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Äspö Hard Rock Laboratory

Prototype Repository

Hydraulic tests in exploratory holes
Injection tests 2

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April 2001

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Foreword

This technical document is one of several reports describing the hydrogeological field characterisation work within the project ”Prototype Repository Test” at the Äspö Hard Rock Laboratory. Up to now the field investigations have been performed in seven test campaigns between November 1997 and August 1999 and during an eighth campaign in February 2001. Each campaign is described in a field report. The field work includes borehole flow logging with double packer system, pressure build up tests, interference tests, pressure measurements and injection tests.

The reports include technical specifications and description of the equipment used, measurement procedures, results of the flow and pressure measurements, relevant test data and all the background data necessary for interpretation and evaluation of field data.

Each test produces a great number of diagrams showing responses in test sections or observation boreholes caused by pressure draw-downs. Each report comprises between 120 and 600 diagrams sorted in appendices after the describing text. Due to the great number, the diagrams are not included in the printed versions of the reports. But the reports, including the diagrams are also stored as Word documents on a CD-R. In addition each diagram is stored as a file (GIF – format). The Word-documents, converted to PDF-format, as well as the diagram-files are available at the Äspö Hard Rock Laboratory.

So far the following field reports have been produced:

Gentzschein, B. 1997: Äspö Hard Rock Laboratory. Prototype Repository. Hydraulic Tests in Pilot Holes. Drill campaign 1. SKB International Progress Report IPR 99-27, December 1997.

Gentzschein, B. 1998: Äspö Hard Rock Laboratory. Prototype Repository. Hydraulic Tests in Exploratory Holes. Drill campaign 2. SKB International Progress Report IPR 99-28, May 1998.

Gentzschein, B. 1999: Äspö Hard Rock Laboratory. Prototype Repository. Hydraulic Tests in Exploratory Holes. Drill campaign 3a. SKB International Progress Report IPR 99-29 , June 1999.

Gentzschein, B. 1999: Äspö Hard Rock Laboratory. Prototype Repository. Hydraulic Tests in Exploratory Holes. Drill campaign 3b. SKB International Progress Report IPR 99-30, June 1999.

Gentzschein, B. 1999: Äspö Hard Rock Laboratory. Prototype Repository. Hydraulic Tests in Exploratory Holes. Injection Tests. SKB International Progress Report IPR 99-31, May 1999.

Gentzschein, B. 1999: Äspö Hard Rock Laboratory. Prototype Repository. Hydraulic Tests in Exploratory Holes. Interference Tests A after drill campaign 3. SKB International Progress Report IPR 99-32, May 1999.

Gentzschein, B. 1999: Äspö Hard Rock Laboratory. Prototype Repository. Hydraulic Tests in Exploratory Holes. Interference Tests B after drill campaign 3. SKB International Progress Report IPR 99-33, November 1999.

Abstract

The Prototype Repository in the Äspö Hard Rock Laboratory aims at simulating conditions in the future Deep Repository as realistically as possible. Some of many tasks are to observe the water saturation and homogenisation of the bentonite buffer and the backfill, and their interaction with the rock as well as to compare developed codes and material models with the observations. These tasks among other things need information on the hydraulic properties of the rock. The geohydrological characterisation of the rock around the Prototype Repository is made in three stages. Each stage is intended to contribute to more details useful for determination of the localisation of the deposition holes and the boundary and rock conditions needed for the interpretation of the experimental data. The three stages are focused on

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

This International Progress Report is report number 8 out of a series of eight which presents the results from stage 2, i e hydrogeological characterisation in pilot and exploratory holes, which have been obtained during the seven first test campaigns between November 1997 and August 1999 and during the eighth campaign in February 2001. More precisely the present International Progress Report shows the results from the second batch of the constant pressure injection tests in 13 holes between sections 3/542 and 3/578. The tests were performed after the completion of the deposition holes, while the first batch of the constant injection tests were performed in January 1999, prior to drilling of the deposition holes, and described in the fifth report. (The first four reports concerned in-flow and pressure build-up studies in 33 exploratory drillholes in the Prototype Repository rock volume, supplemented with interference tests in hole sections with high in-flows. The sixth report concerned the first campaign of interference tests in four of the 30 m deep holes and the seventh report presents results from the second campaign of interference tests in seven of the deep exploratory boreholes)

The tests were performed using a test system consisting of a pressure vessel (for water volume measurements) connected to a nitrogen gas vessel and a gas regulator. Packers were installed in the studied holes so that three sections of 0.5 m each were obtained down to a depth of 1.75 m. Consequently 39 sections could be tested. During the flow phase the pressure in the test section was increased by 0.2 to 0.4 MPa over the ambient pressure.

Sammanfattning

Prototypförvaret i Äspölaboratoriet byggs för att simulera förhållandena så naturnära som möjligt i det framtida djupförvaret. Några av många uppgifter är att observera bentonitbuffertens och återfyllens vattenmättnad och homogenisering liksom den interaktion mellan materialen och berget som sker, samt att jämföra utvecklade koder och materialmodeller med de gjorda observationerna. För dessa uppgifter behöver bl a bergets hydrauliska egenskaper beskrivas. Denna geohydrologiska karakterisering av berget omkring Prototypförvar görs i tre steg. Varje steg skall bidra med mer användbar detaljinformation om lokalisering av deponeringshål samt randvillkor och bergegenskaper som behövs för tolkning av framtida observationer. De tre stegen inriktas på:

1. Kartering av tunneln
2. Pilot och undersökningshål
3. Deponeringshål

Denna International Progress Report utgör rapport nummer 8 av åtta i en serie som presenterar resultaten från Steg 2, d v s de hydrogeologiska karaktäriseringar i pilot- och undersökningshål som gjorts i sju kampanjer mellan november 1997 och augusti 1999 och i den åttonde kampanjen i februari 2001. Mer precist redovisar föreliggande International Progress Report resultaten från injektionstester i 13 borrhål mellan sektion 3/542 och 3/578. Fyra av hålen är 30 m långa och åtta ca 12 m djupa. (De fyra första rapporterna redovisade resultaten från inflödes- och tryckuppbyggnadstester i de 33 undersökningshålen i prototypförvarsområdet kompletterade med interferenstester i borrhålssektioner med stort inflöde. Den sjätte rapporten behandlar en första omgång av interferenstester i fyra av de 30 m djupa undersökningsborrhålen och den sjunde rapporten presenterar en andra omgång interferenstester i sju av de långa undersökningshålen.

I testerna användes ett mätsystem bestående bl a av ett tryckkärl för vattenvolymmätningar vilket var anslutet till en kvävgasflaska och en gasregulator. Manschetter installerades i de studerade borrhålen så att tre sektioner om 0.5 m vardera avskildes ned till ett djup av 1.75 m. Följaktligen kunde 39 mätintervall testas i de 13 borrhålen. Under flödesfasen ökades trycket i den testade sektionen med mellan 0.2 och 0.4 MPa.

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1 Background

Within the scope of SKB's program for R&D 1995, SKB has decided to carry out a project named "Prototype Repository Test" at the Äspö Hard Rock Laboratory. The aim of the project is to test important components in 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 SKB's 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.

The characterisation of the test site, located in the TBM-drilled part of the Äspö HRL-tunnel, 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. Stage 2 was divided into three drilling campaigns:

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

Ten pilot holes were drilled between October 14th and October 20th 1997 in the tunnel interval 3/539 m - 3/593 m. Ten of the short exploratory boreholes were drilled in the tunnel interval 3/544 m - 3/588 m between March 16th and March 24th 1998. Hydraulic tests were performed in these boreholes in November 1997 and in April 1998. Two short exploratory holes were drilled April 25th and 26th 1998. Nine long exploratory (30 m) boreholes were drilled June 3rd - June 28th 1998. Further more four of the older boreholes were extended to 30 m depth during May 1998. In July and August 1998 two c 50 m long exploratory boreholes where drilled from the G-tunnel towards and above the prototype tunnel. During the summer and autumn 1998 flow measurements and hydraulic tests (PBT's and interference tests) were performed in the long exploratory holes. The last tests were completed in December 1998.

In January 1999 a first campaign of constant pressure injection tests was carried out in the prototype tunnel. The tests were performed in the upper part of 13 of the exploratory boreholes. After completion of the six deposition boreholes the injection tests were repeated. This report describes objectives, performance and results of the second campaign of injection tests performed in February 2001.

2 Objectives

2.1 General objectives

The Prototype Repository is aimed at simulating a real repository in as many aspects as possible 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 demonstrate the integrated function of a full-scale prototype of the repository system
- To provide a full-scale reference for testing/scrutinization of models, experiments and assumptions
- To develop, test and demonstrate appropriate engineering standards, quality standards and quality assurance systems.
- To demonstrate technology for monitoring of the repository system.

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.

2.2 Objectives of the hydraulic tests – injection tests

The objectives of the hydraulic tests in the long exploratory boreholes are:

- The hydraulic tests in the exploratory holes shall provide hydrogeological data useful for setting up a hydrogeological model of the rock volume around the TBM tunnel.
- The injection tests in the exploratory holes shall provide data for the geological and hydrogeological models. Another objective is to see if t the hydraulic characteristics in the near field of the upper part of the depositions will change due to drilling of the deposition holes. In order to observe any changes the tests have to be made in exactly the same manner prior to and after drilling of the deposition holes.

3 Scope

The injection tests were performed in 13 boreholes located in the TBM drilled part of the tunnel between section 3/542 m and section 3/578 m. Nine of the boreholes are vertical or subvertical, four have an inclination of 45 degrees. The nominal diameter is 76 mm. The borehole lengths and the dates of drilling are presented in Table 3-1.

Prior to the injection tests the equipment was mobilised. The mobilisation included transfer to the test site and calibration of pressure transducers. The preparations were conducted 8-10th and 12-13th of February 2001.

Table 3-1. Drilling data and borehole data of 13 injection tested exploratory boreholes in the Prototype Repository

Borehole	Drilling completed (Date)	Borehole length (m)	Comment
KA3542G01	980623	30.04	inclination 45º
KA3542G02	980616	30.01	“
KA3544G01	980324	12.00	
KA3546G01	980323	12.00	
KA3548G01	980323	12.01	
KA3550G01	980322	12.03	
KA3552G01	980321	12.01	
KA3554G01	980623	30.01	inclination 45º
KA3554G02	980616	30.01	“
KA3572G01	980320	12.00	
KA3574G01	980425	12.00	
KA3576G01	980426	12.01	
KA3578G01	980319	12.58	

Three tests with section length 0.50 m were were carried out in all boreholes in the interval 0.25 m – 1.75 m. Consequently 39 sections were tested, see Table 3-2. The test period started February 13th and ended 23rd of February 2001.
The demobilisation of the test equipment was carried out February 23rd

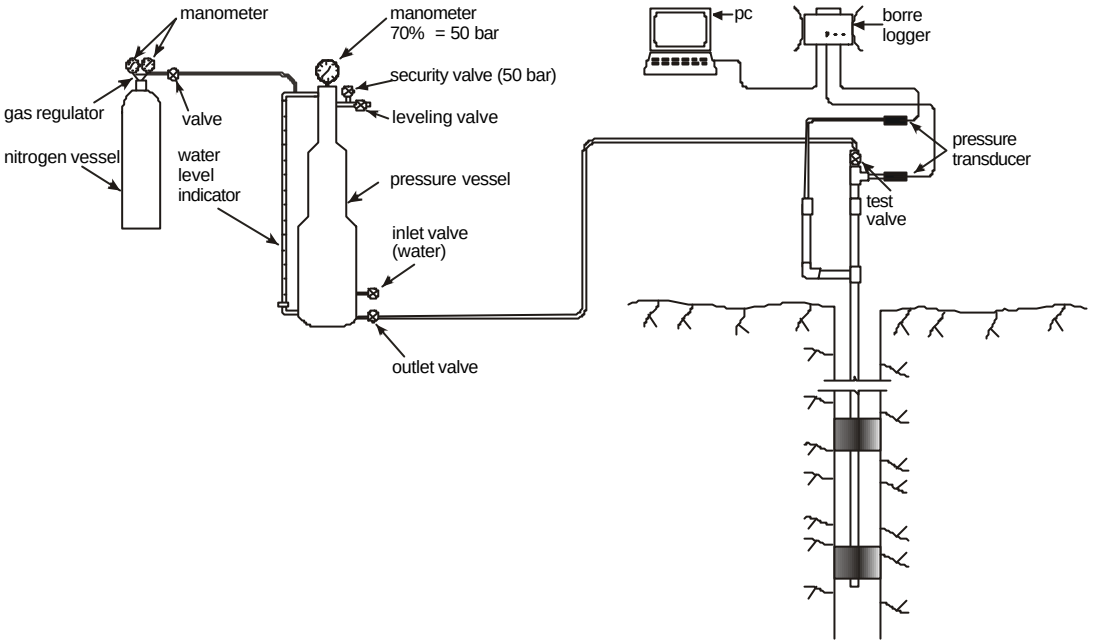
Table 3-2. A list of injection tests conducted in exploratory boreholes Prototype Repository, February 2001

Borehole	Date of test	Test No	Section	Start Test	V. 0pen	V Close	End of Test
KA3542G02	010213	1a	0.25 - 0.75	15:05	17:16:00	17:36:00	17:46:00
KA3542G02	010213	1b	0.75 -.1.25	17:52	18:19:00	18:39:00	08:09:00 (14/2)
KA3542G02	010214	1c	1.25 - 1.75	08:24	09:56:00	10:16:01	10:37:00
KA3542G01	010214	1d	0.25 - 0.75	10:43	11:07:00	11:27:00	13:32:00
KA3542G01	010214	1e	0.75 -.1.25	13:27	13:58:00	14:18:00	14:28:17
KA3542G01	010214	1f	1.25 - 1.75	14:33	14:59:00	15:19:00	15:38
KA3548G01	010214	1g	0.25 - 0.75	15:55	16:45:00	17:05:00	17:15:55
KA3548G01	010214	1	0.75 -.1.25	17:30	17:53:00	18:13:00	08:14:11 (15/2)
KA3548G01	010215	2	1.25 - 1.75	08:24	08:46	09:06:00	09:16:00
KA3548G01	010215	3	0.25 - 0.75	09:25	09:52:01	10:12:01	10:23
KA3554G01	010215	4	0.25 - 0.75	10:45	14:09:0	14:29:01	14:39:20
KA3554G01	010215	6a	0.75 -.1.25	14:47	15:21:00	15:41:00	15:53:10
KA3554G01	010215	5	1.25 - 1.75	16:02	16:28:00	16:48:00	16:59
KA3554G01	010215	6	0.75 - 1.25	17:05	17:30:00	17:50:00	08:05 (16/2)
KA3554G02	010216	7	0.25 - 0.75	08:59	09:16:00	09:36:00	09:46:21
KA3554G02	010216	8	0.75 -.1.25	09:52	10:12:00	10:32:00	10:42
KA3554G02	010216	9	1.25 - 1.75	10:45	11:12:01	11:32:01	12:47
KA3546G01	010216	10a	0.25 - 0.75	13:10	13:44:01	14:04:01	14:16:01
KA3546G01	010219	10	0.25 - 0.75	13:10(16/2)	09:29:01	09:49:01	09:59:20
KA3546G01	010219	11	0.75 -.1.25	10:05	10:29:02	10:49:02	10:59
KA3546G01	010219	12	1.25 - 1.75	11:07	11:19:03	11:39:02	13:02
KA3544G01	010219	13	0.25 - 0.75	13:37	14:36:02	14:56:02	15:06
KA3544G01	010219	14	0.75 -.1.25	15:10	15:35:02	15:55:02	16:15
KA3544G01	010219	15	1.25 - 1.75	16:08	16:30:02	16:50:02	17:02
KA3550G01	010220	16	0.25 - 0.75	11:22	11:50:03	12:10:02	13:30
KA3550G01	010220	17	0.75 -.1.25	13:35	13:54:03	14:14:03	14:24:01
KA3550G01	010220	18	1.25 - 1.75	14:27	14:48:03	15:08:03	15:28
KA3552G01	010220	19	0.25 - 0.75	15:45	16:05:03	16:25:03	16:35
KA3552G01	010220	20	0.75 -.1.25	16:37	16:57:03	17:17:03	08:07 (21/2)
KA3552G01	010221	21	1.25 - 1.75	08:18	08:37:03	08:57:02	09:23:30
KA3578G01	010221	22	0.25 - 0.75	10:37	11:06:02	11:26:02	12:51
KA3578G01	010221	23	0.75 -.1.25	12:55	13:16:02	13:36:02	13:47:01
KA3578G01	010221	24	1.25 - 1.75	13:49	14:10:03	14:30:03	14:58
KA3572G01	010221	25	0.25 - 0.75	15:20	15:53:03	16:13:03	16:24
KA3572G01	010221	26	0.75 -.1.25	16:25	16:45:03	17:05:03	08:04:22 (22/2)
KA3572G01	010222	27	1.25 - 1.75	08:05	08:27:03	08:47:03	09:09
KA3542G01	010222	28	0.25 - 0.75	09:12	10:14:03	10:34:03	10:45
KA3542G01	010222	29	0.75 -.1.25	10:48	11:08:3	11:28:03	12:48
KA3542G01	010222	30	1.25 - 1.75	12:55	13:11:03	13:31:03	13:41
KA3542G02	010222	31	0.25 - 0.75	14:48	15:11:03	15:31:03	15:56:51
KA3542G02	010222	32	0.75 -.1.25	16:03	16:20:03	16:40:03	16:50
KA3542G02	010222	33	1.25 - 1.75	16:53	17:52:03	18:12:03	18:23:40
KA3576G01	010222	34	0.25 - 0.75	18:28	19:10:03	19:30:03	19:40:01
KA3576G01	010222	35	0.75 -.1.25	19:42	19:58:04	20:18:04	20:28
KA3576G01	010222	36	1.25 - 1.75	20:30	20:50:04	21:10:04	08:27:25(23/2)
KA3574G01	010223	37	0.25 - 0.75	08:28	09:43:04	10:03:04	10:13
KA3574G01	010223	38	0.75 -.1.25	10:16	10:33:03	10:53:03	11:03:01
KA3574G01	010223	39	1.25 - 1.75	11:05	11:25:04	11:45:04	13:30

4 Equipment used

4.1 Injection test equipment

A specially designed test system developed by GEOSIGMA AB was used for the tests.



Figur 4-1 Tentative sketch of the test system for constant head tests with a mechanical packer in the borehole.

Figure 4-1 show the test system used for constant head injection tests with a mechanical packer in the borehole. In principle, the system consists of a pressure vessel (used to measure the injected water volume) with three different diameters to increase the measurement range. On the pressure vessel a graduated standpipe, used to measure the decline of the water level during injection, is mounted. The pressure vessel is connected to a nitrogen gas vessel and a gas regulator.

Prior to testing the boreholes must be de-aired. During the injection phase, water is injected into the borehole through a reinforced hydraulic hose (∅ 13.4/8 mm) from the pressure vessel by opening the test valve mounted on the packer pipe. The injection pressure is kept constant with the help of the gas regulator. The recovery phase starts by closing the test valve and the pressure recovery in the test section is measured.

The pressure in the test section and in the interval below the double packer will be monitored using the data logger BORRE MDL ver. 2.2, manufactured by IPA-konsult AB. The data logger has standard test sequences and standard measurement intervals, but the logger can easily be reprogrammed to perform individual test sequences.

The average flow rate (during injection) is measured from the change of water level in the graduated standpipe on the pressure vessel during a certain time period. The calibration curve between water level change and volume injected is shown in Figure 4-3. The different slopes of the curve correspond to the different diameters of the pressure vessel.

The test system can also be used for constant drawdown tests in flowing boreholes. Such tests are performed by adjusting the natural flow from the tested borehole section to achieve a constant head (drawdown) during the flow period and then closing the test valve to let the pressure recover in the section. In flowing boreholes, the pressure- and nitrogen gas vessels in Figure 4-1 are not needed during testing.

4.1.1 Test procedures and measurement limits

For injection tests, pressure is applied to the tested borehole section by opening the gas regulator and the test valve. The applied pressure should aim at exceeding the maximal borehole pressure about the same amount as was the case in the previous tests in January 1999

During the initial phase of injection a rapid (apparent) decline in flow rate will result due to compression of the water/gas volume in the pressure bottle. These effects are similar to borehole storage effects (during the recovery phase) in low-conductive sections due to the compressibility of water and any deformation of equipment. Prior to testing, it is possible to determine the borehole storage coefficient of the test system.

After the initial phase, the flow rate is monitored by manual recording the decline of the water level in the standpipe during the injection period. This period is stopped by closing the test valve. Then the pressure recovery in the tested section is monitored by the Borre data logger. The pressure eventually reaches the natural hydrostatic borehole pressure depending on the hydraulic conductivity of the borehole.

For tests with the mechanical packers the lower measurement limit of flow rate could be estimated to Q_{min} = 0.4 ml/min ($6.7 \cdot 10^{-9}$ m^3/s), considering the uncertainty of the flow rate measurement (reading) and elastic deformation of (mainly) the packer. During the injection phase variations of the pressure (not perfectly constant) also affect the lower measurement limit. The potential error associated with the above estimate of Q_{min} is estimated to c. ±50 %. Assuming an injection pressure of 50 m this corresponds to a lower measurement limit in terms of transmissivity of $T_{min}=1.5 \cdot 10^{-10}$ m^2/s. In a 0.5 m long section this corresponds to an average hydraulic conductivity $K_{min}=3 \cdot 10^{-10}$ m/s.

The upper measurement limit for the actual test system is rather subjective. The maximal flow rate during injection may correspond to the maximal change of water level in the standpipe (total range) of c. 1400 mm (corresponding to a volume of c. 1370 ml, see Figure 3-3) during a certain time, say 4 minutes. These values correspond to an average flow rate of c. $6 \cdot 10^{-6}$ m^3/s (0.36 l/min) during this time interval. For an assumed injection pressure of dp_s=50 m as above, the upper measurement limit in terms of (steady-state) transmissivity from the injection phase may then be estimated to $T_{max}= 1.5 \cdot 10^{-7}$ m^2/s. This value corresponds to

K_{max}= $3 \cdot 10^{-7}$ m/s for a 0.5 m section. However, the performance of the actual test system in this measurement range is uncertain.

4.1.2 Packers

A mechanical packer manufactured by LIVINSTONE AB will be used. The packer enables testing of 0.5 meter intervals. The whole length is 2.3 m and the length of the sealing rubber is 0.1 m, see Figure 4-2. The packer is the same packer that was used when testing the Prototype boreholes in January 1999.

4.1.3 Pressure transducers

The pressure transducers used were of type Druck PTX 1400. The pressure range was 60 bar. The level of each pressure transducer above the tunnel floor is listed in Tables 4-1.

