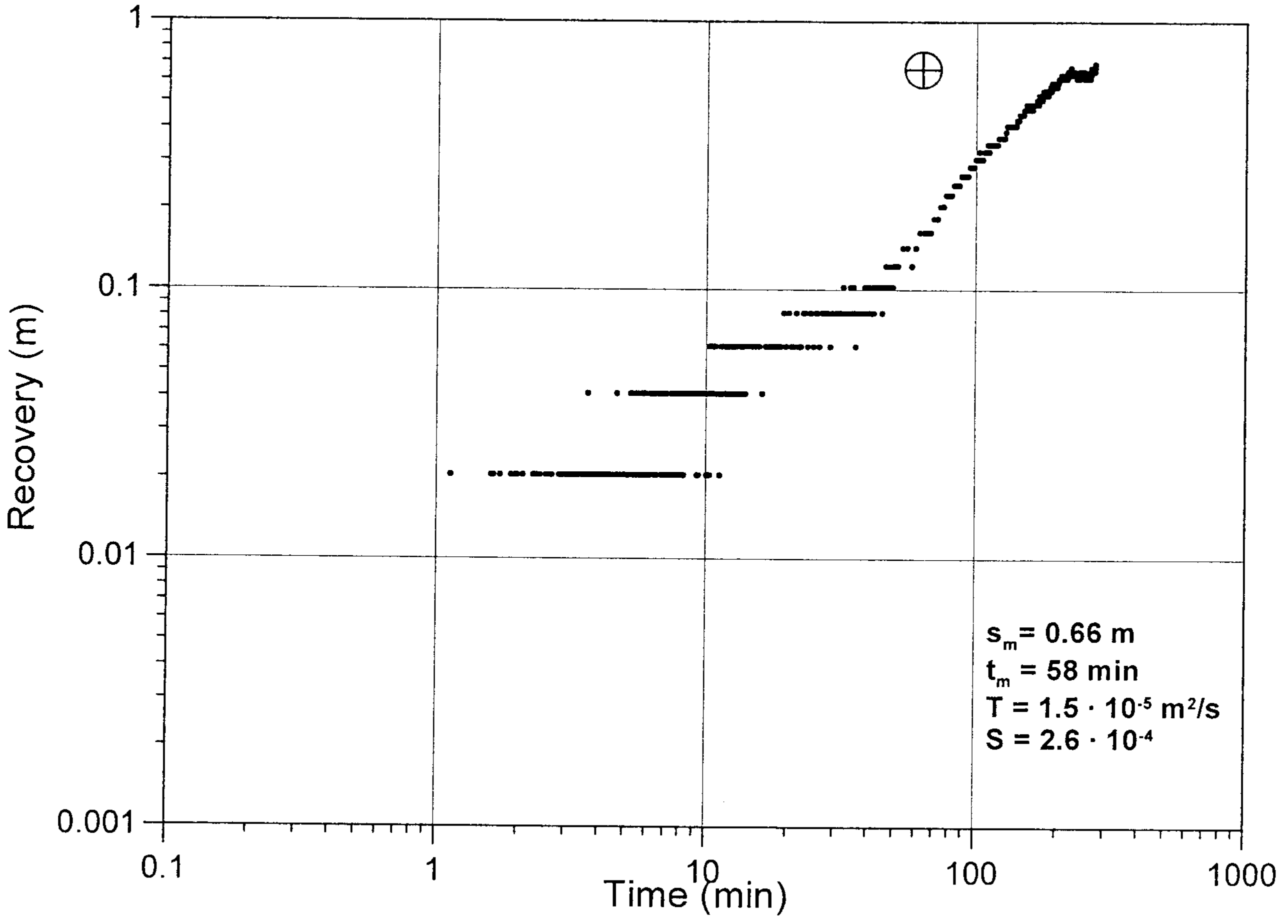
14_KA3554G2_2.GRF 27-okt-99

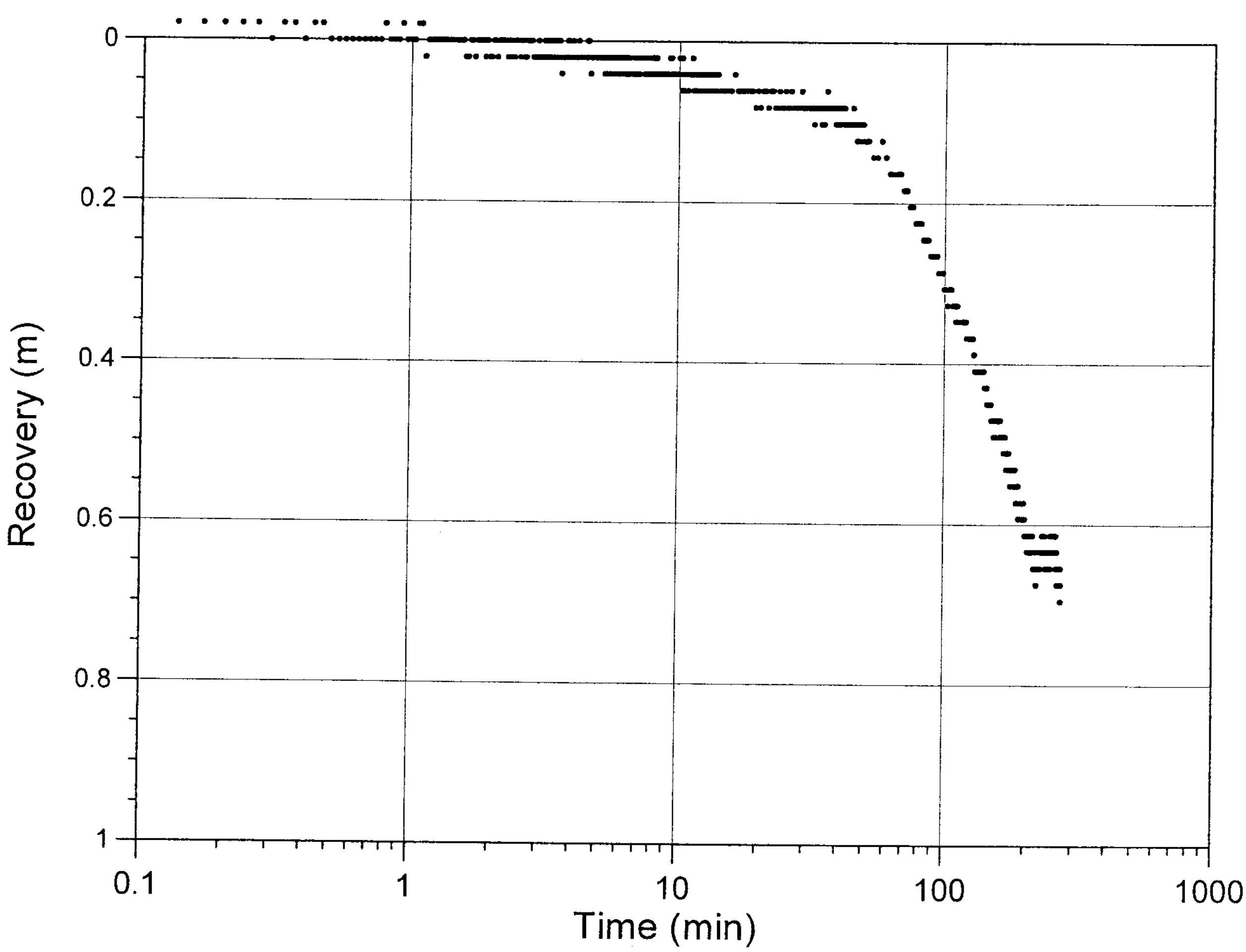




14_KA3554G2_3.GRF 27-okt-99

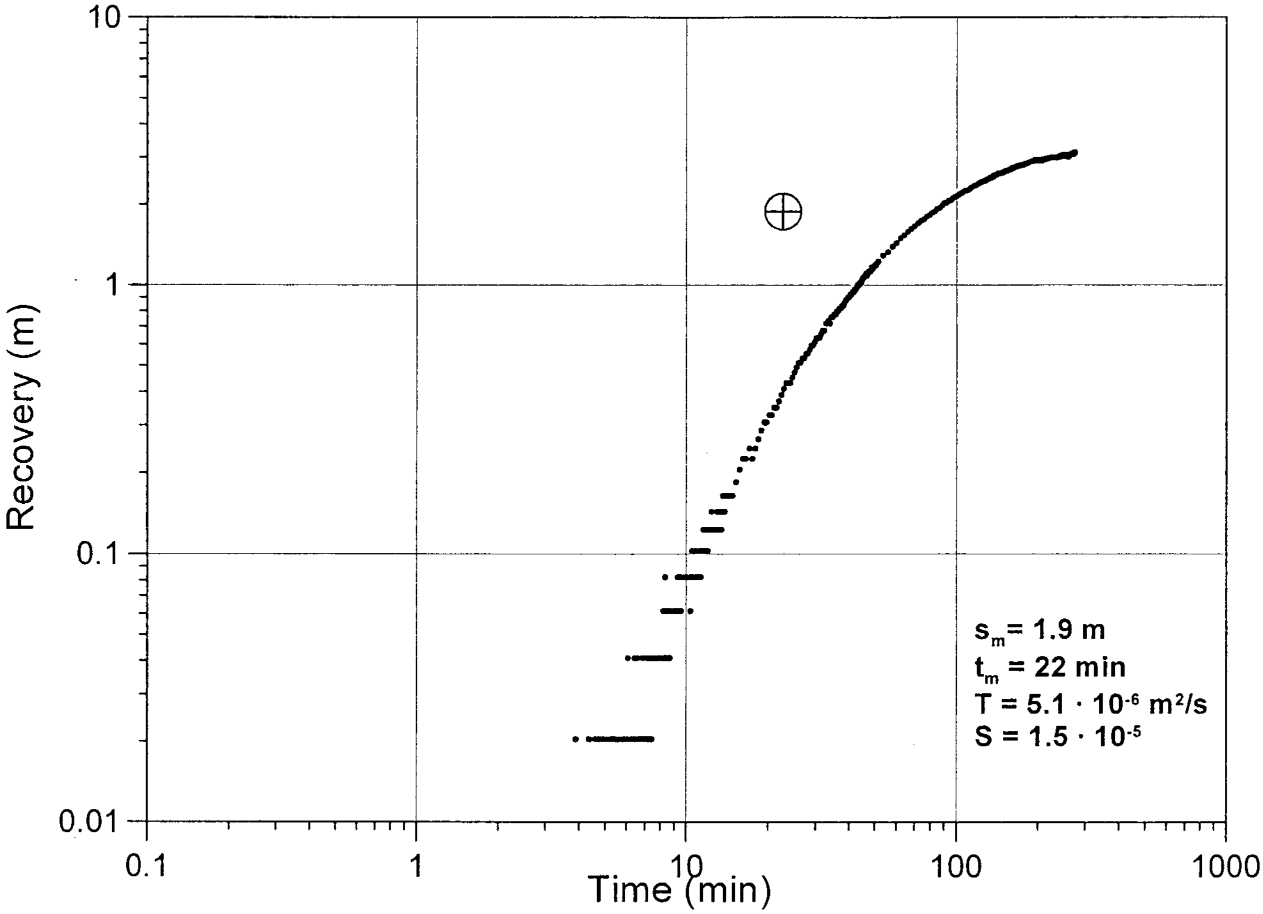
KA3563G01:1

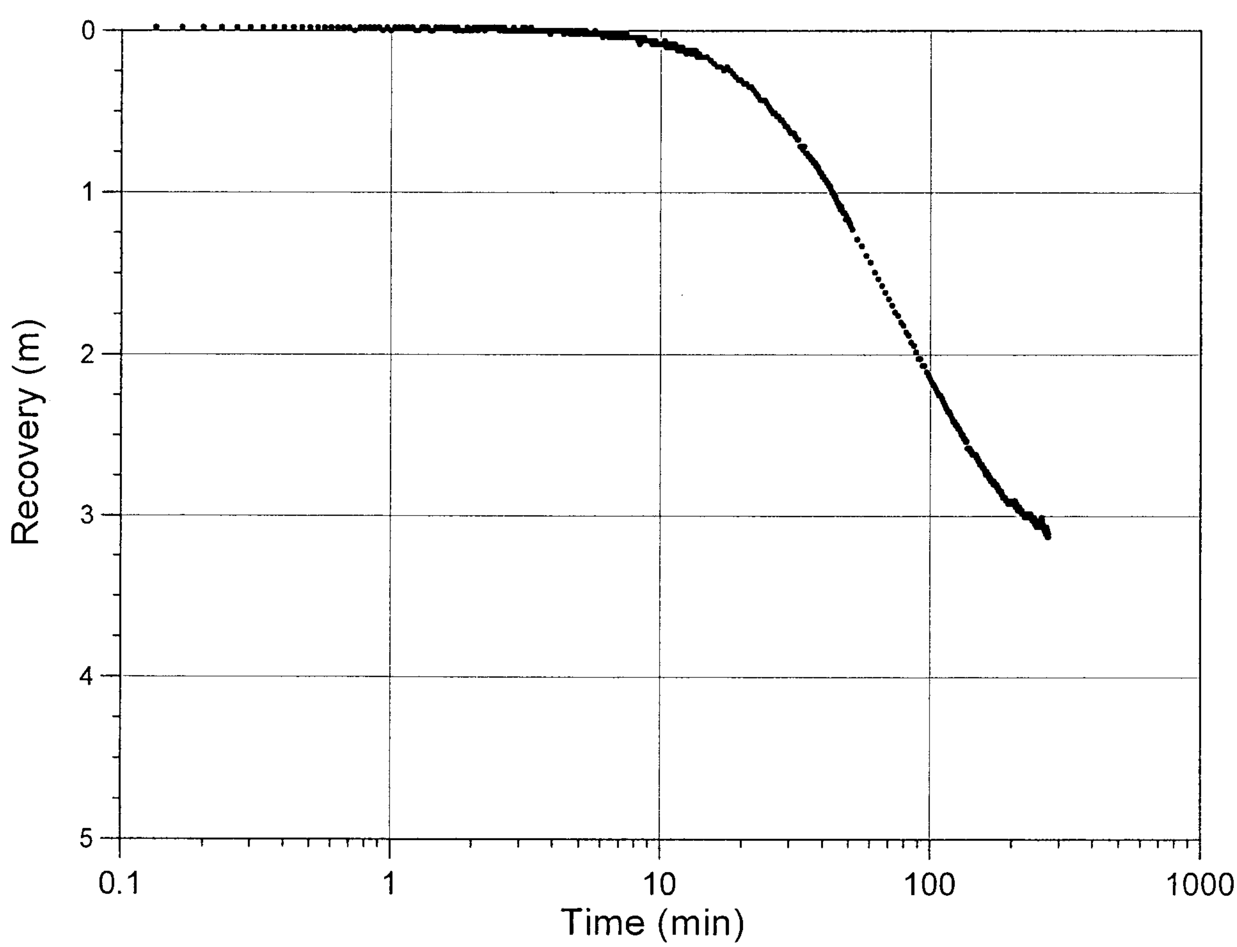




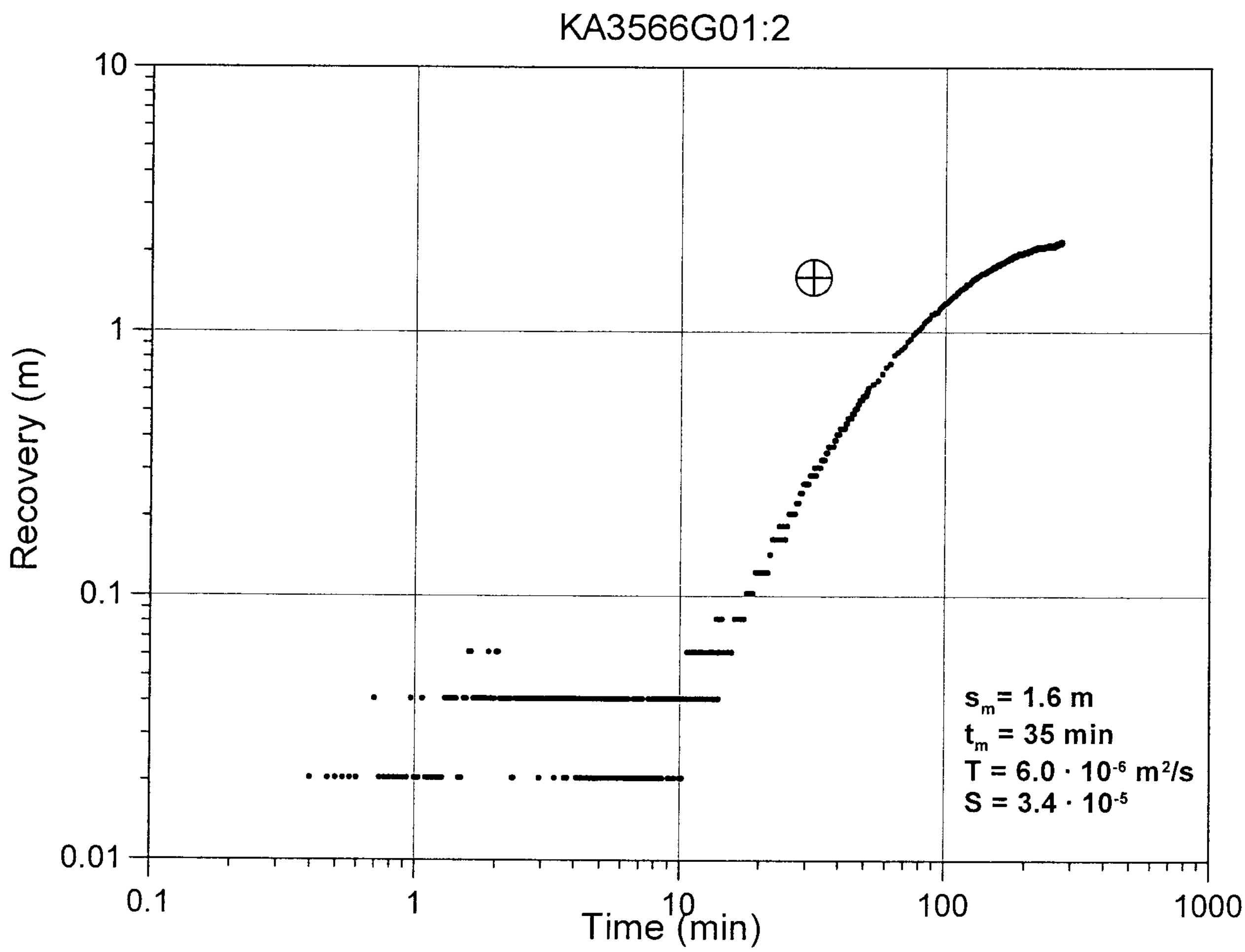
14_KA3563G1_1.GRF 27-okt-99