The technical specifications of the pressure transducers are:

Supply voltage:	9 - 28 VDC
Output current:	4 - 20 mA
Linearity, hysteresis and Repeatability :	± 0.25 % of full scale (typically 0.15 % F.S)
Best straight line definition:	±0.2 % F.S. (typically ±0.1 % F.S)
Temperature error :	± 2 % F.S. over -20 ^{o}C to +80 ^{o}C (typically 1.5 % F.S)

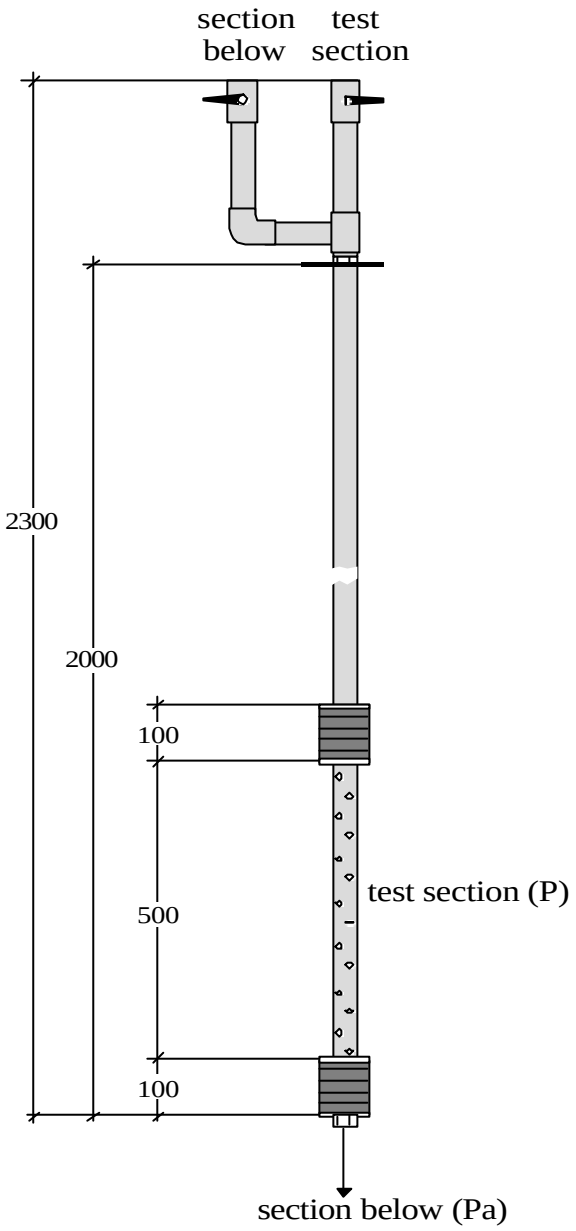
Tabell 4-1. Level of pressure transducers above the tunnel floor. Prototype Repository. Injection tests_2, February 2001.

Borehole	Level of transducer above floor (m)
KA3542G01	0.40
KA3542G02	0.40
KA3544G01	0.35
KA3546G01	0.35
KA3548G01	0.49
KA3550G01	0.35
KA3552G01	0.35
KA3554G01	0.40
KA3554G02	0.40
KA3572G01	0.49
KA3574G02	0.35
KA3576G01	0.35
KA3578G01	0.49

Prior to the tests 8 of the 13 boreholes were shut in by means of short mechanichal packers, see Table 4-2.

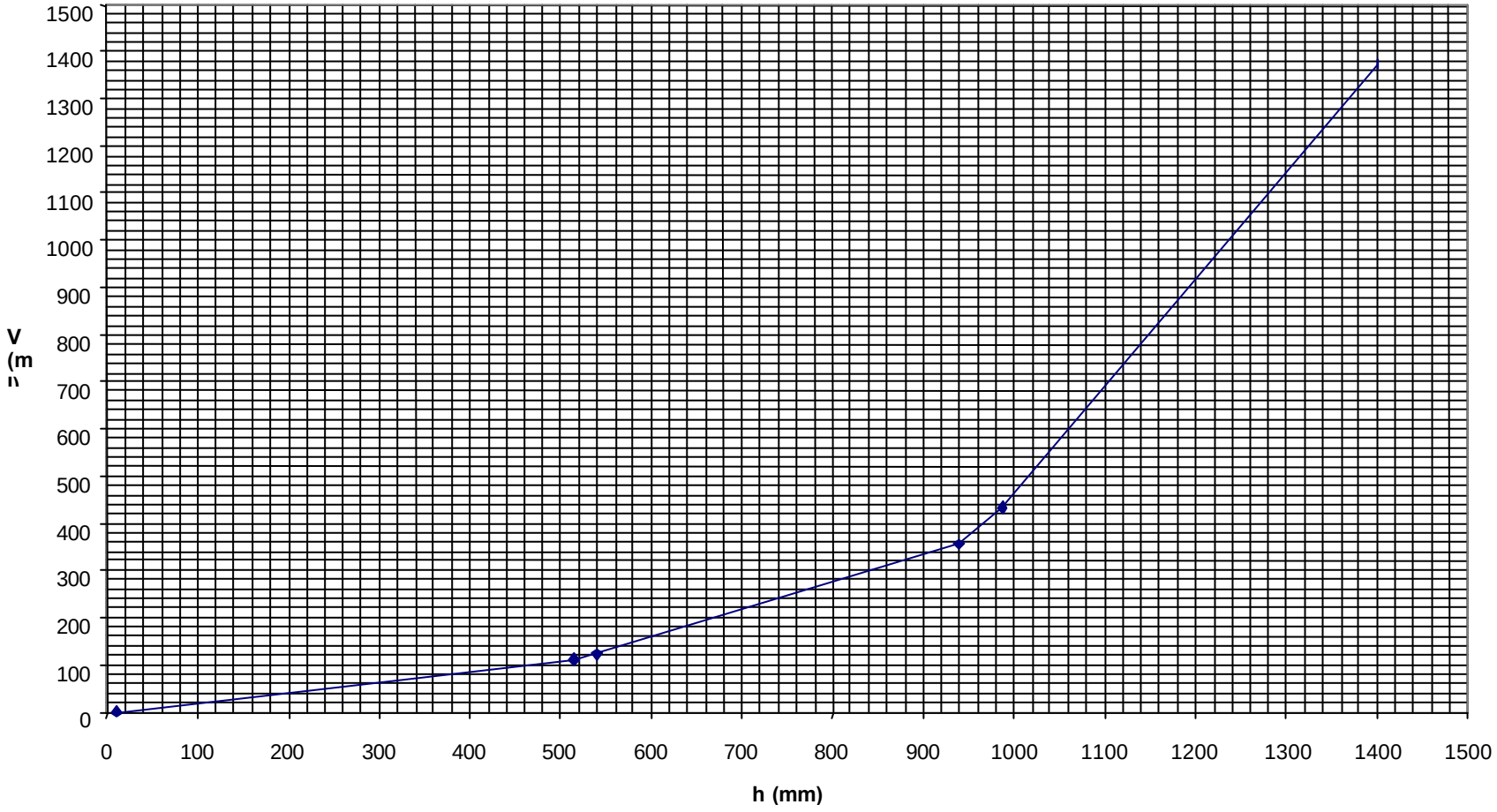
Table 4-2 Date and time of packer release and packer expansion during Injection tests_2, Prototype Repository, February 2001.

Borehole	Packer release (YYMMDD hh:mm)	Packer expansion (YYMMDD hh:mm)	Comment
KA3542G01	010213 15:30	010215 10:55	
KA3542G01	010222 09:30	010215 10:55	
KA3542G02	010215 14:30	-	No reinstallation due to malfunction of the packer
KA3544G01	010219 13:00	010220 09:55	
KA3546G01			No packer
KA3548G01			No packer
KA3550G01			No packer
KA3552G01	010220 14:30	010221 09:33	
KA3554G01			No packer
KA3554G02	010216 08:39	010216 13:40	
KA3572G01	010221 14:55	010222 10:00	
KA3574G02	010223 08:15	010223 13:45	
KA3576G01			No Packer
KA3578G01	010221 10:00	010221 15:30	



Figur 4-2 *Mechanical double packer used in the injection tests of 13 exploratory boreholes of the Prototype Repository, February 2001*

Figure 4-3 Calibration chart between water level change (h mm) and volume V (ml).



5 Performance and evaluation

5.1 Test principles

The tests were performed as constant pressure injection tests. At first the test packer (Figure 4-1) was expanded. The test interval and the packer pipe were thereafter filled with water. The pressure stabilised for c. 20 minutes. Water was injected to the test section using an excess pressure of c. 2-3 bar over the initial undisturbed pressure. After 20 minutes the injection flow was stopped and the pressure recovery was monitored during 10 minutes. Thereafter the packers were lowered 0.5 m for the next test.

The pressure was measured within the test section as well as in the borehole interval below the packers.

During the tests in January 1999 an injection pump was used. The borehole pressure of the test section 1.25 m – 1.75 m in borehole KA3542G02 was higher than the maximum injection pressure of the pump, why an outflow pressure build-up test (PBT) was performed, (Gentzschein, 1999c). A PBT was performed again in this section during the second test campaign.

5.2 Test cycle and procedures

The test cycle was performed as follows:

- The double packer was lowered into position and the sealing rubbers were expanded to delimit the test interval
- The measurement section and the packer pipes were filled up with water.
- The injection hose and the pressure hoses (all filled up with water) were connected via quick-couplings
- The logger was started. The undisturbed pressure was measured for about 20 minutes
- The first 4-5 minutes of the injection period the pressure was measured with the highest sampling rate possible (every 3rd second), thereafter with a sampling every 20 second.
- The stand pipe water level was recorded 5s, 10s, 20s, 40s, 60s, 90s, 2 min, 2.5 min, 3 min, 4 min, 5min, 6min, 7 min, 8 min, 9 min, 10 min, 12 min, 14 min, 16 min, 18 min and 20 min after start of injection.
- The injection flow time and recovery time were approximately the times shown below (t_p = Flow time, t_{PB} = Recovery time)
  t_p = 20 min, t_{PB} = 10 min.
- The logger was restarted just before closing time.
- The valve was closed. First 4-5 minutes of the recovery period the pressure again was measured with the highest sampling rate possible, thereafter with a sampling every 20 second.
- Pressure recovery time according to the time given above.
- Transfer to the next borehole section.

In the borehole section KA3542G02, 1.25m – 1.75 m one outflow test was performed following the same test cycle as above.

During the injection period changes of the water level in the stand pipe of 0.5 mm was recorded. This corresponds to a flow rate of 0.1 ml/min or less, which is lower than the measurement limit of flow rate, see chapter 4.1.1. However, when estimating the measurement limit not only the accuracy of the reading but also the elastic deformation of the test system is considered.

The boreholes were tested in the following order:

KA3542G02	13-14/ 2
KA3542G01	14/ 2
KA3548G01	14-15/ 2
KA3554G01	15/ 2
KA3554G02	16/ 2
KA3546G01	19/ 2
KA3544G01	19/ 2
KA3550G01	20/ 2
KA3552G01	20-21/ 2
KA3578G01	21/ 2
KA3572G02	21-22/ 2
KA3542G01	22/ 2
KA3542G02	22/ 2
KA3576G01	22/ 2
KA3574G01	23/ 2

When testing the first (the uppermost) interval of KA3548G01 a small leakage was discovered. A fitting was replaced and the leakage stopped. The interval was tested again and a smaller flow rate was observed. The leakage could be estimated to $5 \cdot 10^{-5}$ l/min.
Since it was uncertain when the leakage started all tests preceding the test in KA3548G01 were repeated the 22nd of February. This report presents the second test of the double tested intervals with one exception. The second (outflow-)test of the section KA3542G02, 1.25 – 1.75 m was judged to be of bad quality. Therefore the test performed February 14th is described in this report, see chapter 6.1.2.

5.3 Calibration

The pressure transducers P and P_a, see chapter 4, were calibrated with the help of the reference pressure system established in the Äspö HRL tunnel. The transducers were connected to two hoses, filled with water of known density. The water column of each hose ends at a well defined reference water level (at KK0120 and KK2850) enabling calculation of the calibration constants. The position of the pressure sensors and the barometric pressure are also used in the calibration process. The elevation of the sensors were surveyed prior to the tests and the barometric pressure was measured with a Druck DPI 700 digital pressure indicator, which have a factory-listed accuracy of 0.05% of full scale (2 bar). The results of the calibration are calibration constants, which are entered to a calibration file.

5.4 Data processing

Data from the logger were fetched at least once a day, and saved into a *.BOR-file. The raw data are converted to pressures with the help of the programme ***borefil.exe***. Input data are the BOR-file and the calibration file **(**.CAL) containing the calibration constants. The output file is called *.HYF, see Gentzschein (1994).

Using the program ***SKBPLOT*** the HYF-files are converted to OVR-files of MIO-format, see Johansson and Olsson (1994). The OVR-files contain the same data as the *.HYF-files, but are more readable (data in columns).

The files are listed in a table, see Appendix 1.

6 Results

6.1 Injection tests

Appendices 2-14 contain diagrams of the tests.

For each test the following diagrams are produced.

- Lin-Lin plots for the pressure and flow rate during stabilisation, draw-down and recovery phases.
- Lin–Log plots for the pressure, where Agarwal time correction is performed for the pressure build-up.
- Log–Log plots for the pressure, where Agarwal time correction is performed for the pressure build-up.

Data files corresponding to the tests were created and saved. (Appendix 1)

Details and important test data for each test are described in Chapters 6.1.1 – 6.1.14. The abbreviations used are:

- 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
- Q_p = Flow rate at the end of the flowing period
- V_{tot} = Total injected water volume during the entire flowing period (m^3)
- V = Injected volume excluding the first 5 or 10 seconds (m^3)
- QT_{ave} = Average flow rate based on V_{tot} (l/min)

  QT_{ave} = Vtot/ tp where tp = length of the flowing period.

- Q_{ave} = Average flow rate, based on V (l/min)

  Q_{ave} = V/ tp where tp = length of the flowing period.

- Recovery (%) = $\dfrac{(Pf - Pp) \cdot 100}{Po - Pp}$

Flow rates lower than the measuring limit (0.4 ml/min, se Chapters 4.1.1 and 5.2) are noted in the flow tables of Chapters 6.1. – 6.1.14 , but are considered to be uncertain.

6.1.1 Borehole KA3542G01

Section 0.25 m - 0.75 m

Date: 01-02-22 Field Crew: B. Gentzschein, J.Källgården

Packer expansion: 010222 09:12
Valve opened: 010222 10:14.03 Valve closed: 010222 10:34.03
Total flowing time : 20.0 min. Tot. Pr. Build-up time 11 min.

Pressure data

Pressure before injection start (P_0, KPa) : 281.7
Pressure just before closing the valve (P_p, KPa): 440.2
Pressure at the end of the recovery (P_f, KPa) : 377.1

Flow data

Manually measured flow rates of KA3542G01, section 0.25 m –0.75 m, are presented in the table below.

Table Manually measured flow rates, Injection test in KA3542G01, section 0.25 m –0.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
10:14:05	81,03
10:14:10	1,31
10:14:18	2,61
10:14:33	0,98
10:14:53	0,98
10:15:10	1,31
10:15:26	0,87
10:15:48	0,65
10:16:18	0,65
10:16:48	0,87
10:17:33	0,54
10:18:33	0,65
10:19:33	0,54
10:20:33	0,65
10:21:33	0,54
10:22:33	0,54
10:23:33	0,54
10:25:03	0,60
10:27:03	0,49
10:29:03	0,49
10:31:03	0,49
10:33:03	0,60

Calculated flow and volume data

Total injected water volume (V_{tot} , m^3) = $1.9 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds(V,m^3) = $1,2 \cdot 10^{-5}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $9.5 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = $6.1 \cdot 10^{-4}$
Flow rate at the end of the flow Phase (Qp, l/min) = $6.0 \cdot 10^{-4}$

Borehole KA3542G01, section 0.75 -1.25 m

Date: 01-02-22 Field Crew: B. Gentzschein, J.Källgården

Packer expansion: 010222 1048
Valve opened: 010222 110803 Valve closed: 010222 112803
Total flowing time : 20.0 min. Tot. Pr. Build-up time 10.0 m1in.

Pressure data

Pressure before injection start (P_0, KPa) : 116.3
Pressure just before closing the valve (P_p, KPa): 349.8
Pressure at the end of the recovery (P_f, KPa) : 347.7

Flow data

Manually measured flow rates of KA3542G01, section 0.75 m –1.25 m, are presented in the table below.

Table Manually measured flow rates, Injection test in KA3542G01, section 0.75 m –1.25 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
11:08:08	210,4
11:08:15	0,436
11:09:28	0,503
11:11:18	0,073
11:13:03	0,055
11:15:03	0,055
11:22:08	0,018

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $1.8 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds(V,m^3) = $4{,}4 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $9.0 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = $2.2 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = $1.8 \cdot 10^{-5}$

Comment

Very small recovery

Borehole KA3542G01, section 1.25 - 1.75 m

Date: 01-02-22 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010222 12:55
Valve opened: 010222 13:11.03 Valve closed: 010222 13:31.03
Total flowing time : 20.0 min. Tot. Pr. Build-up time 10.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 111.3
Pressure just before closing the valve (P_p, KPa): 350.0
Pressure at the end of the recovery (P_f, KPa) : 349.6

Flow data

Manually measured flow rates of KA3542G01, section 1.25 m –1.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3542G01, section 1.25 m –1.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
13:11:05	198.7
13:11:10	0,187
13:11:18	0,087
13:11:33	0,055
13:11:53	0,055
13:12:10	0,036
13:12:26	0,012

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $1.7 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds(V,m^3) = $6,5 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $8.6 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = $3.3 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = $1.2 \cdot 10^{-5}$

Comment

Almost no recovery

6.1.2 Borehole KA3542G02

Borehole KA3542G02 section 0.25 - 0.75 m

Date: 01-02-22 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010222 14:48
Valve opened: 010222 15:11.03 Valve closed: 010222 15:31.03
Total flowing time : 20.0 min. Tot. Pr. Build-up time 15.8 min.

Pressure data

Pressure before injection start (P_0, KPa) : 112.2
Pressure just before closing the valve (P_p, KPa): 354.9
Pressure at the end of the recovery (P_f, KPa) : 355.8

Flow data

Manually measured flow rates of KA3542G02, section 0.25 m –0.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3542G02, section 0.25 m –0.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
15:11:05	381,639
15:11:10	1,307
15:11:53	0,082
15:13:48	0,044
15:22:03	0,018
15:28:03	0,018

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = 3.3^{-5}
Injected volume excluding the first 5 seconds(V,m^3) = $9{,}8 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $1.6 \cdot 10^{-3}$
Average flow rate based on V (Q_{ave} ,l/min) = $4.9 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = $1.8 \cdot 10^{-5}$

Comment

There were short breaks in the pressure monitoring.
The pressure increased during the recovery period.

Borehole KA3542G02, section 0.75 – 1.25 m

Date: 01-02-22 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010222 16:03
Valve opened: 010222 16:20.03 Valve closed: 010222 16:40.03
Total flowing time : 20.0 min. Tot. Pr. Build-up time 10.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 108.7
Pressure just before closing the valve (P_p, KPa): 353.0
Pressure at the end of the recovery (P_f, KPa) : 353.5

Flow data

Manually measured flow rates of KA3542G02, section 0.75 m –1.25 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3542G02, section 0.75 m –1.25 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
16:20:13	243,1
16:21:13	0,131
16:22:33	0,218
16:26:03	0,055
16:28:33	0,036
16:35:03	0,182

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $8.2 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds(V,m^3) = $1{,}1 \cdot 10^{-6}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $4.1 \cdot 10^{-3}$
Average flow rate based on V (Q_{ave} ,l/min) = $5.5 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = $1.8 \cdot 10^{-5}$

Comment

There were short breaks in the pressure monitoring.
The pressure increased during the recovery period.

Borehole KA3542G02, section 1.25–1.75 m

Date: 01-02-14 Field Crew: B. Gentzschein, T. Sträng

Packer expansion: 010214 08:24
Valve opened: 010214 09:56.00 Valve closed: 010214 10:16.01
Total flowing time : 20.0 min. Tot. Pr. Build-up time 21.0 min.

The test was performed as an outflow Pressure Build-up Test

Pressure data

Pressure before injection start (P_0, KPa) : 2419.2
Pressure just before closing the valve (P_p, KPa): 117.5
Pressure at the end of the recovery (P_f, KPa) : 2325.5

Flow data

Manually measured flow rates of KA3542G02, section 1.25 m –1.75 m, are presented in the table below.

Table Manually measured flow rates, Pressure Buil-up Test in KA3542G02, section 1.25 m –1.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
09:56:05	177,5
09:56:15	27,3
09:56:40	6,82
09:57:07	9,10
09:57:38	4,55
09:58:15	4,55
09:58:45	4,55
09:59:09	3,79
09:59:39	3,25
10:00:30	2,28
10:01:30	2,28
10:02:38	3,64
10:03:37	9,10
10:04:30	4,55
10:05:30	11,4
10:07:00	3,98
10:09:00	5,12
10:11:00	3,41
10:13:00	4,55
10:14:30	4,55
10:15:30	6,83

Calculated flow and volume data

Total Outflow water volume (V_{tot}, m^3) = $1.3 \cdot 10^{-4}$
Outflow volume excluding the first 10 seconds(V,m^3) = $1,0 \cdot 10^{-4}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $6.5 \cdot 10^{-3}$
Average flow rate based on V (Q_{ave} ,l/min) = $5.0 \cdot 10^{-3}$
Flow rate at the end of the Flow Phase (Qp, l/min) = $6.8 \cdot 10^{-3}$

6.1.3 Borehole KA3548G01

Borehole KA3548G01 section 0.25 - 0.75 m

Date: 01-02-15 Field Crew: B. Gentzschein, T. Sträng

Packer expansion: 010215 09:26
Valve opened: 010215 09:52.01 Valve closed: 010215 10:21.01
Total flowing time : 20.0 min. Tot. Pr. Build-up time 11.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 114.0
Pressure just before closing the valve (P_p, KPa): 320.3
Pressure at the end of the recovery (P_f, KPa) : 315.7

Flow data

Manually measured flow rates of KA3548G01, section 0.25 m –0.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3548G01, section 0.25 m –0.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
09:52:03	47,1
09:53:31	0,045
09:56:16	0,031
09:59:00	0
10:11	0

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $4.1 \cdot 10^{-6}$
Injected volume excluding the first 10 seconds(V,m^3) = $2{,}2 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $2.1 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = $1.1 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = 0

Borehole KA3548G01 section 0.75 - 1.25 m

Date: 01-02-14 Field Crew: B. Gentzschein, T. Sträng

Packer expansion: 010214 17:30
Valve opened: 010214 17:53.00 Valve closed: 010214 18:13.00
Total flowing time : 20.0 min. Tot. Pr. Build-up time: 841 min.

Pressure data

Pressure before injection start (P_0, KPa) : 120.7
Pressure just before closing the valve (P_p, KPa): 329.5
Pressure at the end of the recovery (P_f, KPa) : 219.0

Flow data

Manually measured flow rates of KA3548G01, section 0.75 m –1.25 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3548G01, section 0.75 m –1.25 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
17:53:05	34,0
17:53:43	0,101
17:57:08	0,019
18:05:30	0,010

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $6.0 \cdot 10^{-6}$
Injected volume excluding the first 10 seconds (V,m^3) = $3{,}3 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $3.0 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = $1.6 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = $1.0 \cdot 10^{-5}$

Comment

The recovery period lasted over the night.

Borehole KA3548G01 section 1.25 - 1.75 m

Date: 01-02-15 Field Crew: B. Gentzschein, T. Sträng

Packer expansion: 010215 08:24
Valve opened: 010215 08:46.00 Valve closed: 010214 09:06.00
Total flowing time : 20.0 min. Tot. Pr. Build-up time: 10.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 109.4
Pressure just before closing the valve (P_p, KPa): 318.2
Pressure at the end of the recovery (P_f, KPa) : 315.0

Flow data

Manually measured flow rates of KA3548G01, section 1.25 m –1.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3548G01, section 1.25 m –1.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
08:46:05	27,4
08:46:15	0,653
08:47:10	0,065
08:49:00	0
09:05:00	0

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $4.8 \cdot 10^{-6}$
Injected volume excluding the first 10 seconds (V, m^3) = $2,2 \cdot 10^{-7}$
Average flow rate based on V_{tot} (QT_{ave}, l/min) = $2.4 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = $1.1 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = 0

6.1.4 Borehole KA3554G01

Borehole KA3554G01 section 0.25 - 0.75 m

Date: 01-02-15 Field Crew: B. Gentzschein, T. Sträng

Packer expansion: 010215 10:45
Valve opened: 010215 14:09.00 Valve closed: 010215 14:29.00
Total flowing time : 20.0 min. Tot. Pr. Build-up time 10.3 min.

Pressure data

Pressure before injection start (P_0, KPa) : 134.3
Pressure just before closing the valve (P_p, KPa): 310.8
Pressure at the end of the recovery (P_f, KPa) : 123.5

Flow data

Manually measured flow rates of KA3554G01, section 0.25 m –0.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3554G01, section 0.25 m –0.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
14:09:05	49,0
14:09:15	26,1
14:09:25	22,9
14:09:35	21,6
14:09:50	0,98
14:10:15	33,3
14:10:45	20,0
14:11:15	19,6
14:11:45	19,2
14:12:30	20,0
14:13:30	18,2
14:14:30	18,1
14:15:32	18,1
14:16:32	15,6
14:17:30	21,0
14:18:30	18,7
14:20:00	18,7
14:22:00	18,7
14:24:00	17,8
14:26:02	18,4
14:28:02	19,2

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $3.8 \cdot 10^{-4}$
Injected volume excluding the first 10 seconds (V,m^3) = $3,7 \cdot 10^{-4}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $1.91 \cdot 10^{-2}$
Average flow rate based on V (Q_{ave} ,l/min) = $1.88 \cdot 10^{-2}$
Flow rate at the end of the Flow Phase (Qp, l/min) = $1.9 \cdot 10^{-2}$

Borehole KA3554G01 section 0.75 - 1.25 m

Date: 01-02-15 Field Crew: B. Gentzschein, T. Sträng

Packer expansion: 010215 17:05
Valve opened: 010215 17:30.00 Valve closed: 010215 17:50.00
Total flowing time : 20.0 min. Tot. Pr. Build-up time 855 min.

Pressure data

Pressure before injection start (P_0, KPa) : 340.8
Pressure just before closing the valve (P_p, KPa): 618.3
Pressure at the end of the recovery (P_f, KPa) : 428.2

Flow data

Manually measured flow rates of KA3554G01, section 0.75 m –1.25 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3554G01, section 0.75 m –1.25 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
17:30:02	18,3
17:30:07	2,614
17:30:35	0,261
17:31:45	0,073
17:33:15	0,073
17:34:30	0,109
17:35:30	0,109
17:36:30	0,109
17:38:00	0,055
17:40:30	0,363
17:43:00	0,054
17:45:00	0,109
17:47:00	0,054
17:49:00	0,054

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $3.3 \cdot 10^{-6}$
Injected volume excluding the first 5 seconds (V,m^3) = $1,7 \cdot 10^{-6}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $1.6 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = $8.8 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = $5.4 \cdot 10^{-5}$

Comment

The recovery period lasted over the night.

Borehole KA3554G01 section 1.25 - 1.75 m

Date: 01-02-15 Field Crew: B. Gentzschein, T. Sträng

Packer expansion: 010215 16:02
Valve opened: 010215 16:28.00 Valve closed: 010215 16:48.00
Total flowing time : 20.0 min. Tot. Pr. Build-up time 11.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 125.1
Pressure just before closing the valve (P_p, KPa): 416.5
Pressure at the end of the recovery (P_f, KPa) : 407.5

Flow data

Manually measured flow rates of KA3554G01, section 1.25 m –1.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3554G01, section 1.25 m –1.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
16:28:02	28,8
16:28:13	0,436
16:28:40	0,163
16:29:30	0,110
16:32:00	0,027
16:35:	0
16:47:	0

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $2.8 \cdot 10^{-6}$
Injected volume excluding the first 5 seconds (V,m^3) = $4{,}4 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $1.4 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = $2.2 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = 0

6.1.5 Borehole KA3554G02

Borehole KA3554G02 section 0.25 - 0.75 m

Date: 01-02-16 Field Crew: B. Gentzschein, T. Sträng

Packer expansion: 010216 08:59
Valve opened: 010216 09:16.00 Valve closed: 010216 09:36.00
Total flowing time : 20.0 min. Tot. Pr. Build-up time: 10.3 min.

Pressure data

Pressure before injection start (P_0, KPa) : 119.8
Pressure just before closing the valve (P_p, KPa): 317.0
Pressure at the end of the recovery (P_f, KPa) : 310.6

Flow data

Manually measured flow rates of KA3554G02, section 0.25 m –0.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3554G02, section 0.25 m –0.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
09:16:05	32,020
09:16:20	0,327
09:17:15	0,145
09:18:15	0,218
09:18:45	0,218
09:19:30	0,218
09:20:30	0,109
09:21:30	0,218
09:22:30	0,218
09:23:30	0,109
09:24:30	0,109
09:25:30	0,109
09:27:00	0,109
09:29:00	0,163
09:31:00	0,163
09:33:00	0,109
09:35:00	0,109

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $8.3 \cdot 10^{-6}$
Injected volume excluding the first 10 seconds(V,m^3) = $2{,}9 \cdot 10^{-6}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $4.1 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = $1.5 \cdot 10^{-4}$
Flow rate at the end of the Flow Phase (Qp, l/min) = $1.1 \cdot 10^{-4}$

Borehole KA3554G02 section 0.75 - 1.25 m

Date: 01-02-16 Field Crew: B. Gentzschein, T. Sträng

Packer expansion: 010216 09:52
Valve opened: 010216 10:12.00 Valve closed: 010216 10:32.00
Total flowing time : 20.0 min. Tot. Pr. Build-up time: 10.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 122.1
Pressure just before closing the valve (P_p, KPa): 325.8
Pressure at the end of the recovery (P_f, KPa) : 325.8

Flow data

Manually measured flow rates of KA3554G02, section 0.75 m –1.25 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3554G02, section 0.75 m –1.25 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
10:12:05	146,4
10:12:15	0,653
10:12:35	0,327
10:13	0
10:31	0

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $2.5 \cdot 10^{-5}$
Injected volume excluding the first 10 seconds (V,m^3) = $2,2 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $1.2 \cdot 10^{-3}$
Average flow rate based on V (Q_{ave} ,l/min) = $1.1 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = 0

Comment

No recovery was measured.

Borehole KA3554G02 section 1.25 - 1.75 m

Date: 01-02-16 Field Crew: B. Gentzschein, T. Sträng

Packer expansion: 010216 10:45
Valve opened: 010216 11:12.01 Valve closed: 010216 11:32.01
Total flowing time : 20.0 min. Tot. Pr. Build-up time: 75.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 122.8
Pressure just before closing the valve (P_p, KPa): 325.6
Pressure at the end of the recovery (P_f, KPa) : 318.4

Flow data

Manually measured flow rates of KA3554G02, section 1.25 m –1.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3554G02, section 1.25 m –1.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
11:12:08	241,8
11:12:47	0,077
11:15:15	0,03
11:21:30	0,016
11:25	0
11:31	0

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $2.1 \cdot 10^{-5}$
Injected volume excluding the first 15 seconds (V,m^3) = $3{,}3 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $1.0 \cdot 10^{-3}$
Average flow rate based on V (Q_{ave} ,l/min) = $1.6 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = 0

6.1.6 Borehole KA3546G01

Borehole KA3546G01 section 0.25 - 0.75 m

Date: 01-02-19 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010216 13:10

Valve opened: 010219 09:29.01 Valve closed: 010219 09:49.01
Total flowing time : 20.0 min. Tot. Pr. Build-up time 10.3 min.

Pressure data

Pressure before injection start (P_0, KPa) : 116.3
Pressure just before closing the valve (P_p, KPa): 316.6
Pressure at the end of the recovery (P_f, KPa) : 229.1

Flow data

Manually measured flow rates of KA3546G01, section 0.25 m –0.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3546G01, section 0.25 m –0.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
09:29:03	231,3
09:29:08	2,61
09:29:16	0,653
09:29:31	1,634
09:29:51	0,980
09:30:08	0,871
09:30:24	1,307
09:30:46	1,089
09:31:16	0,871
09:31:46	0,871
09:32:31	0,871
09:33:31	0,871
09:34:31	0,762
09:35:31	0,871
09:36:31	0,653
09:37:31	0,871
09:38:31	0,762
09:40:01	0,599
09:42:01	0,653
09:44:01	0,817
09:46:01	0,545
09:48:01	0,708

Calculated flow and volume data

Total injected water volume	(V_{tot}, m^3)	= $3.5 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds	(V,m^3)	= $1,6 \cdot 10^{-5}$
Average flow rate based on V_{tot}	($QT_{ave,}$ l/min)	= $1.7 \cdot 10^{-3}$
Average flow rate based on V	(Q_{ave} ,l/min)	= $7.8 \cdot 10^{-4}$
Flow rate at the end of the Flow Phase	(Qp, l/min)	= $7.1 \cdot 10^{-4}$

Comment

The packer was expanded three days before the test.
The pressure decreases in the beginning of the flowing period.

Borehole KA3546G01 section 0.75 - 1.25 m

Date: 01-02-19 Field Crew: B. Gentzschein, J. Kä

Packer expansion: 010219 10:05

Valve opened: 010219 10:29.02 Valve closed: 010219 10:49.02
Total flowing time : 20.0 min. Tot. Pr. Build-up time: 10.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 117.5
Pressure just before closing the valve (P_p, KPa): 337.8
Pressure at the end of the recovery (P_f, KPa) : 336.6

Flow data

Manually measured flow rates of KA3546G01, section 0.75 m –1.25 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3546G01, section 0.75 m –1.25 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
10:29:04	169,9
10:29:14	0,436
10:30:42	0,041
10:33:32	0,109
10:37:00	0,018
10:42:01	0,054

Calculated flow and volume data

Total injected water volume	(V_{tot}, m^3)	= $1.5 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds	(V,m^3)	= $5,5 \cdot 10^{-7}$
Average flow rate based on V_{tot}	($QT_{ave,}$ l/min)	= $7.4 \cdot 10^{-4}$
Average flow rate based on V	(Q_{ave} ,l/min)	= $2.7 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase	(Qp, l/min)	= $5.4 \cdot 10^{-5}$

Comment

Very small recovery

Borehole KA3546G01 section 1.25 - 1.75 m

Date: 01-02-19 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010219 11:07
Valve opened: 010219 11:19.03 Valve closed: 010219 11:39.02
Total flowing time : 20.0 min. Tot. Pr. Build-up time: 80.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 110.3
Pressure just before closing the valve (P_p, KPa): 380.7
Pressure at the end of the recovery (P_f, KPa) : 371.2

Flow data

Manually measured flow rates of KA3546G01, section 1.25 m –1.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3546G01, section 1.25 m –1.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
11:19:05	181,7
11:19:53	0,327
11:21:03	0,055
11:24:03	0,027
11:28:30	0,022
11:32	0
11:39	0

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $1.5 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds (V,m^3) = $4{,}4 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $7.5 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = $2.2 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = 0

Comment

The recovery lasted over lunch.

6.1.7 Borehole KA3544G01

Borehole KA3544G01 section 0.25 - 0.75 m

Date: 01-02-19 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010219 13:37
Valve opened: 010219 14:36.02 Valve closed: 010219 14:56.02
Total flowing time : 20.0 min. Tot. Pr. Build-up time 10.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 109.6
Pressure just before closing the valve (P_p, KPa): 336.6
Pressure at the end of the recovery (P_f, KPa) : 322.1

Flow data

Manually measured flow rates of KA3544G01, section 0.25 m –0.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3544G01, section 0.25 m –0.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
14:36:04	177,7
14:37:19	0,045
14:39:02	0,073
14:42:02	0,054
14:43:32	0,109
14:46:00	0,054
14:49:02	0,054
14:51:02	0,054
14:53:02	0,054
14:55:02	0,054

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $1.6 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds (V,m^3) = $1{,}1 \cdot 10^{-6}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $7.9 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = $5.5 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = $5.4 \cdot 10^{-5}$

Borehole KA3544G01 section 0.75 - 1.25 m

Date: 01-02-19 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010219 15:10
Valve opened: 010219 15:35.02 Valve closed: 010219 15:55.02
Total flowing time : 20.0 min. Tot. Pr. Build-up time 10.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 115.2
Pressure just before closing the valve (P_p, KPa): 342.2
Pressure at the end of the recovery (P_f, KPa) : 341.3

Flow data

Manually measured flow rates of KA3544G01, section 0.75 m –1.25 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3544G01, section 0.75 m –1.25 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
13:35:04	147,7
13:35:24	0,187
13:37:20	0,033
13:41:30	0,022
13:46:30	0,022
13:49	0
13:54	0

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $1.3 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds (V,m^3) = $4{,}4 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $6.4 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = $2.2 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = 0

Comment

Almost no recovery at all. recovery

Borehole KA3544G01 section 1.25 - 1.75 m

Date: 01-02-19 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010219 16:08
Valve opened: 010219 16:30.02 Valve closed: 010219 16:50.02
Total flowing time : 20.0 min. Tot. Pr. Build-up time 10.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 135.7
Pressure just before closing the valve (P_p, KPa): 339.4
Pressure at the end of the recovery (P_f, KPa) : 342.2

Flow data

Manually measured flow rates of KA3544G01, section 1.25 m –1.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3544G01, section 1.25 m –1.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
16:30:04	125,5

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $1.1 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds(V,m^3) = 0
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $5.2 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = 0
Flow rate at the end of the Flow Phase (Qp, l/min) = 0

Comment

The pressure increases during the recovery period.

6.1.8 Borehole KA3550G01

Borehole KA3550G01 section 0.25 - 0.75 m

Date: 01-02-20 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010220 11:22
Valve opened: 010220 11:50.03 Valve closed: 010220 12:10.02
Total flowing time : 20.0 min. Tot. Pr. Build-up time 81.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 101.6
Pressure just before closing the valve (P_p, KPa): 315.9
Pressure at the end of the recovery (P_f, KPa) : 101.6

Flow data

Manually measured flow rates of KA3550G01, section 0.25 m –0.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3550G01, section 0.25 m –0.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
11:50:05	78,4
11:50:10	5,228
11:50:18	7,842
11:50:33	5,881
11:50:53	5,554
11:51:10	5,228
11:51:25	7,406
11:51:48	4,356
11:52:18	4,792
11:52:48	5,010
11:53:33	4,683
11:54:33	4,683
11:55:33	4,792
11:56:33	4,465
11:57:33	4,574
11:58:33	4,356
11:59:33	4,139
12:01:03	4,302
12:03:03	4,193
12:05:03	3,921
12:07:03	0,926
12:09:03	7,134

Calculated flow and volume data

Total injected water volume	(V_{tot}, m^3)	= $9.5 \cdot 10^{-5}$
Injected volume excluding the first 10 seconds	(V,m^3)	= $8{,}8 \cdot 10^{-5}$
Average flow rate based on V_{tot}	($QT_{ave,}$ l/min)	= $4.8 \cdot 10^{-3}$
Average flow rate based on V	(Q_{ave} ,l/min)	= $4.4 \cdot 10^{-3}$
Flow rate at the end of the Flow Phase (Qp, l/min)		= $4.3 \cdot 10^{-3}$

Comment

The two last flow rate values are too low and too high respectively compared with the preceding flow values, probably due to misreading of the water level. Therefore Qp has been set as the average of the two last flow rate values.

Borehole KA3550G01 section 0.75 - 1.25 m

Date: 01-02-20 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010220 13:35
Valve opened: 010220 13:54.03 Valve closed: 010220 14:14.03
Total flowing time : 20.0 min. Tot. Pr. Build-up time 10.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 109.2
Pressure just before closing the valve (P_p, KPa): 349.1
Pressure at the end of the recovery (P_f, KPa) : 346.8

Flow data

Manually measured flow rates of KA3550G01, section 0.75 m –1.25 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3550G01, section 0.75 m –1.25 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
13:54:05	47,1
13:54:10	1,31
13:54:18	0,653
13:54:51	0,119
13:56:40	0,040
13:59:03	0,055
14:06:00	0,009

Calculated flow and volume data

Total injected water volume	(V_{tot}, m^3)	= $4.6 \cdot 10^{-6}$
Injected volume excluding the first 10 seconds	(V,m^3)	= $6{,}5 \cdot 10^{-7}$
Average flow rate based on V_{tot}	($QT_{ave,}$ l/min)	= $2.3 \cdot 10^{-4}$
Average flow rate based on V	(Q_{ave} ,l/min)	= $3.3 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min)		= $9.0 \cdot 10^{-6}$

Comment
The pressure increases somewhat (c.14 KPa) during the flowing period.

Borehole KA3550G01 section 1.25 - 1.75 m

Date: 01-02-20 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010220 14:27
Valve opened: 010220 14:48.03 Valve closed: 010220 15:08.03
Total flowing time : 20.0 min. Tot. Pr. Build-up time 20.0 min.

Pressure data
Pressure before injection start (P_0, KPa) : 121.6
Pressure just before closing the valve (P_p, KPa): 345.0
Pressure at the end of the recovery (P_f, KPa) : 340.6

Flow data
Manually measured flow rates of KA3550G01, section 1.25 m –1.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3550G01, section 1.25 m –1.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
14:48:05	37,9
14:48:25	0,187
14:50:21	0,033
14:53:33	0,036
14:56:33	0,036
14:59	0
15:07	0

Calculated flow and volume data
Total injected water volume (V_{tot}, m^3) = $3.6 \cdot 10^{-6}$
Injected volume excluding the first 10 seconds(V,m^3) = $4.4 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $1.8 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = $2.2 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = 0

Comment
The pressure increases somewhat (c.8 KPa) during the flowing period.

6.1.9 Borehole KA3552G01

Borehole KA3552G01 section 0.25 - 0.75 m

Date: 01-02-20 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010220 15:45
Valve opened: 010220 16:05.03 Valve closed: 010220 16:25.03
Total flowing time : 20.0 min. Tot. Pr. Build-up time 10.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 114.5
Pressure just before closing the valve (P_p, KPa): 347.7
Pressure at the end of the recovery (P_f, KPa) : 344.5

Flow data

Manually measured flow rates of KA3552G01, section 0.25 m –0.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3552G01, section 0.25 m –0.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
16:05:05	341,1
16:05:10	1,307
16:05:43	0,131
16:06:33	0,109
16:07:33	0,109
16:08:33	0,109
16:10:03	0,055
16:11:33	0,109
16:12:33	0,109
16:15:03	0,027
16:19:03	0,027

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $3.0 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds (V,m^3) = $1{,}1 \cdot 10^{-6}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $1.5 \cdot 10^{-3}$
Average flow rate based on V (Q_{ave} ,l/min) = $5.5 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min)

Comment

The pressure increases somewhat (c.13 KPa) during the flowing period.

Borehole KA3552G01 section 0.75 –1.25 m

Date: 01-02-20 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010220 16:37
Valve opened: 010220 16:57.03 Valve closed: 010220 17:17.03
Total flowing time : 20.0 min. Tot. Pr. Build-up time 890.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 112.9
Pressure just before closing the valve (P_p, KPa): 348.2
Pressure at the end of the recovery (P_f, KPa) : 311.7

Flow data

Manually measured flow rates of KA3552G01, section 0.75 m –1.25 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3552G01, section 0.75 m –1.25 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
16:57:05	307,1
16:57:15	0,436
16:58:13	0,065
16:59:33	0,109
17:01:03	0,055
17:02:33	0,109
17:03:33	0,109
17:05:03	0,055
17:07:33	0,036
17:11:33	0,027

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $2.7 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds (V,m^3) = $9{,}8 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $1.3 \cdot 10^{-3}$
Average flow rate based on V (Q_{ave} ,l/min) = $4.9 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min)

Comment

The pressure increases somewhat (c.13 KPa) during the flowing period.

The recovery period lasted over the night.

Borehole KA3552G01 section 1.25 –1.75 m

Date: 01-02-21 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010221 08:18
Valve opened: 010221 08:37.03 Valve closed: 010221 08:57.03
Total flowing time : 20.0 min. Tot. Pr. Build-up time 26.5 min.

Pressure data

Pressure before injection start (P_0, KPa) : 107.3
Pressure just before closing the valve (P_p, KPa): 341.7
Pressure at the end of the recovery (P_f, KPa) : 340.8

Flow data

Manually measured flow rates of KA3552G01, section 1.25 m –1.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3552G01, section 1.25 m –1.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
08:37:05	307,141
08:37:10	1,30688
08:41:08	0,013
08:50:33	0,012

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $2.6 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds(V,m^3) = $3.3 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $1.3 \cdot 10^{-3}$
Average flow rate based on V (Q_{ave} ,l/min) = $1.6 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min)

Comment

The pressure increases somewhat (c.7 KPa) during the flowing period.

The recovery is very small.

6.1.10 Borehole KA3578G01

Borehole KA3578G01 section 0.25 - 0.75 m

Date: 01-02-21 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010221 10:37
Valve opened: 010221 11:06.02 Valve closed: 010221 11:26.02
Total flowing time : 20.0 min. Tot. Pr. Build-up time 86.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 111.7
Pressure just before closing the valve (P_p, KPa): 348.6
Pressure at the end of the recovery (P_f, KPa) : 304.1

Flow data

Manually measured flow rates of KA3578G01, section 0.25 m –0.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3578G01, section 0.25 m –0.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
11:06:04	109,8
11:06:09	1,31
11:06:37	0,131
11:07:17	0,218
11:07:47	0,109
11:09:32	0,055
11:11:32	0,055
11:13:32	0,036
11:16:32	0,036
11:20:02	0,272
11:24:02	0,022

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $1.0 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds (V,m^3) = $1{,}1 \cdot 10^{-6}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $5.1 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = $5.4 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = $2.2 \cdot 10^{-5}$

Comment

The pressure increases somewhat (c.10 KPa) during the flowing period.