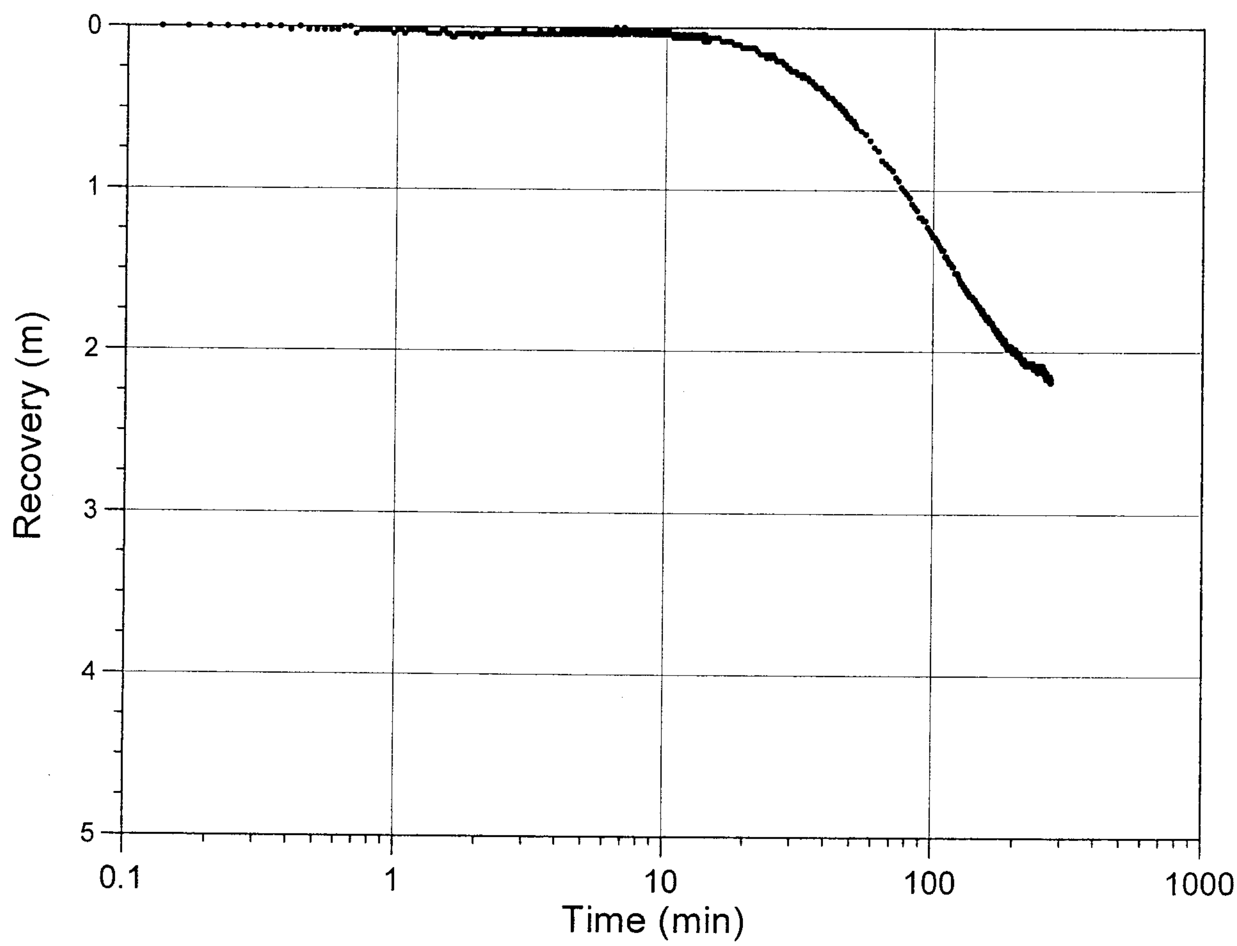
KA3566G01:1



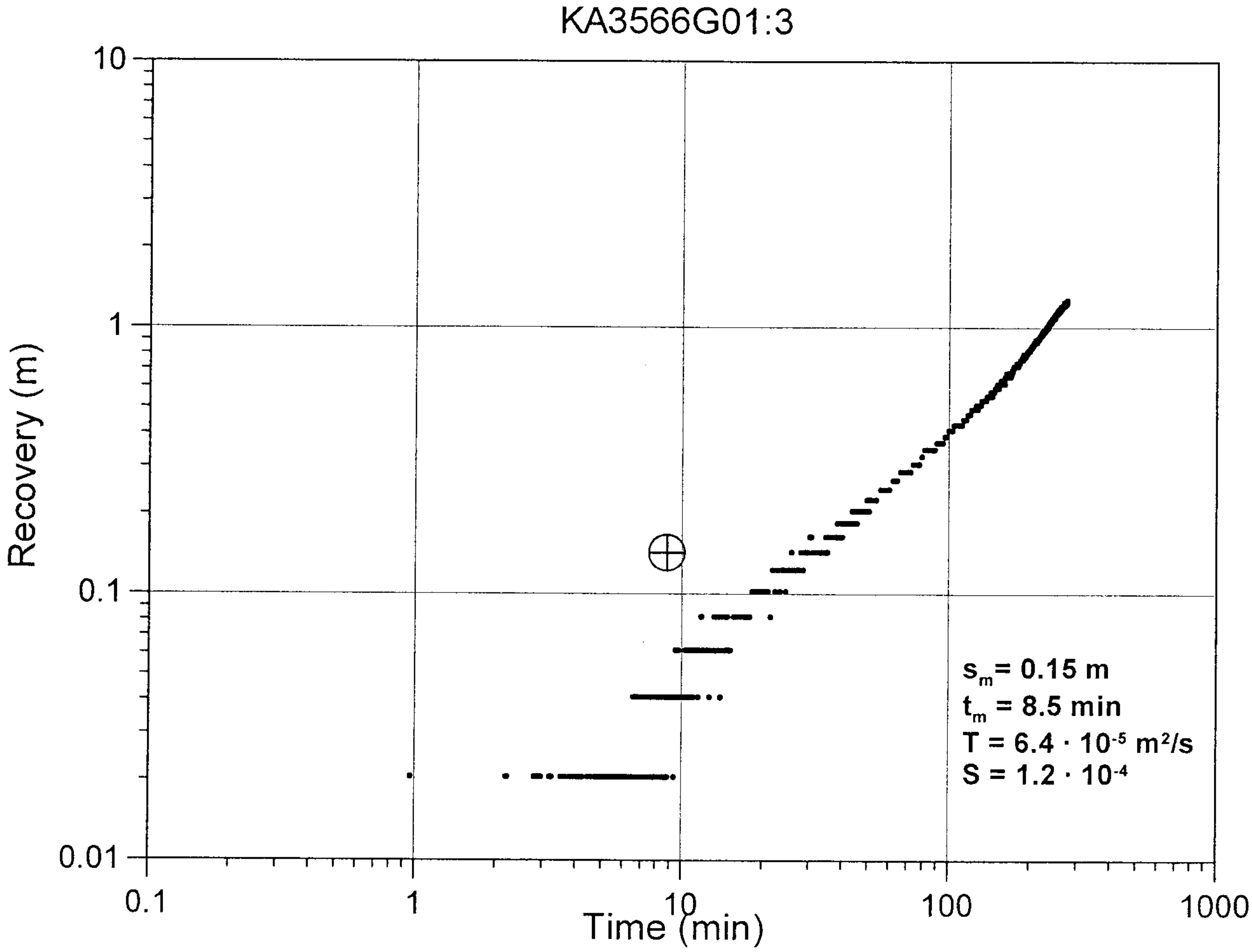


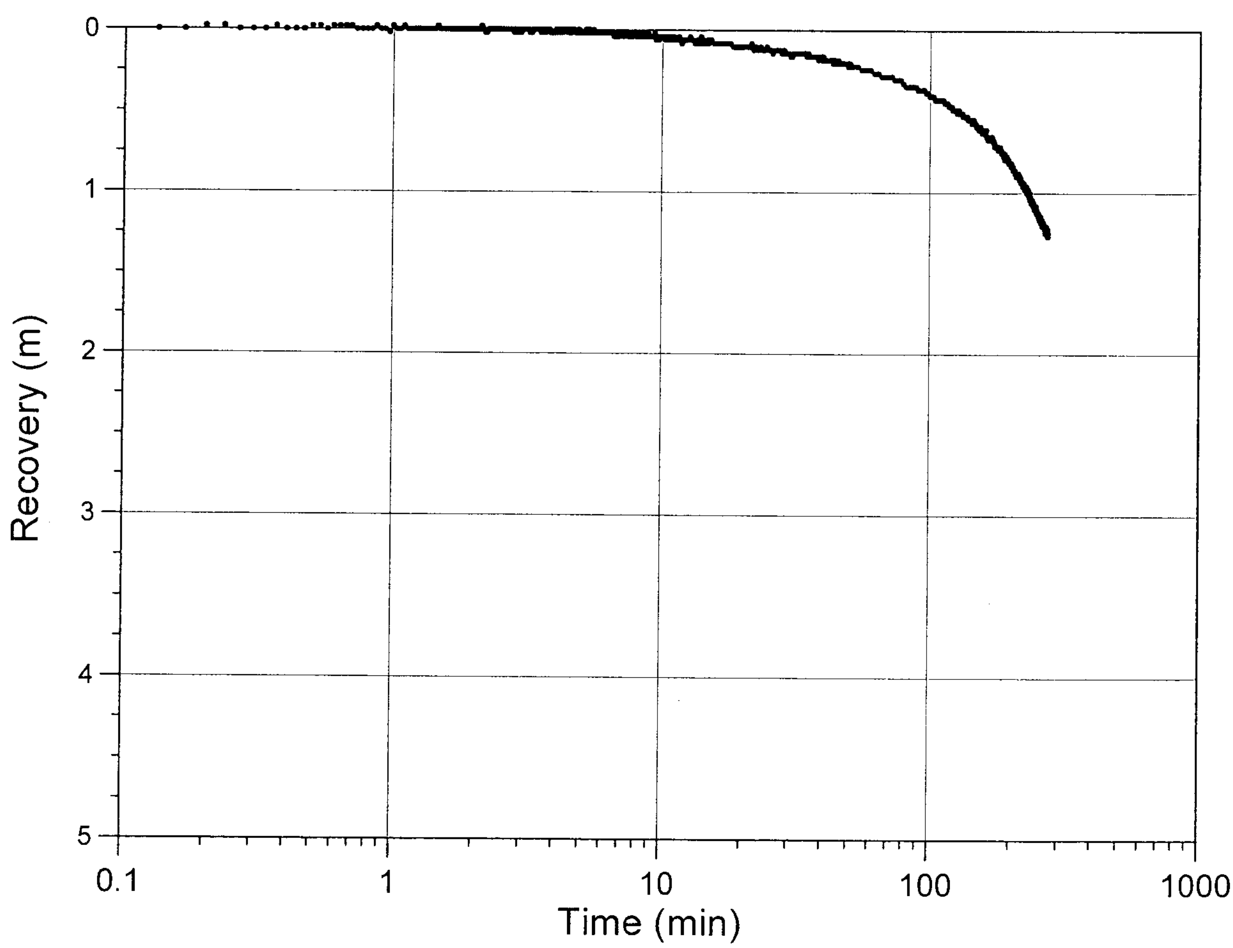
14_KA3566G1_1.GRF 27-okt-99



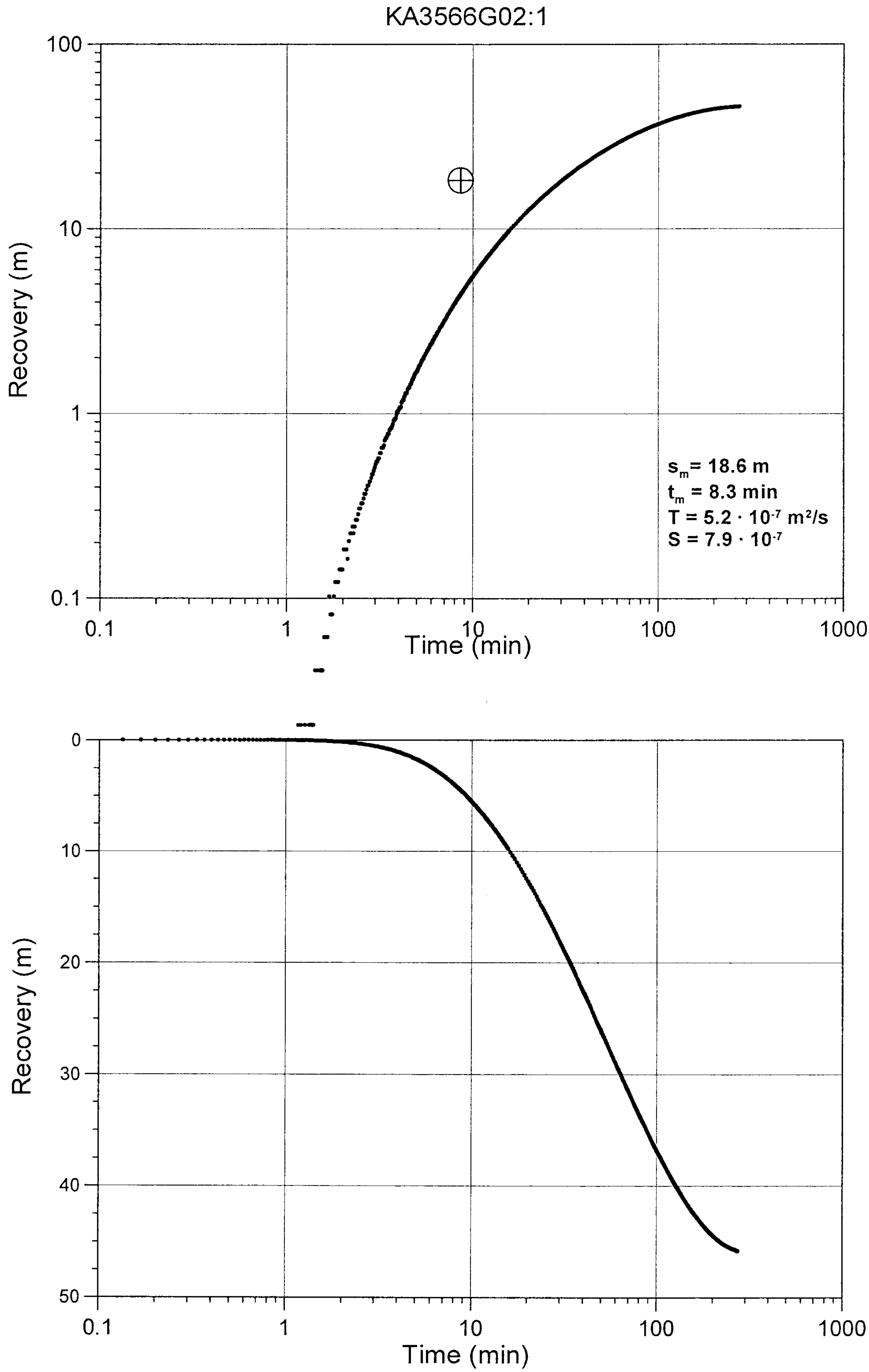


14_KA3566G1_2.GRF 27-okt-99

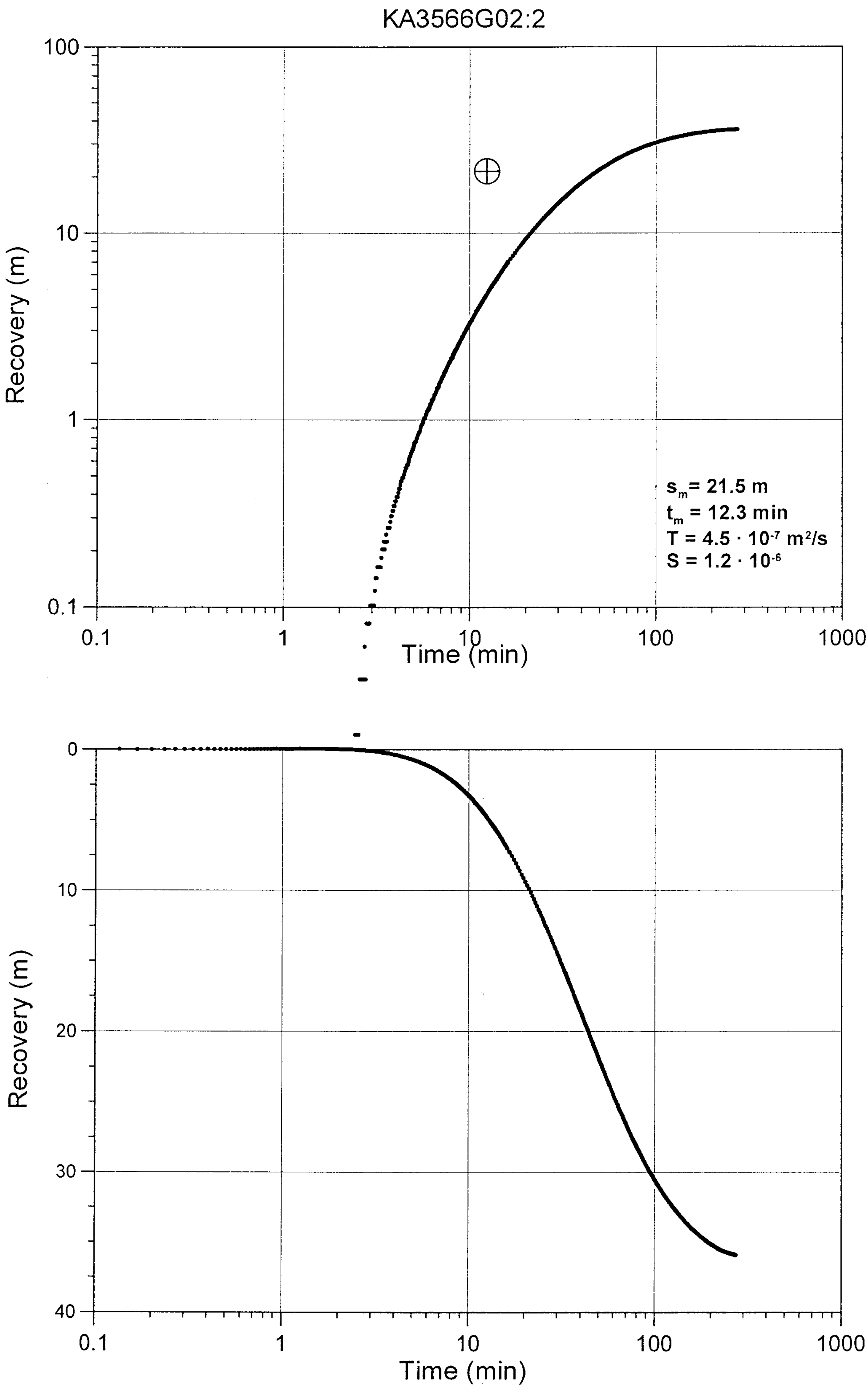




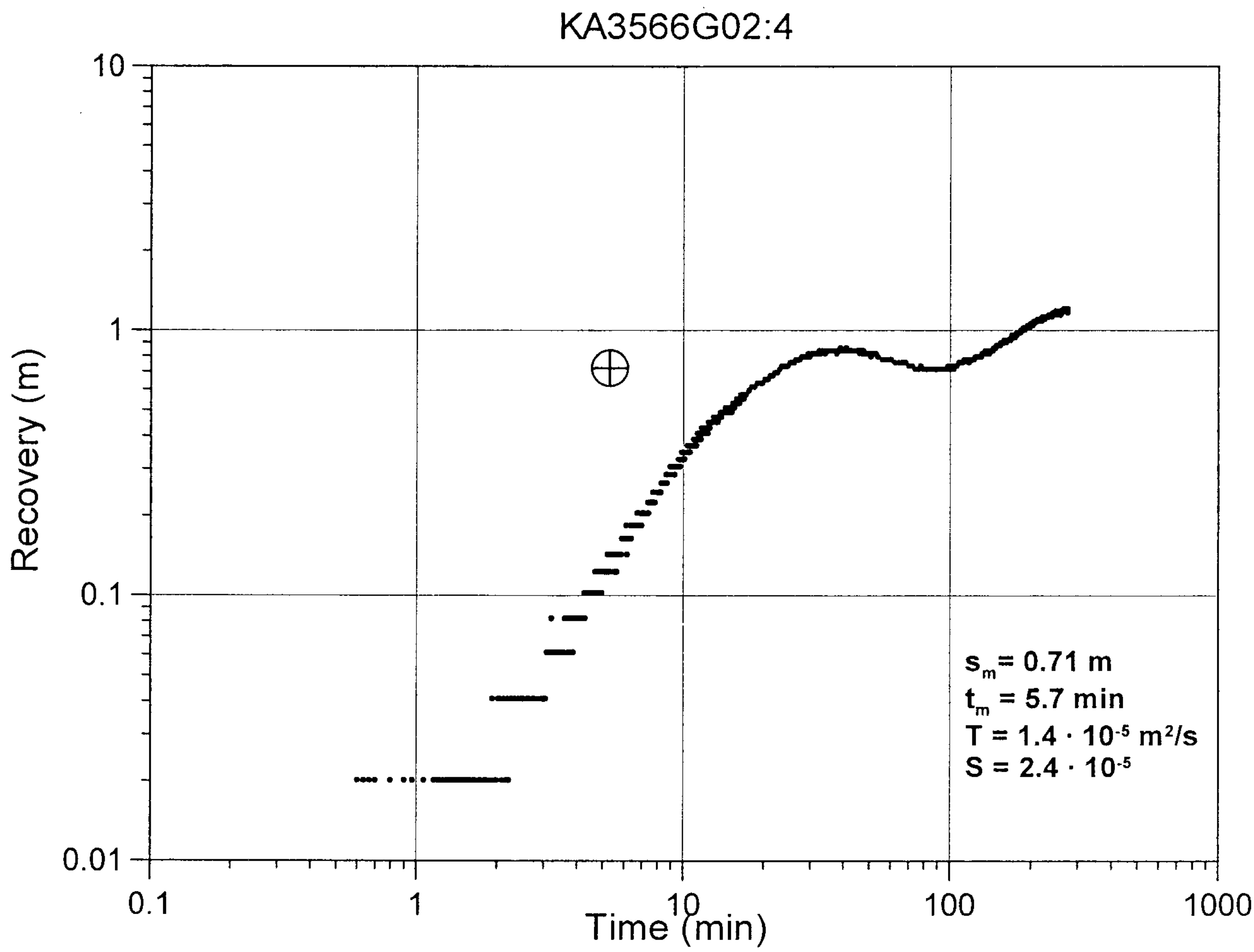
14_KA3566G1_3.GRF 27-okt-99