The recovery lasted over the lunch.

Borehole KA3578G01 section 0.75 - 1.25 m

Date: 01-02-21 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010221 12:55
Valve opened: 010221 13:16.02 Valve closed: 010221 13:36.02
Total flowing time : 20.0 min. Tot. Pr. Build-up time 11.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 117.0
Pressure just before closing the valve (P_p, KPa): 348.4
Pressure at the end of the recovery (P_f, KPa) : 346.8

Flow data

Manually measured flow rates of KA3578G01, section 0.75 m –1.25 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3578G01, section 0.75 m –1.25 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
13:06:04	88,9
13:06:59	0,057
13:08:32	0,109
13:10:32	0,022
13:14:02	0,055
13:18:32	0,016

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $8.0 \cdot 10^{-6}$
Injected volume excluding the first 5 seconds (V,m^3) = $5{,}5 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $4.0 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = $2.7 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min)

Comment

The pressure increases somewhat (c.10 KPa) during the flowing period.

Borehole KA3578G01 section 1.25 - 1.75 m

Date: 01-02-21 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010221 13:49
Valve opened: 010221 14:10.03 Valve closed: 010221 14:30.03
Total flowing time : 20.0 min. Tot. Pr. Build-up time 28.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 120.2
Pressure just before closing the valve (P_p, KPa): 363.4
Pressure at the end of the recovery (P_f, KPa) : 357.2

Flow data

Manually measured flow rates of KA3578G01, section 1.25 m –1.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3578G01, section 1.25 m –1.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
14:10:05	82,3
14:10:43	0,187
14:11:40	0,145
14:13:03	0,055
14:15:03	0,055
14:17:03	0,055
14:20:03	0,027
14:25:02	0,018

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $7.7 \cdot 10^{-6}$
Injected volume excluding the first 5 seconds (V,m^3) = $8{,}7 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $3.9 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = $4.4 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min)

Comment

The pressure increases somewhat (c.20 KPa) during the flowing period.

6.1.11 Borehole KA3572G01

Borehole KA3572G01 section 0.25 - 0.75 m

Date: 01-02-21 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010221 15:30
Valve opened: 010221 15:53.03 Valve closed: 010221 16.13.03
Total flowing time : 20.0 min. Tot. Pr. Build-up time 11.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 112.2
Pressure just before closing the valve (P_p, KPa): 348.6
Pressure at the end of the recovery (P_f, KPa) : 332.0

Flow data

Manually measured flow rates of KA3572G01, section 0.25 m –0.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3572G01, section 0.25 m –0.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
15:53:05	343,7
15:53:15	0,871
15:53:33	0,327
15:54:00	0,187
15:54:25	0,436
15:54:48	0,436
15:55:33	0,109
15:56:33	0,109
15:57:33	0,327
15:58:33	0,109
15:59:33	0,109
16:00:33	0,109
16:01:33	0,109
16:02:33	0,109
16:04:03	0,109
16:06:03	0,109
16:08:03	0,054
16:10:03	0,109
16:12:03	0,054

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $3.1 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds (V,m^3) = $2,7 \cdot 10^{-6}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $1.6 \cdot 10^{-3}$
Average flow rate based on V (Q_{ave} ,l/min) = $1.4 \cdot 10^{-4}$
Flow rate at the end of the Flow Phase (Qp, l/min) = $5.4 \cdot 10^{-5}$

Comment
The pressure increases somewhat (c.7 KPa) during the flowing period.

Borehole KA3572G01 section 0.75 - 1.25 m

Date: 01-02-21 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010221 16:25
Valve opened: 010221 16:45.03 Valve closed: 010221 17.05.03
Total flowing time : 20.0 min. Tot. Pr. Build-up time 899.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 111.5
Pressure just before closing the valve (P_p, KPa): 348.6
Pressure at the end of the recovery (P_f, KPa) : 229.1

Flow data

Manually measured flow rates of KA3572G01, section 0.75 m –1.25 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3572G01, section 0.75 m –1.25 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
16:45:05	271,8
16:45:10	1,31
16:45:28	0,218
16:45:53	0,327
16:46:10	0,436
16:46:40	0,109
16:47:18	0,218
16:47:48	0,218
16:48:33	0,109
16:49:33	0,218
16:50:33	0,109
16:51:33	0,218
16:52:33	0,109
16:53:33	0,109
16:54:33	0,109
16:56:03	0,109
16:58:03	0,054
17:00:03	0,054
17:02:03	0,054
17:04:03	0,054

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $2.5 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds (V,m^3) = $2{,}4 \cdot 10^{-6}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $1.3 \cdot 10^{-3}$
Average flow rate based on V (Q_{ave} ,l/min) = $1.2 \cdot 10^{-4}$
Flow rate at the end of the Flow Phase (Qp, l/min) = $5.4 \cdot 10^{-5}$

Comment

The pressure increases somewhat (c.9 KPa) during the flowing period.

Borehole KA3572G01 section 1.25 - 1.75 m

Date: 01-02-22 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010222 08:05
Valve opened: 010222 08:27.03 Valve closed: 010222 08:47.03
Total flowing time : 20.0 min. Tot. Pr. Build-up time 12.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 105.0
Pressure just before closing the valve (P_p, KPa): 338.3
Pressure at the end of the recovery (P_f, KPa) : 323.0

Flow data

Manually measured flow rates of KA3572G01, section 1.25 m –1.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3572G01, section 1.25 m –1.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
08:27:05	275,8
08:27:50	0,077
08:29:03	0,109
08:30:18	0,073
08:31:33	0,218
08:32:33	0,109
08:33:33	0,109
08:34:33	0,109
08:36:08	0,050
08:39:08	0,028
08:42:03	0,054
08:44:03	0,054

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $2.4 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds (V,m^3) = $1{,}3 \cdot 10^{-6}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $1.2 \cdot 10^{-3}$
Average flow rate based on V (Q_{ave} ,l/min) = $6.6 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min)

6.1.12 Borehole KA3576G01

Borehole KA3576G01 section 0.25 - 0.75 m

Date: 01-02-22 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010222 18:28
Valve opened: 010222 19:10.03 Valve closed: 010222 19.30.03
Total flowing time : 20.0 min. Tot. Pr. Build-up time 10.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 108.3
Pressure just before closing the valve (P_p, KPa): 356.7
Pressure at the end of the recovery (P_f, KPa) : 355.1

Flow data

Manually measured flow rates of KA3576G01, section 0.25 m –0.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3576G01, section 0.25 m –0.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
19:10:05	271,8
19:10:15	0,436
19:10:50	0,119
19:12:40	0,040
19:15:03	0,055
19:16:33	0,109
19:18:03	0,055
19:21:33	0,218
19:25:03	0,054

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $2.4 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds (V,m^3) = $8,7 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $1.2 \cdot 10^{-3}$
Average flow rate based on V (Q_{ave} ,l/min) = $4.4 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min)

Comment

The pressure increases somewhat (c.8 KPa) during the flowing period.

Borehole KA3576G01 section 0.75 - 1.25 m

Date: 01-02-22 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010222 19:42
Valve opened: 010222 19:58.04 Valve closed: 010222 20.18.04
Total flowing time : 20.0 min. Tot. Pr. Build-up time 9.9 min.

Pressure data

Pressure before injection start (P_0, KPa) : 120.5
Pressure just before closing the valve (P_p, KPa): 347.7
Pressure at the end of the recovery (P_f, KPa) : 350.3

Flow data

Manually measured flow rates of KA3576G01, section 0.75 m –1.25 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3576G01, section 0.75 m –1.25 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
19:58:06	201,3
19:58:16	0,436
19:58:34	0,327
20:01:53	0,172
20:09:34	0,012

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $1.7 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds (V,m^3) = $4{,}4 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $8.6 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = $2.2 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min)

Comment

The pressure increases during the recovery period.

Borehole KA3576G01 section 1.25 - 1.75 m

Date: 01-02-22 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010222 20:30
Valve opened: 010222 20:50.04 Valve closed: 010222 21:10.04
Total flowing time : 20.0 min. Tot. Pr. Build-up time 677.4 min.

Pressure data

Pressure before injection start (P_0, KPa) : 110.8
Pressure just before closing the valve (P_p, KPa): 347.2
Pressure at the end of the recovery (P_f, KPa) : 348.4

Flow data

Manually measured flow rates of KA3576G01, section 1.25 m –1.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3576G01, section 1.25 m –1.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
20:50:06	211,7
20:51:19	0,451
20:56:19	0,145
21:09:04	0

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $1.8 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds (V,m^3) = $2{,}2 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $8.9 \cdot 10^{-4}$
Average flow rate based on V (Q_{ave} ,l/min) = $1.1 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = 0

Comment

The pressure increases during the recovery period.

6.1.13 Borehole KA3574G01

Borehole KA3574G01 section 0.25 - 0.75 m

Date: 01-02-23 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010223 08:28
Valve opened: 010223 09:43.04 Valve closed: 010223 10:03.04
Total flowing time : 20.0 min. Tot. Pr. Build-up time 9.9 min.

Pressure data

Pressure before injection start (P_0, KPa) : 119.8
Pressure just before closing the valve (P_p, KPa): 331.1
Pressure at the end of the recovery (P_f, KPa) : 328.8

Flow data

Manually measured flow rates of KA3574G01, section 0.25 m –0.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3574G01, section 0.25 m –0.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
09:43:09	2844,5
09:43:16	1857,2
09:43:21	597,5
09:43:29	66,9
09:43:39	54,6
09:44:49	2,28
09:45:49	9,104
09:46:34	2,27
09:49:39	2,66
09:50:34	1,14
09:53:34	0,380
09:56:04	0
10:02:04	0

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $7.0 \cdot 10^{-4}$
Injected volume excluding the first 10 seconds (V,m^3) = $2,3 \cdot 10^{-4}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $3.5 \cdot 10^{-2}$
Average flow rate based on V (Q_{ave} ,l/min) = $1.2 \cdot 10^{-2}$
Flow rate at the end of the Flow Phase (Qp, l/min) = 0

Comment

It was difficult to evacuate the air from the test interval. A first test starting at 09:19 was interrupted after c. 9 minutes of injection. During the flowing period there were problems reading the water level, since “delayed drops” fell down in the stand pipe.

Borehole KA3574G01 section 0.75 - 1.25 m

Date: 01-02-23 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010223 10:16
Valve opened: 010223 10:33.03 Valve closed: 010223 10:53.03
Total flowing time : 20.0 min. Tot. Pr. Build-up time 10.0 min.

Pressure data

Pressure before injection start (P_0, KPa) : 116.3
Pressure just before closing the valve (P_p, KPa): 348.9
Pressure at the end of the recovery (P_f, KPa) : 345.4

Flow data

Manually measured flow rates of KA3574G01, section 0.75 m –1.25 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3574G01, section 0.75 m –1.25 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
10:33:05	316,3
10:33:58	0,119
10:34:25	0,145
10:35:50	0,484
10:38:03	0,055
10:40:03	0,055
10:42:03	0,054
10:44:03	0,054
10:46:03	0,054
10:49:03	0,027
10:52:03	0,054

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $2.3 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds (V,m^3) = $1,1 \cdot 10^{-6}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $1.4 \cdot 10^{-3}$
Average flow rate based on V (Q_{ave} ,l/min) = $5.5 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = $5.4 \cdot 10^{-5}$

Comment

The pressure increases somewhat (c.8 KPa) during the flowing period.

Borehole KA3574G01 section 1.25 - 1.75 m

Date: 01-02-23 Field Crew: B. Gentzschein, J. Källgården

Packer expansion: 010223 11:05
Valve opened: 010223 11:25.04 Valve closed: 010223 11:45.04
Total flowing time : 20.0 min. Tot. Pr. Build-up time 105 min.

Pressure data

Pressure before injection start (P_0, KPa) : 121.2
Pressure just before closing the valve (P_p, KPa): 360.4
Pressure at the end of the recovery (P_f, KPa) : 361.6

Flow data

Manually measured flow rates of KA3574G01, section 1.25 m –1.75 m, are presented in the table below.

Table Manually measured flow rates, Injection Test in KA3574G01, section 1.25 m –1.75 m. Prototype Repository, February 2001

Time	Flow rate (l/min * 10^{-3})
11:25:06	269,2
11:25:11	1,307
11:25:19	0,653
11:26:29	0,050
11:28:19	0,073
11:30:04	0,055
11:32:04	0,055
11:34:04	0,055
11:37:04	0,027
11:40:04	0,054
11:42:04	0
11:44:04	0

Calculated flow and volume data

Total injected water volume (V_{tot}, m^3) = $2.7 \cdot 10^{-5}$
Injected volume excluding the first 5 seconds (V,m^3) = $9{,}8 \cdot 10^{-7}$
Average flow rate based on V_{tot} ($QT_{ave,}$ l/min) = $1.2 \cdot 10^{-3}$
Average flow rate based on V (Q_{ave} ,l/min) = $4.9 \cdot 10^{-5}$
Flow rate at the end of the Flow Phase (Qp, l/min) = 0

Comment

The pressure increases (c.18 KPa) during the flowing period. as well as the recovery period.

6.2 Compilation of results

Tables 6-1 and 6-2 summarise pressure data and flow data respectively.

Table 6-1 Pressure data from Injection tests conducted in the exploratory boreholes. Prototype Repository, February 2001.

Borehole	Date of test	Section (m)	P_o (Kpa)	P_p (Kpa)	P_f (Kpa)	$P_p - P_o$ (Kpa)	$P_p - P_f$ (Kpa)	Recovery (%)
KA3542G01	010222	0.25 - 0.75	281.7	440.2	377	158.5	63.2	40
KA3542G01	010222	0.75 -.1.25	116.3	349.8	347.7	233.5	2.1	1
KA3542G01	010222	1.25 - 1.75	111.3	350	349.6	238.7	0.4	0
KA3542G02	010222	0.25 - 0.75	112.2	354.9	355.8	242.7	-0.9	0
KA3542G02	010222	0.75 -.1.25	108.7	353	353.3	244.3	-0.3	0
KA3542G02	010214	1.25 - 1.75	2419.7	117.5	2325.5	-2302.2	-2208	96
KA3544G01	010219	0.25 - 0.75	109.6	336.6	322.1	227	14.5	6
KA3544G01	010219	0.75 -.1.25	115.2	342.2	341.3	227	0.9	0
KA3544G01	010219	1.25 - 1.75	135.7	339.4	342.2	203.7	-2.8	-1
KA3546G01	010219	0.25 - 0.75	116.3	316.6	229.1	200.3	87.5	44
KA3546G01	010219	0.75 -.1.25	117.5	337.8	326.6	220.3	11.2	5
KA3546G01	010219	1.25 - 1.75	110.3	380.7	371.2	270.4	9.5	4
KA3548G01	010215	0.25 - 0.75	114	320.3	315.6	206.3	4.7	2
KA3548G01	010214	0.75 -.1.25	120.7	329.5	219	208.8	110.5	53
KA3548G01	010215	1.25 - 1.75	109.4	318.2	315	208.8	3.2	2
KA3550G01	010220	0.75 -.1.25	109.2	349.1	346.8	239.9	2.3	1
KA3550G01	010220	0.75 -.1.25	109.2	349.1	346.8	239.9	2.3	1
KA3550G01	010220	0.25 - 0.75	101.6	315.9	101.6	214.3	214.3	100
KA3552G01	010220	0.25 - 0.75	114.5	347.7	344.5	233.2	3.2	1
KA3552G01	010220	0.75 -.1.25	112,9	348,2	311,7	235,3	36,5	16
KA3552G01	010221	1.25 - 1.75	107.3	341.7	340.8	234.4	0.9	0
KA3554G01	010215	0.25 - 0.75	134.3	310.8	123.5	176.5	187.3	106
KA3554G01	010215	0.75 - 1.25	340.8	618.3	428.2	277.5	190.1	69
KA3554G01	010215	1.25 - 1.75	125.1	416.5	407.5	291.4	9	3
KA3554G02	010216	0.25 - 0.75	119.8	317	310.6	197.2	6.4	3
KA3554G02	010216	0.75 -.1.25	122.1	325.8	325.8	203.7	0	0
KA3554G02	010216	1.25 - 1.75	112.8	325.6	318.4	212.8	7.2	3
KA3572G01	010221	0.25 - 0.75	112.2	348.6	332	236.4	16.6	7
KA3572G01	010221	0.75 -.1.25	111.5	348.6	229.1	237.1	119.5	50
KA3572G01	010222	1.25 - 1.75	105	338.3	323	233.3	15.3	7
KA3574G01	010223	0.25 - 0.75	119.8	331	328.8	211.2	2.2	1
KA3574G01	010223	0.75 -.1.25	116.3	348.9	345.1	232.6	3.8	2
KA3574G01	010223	1.25 - 1.75	121.2	360.4	361.6	239.2	-1.2	-1
KA3576G01	010222	0.25 - 0.75	108.3	356.7	355.1	248.4	1.6	1
KA3576G01	010222	0.75 -.1.25	120.5	347.7	350.3	227.2	-2.6	-1
KA3576G01	010222	1.25 - 1.75	110.8	347.3	348.4	236.5	-1.1	0
KA3578G01	010221	0.25 - 0.75	111.7	348.6	304.1	236.9	44.5	19
KA3578G01	010221	0.75 -.1.25	117	348.4	346.8	231.4	1.6	1
KA3578G01	010221	1.25 - 1.75	120.2	363.4	357.2	243.2	6.2	3

Table 6-2 Flow data and volume data from Injection tests conducted in the exploratory boreholes. Prototype Repository, February 2001.

Borehole	Date of test (YYMMDD)	Section (m)	V_{tot}, (m^3)	V (m^3)	QT_{ave}, (l/min)	Q_{ave}, (l/min)
KA3542G01	010222	0.25 - 0.75	$1.9 \cdot 10^{-5}$	$1.2 \cdot 10^{-5}$	$9.5 \cdot 10^{-4}$	$6.1 \cdot 10^{-4}$
KA3542G01	010222	0.75 -1.25	$1.8 \cdot 10^{-5}$	$4.4 \cdot 10^{-7}$	$9.0 \cdot 10^{-4}$	$2.2 \cdot 10^{-5}$
KA3542G01	010222	1.25 - 1.75	$1.7 \cdot 10^{-5}$	$6.5 \cdot 10^{-7}$	$8.6 \cdot 10^{-4}$	$3.3 \cdot 10^{-5}$
KA3542G02	010222	0.25 - 0.75	$3.3 \cdot 10^{-5}$	$9.8 \cdot 10^{-7}$	$1.6 \cdot 10^{-3}$	$4.9 \cdot 10^{-5}$
KA3542G02	010222	0.75 -1.25	$8.2 \cdot 10^{-5}$	$1.1 \cdot 10^{-6}$	$4.1 \cdot 10^{-3}$	$5.5 \cdot 10^{-5}$
KA3542G02	010214	1.25 - 1.75	$1.3 \cdot 10^{-4}$	$1.0 \cdot 10^{-4}$	$6.5 \cdot 10^{-3}$	$5.0 \cdot 10^{-3}$
KA3544G01	010219	0.25 - 0.75	$1.6 \cdot 10^{-5}$	$1.1 \cdot 10^{-6}$	$7.9 \cdot 10^{-4}$	$5.5 \cdot 10^{-5}$
KA3544G01	010219	0.75 -1.25	$1.3 \cdot 10^{-5}$	$4.4 \cdot 10^{-7}$	$6.4 \cdot 10^{-4}$	$2.2 \cdot 10^{-5}$
KA3544G01	010219	1.25 - 1.75	$1.1 \cdot 10^{-5}$	0	$5.2 \cdot 10^{-4}$	0
KA3546G01	010219	0.25 - 0.75	$3.5 \cdot 10^{-5}$	$1.6 \cdot 10^{-5}$	$1.7 \cdot 10^{-3}$	$7.8 \cdot 10^{-4}$
KA3546G01	010219	0.75 -1.25	$1.5 \cdot 10^{-5}$	$5.5 \cdot 10^{-7}$	$7.4 \cdot 10^{-4}$	$2.7 \cdot 10^{-5}$
KA3546G01	010219	1.25 - 1.75	$1.5 \cdot 10^{-5}$	$4.4 \cdot 10^{-7}$	$7.5 \cdot 10^{-4}$	$2.2 \cdot 10^{-5}$
KA3548G01	010215	0.25 - 0.75	$4.1 \cdot 10^{-6}$	$2.2 \cdot 10^{-7}$	$2.1 \cdot 10^{-4}$	$1.1 \cdot 10^{-5}$
KA3548G01	010214	0.75 -1.25	$6.0 \cdot 10^{-6}$	$3.3 \cdot 10^{-7}$	$3.0 \cdot 10^{-4}$	$1.6 \cdot 10^{-5}$
KA3548G01	010215	1.25 - 1.75	$4.8 \cdot 10^{-6}$	$2.2 \cdot 10^{-7}$	$2.4 \cdot 10^{-4}$	$1.1 \cdot 10^{-5}$
KA3550G01	010220	0.25 - 0.75	$9.5 \cdot 10^{-5}$	$8.8 \cdot 10^{-5}$	$4.8 \cdot 10^{-3}$	$4.4 \cdot 10^{-3}$
KA3550G01	010220	0.75 -1.25	$4.6 \cdot 10^{-6}$	$6.5 \cdot 10^{-7}$	$2.3 \cdot 10^{-4}$	$3.3 \cdot 10^{-5}$
KA3550G01	010220	1.25 - 1.75	$3.6 \cdot 10^{-6}$	$4.4 \cdot 10^{-7}$	$1.8 \cdot 10^{-4}$	$2.2 \cdot 10^{-5}$
KA3552G01	010220	0.25 - 0.75	$3.0 \cdot 10^{-5}$	$1.1 \cdot 10^{-6}$	$1.5 \cdot 10^{-3}$	$5.4 \cdot 10^{-5}$
KA3552G01	010220	0.75 -1.25	$2.7 \cdot 10^{-5}$	$9.8 \cdot 10^{-7}$	$1.3 \cdot 10^{-3}$	$4.9 \cdot 10^{-5}$
KA3552G01	010221	1.25 - 1.75	$2.6 \cdot 10^{-5}$	$4.4 \cdot 10^{-7}$	$1.3 \cdot 10^{-3}$	$1.6 \cdot 10^{-5}$
KA3554G01	010215	0.25 - 0.75	$3.8 \cdot 10^{-4}$	$3.7 \cdot 10^{-4}$	$1.9 \cdot 10^{-2}$	$1.9 \cdot 10^{-2}$
KA3554G01	010215	0.75 -1.25	$3.3 \cdot 10^{-6}$	$1.7 \cdot 10^{-6}$	$1.6 \cdot 10^{-4}$	$8.8 \cdot 10^{-5}$
KA3554G01	010215	1.25 - 1.75	$2.8 \cdot 10^{-6}$	$4.4 \cdot 10^{-7}$	$1.4 \cdot 10^{-4}$	$2.2 \cdot 10^{-5}$
KA3554G02	010216	0.25 - 0.75	$8.3 \cdot 10^{-6}$	$2.9 \cdot 10^{-6}$	$4.1 \cdot 10^{-4}$	$1.5 \cdot 10^{-4}$
KA3554G02	010216	0.75 -1.25	$2.5 \cdot 10^{-5}$	$2.2 \cdot 10^{-7}$	$1.2 \cdot 10^{-3}$	$1.1 \cdot 10^{-5}$
KA3554G02	010216	1.25 - 1.75	$2.1 \cdot 10^{-5}$	$3.3 \cdot 10^{-7}$	$1.0 \cdot 10^{-3}$	$1.6 \cdot 10^{-5}$
KA3572G01	010221	0.25 - 0.75	$3.1 \cdot 10^{-5}$	$2.7 \cdot 10^{-6}$	$1.6 \cdot 10^{-3}$	$1.4 \cdot 10^{-4}$
KA3572G01	010221	0.75 -1.25	2.5^{-5}	$2.4 \cdot 10^{-6}$	$1.3 \cdot 10^{-3}$	$1.2 \cdot 10^{-4}$
KA3572G01	010222	1.25– 1.75	$2.4 \cdot 10^{-5}$	$1.3 \cdot 10^{-6}$	$1.2 \cdot 10^{-3}$	$6.5 \cdot 10^{-5}$
KA3574G01	010223	0.25 –0.75	$7.0 \cdot 10^{-4}$	$2.3 \cdot 10^{-4}$	$3.5 \cdot 10^{-2}$	$1.2 \cdot 10^{-2}$
KA3574G01	010223	0.75 -1.25	$2.7 \cdot 10^{-5}$	$1.1 \cdot 10^{-6}$	$1.4 \cdot 10^{-3}$	$5.5 \cdot 10^{-5}$
KA3574G01	010223	1.25 - 1.75	$2.3 \cdot 10^{-5}$	$9.8 \cdot 10^{-7}$	$1.2 \cdot 10^{-3}$	$4.9 \cdot 10^{-5}$
KA3576G01	010222	0.25 - 0.75	$2.4 \cdot 10^{-5}$	$8.7 \cdot 10^{-7}$	$1.2 \cdot 10^{-3}$	$4.4 \cdot 10^{-5}$
KA3576G01	010222	0.75 -1.25	$1.7 \cdot 10^{-5}$	$4.4 \cdot 10^{-7}$	$8.6 \cdot 10^{-4}$	$2.2 \cdot 10^{-5}$
KA3576G01	010222	1.25 - 1.75	$1.8 \cdot 10^{-5}$	$2.2 \cdot 10^{-7}$	$8.9 \cdot 10^{-4}$	$1.1 \cdot 10^{-5}$
KA3578G01	010221	0.25 - 0.75	$1.0 \cdot 10^{-5}$	$1.1 \cdot 10^{-6}$	$5.1 \cdot 10^{-4}$	$5.4 \cdot 10^{-5}$
KA3578G01	010221	0.75 -1.25	$8.0 \cdot 10^{-6}$	$5.5 \cdot 10^{-7}$	$4.0 \cdot 10^{-4}$	$2.7 \cdot 10^{-5}$
KA3578G01	010221	1.25 - 1.75	$7.7 \cdot 10^{-6}$	$8.7 \cdot 10^{-7}$	$3.9 \cdot 10^{-4}$	4.4^{-5}

V_{tot} (m^3) = Total injected water volume
V (m^3) = Injected volume excluding the first 5 or 10 seconds
QT_{ave} (l/min) = Average flow rate based on V_{tot}
Q_{ave} (l/min) = Average flow rate based on V

7 References

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8 Appendices

APPENDIX 1 List of data files

APPENDIX 2 Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3542G01. February 2001

APPENDIX 3 Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3542G02. February 2001

APPENDIX 4 Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3544G01. February 2001

APPENDIX 5 Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3546G01. February 2001

APPENDIX 6 Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3548G01. February 2001

APPENDIX 7 Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3550G01. February 2001

APPENDIX 8 Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3552G01. February 2001

APPENDIX 9 Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3554G02. February 2001

APPENDIX 10 Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3554G01. February 2001

APPENDIX 11 Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3572G01. February 2001

APPENDIX 12 Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3574G01. February 2001

APPENDIX 13 Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3576G01. February 2001

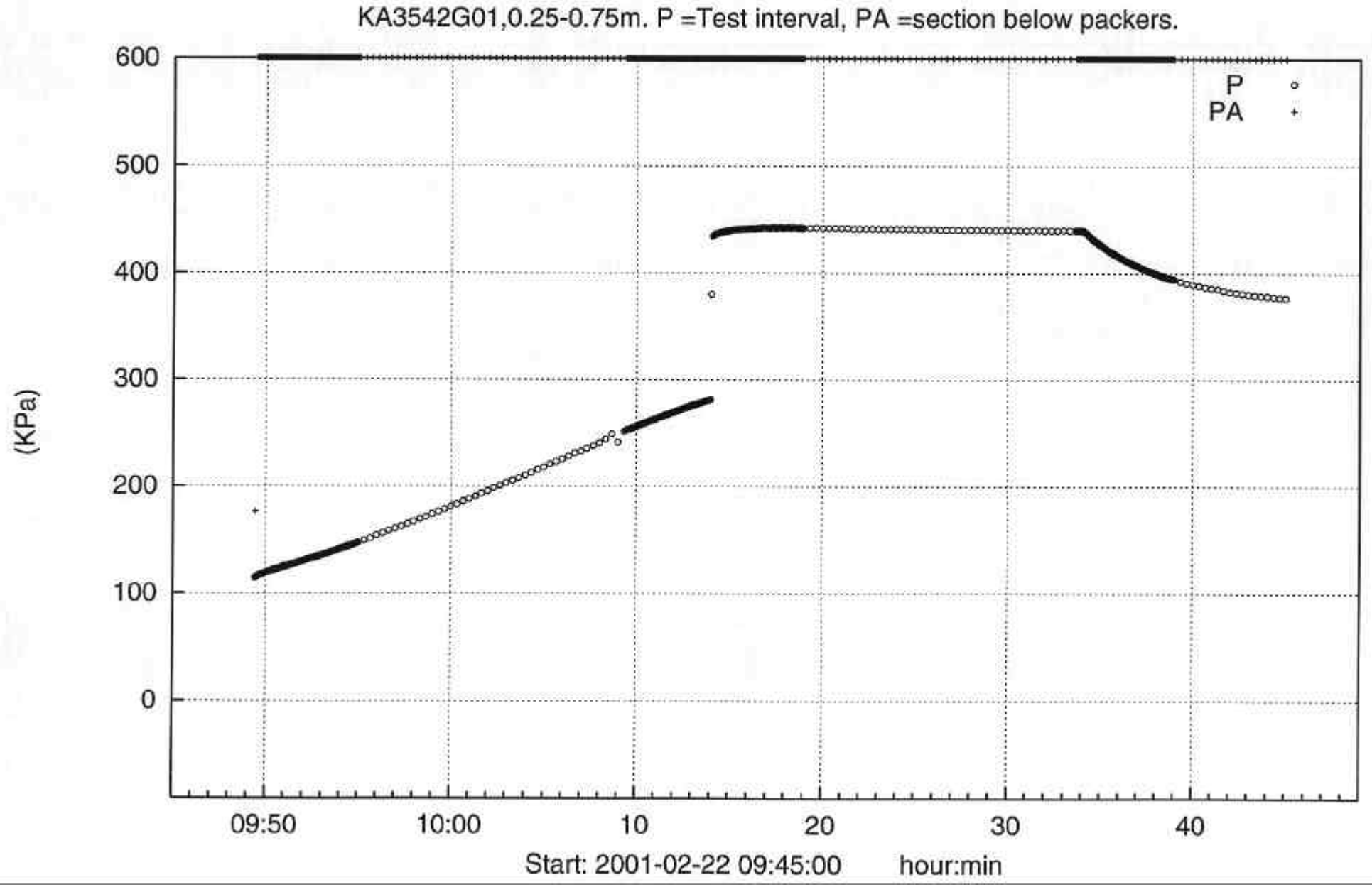
APPENDIX 14 Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3578G01. February 2001

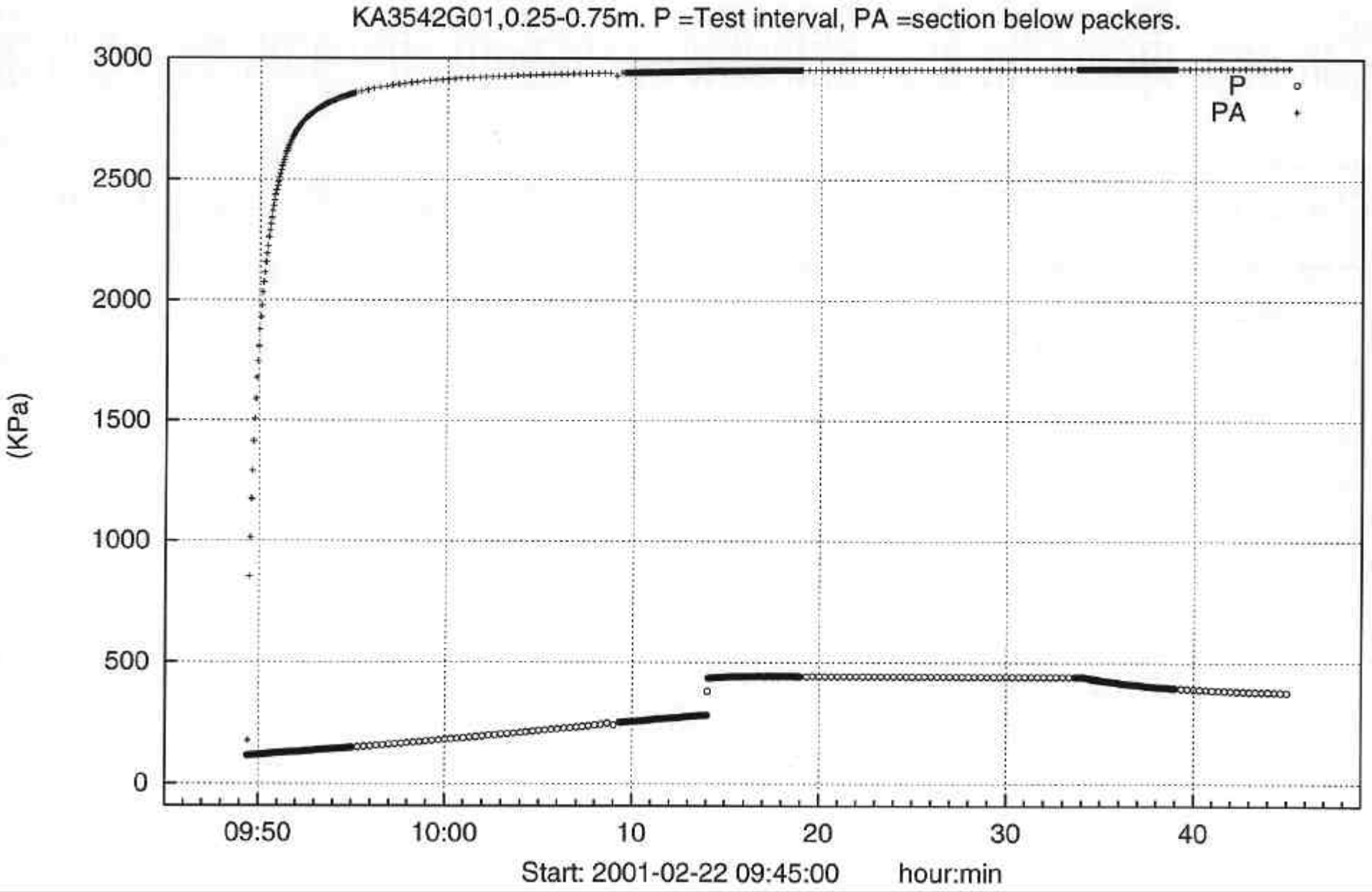
APPENDIX 1: List of data files Injection tests 2, Prototype Repository, February 2001

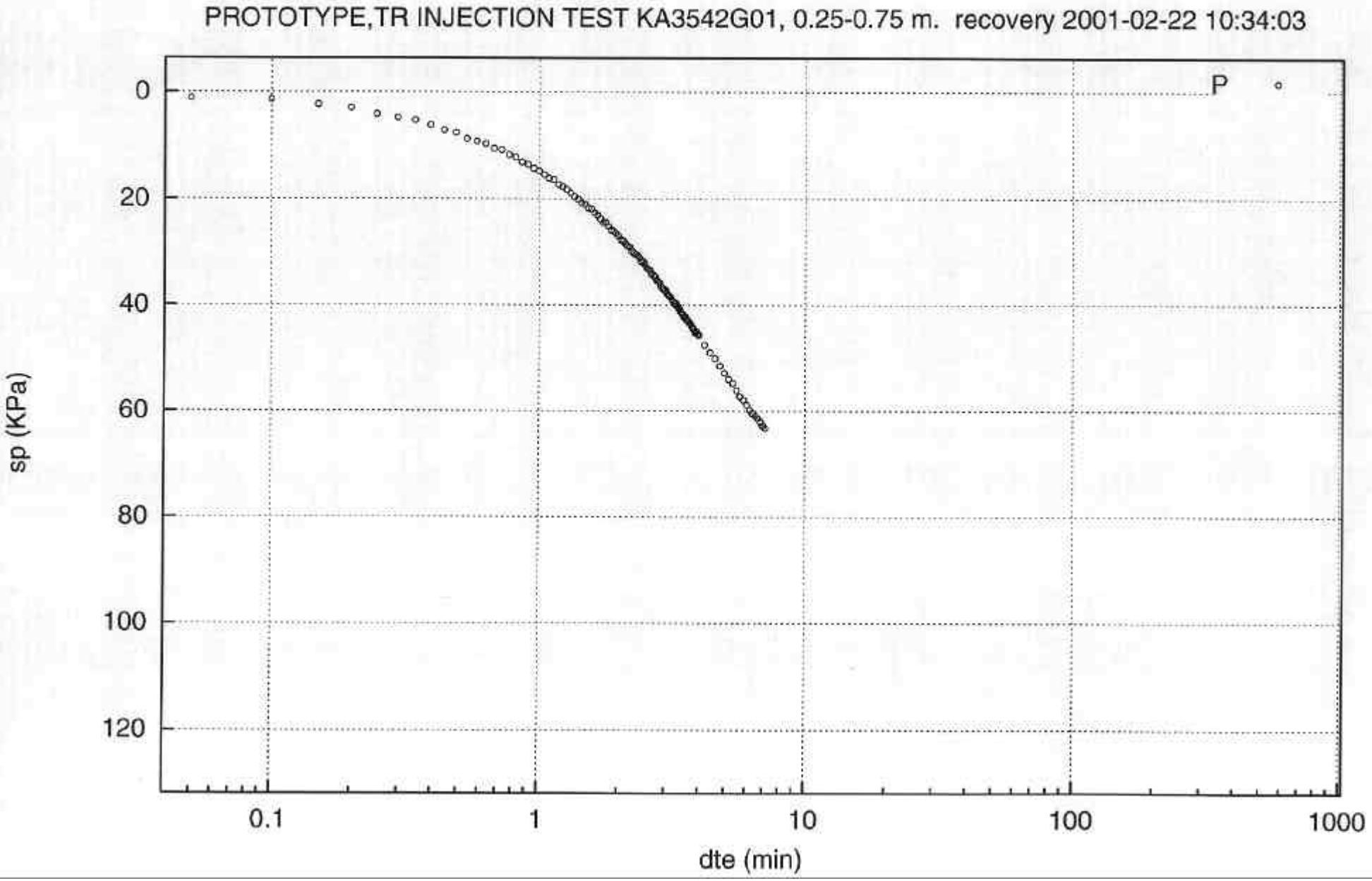
Borehole	Section (m)	Test No	Start of test	End of Test	Raw data files	Pressure data files (HYF-files)	Pressure data files (OVR-files)
KA3542G02	0.25 - 0.75	1a	010213 15:05	010213 17:46	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3542G02	0.75 -.1.25	1b	010213 17:52	010214 08:09	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3542G02	1.25 - 1.75	1c	010214 08:24	010214 10:37	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3542G01	0.25 - 0.75	1d	010214 10:43	010214 13:32	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3542G01	0.75 -.1.25	1e	010214 13:27	010214 14:28	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3542G01	1.25 - 1.75	1f	010214 14:33	010214 15:38	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3548G01	0.25 - 0.75	1g	010214 15:55	010214 17:15	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3548G01	0.75 -.1.25	1	010214 17:30	010215 08:14	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3548G01	1.25 - 1.75	2	010215 08:24	010215 09:16	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3548G01	0.25 - 0.75	3	010215 09:25	010215 10:23	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3554G01	0.25 - 0.75	4	010215 10:45	010215 14:39	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3554G01	0.75 -.1.25	6a	010215 14:47	010215 15:53	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3554G01	1.25 - 1.75	5	010215 16:02	010215 16:59	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3554G01	0.75 -.1.25	6	010215 17:05	010216 08:05	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3554G02	0.25 - 0.75	7	010216 08:59	010216 09:46	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3554G02	0.75 -.1.25	8	010216 09:52	010216 10:42	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3554G02	1.25 - 1.75	9	010216 10:45	010216 12:47	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3546G01	0.25 - 0.75	10a	010216 13:10	010216 14:16	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3546G01	0.25 - 0.75	10	010216 13:10	010219 09:59	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3546G01	0.75 -.1.25	11	010219 10:05	010219 10:59	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3546G01	1.25 - 1.75	12	010219 11:07	010219 13:02	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3544G01	0.25 - 0.75	13	010219 13:37	010219 15:06	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3544G01	0.75 -.1.25	14	010219 15:10	010219 16:15	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3544G01	1.25 - 1.75	15	010219 16:08	010219 17:02	PRINJ250.BOR	PRINJ250.HYF	PRINJ250.OVR
KA3550G01	0.25 - 0.75	16	010220 11:22	010220 13:30	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3550G01	0.75 -.1.25	17	010220 13:35	010220 14:24	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3550G01	1.25 - 1.75	18	010220 14:27	010220 15:28	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3552G01	0.25 - 0.75	19	010220 15:45	010220 16:35	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3552G01	0.75 -.1.25	20	010220 16:37	010221 08:07	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3552G01	1.25 - 1.75	21	010221 08:18	010221 09:23	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3578G01	0.25 - 0.75	22	010221 10:37	010221 12:51	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3578G01	0.75 -.1.25	23	010221 12:55	010221 13:47	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3578G01	1.25 - 1.75	24	010221 13:49	010221 14:58	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3572G01	0.25 - 0.75	25	010221 15:20	010221 16:24	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3572G01	0.75 -.1.25	26	010221 16:25	010222 08:04	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3572G01	1.25 - 1.75	27	010222 08:05	010222 09:09	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3542G01	0.25 - 0.75	28	010222 09:12	010222 10:45	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3542G01	0.75 -.1.25	29	010222 10:48	010222 12:48	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3542G01	1.25 - 1.75	30	010222 12:55	010222 13:41	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3542G02	0.25 - 0.75	31	010222 14:48	010222 15:57	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3542G02	0.75 -.1.25	32	010222 16:03	010222 16:50	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3542G02	1.25 - 1.75	33	010222 16:53	010222 18:23	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3576G01	0.25 - 0.75	34	010222 18:28	010222 19:40	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3576G01	0.75 -.1.25	35	010222 19:42	010222 20:28	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3576G01	1.25 - 1.75	36	010222 20:30	010223 08:27	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3574G01	0.25 - 0.75	37	010223 08:28	010223 10:13	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3574G01	0.75 -.1.25	38	010223 10:16	010223 11:03	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR
KA3574G01	1.25 - 1.75	39	010223 11:05	010223 13:30	PRINJ254.BOR	PRINJ254.HYF	PRINJ254.OVR

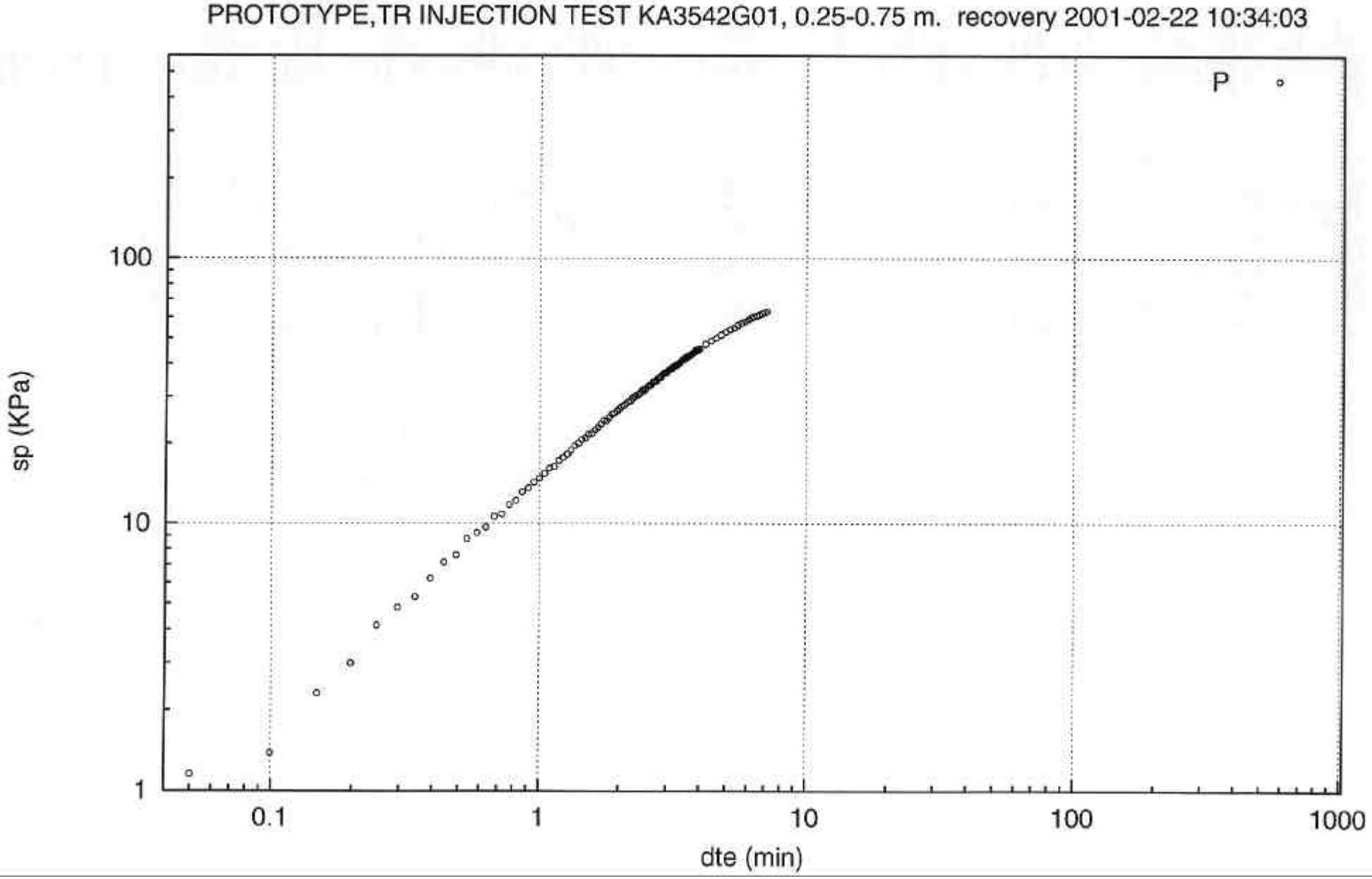
The Calibration file **BORRE39.CAL** was used when converting "BOR-files " to "HYF-files".