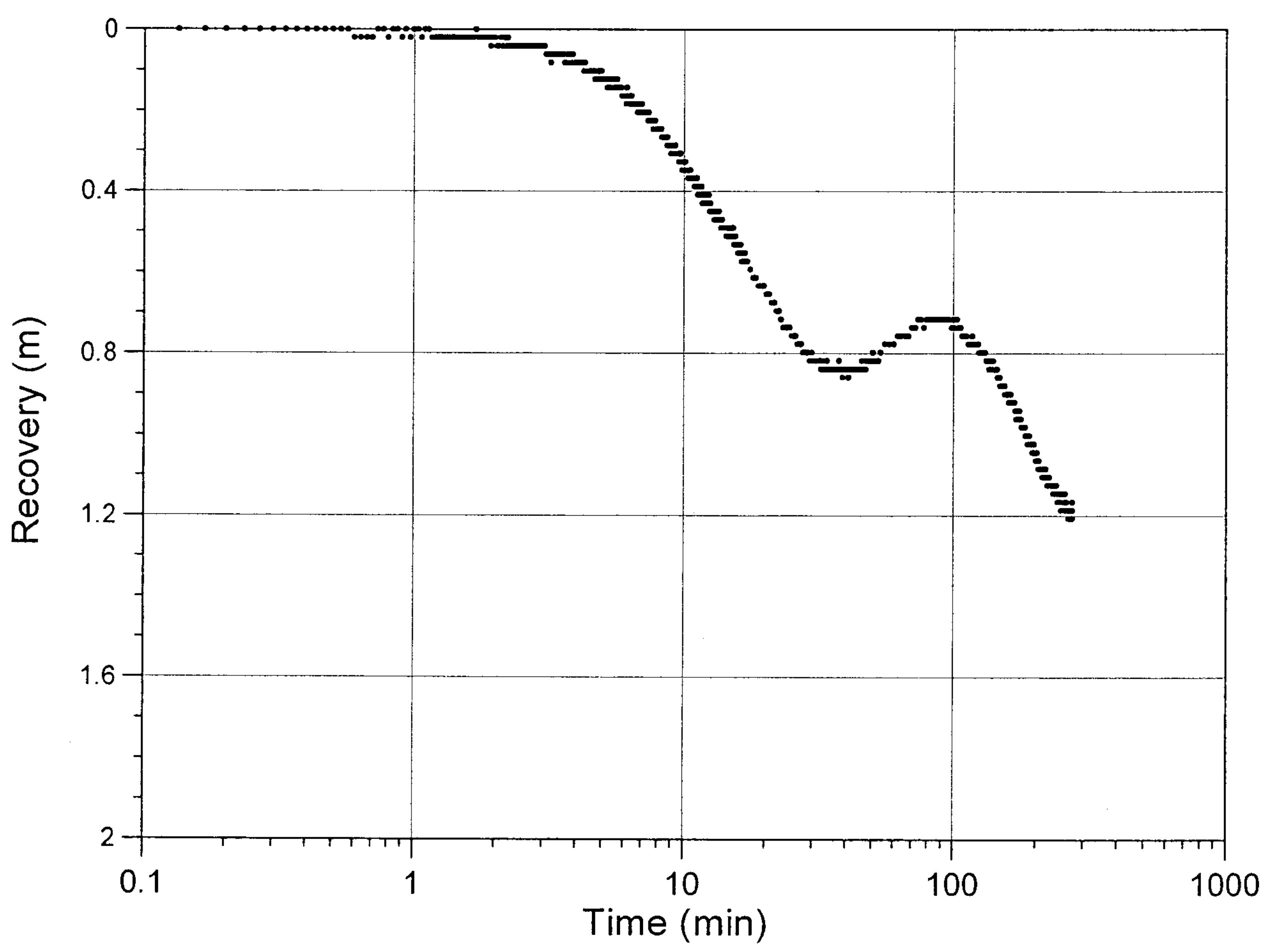


14_KA3566G2_1.GRF 27-okt-99

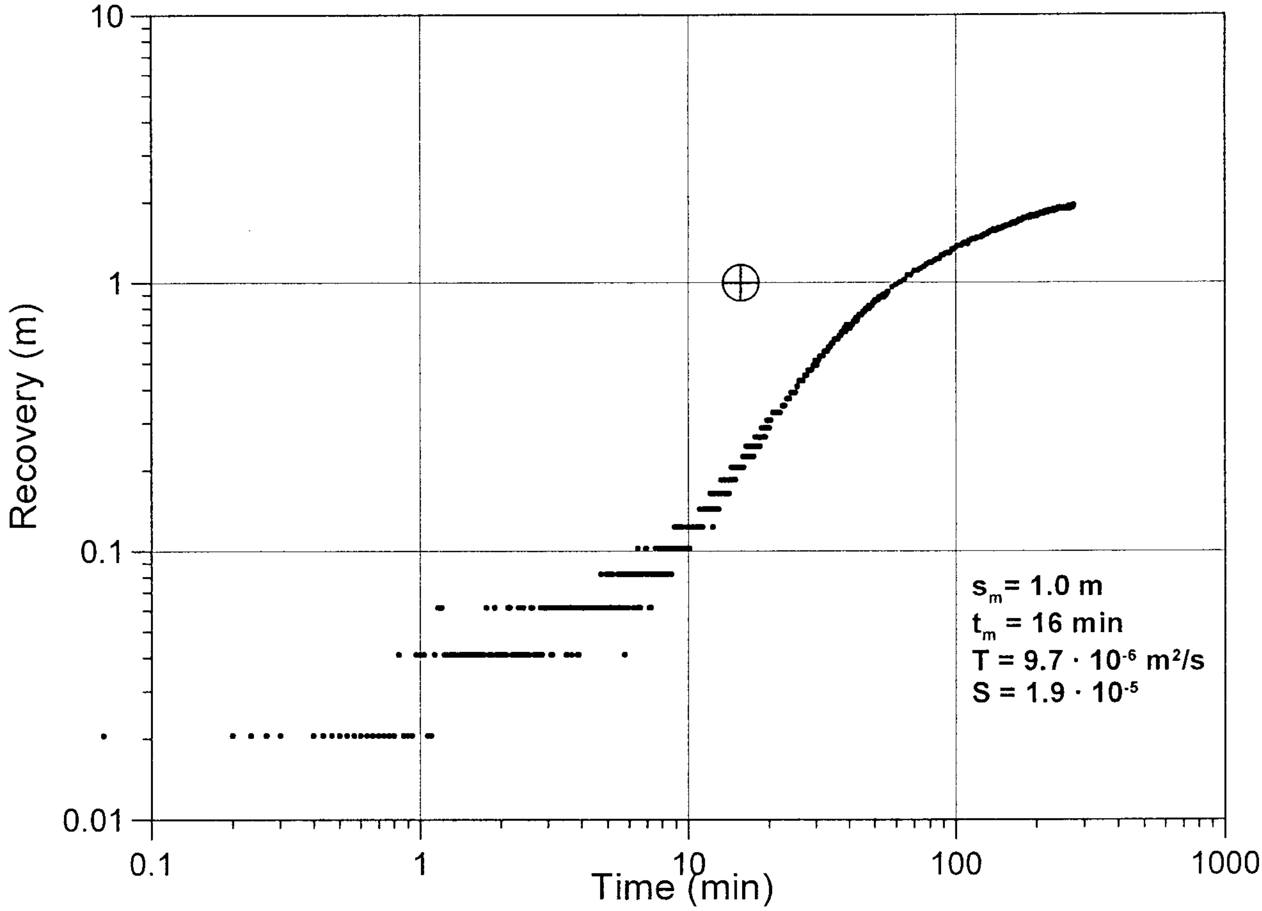


14_KA3566G2_2.GRF 27-okt-99

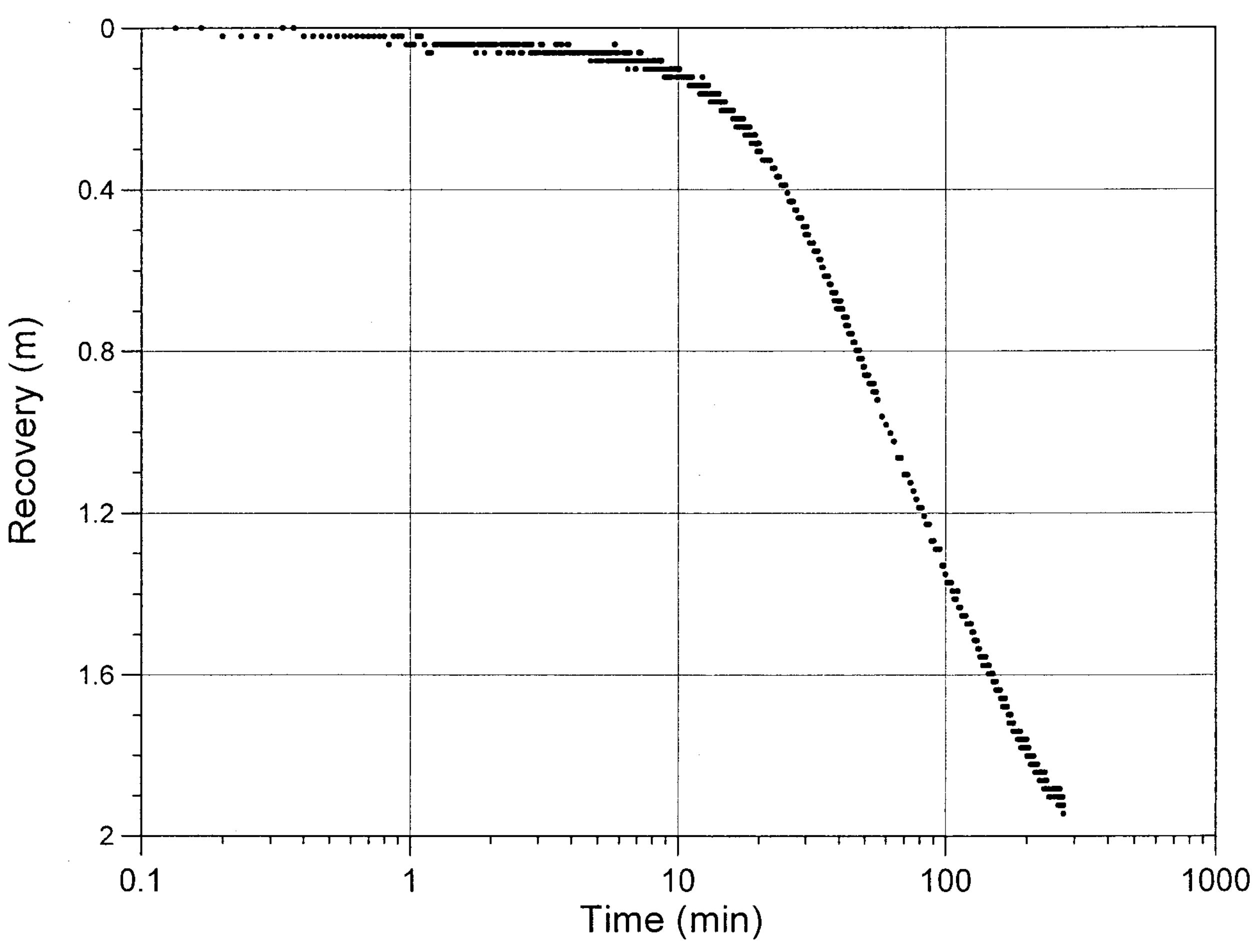

KA3566G02:4
Recovery (m)
Time (min)
10
1
0.1
0.01
0.1
1
10
100
1000
s_m = 0.71 m
t_m = 5.7 min
T = 1.4 · 10^{-5} m²/s
S = 2.4 · 10^{-5}


Recovery (m)
Time (min)
0
0.4
0.8
1.2
1.6
2
0.1
1
10
100
1000

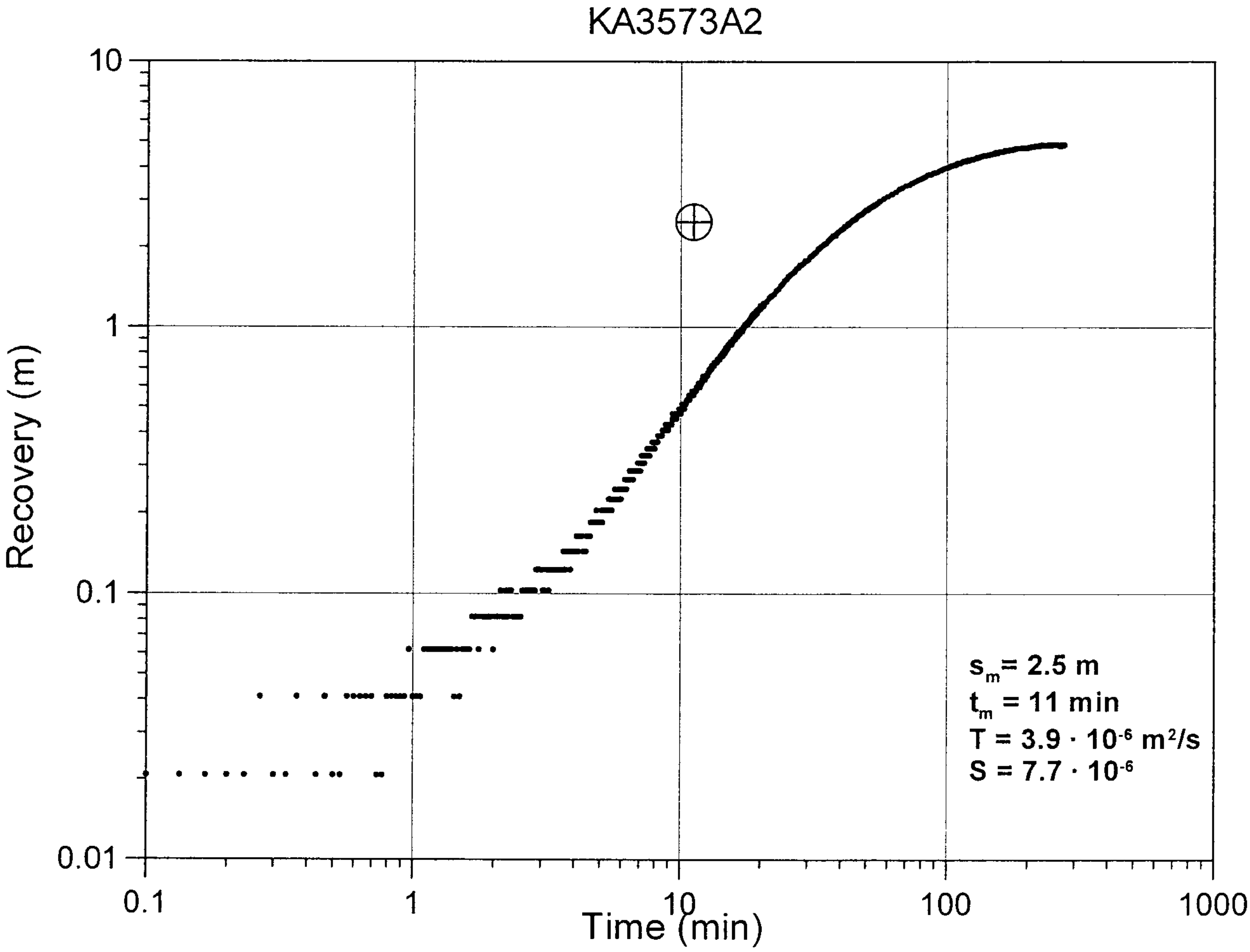
KA3573A1

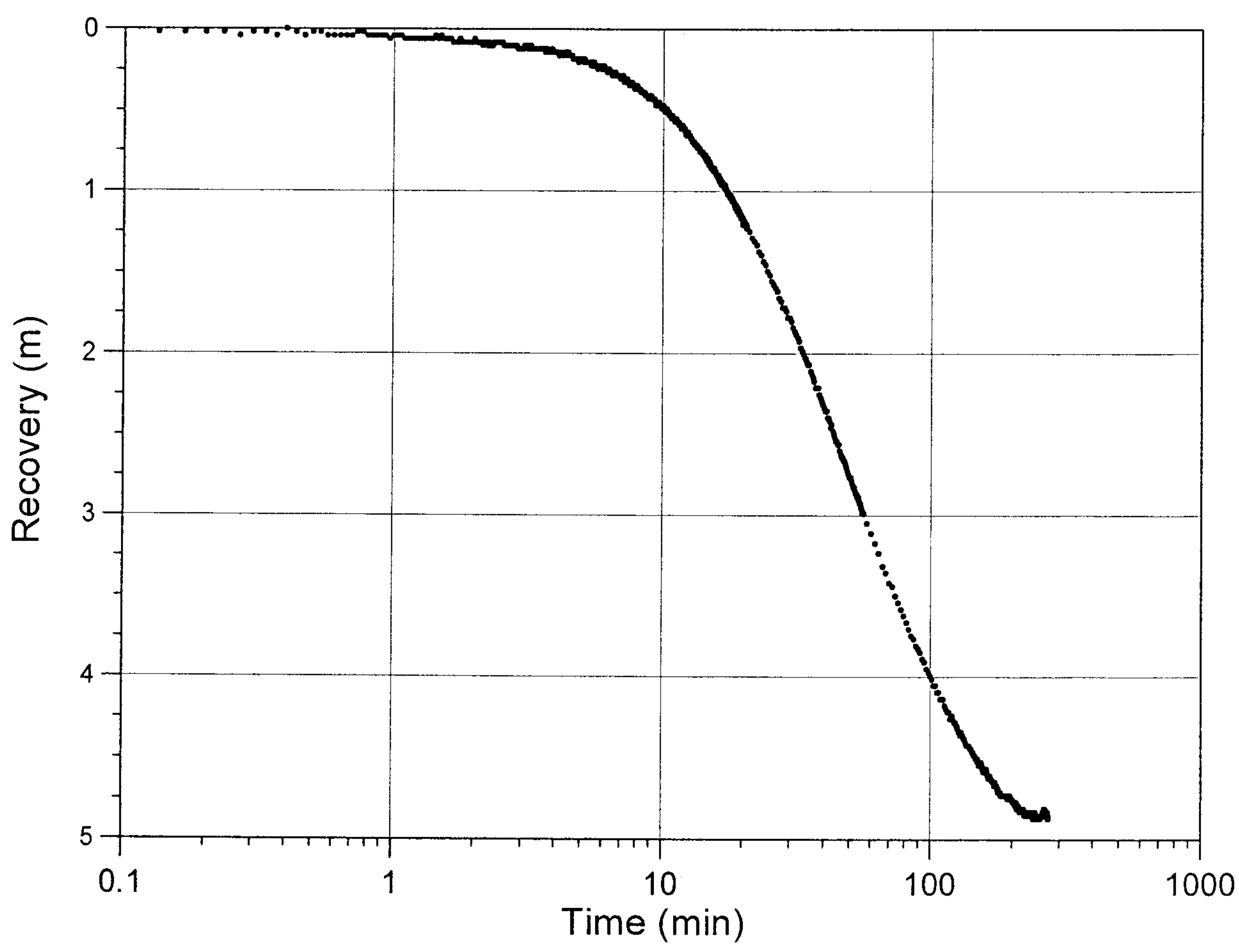


10
1
0.1
0.01
Recovery (m)
0.1
1
10
100
1000
Time (min)
s_m= 1.0 m
t_m = 16 min
T = 9.7 · 10^{-6} m^2/s
S = 1.9 · 10^{-5}



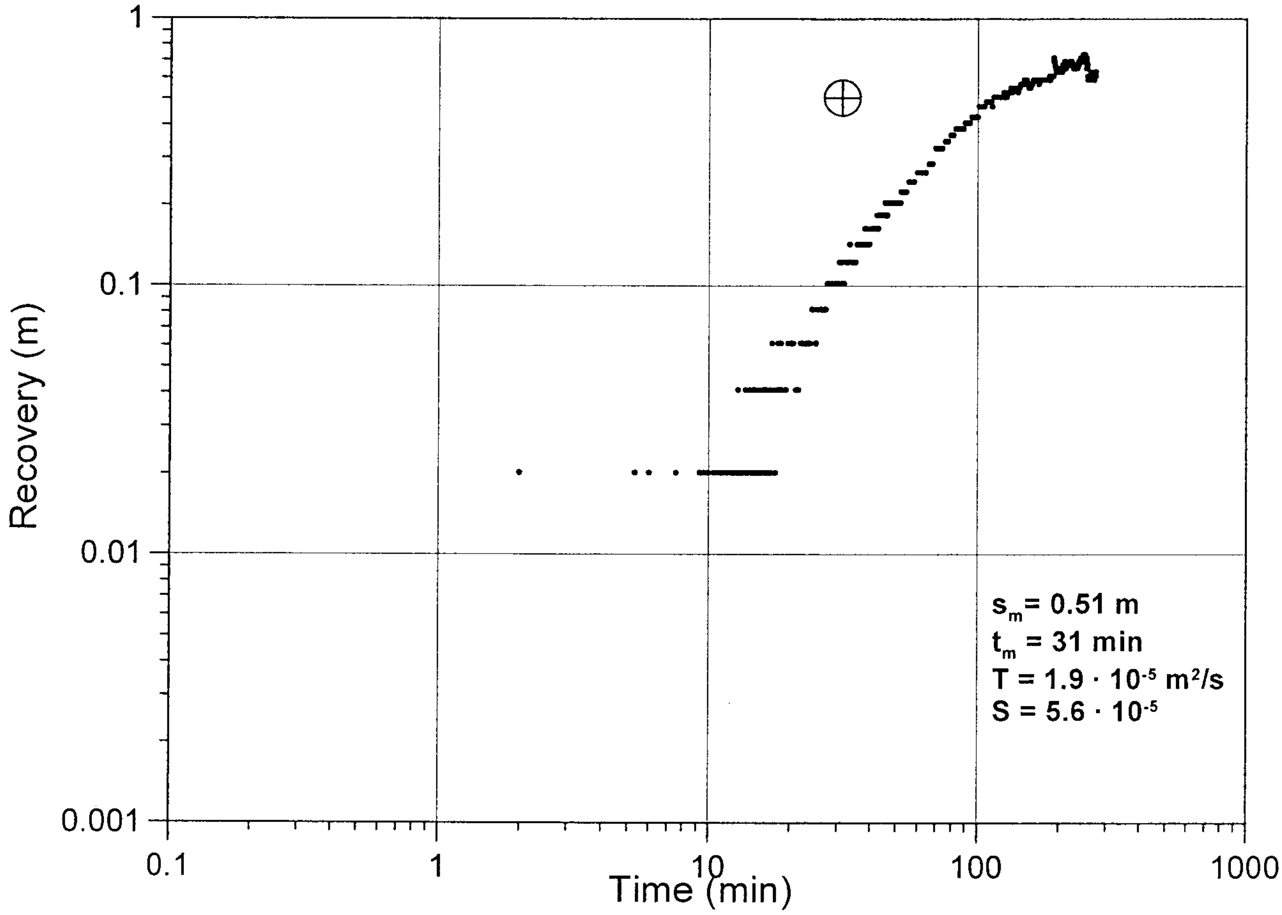
0
0.4
0.8
1.2
1.6
2
Recovery (m)
0.1
1
10
100
1000
Time (min)