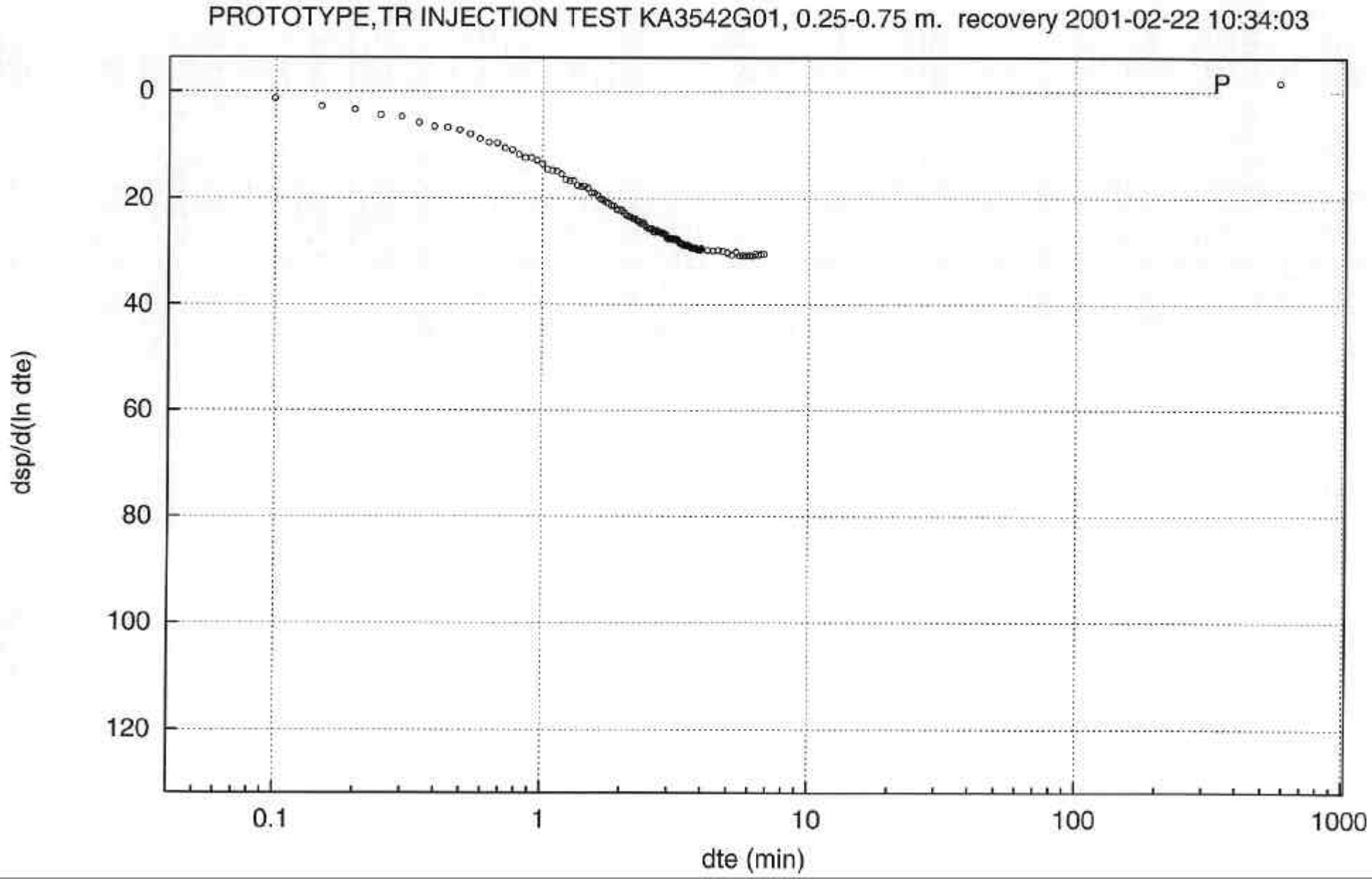
APPENDIX 2 Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3542G01. February 2001

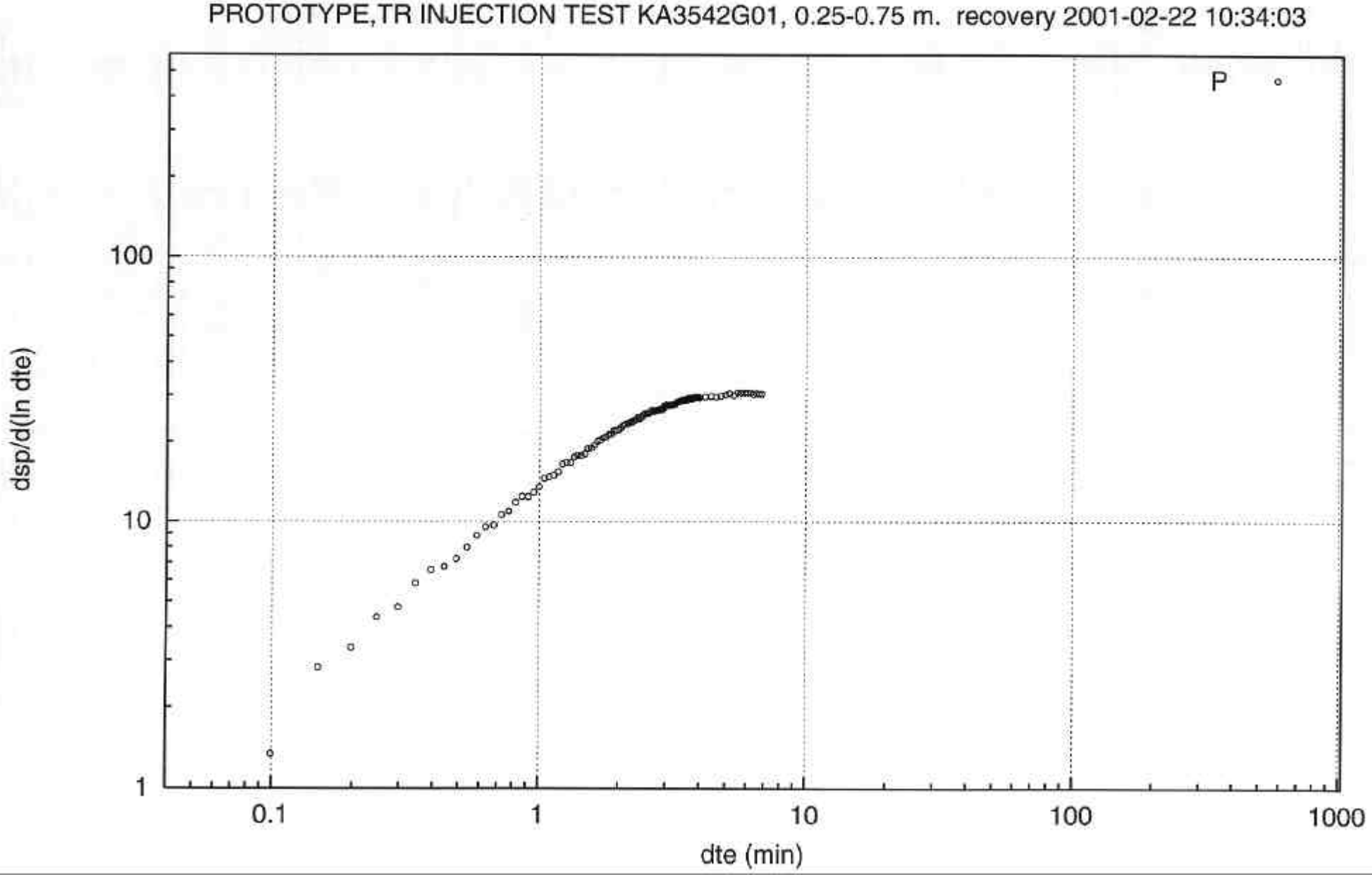

KA3542G01,0.25-0.75m. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
09:50
10:00
10
20
30
40
Start: 2001-02-22 09:45:00
hour:min

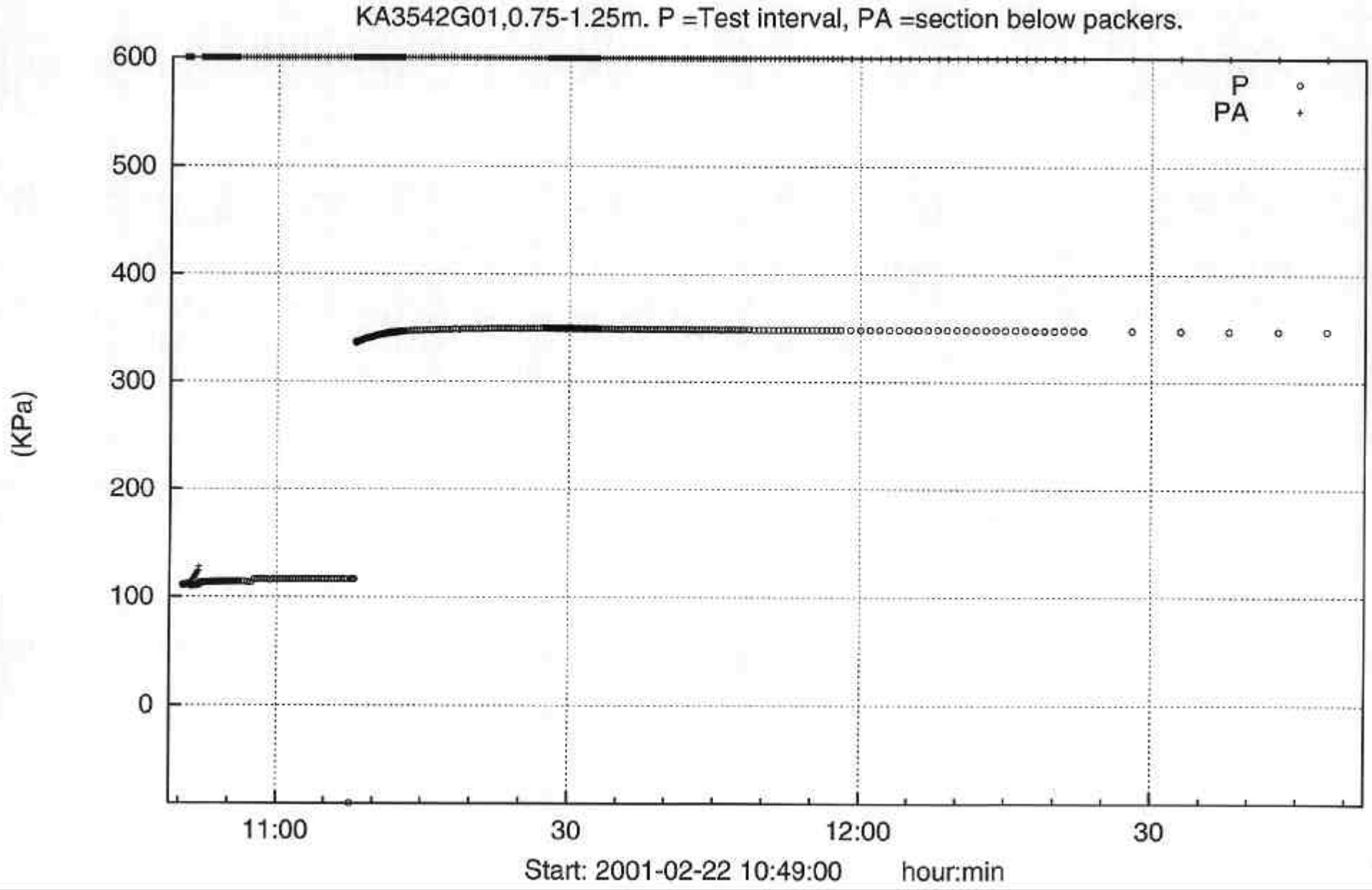

KA3542G01,0.25-0.75m. P =Test interval, PA =section below packers.
3000
2500
2000
1500
1000
500
0
(KPa)
P
PA
09:50
10:00
10
20
30
40
Start: 2001-02-22 09:45:00
hour:min

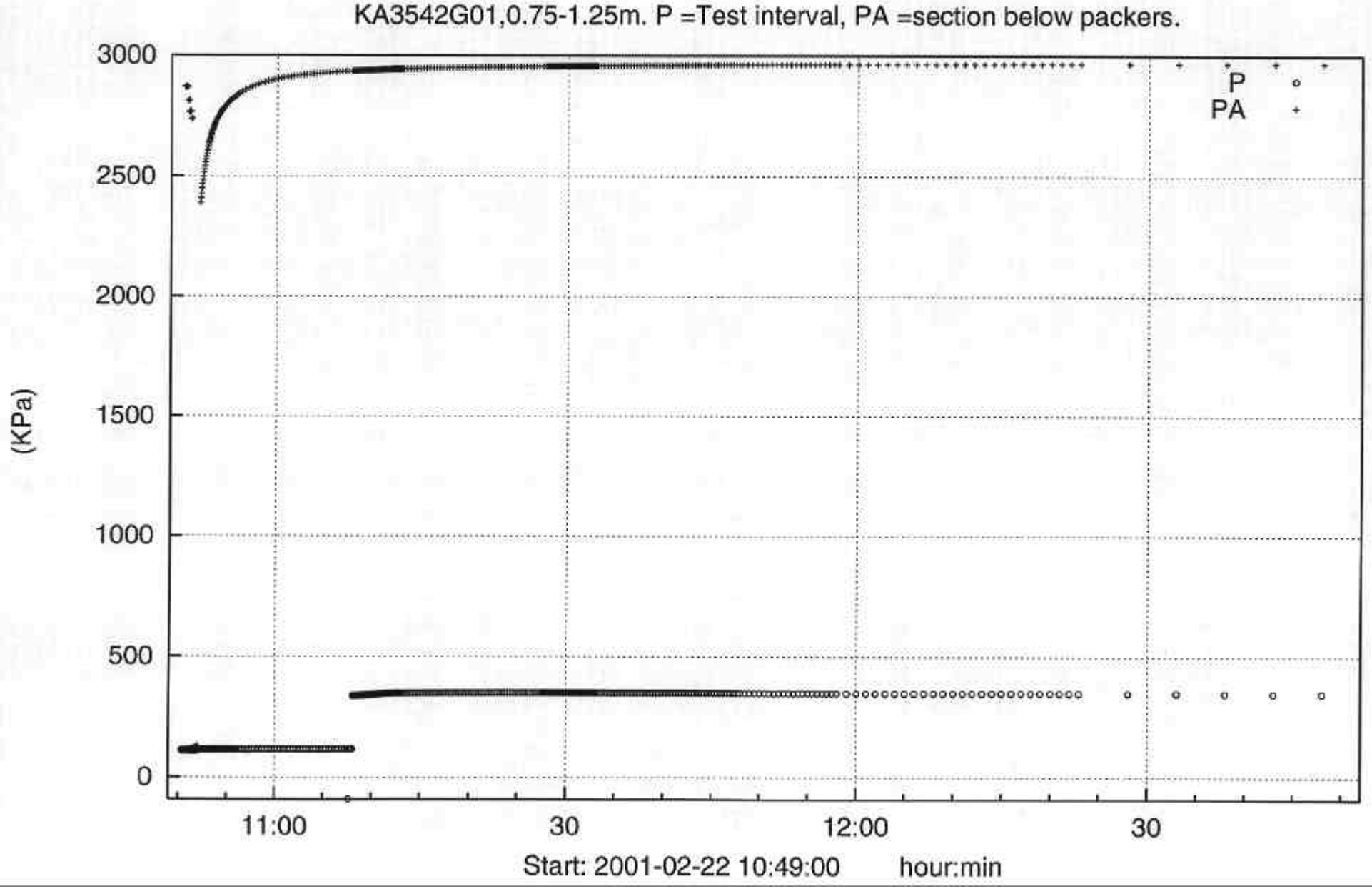

PROTOTYPE,TR INJECTION TEST KA3542G01, 0.25-0.75 m. recovery 2001-02-22 10:34:03
P
sp (KPa)
0
20
40
60
80
100
120
0.1
1
10
100
1000
dte (min)

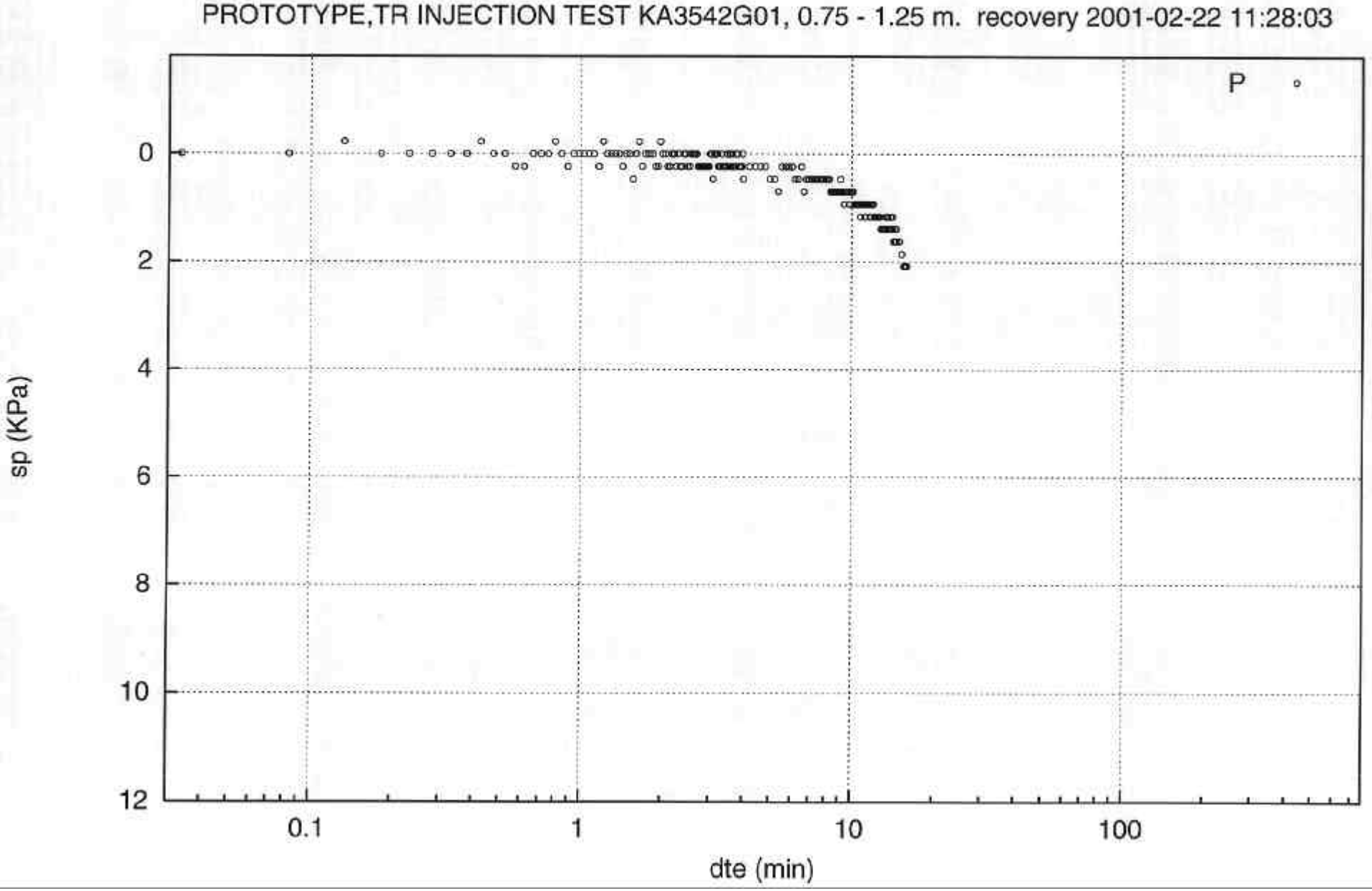

PROTOTYPE,TR INJECTION TEST KA3542G01, 0.25-0.75 m. recovery 2001-02-22 10:34:03
P
sp (KPa)
100
10
1
0.1
1
10
100
1000
dte (min)

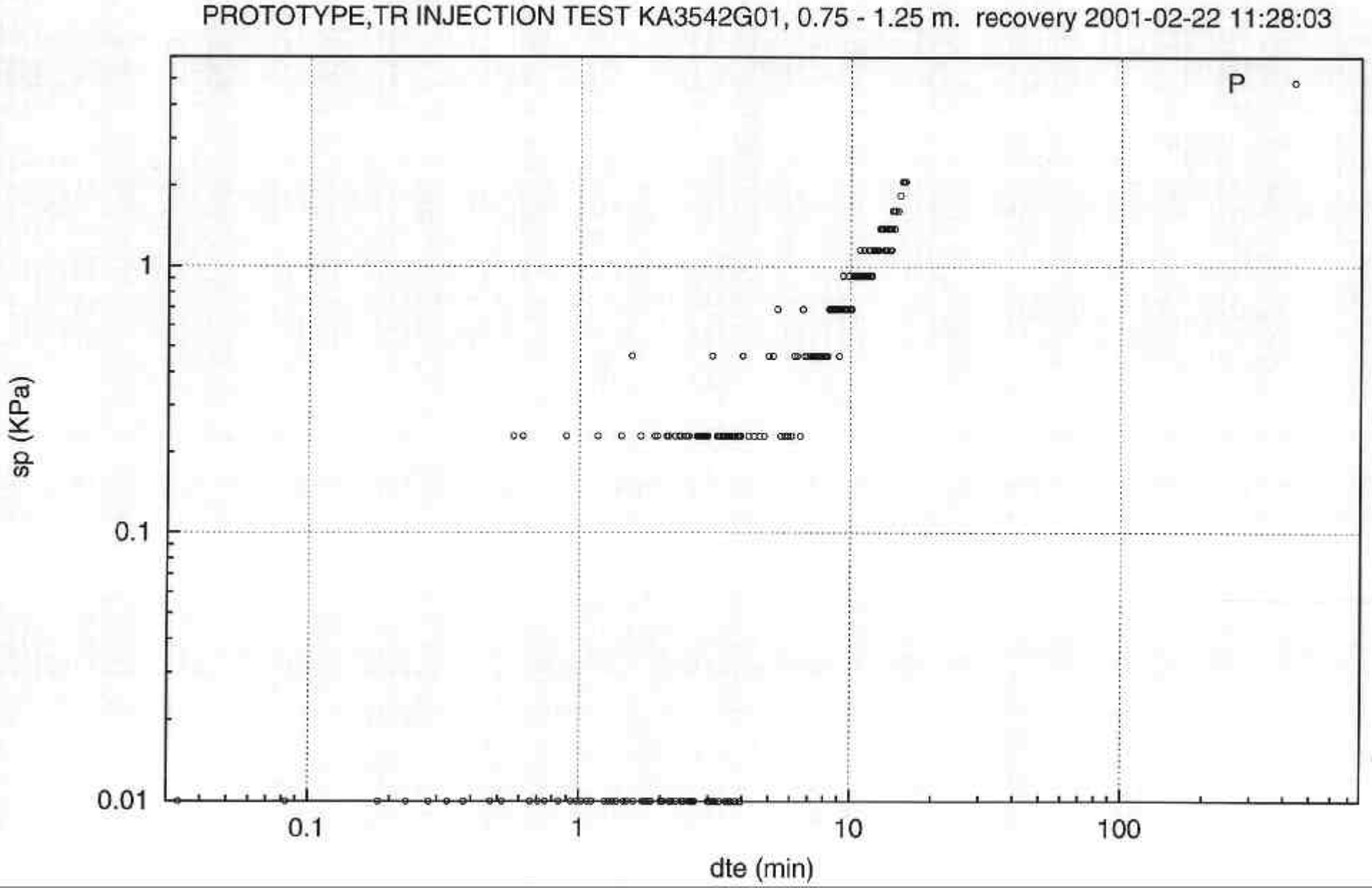

PROTOTYPE,TR INJECTION TEST KA3542G01, 0.25-0.75 m. recovery 2001-02-22 10:34:03
P
0
20
40
60
80
100
120
dsp/d(ln dte)
0.1
1
10
100
1000
dte (min)