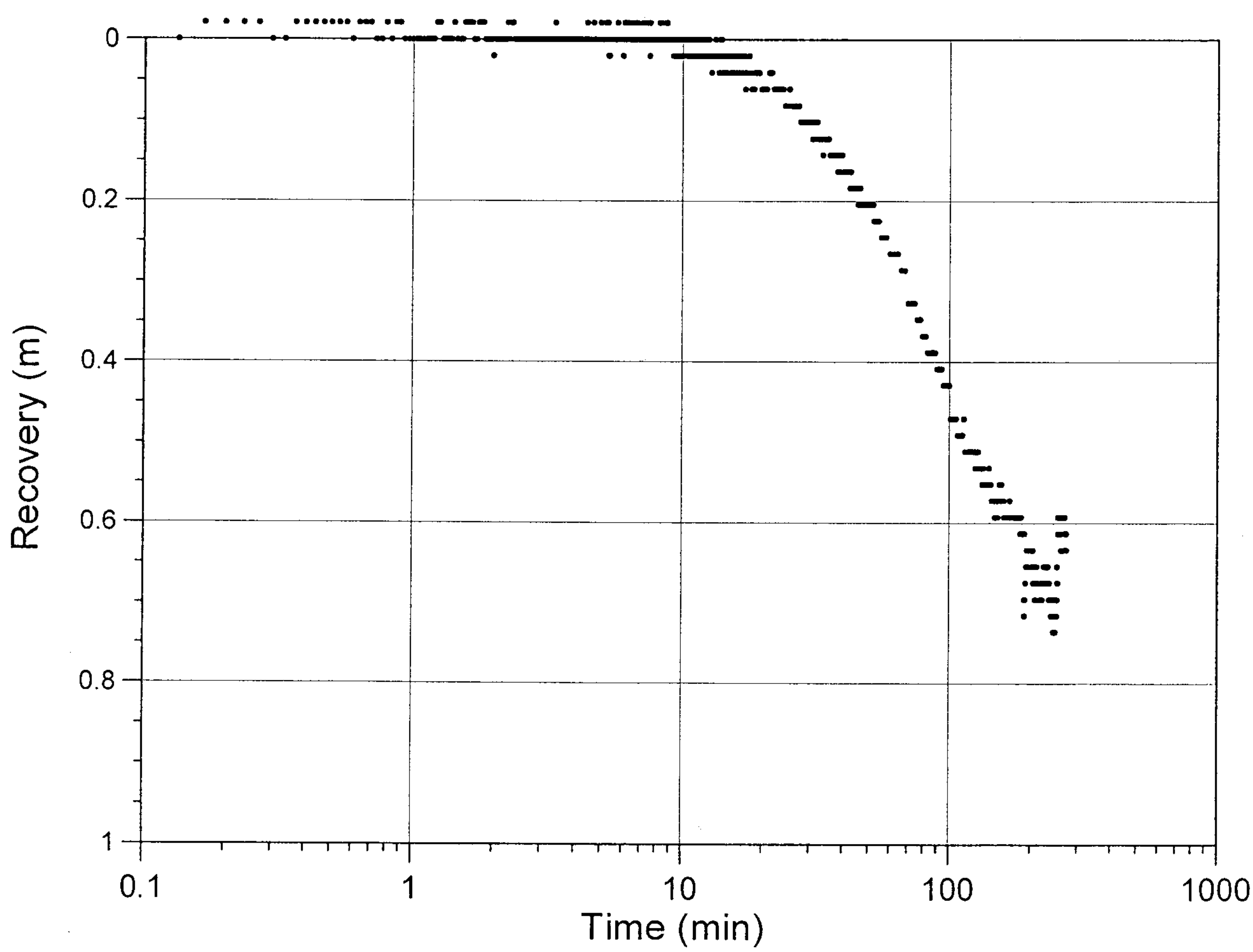


14_KA3573A2.GRF 27-okt-99

KA3590G1_1

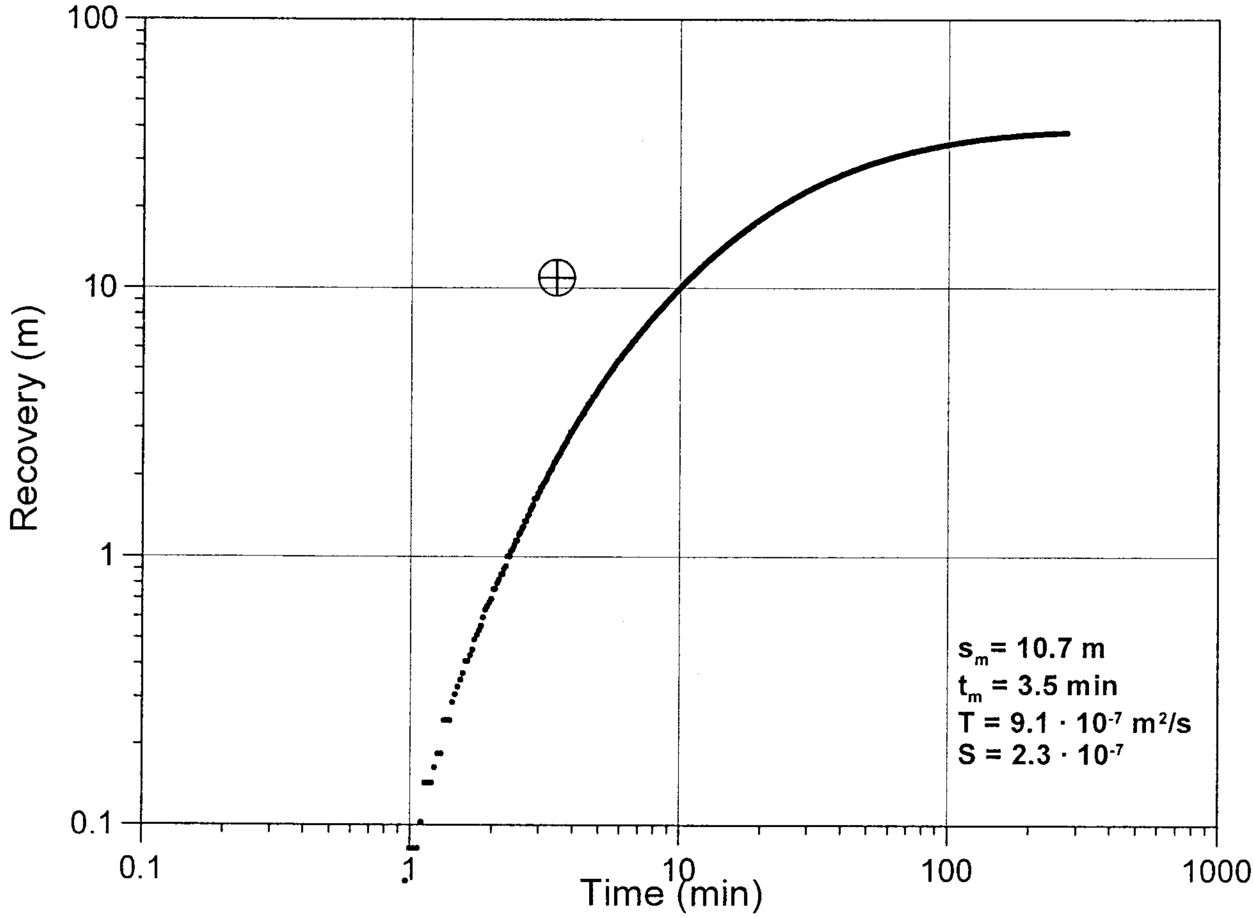


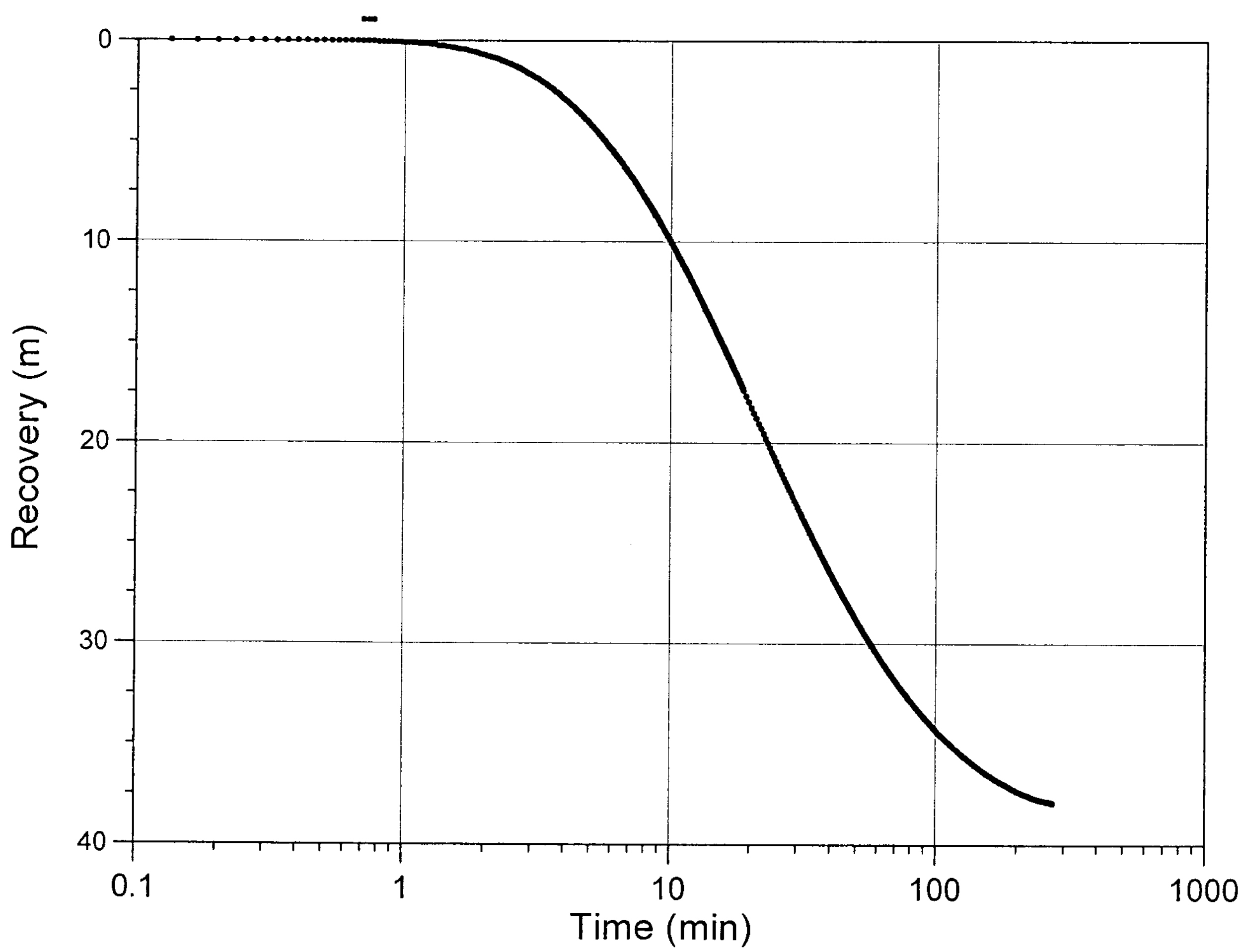
Recovery (m)
Time (min)
1
0.1
0.01
0.001
0.1
1
10
100
1000
s_m = 0.51 m
t_m = 31 min
T = 1.9 · 10^{-5} m^2/s
S = 5.6 · 10^{-5}