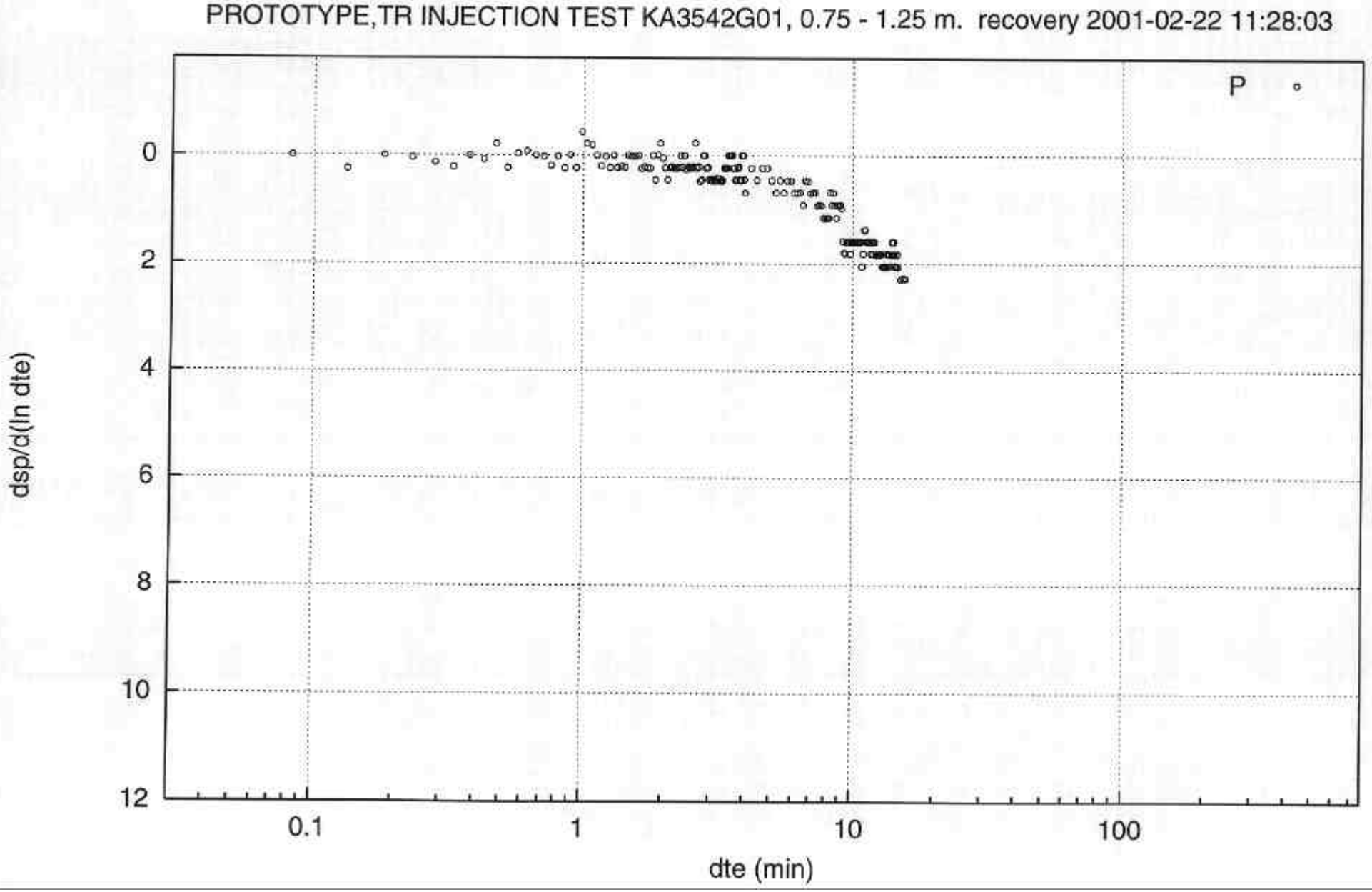

PROTOTYPE,TR INJECTION TEST KA3542G01, 0.25-0.75 m. recovery 2001-02-22 10:34:03
P
dsp/d(ln dte)
100
10
1
0.1
1
10
100
1000
dte (min)

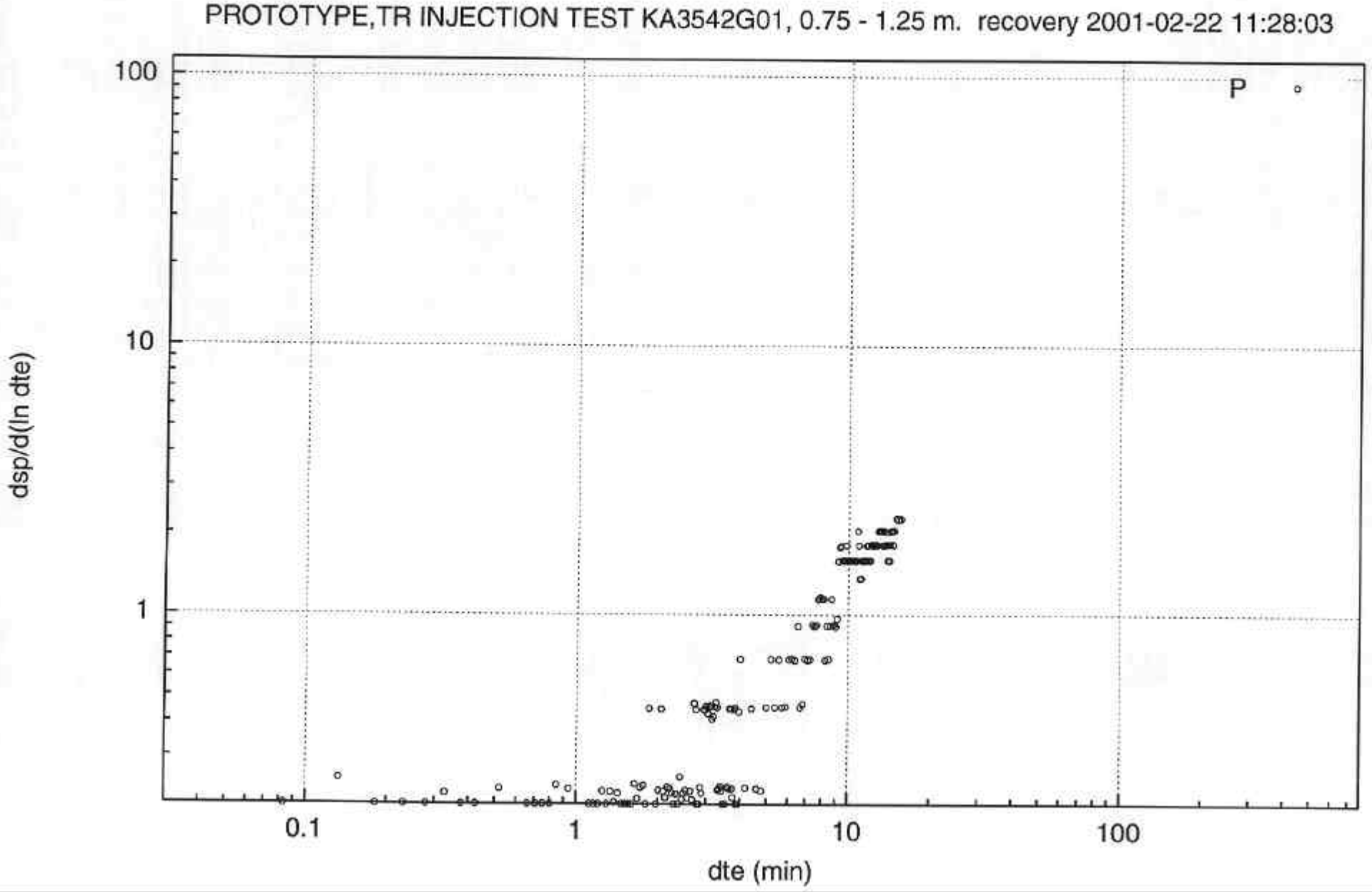

KA3542G01,0.75-1.25m. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
11:00
30
12:00
30
Start: 2001-02-22 10:49:00
hour:min

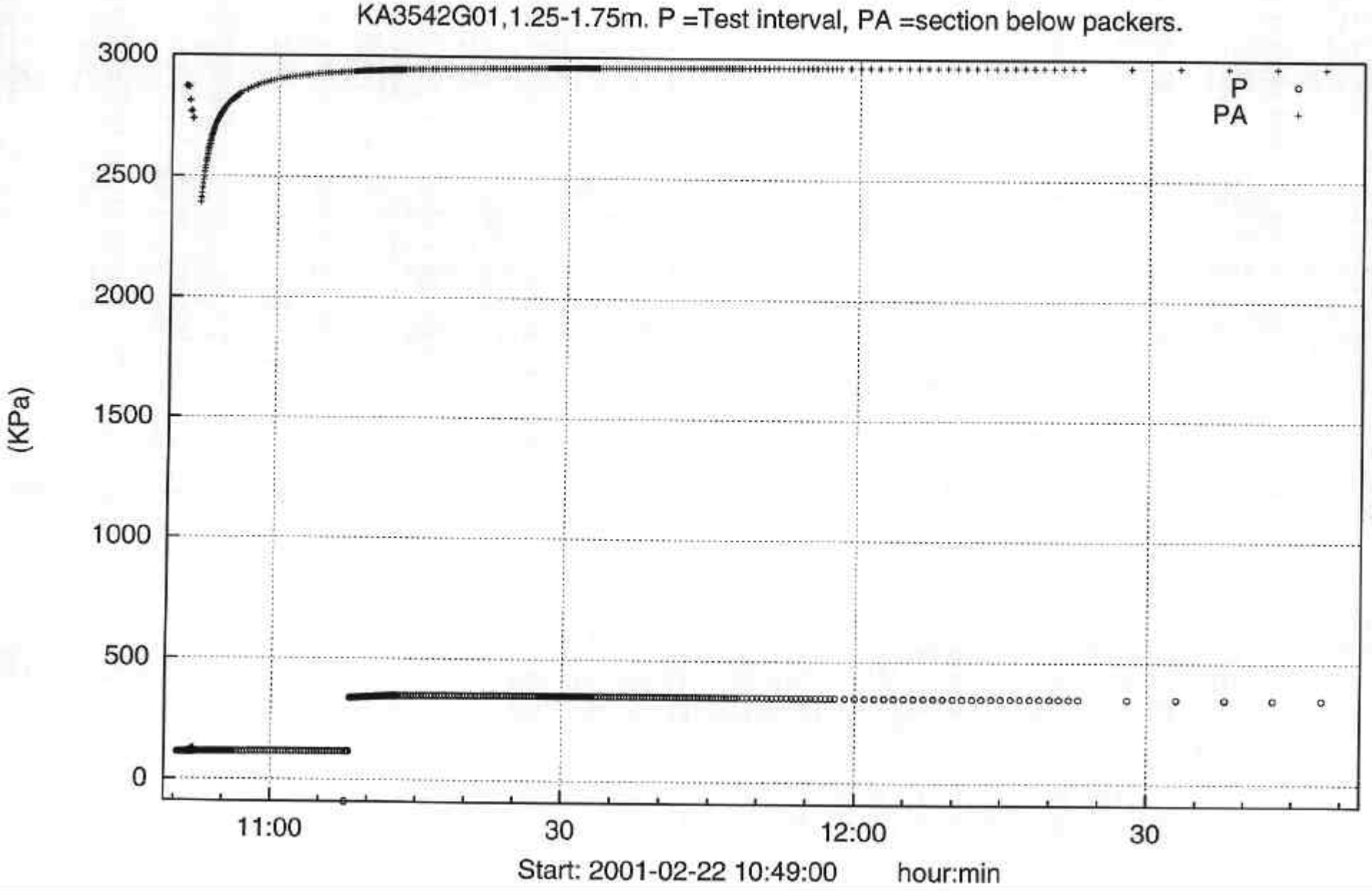

KA3542G01,0.75-1.25m. P =Test interval, PA =section below packers.
3000
2500
2000
1500
1000
500
0
(KPa)
P
PA
11:00
30
12:00
30
Start: 2001-02-22 10:49:00
hour:min

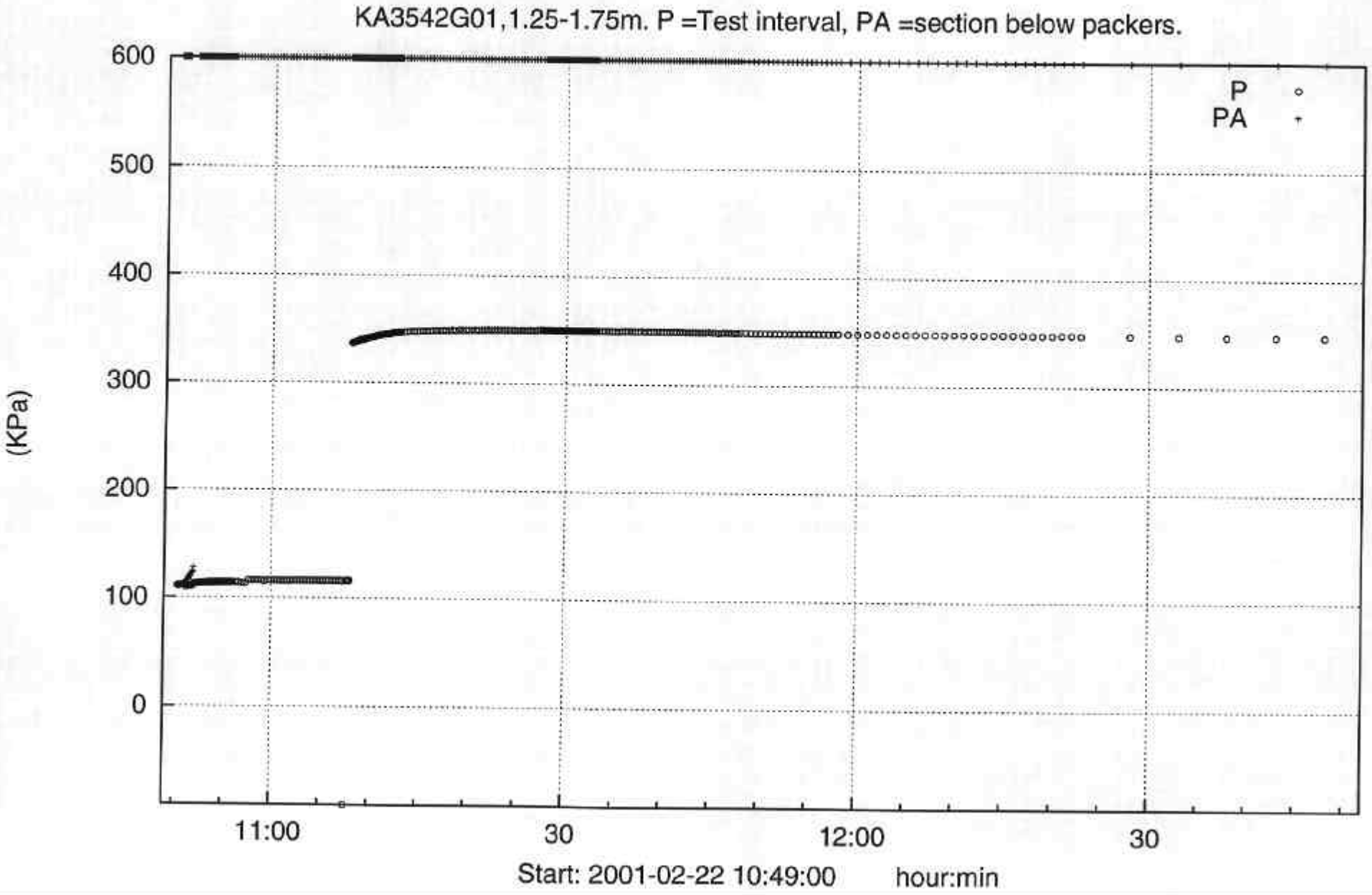

PROTOTYPE,TR INJECTION TEST KA3542G01, 0.75 - 1.25 m. recovery 2001-02-22 11:28:03
P
sp (KPa)
0
2
4
6
8
10
12
0.1
1
10
100
dte (min)

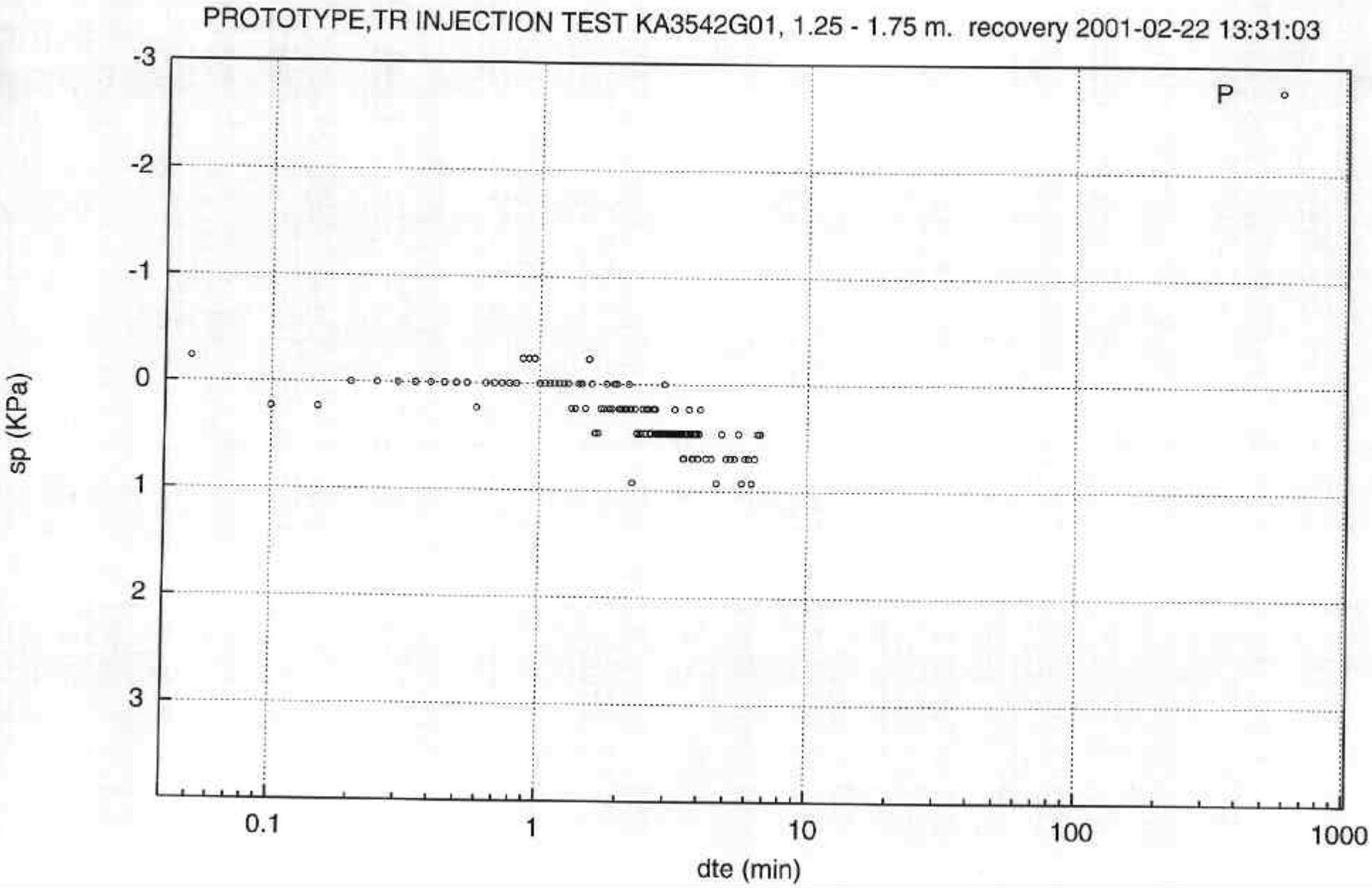

PROTOTYPE,TR INJECTION TEST KA3542G01, 0.75 - 1.25 m. recovery 2001-02-22 11:28:03
P
sp (KPa)
1
0.1
0.01
0.1
1
10
100
dte (min)