Recovery (m)
Time (min)
0
0.2
0.4
0.6
0.8
1
0.1
1
10
100
1000

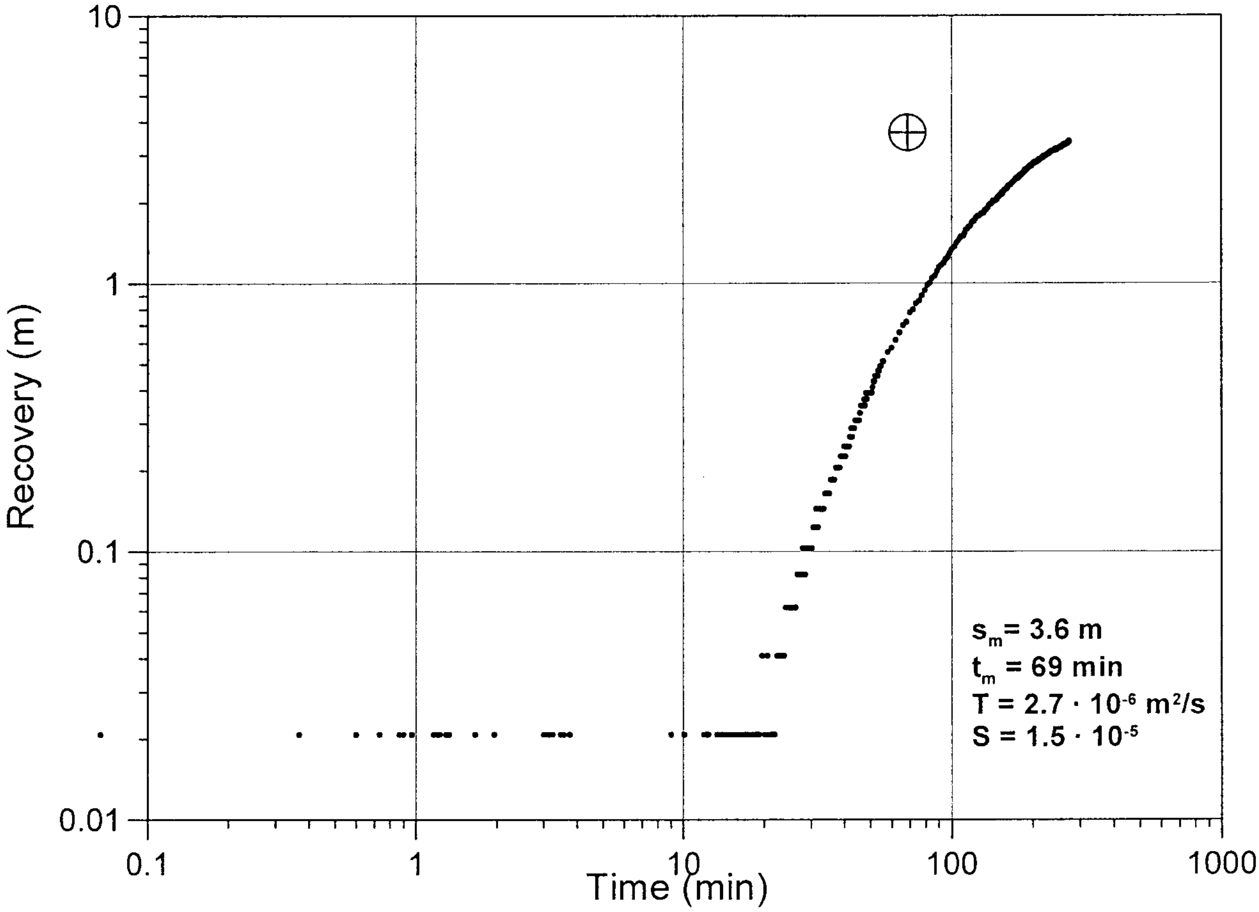
KA3590G2_1

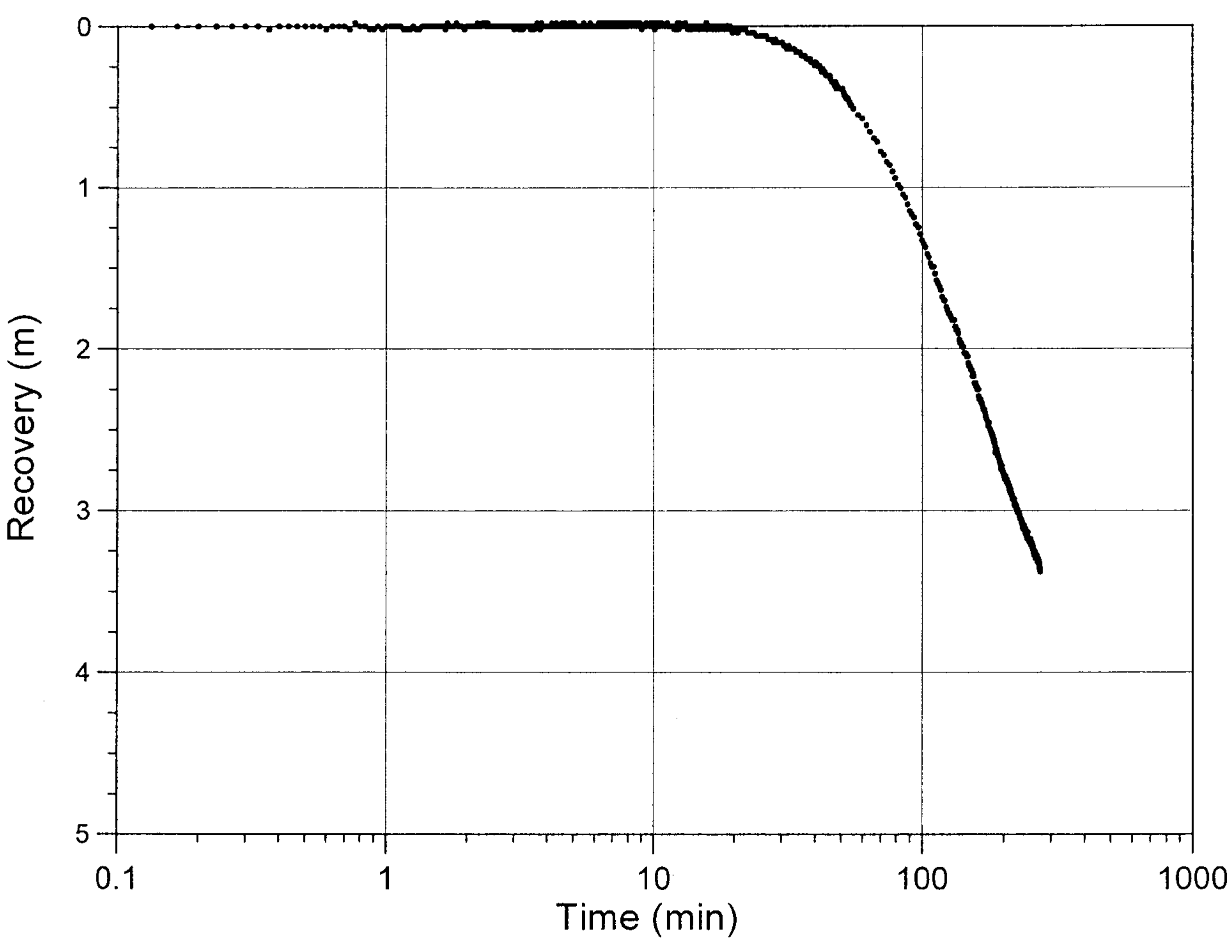




14_KA3590G2_1.GRF 27-okt-99

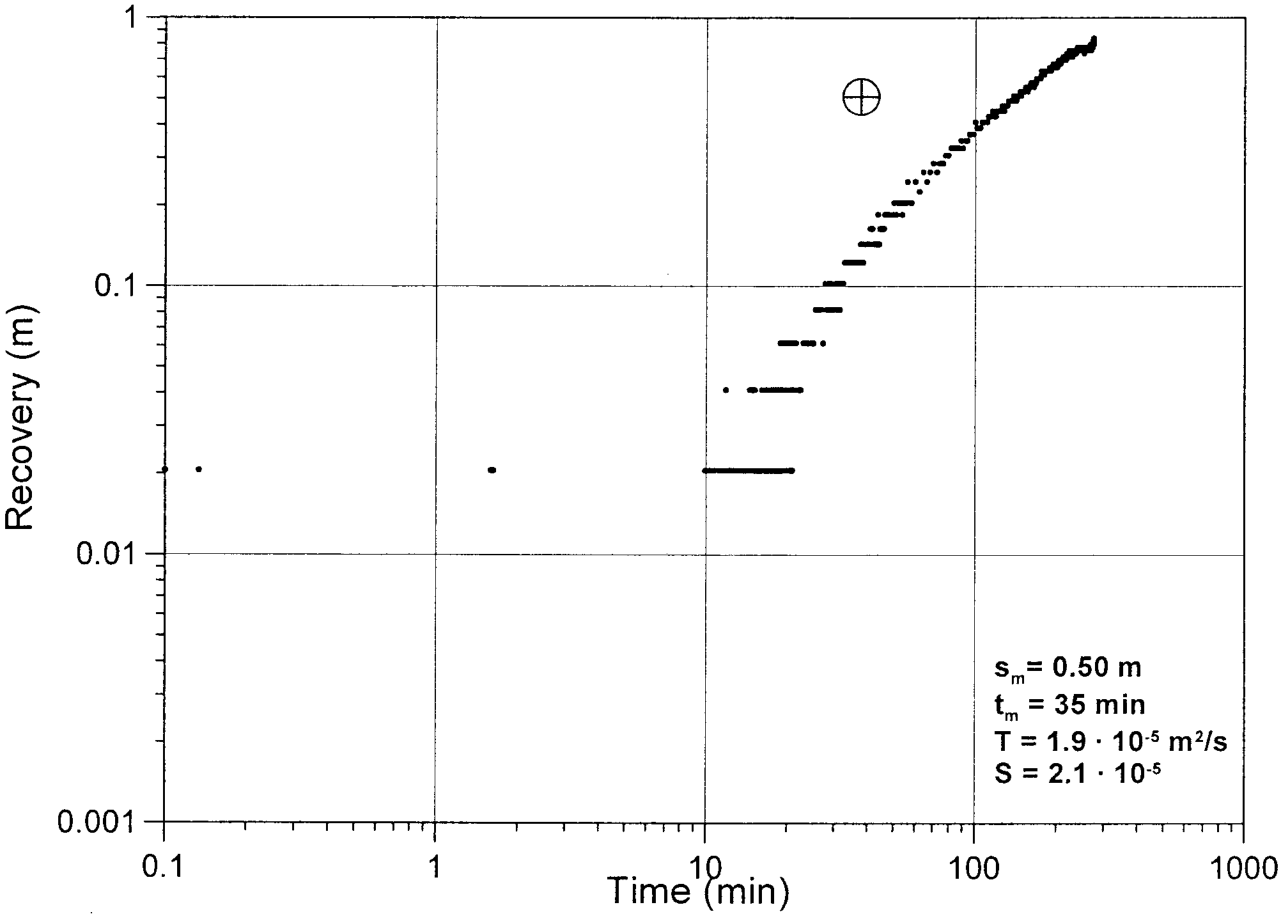
KA3593G1_1

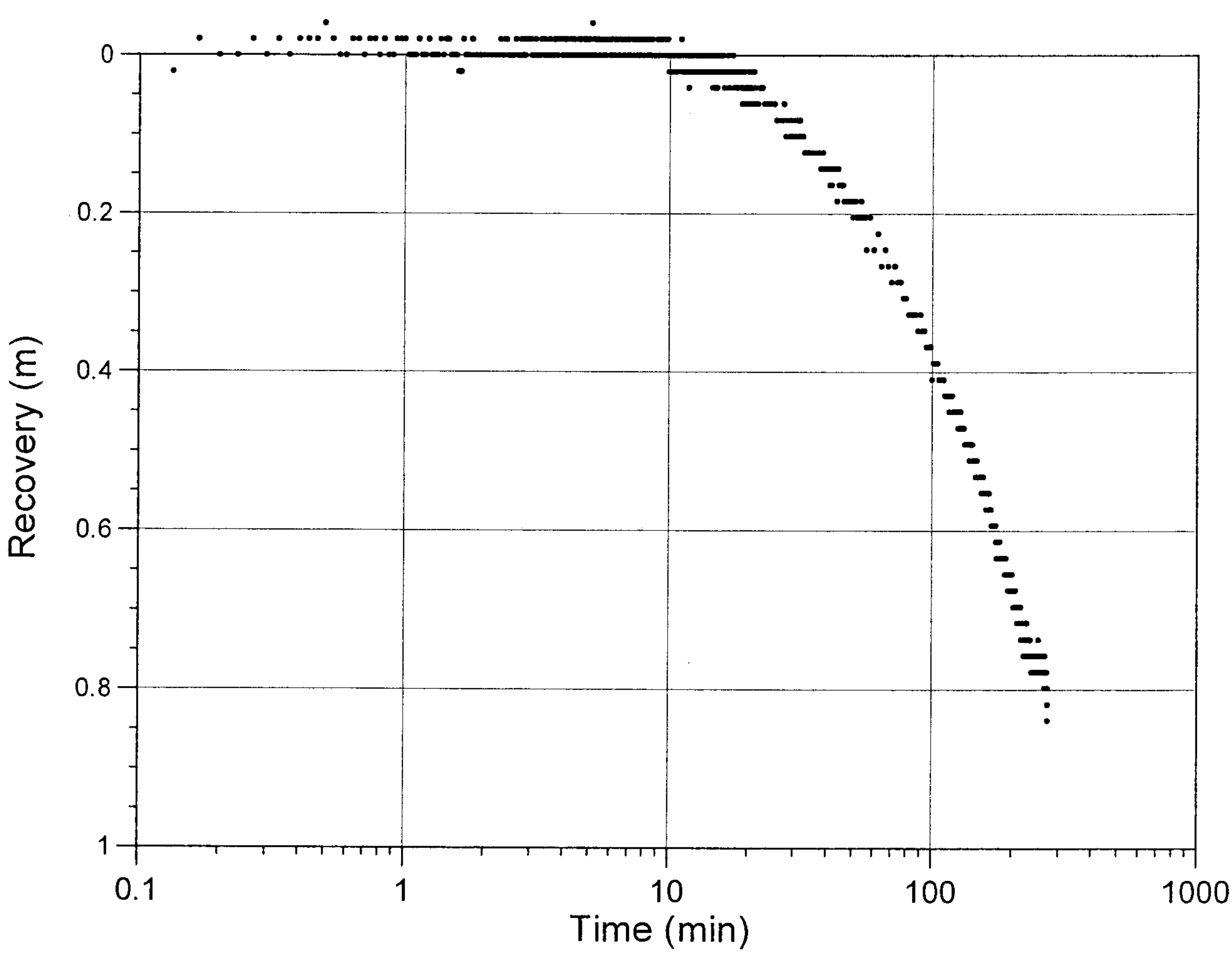




14_KA3593G1_1.GRF 27-okt-99

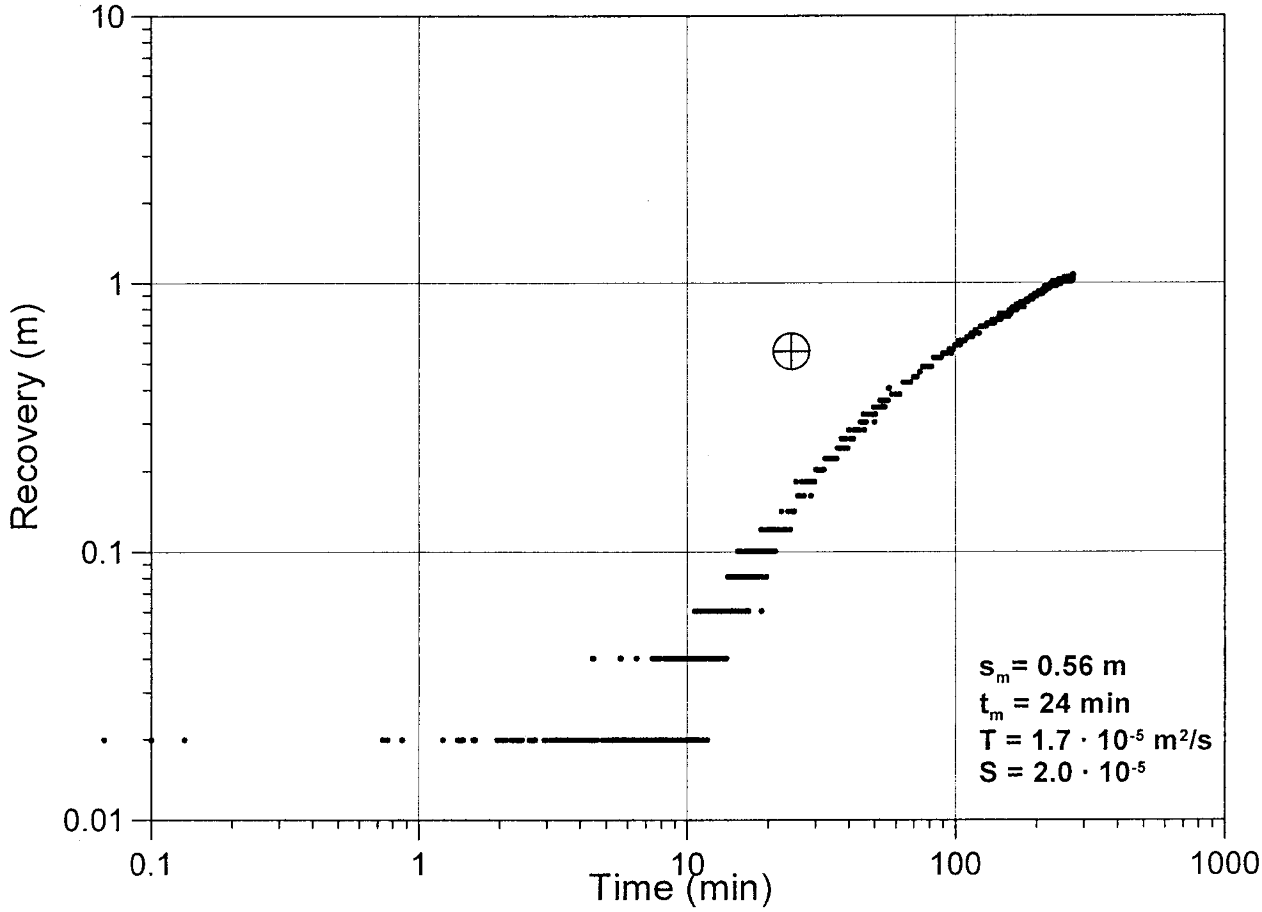
KA3600F:1



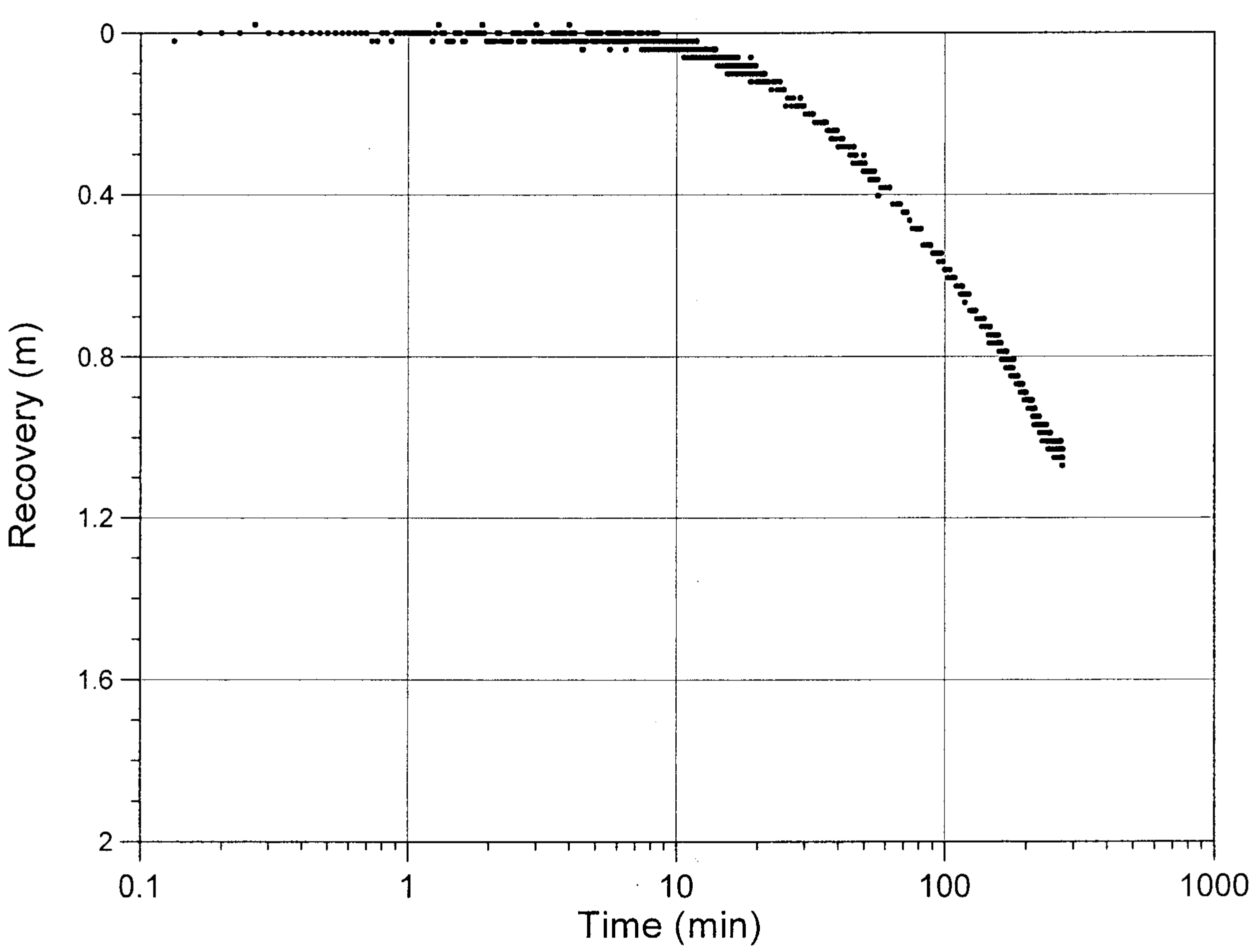


14_KA3600F1.GRF 27-okt-99

KA3600F:2

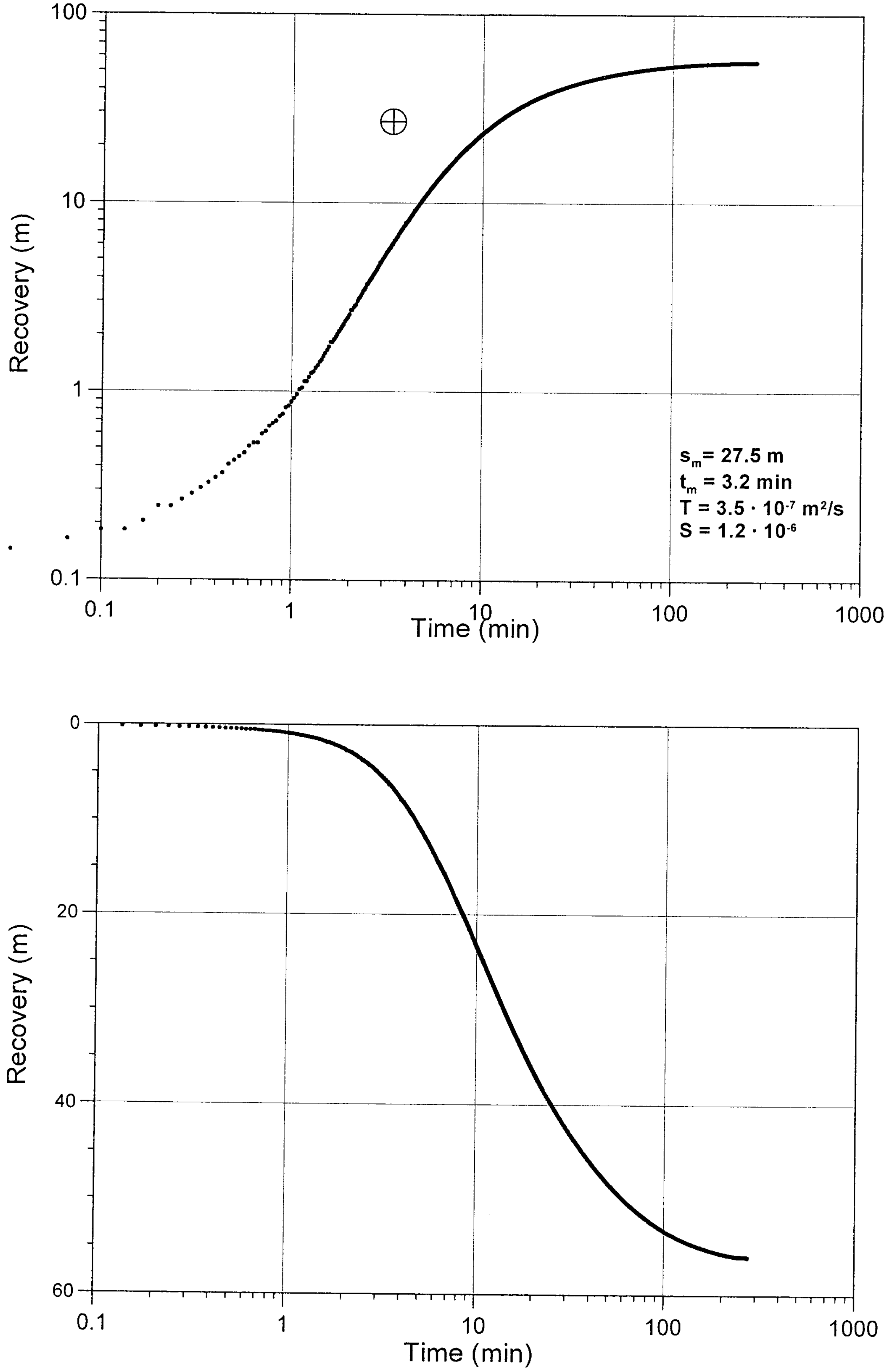


10
1
0.1
0.01
Recovery (m)
0.1
1
10
100
1000
Time (min)
s_m= 0.56 m
t_m = 24 min
T = 1.7 · 10^{-5} m^2/s
S = 2.0 · 10^{-5}

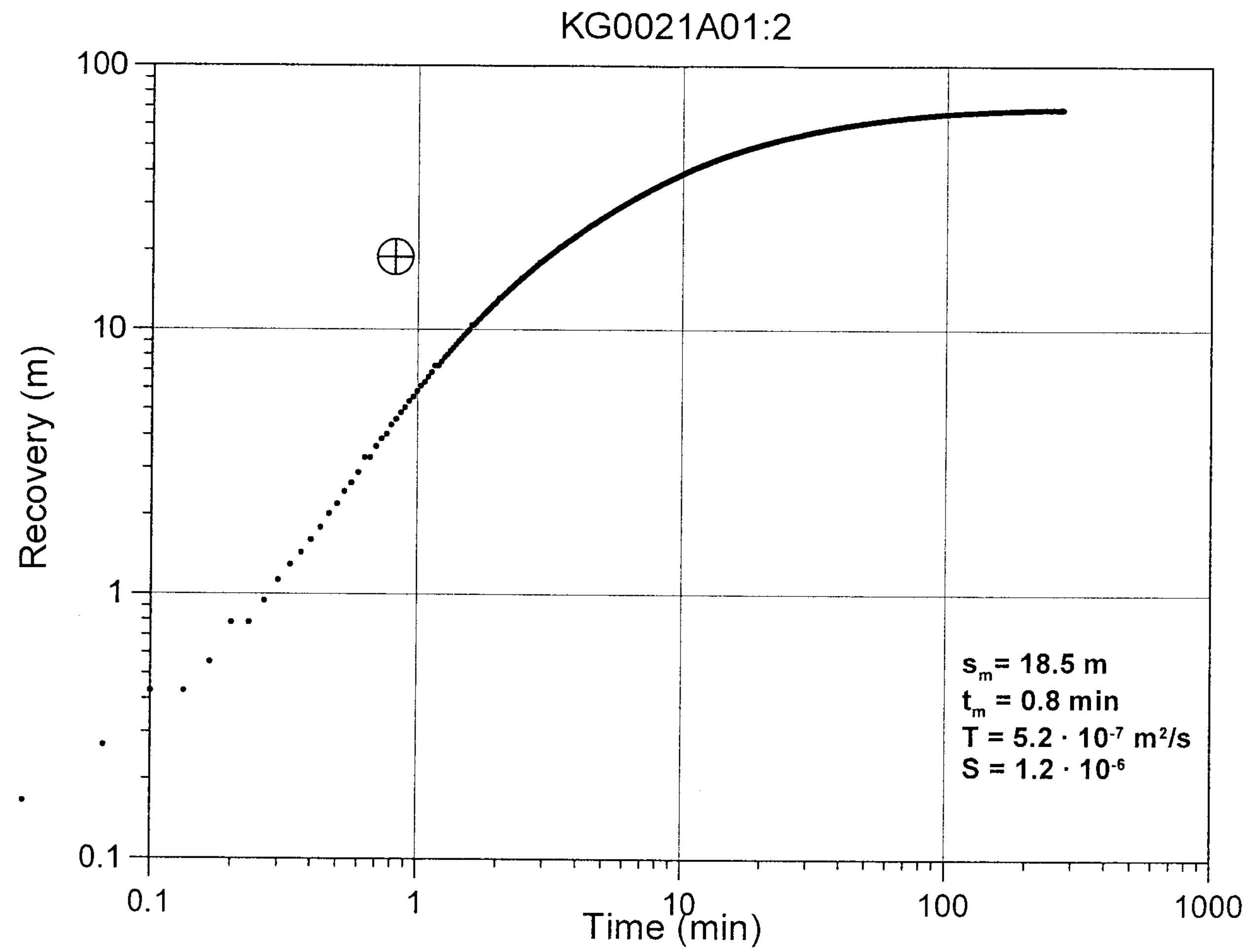


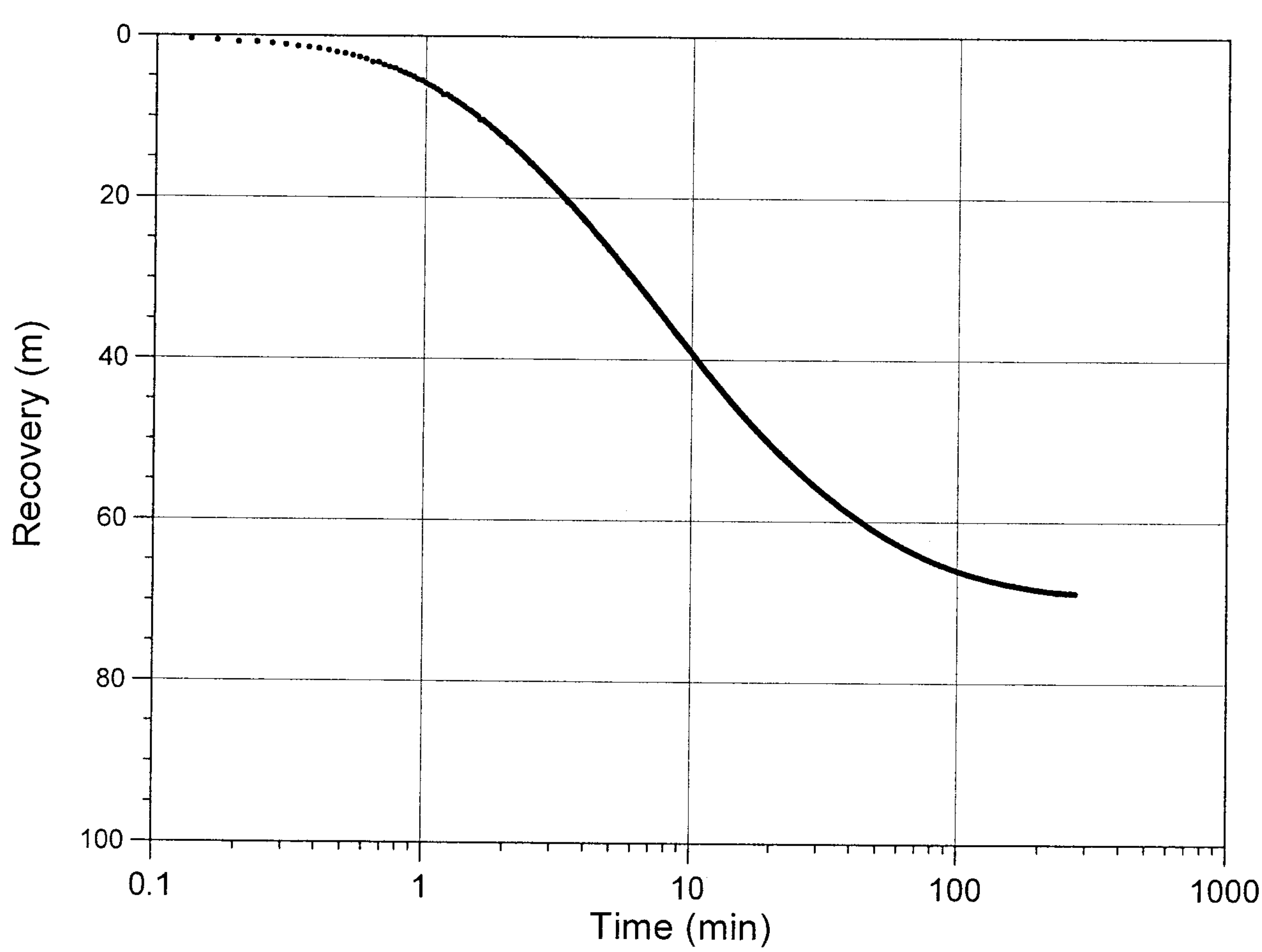
0
0.4
0.8
1.2
1.6
2
Recovery (m)
0.1
1
10
100
1000
Time (min)

KG0021A01:1



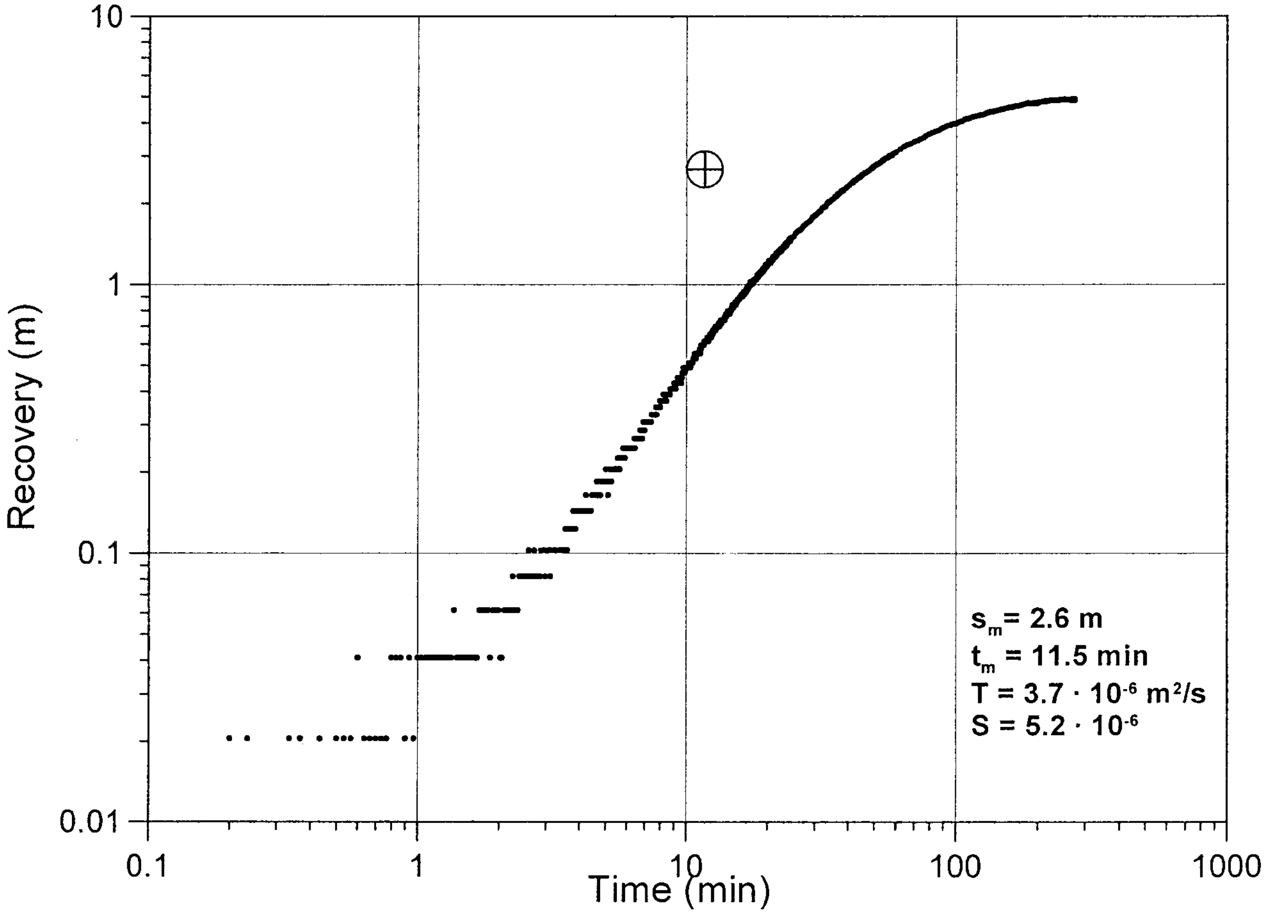
14_KG0021A1_1.GRF 27-okt-99

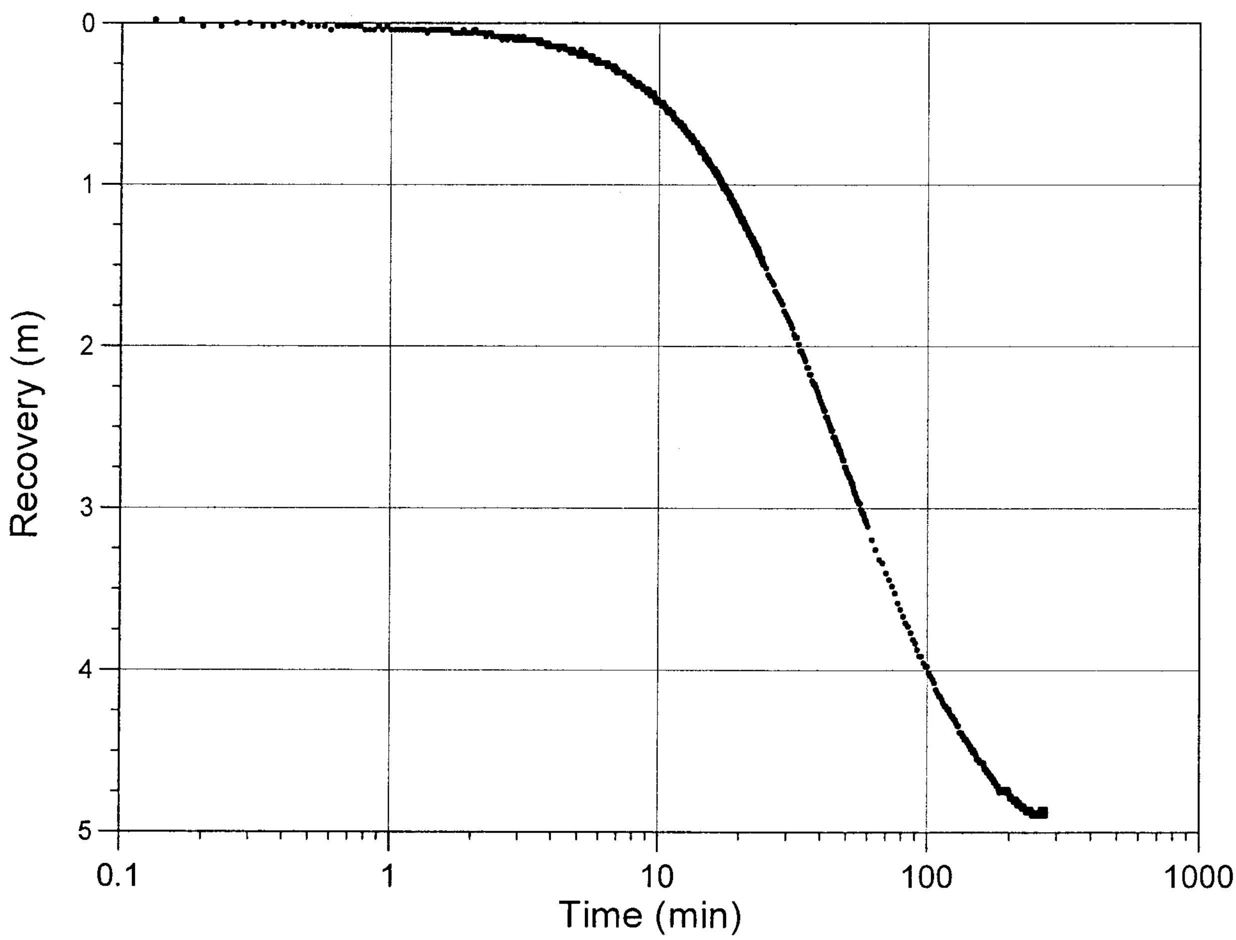




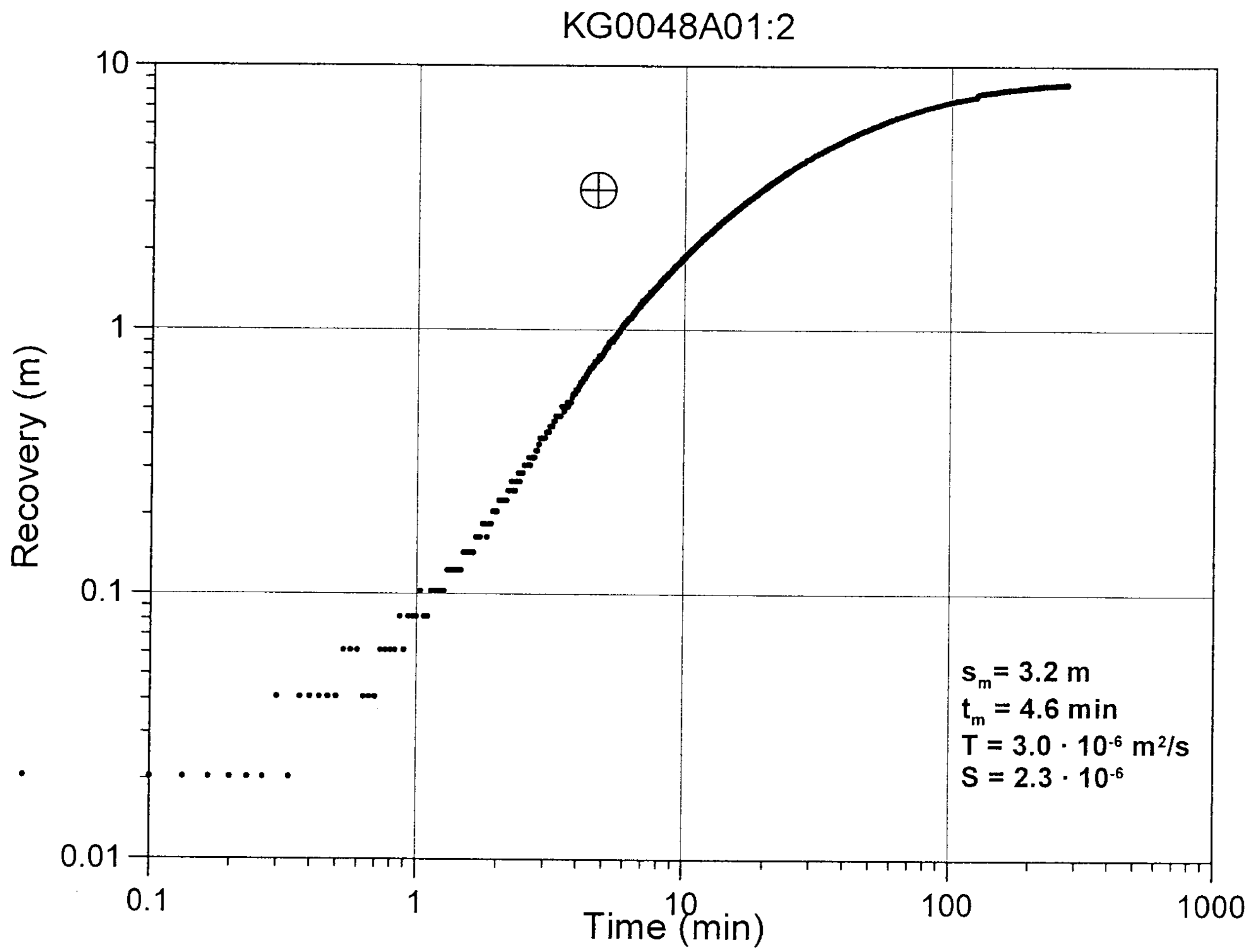
14_KG0021A1_2.GRF 27-okt-99

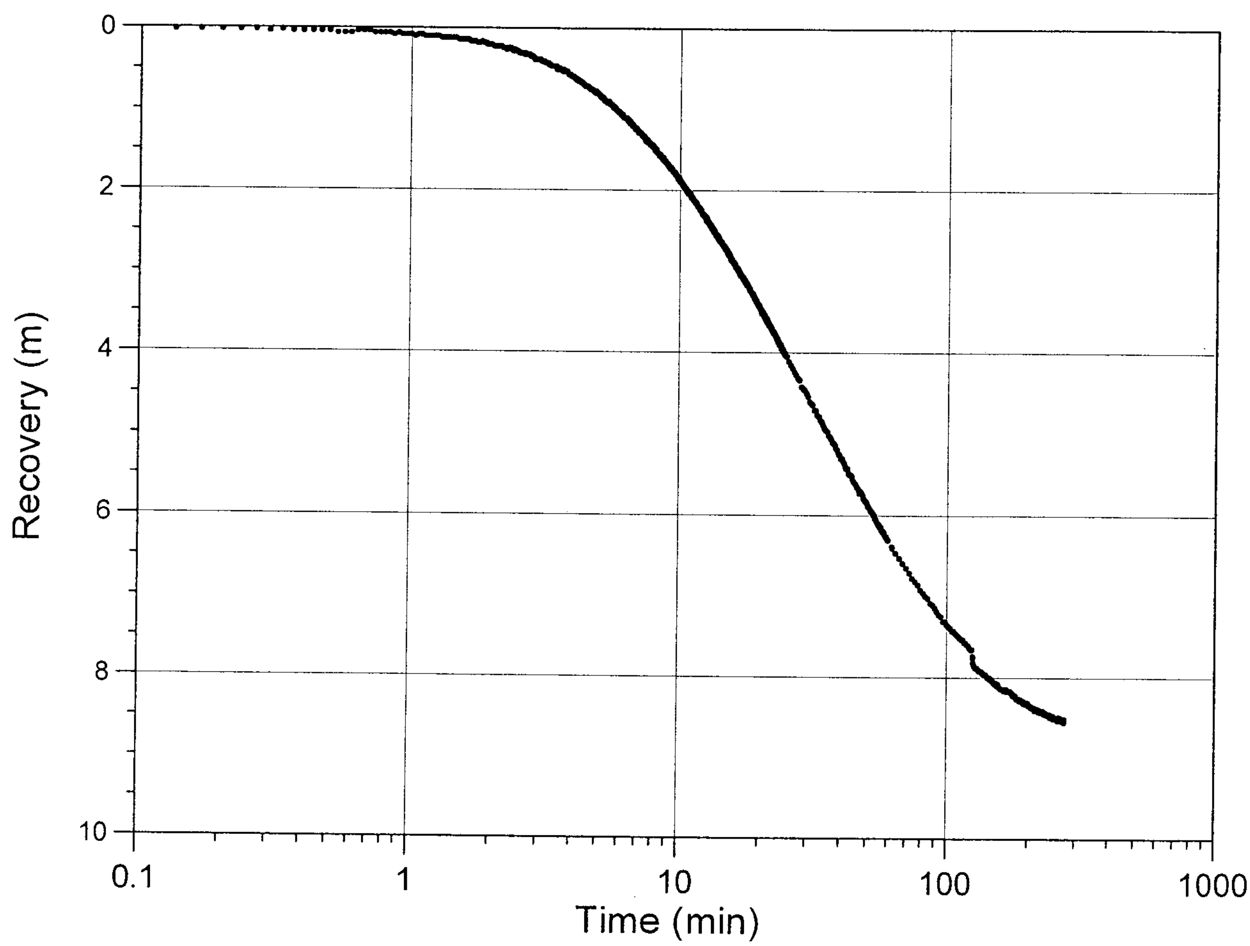
KG0048A01:1



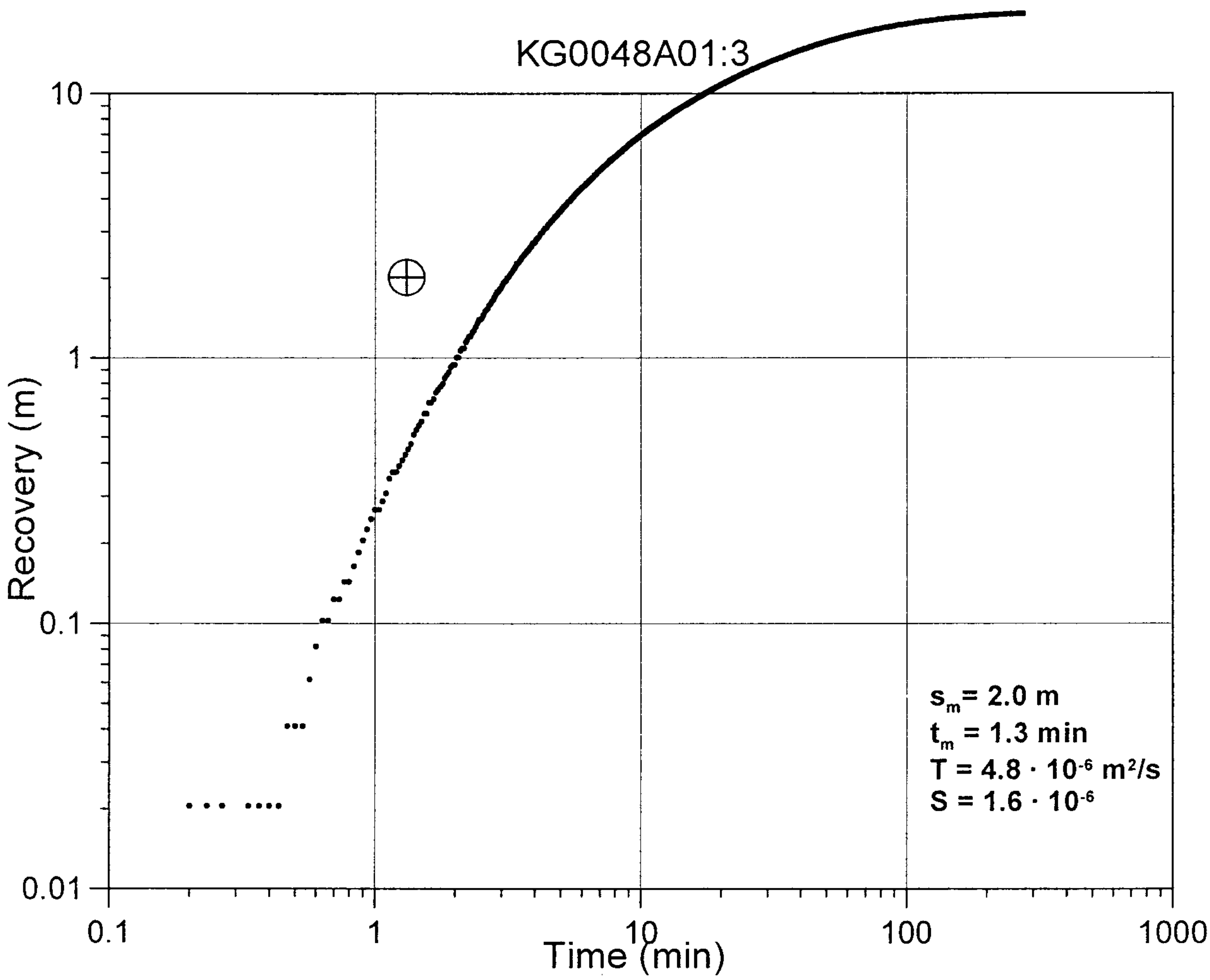


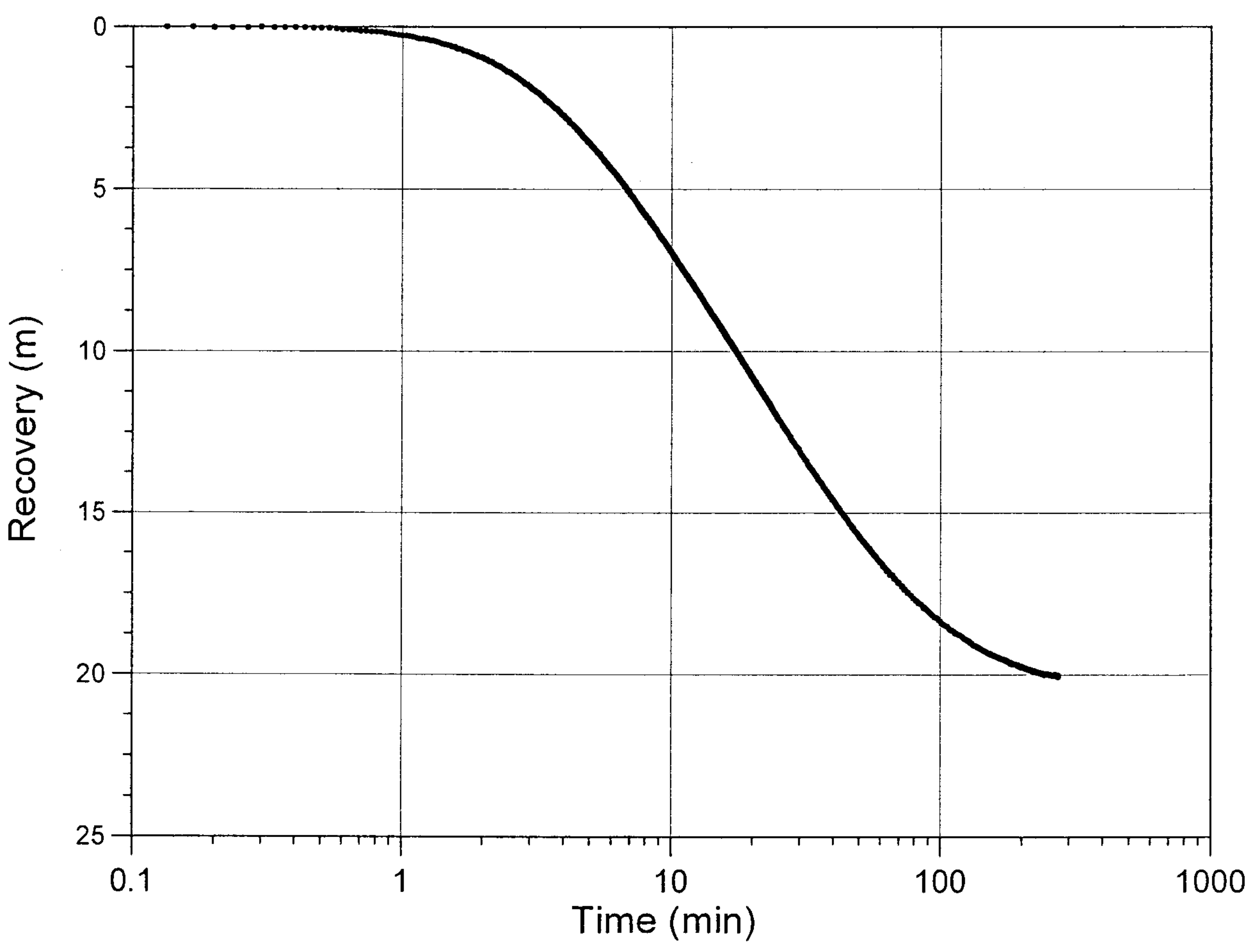
14_KG0048A1_1.GRF 27-okt-99



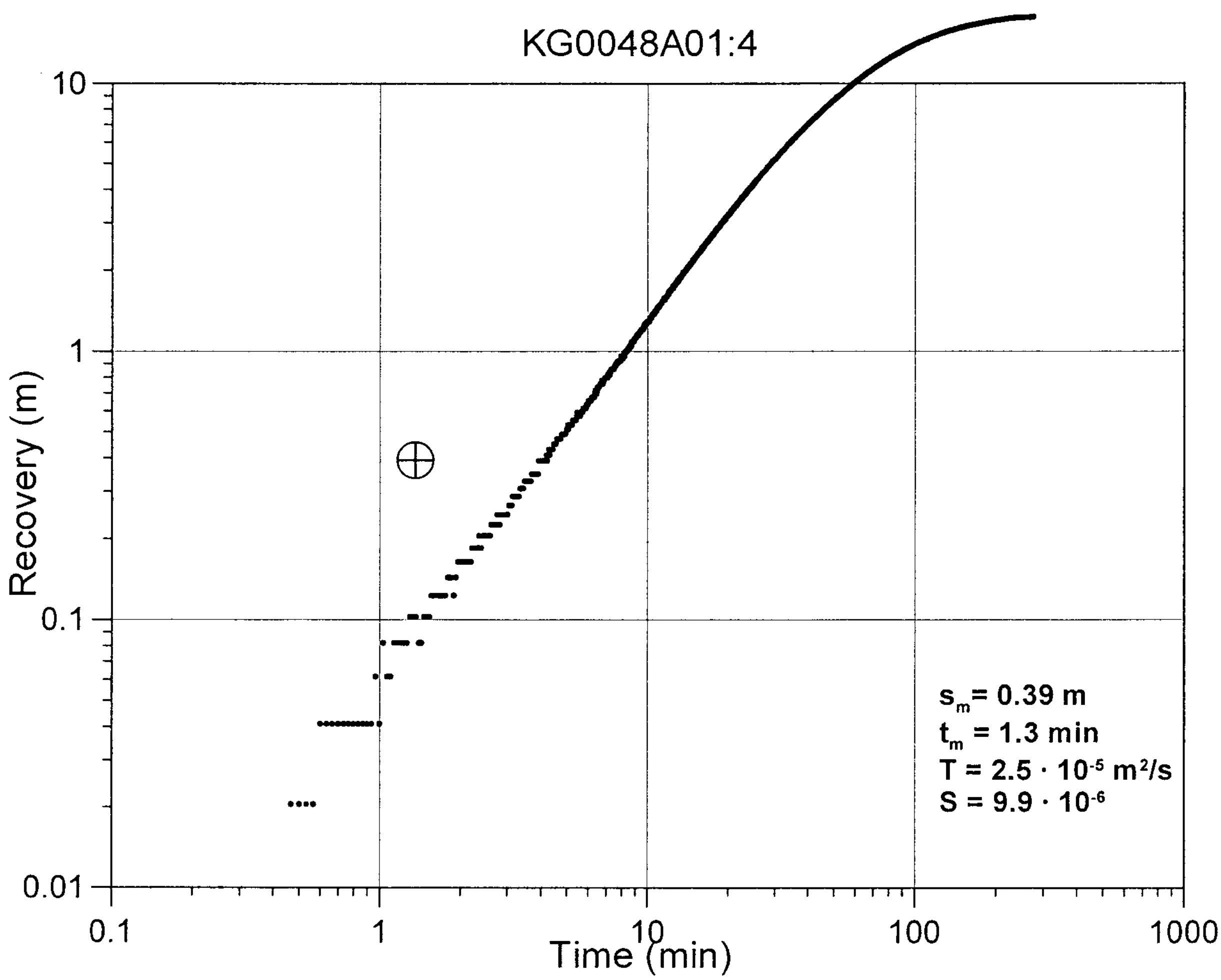


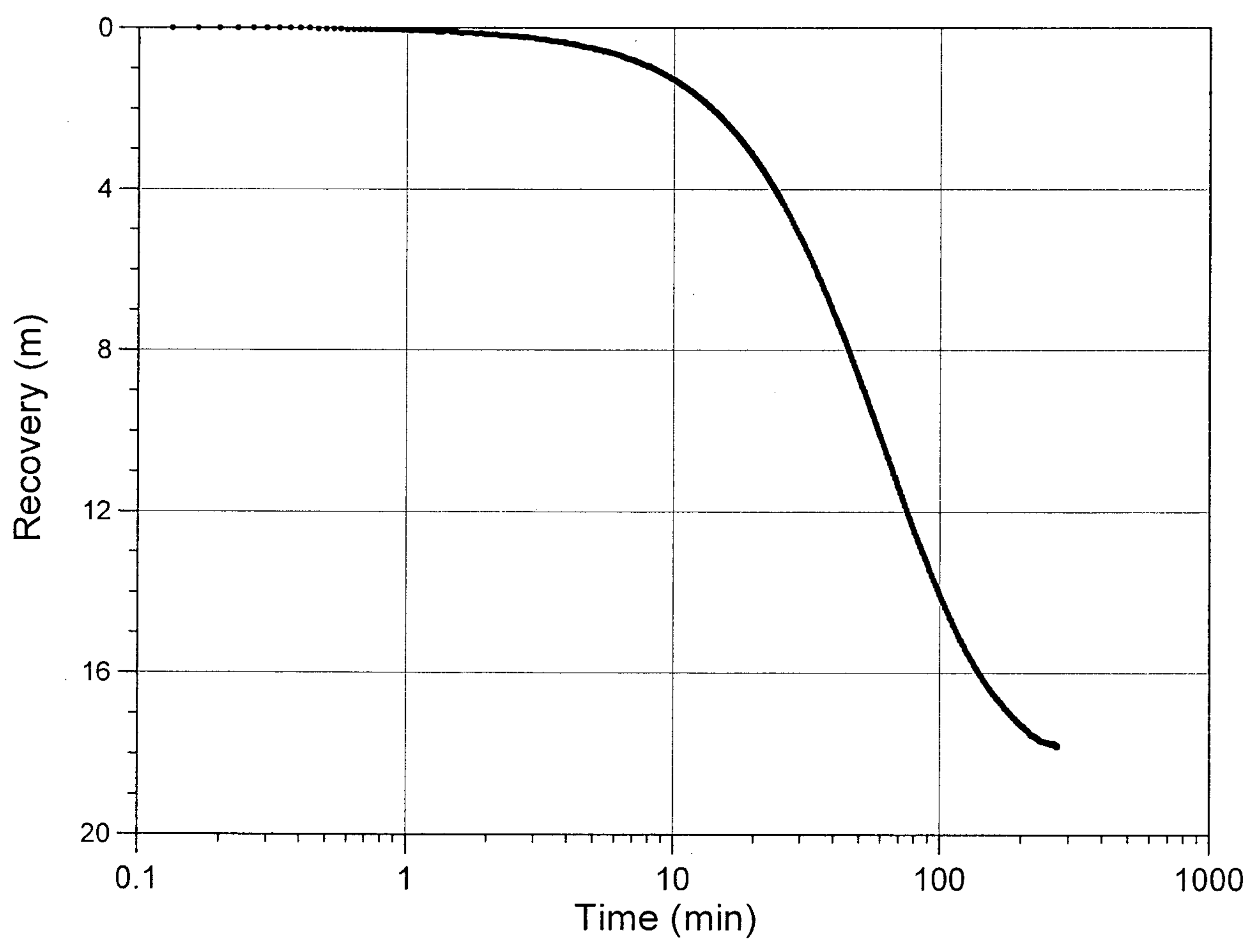
14_KG0048A1_2.GRF 27-okt-99





14_KG0048A1_3.GRF 27-okt-99


KG0048A01:4
Recovery (m)
Time (min)
10
1
0.1
0.01
0.1
1
10
100
1000
s_m = 0.39 m
t_m = 1.3 min
T = 2.5 · 10^-5 m²/s
S = 9.9 · 10^-6


Recovery (m)
Time (min)
0
4
8
12
16
20
0.1
1
10
100
1000