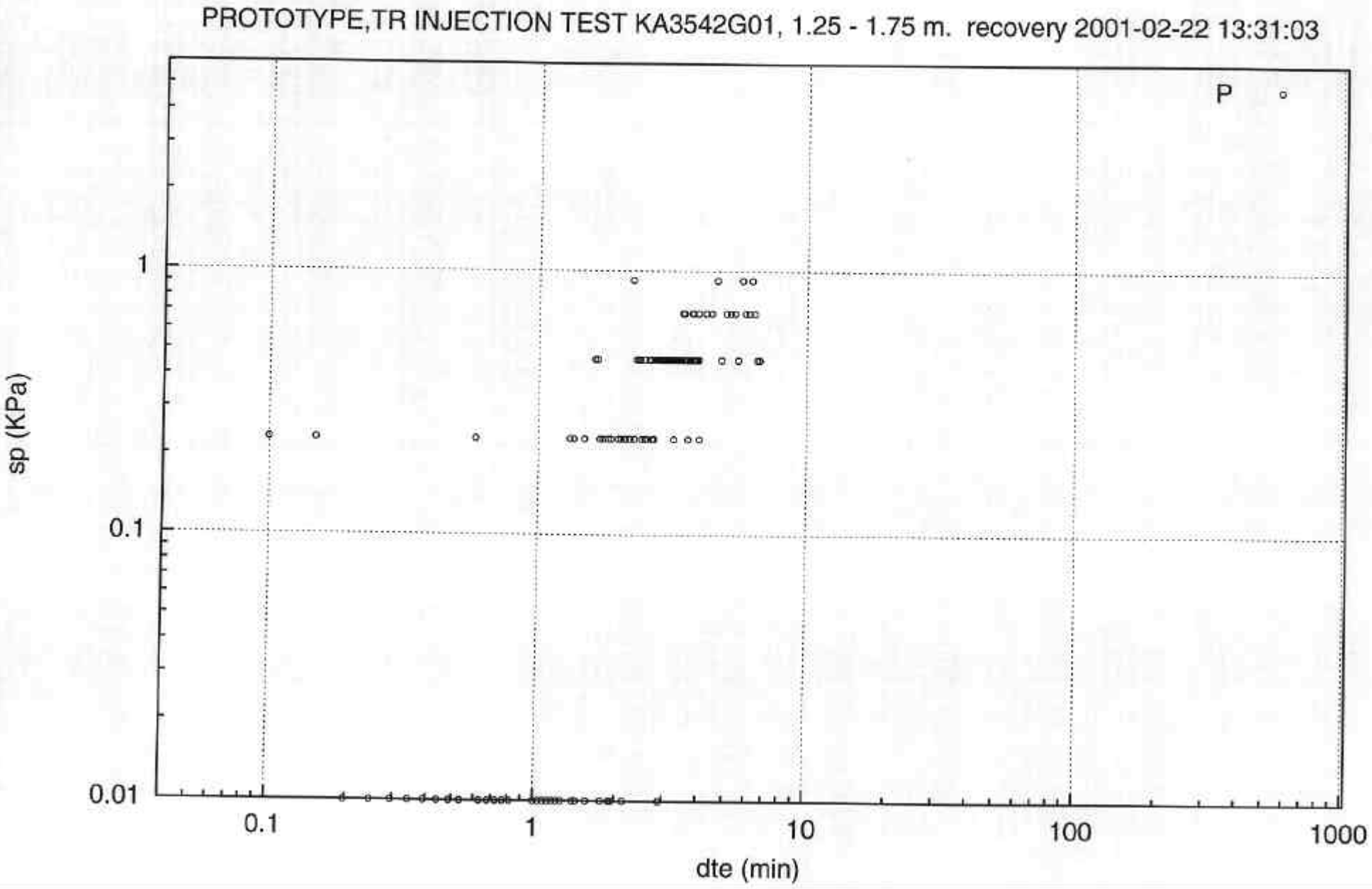

PROTOTYPE,TR INJECTION TEST KA3542G01, 0.75 - 1.25 m. recovery 2001-02-22 11:28:03
P
dsp/d(ln dte)
0
2
4
6
8
10
12
0.1
1
10
100
dte (min)

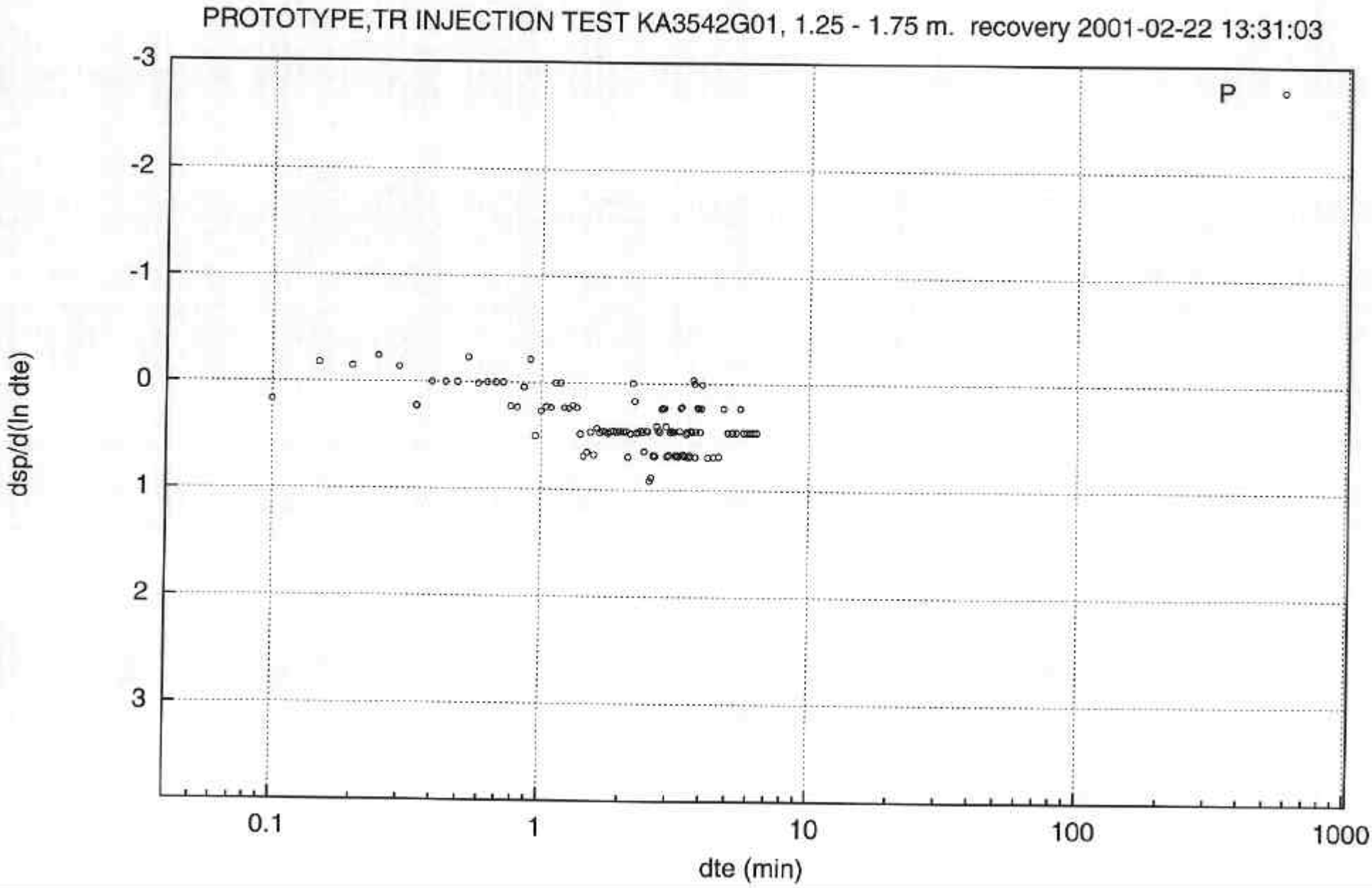

PROTOTYPE,TR INJECTION TEST KA3542G01, 0.75 - 1.25 m. recovery 2001-02-22 11:28:03
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
dte (min)

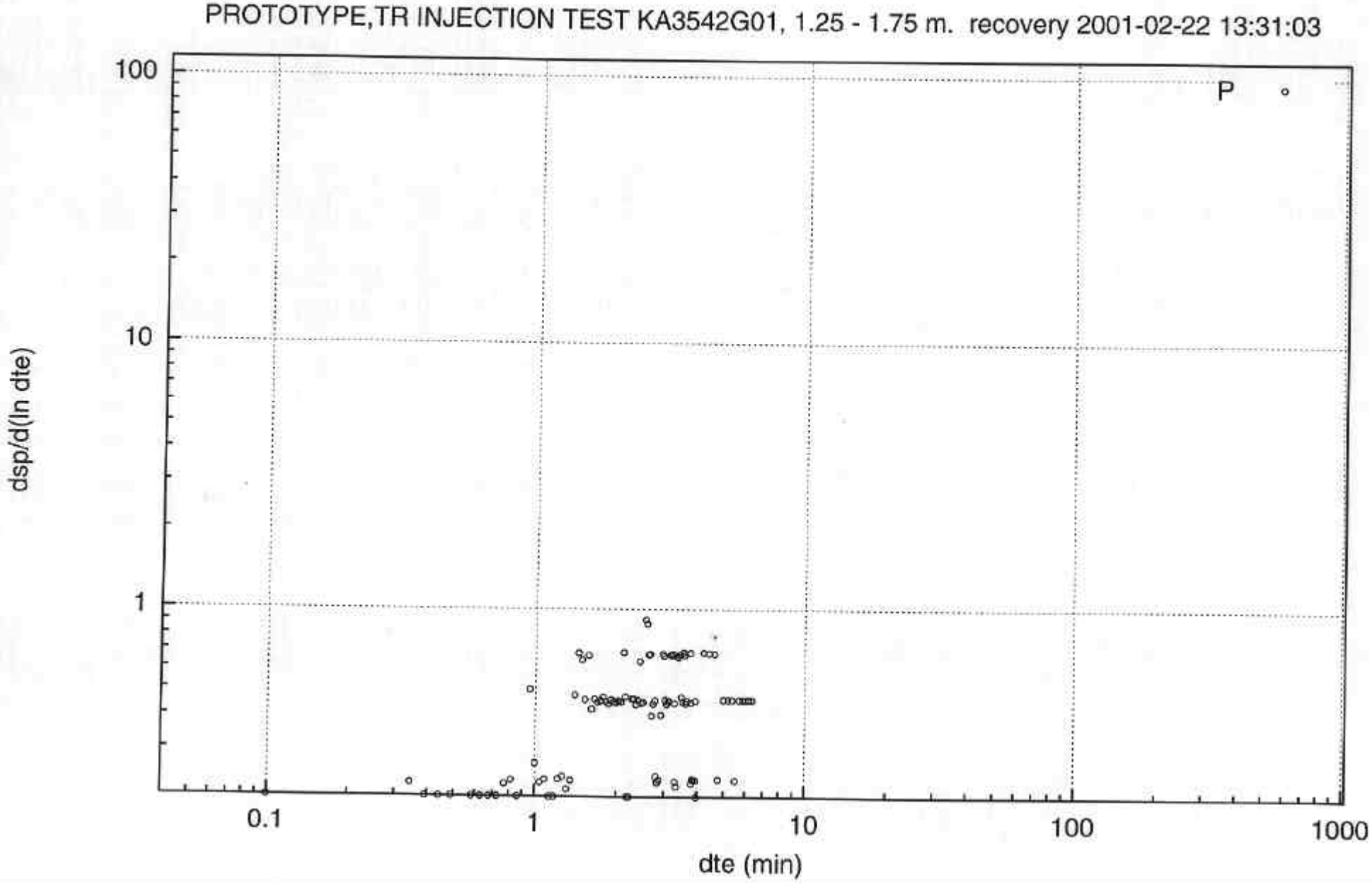

KA3542G01,1.25-1.75m. P =Test interval, PA =section below packers.
3000
2500
2000
1500
1000
500
0
(KPa)
P
PA
11:00
30
12:00
30
Start: 2001-02-22 10:49:00
hour:min


KA3542G01,1.25-1.75m. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
11:00
30
12:00
30
Start: 2001-02-22 10:49:00
hour:min

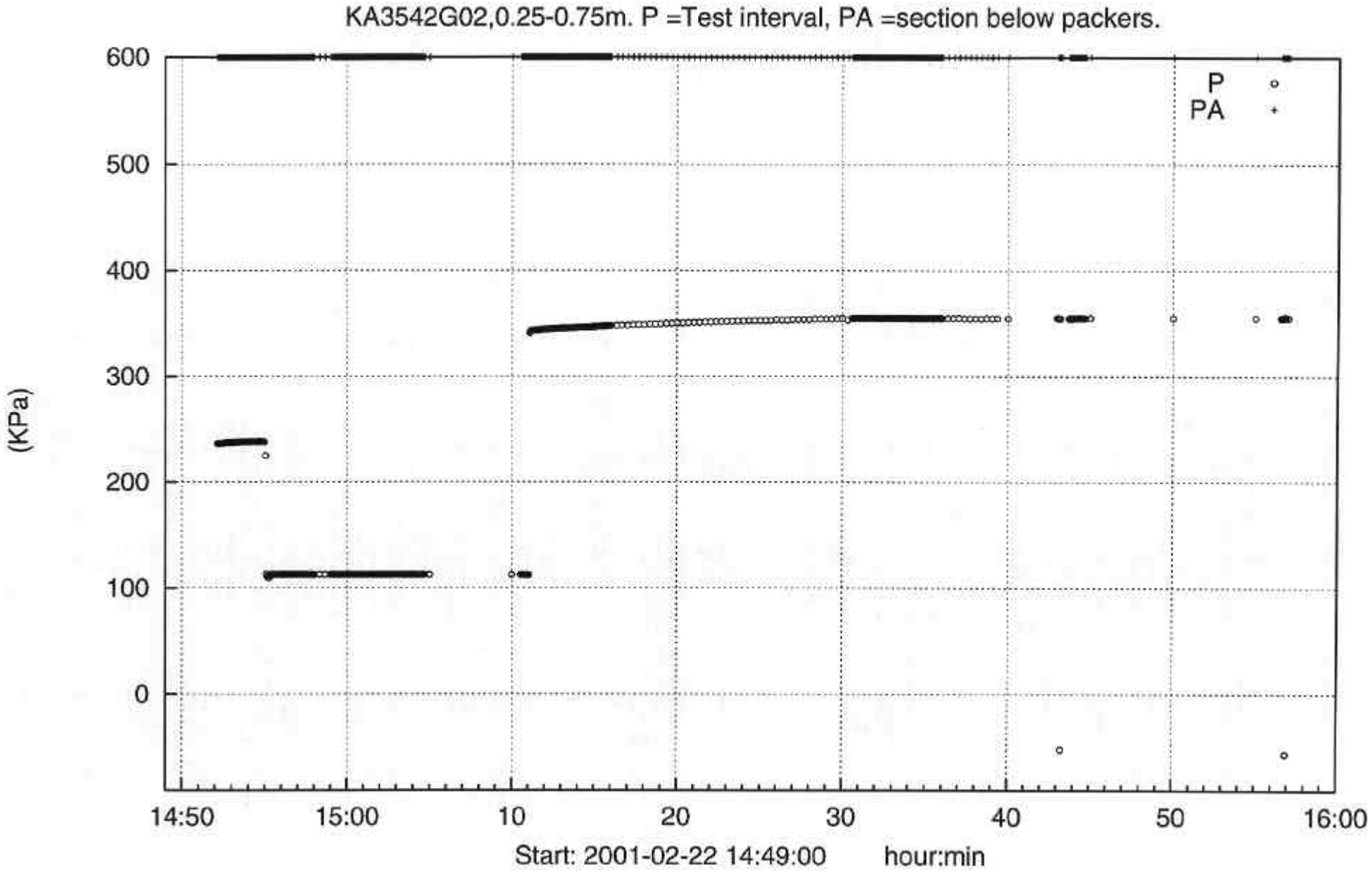

PROTOTYPE,TR INJECTION TEST KA3542G01, 1.25 - 1.75 m. recovery 2001-02-22 13:31:03
P
sp (KPa)
-3
-2
-1
0
1
2
3
0.1
1
10
100
1000
dte (min)

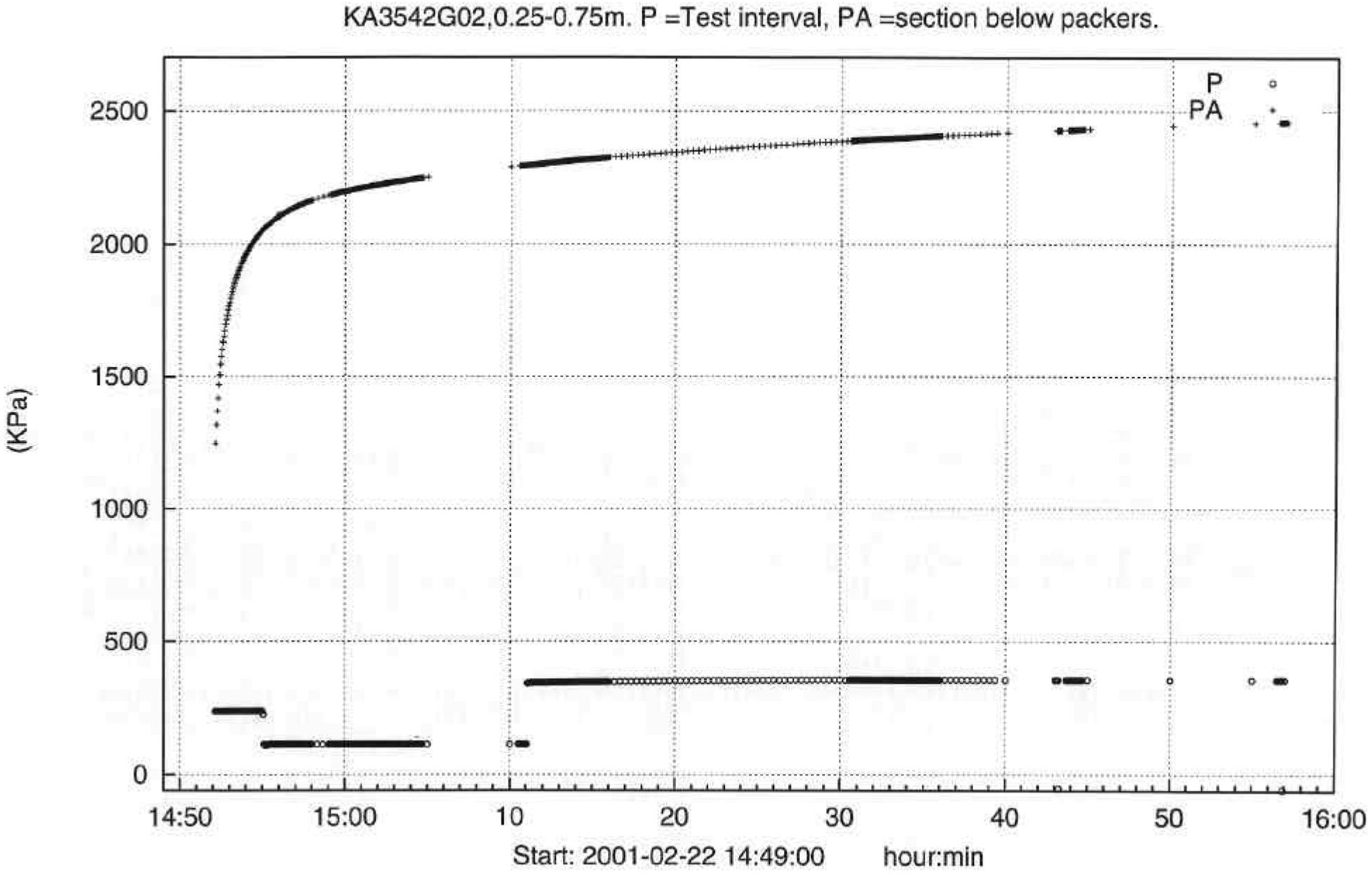

PROTOTYPE,TR INJECTION TEST KA3542G01, 1.25 - 1.75 m. recovery 2001-02-22 13:31:03
P
sp (KPa)
1
0.1
0.01
0.1
1
10
100
1000
dte (min)

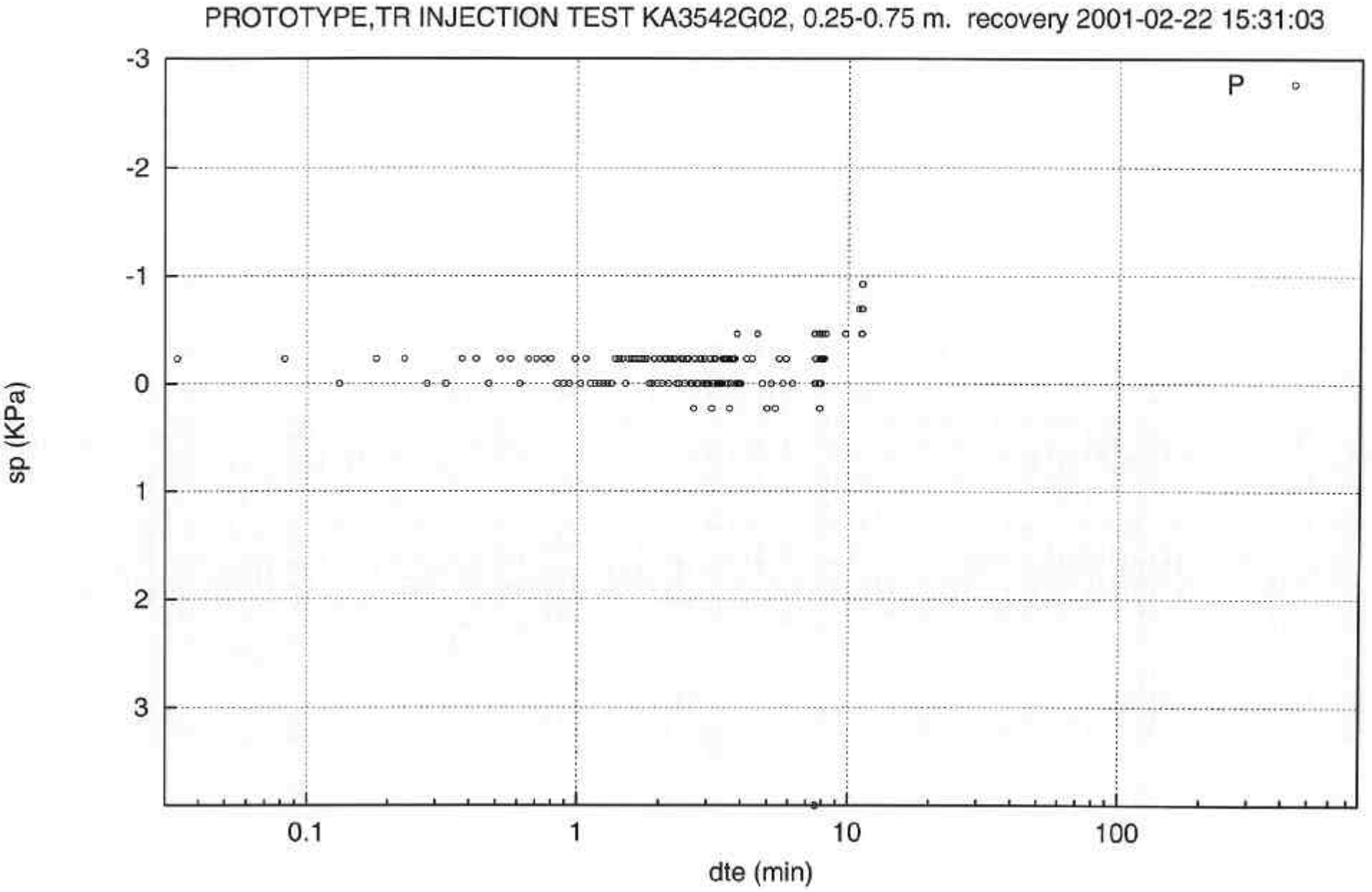

PROTOTYPE,TR INJECTION TEST KA3542G01, 1.25 - 1.75 m. recovery 2001-02-22 13:31:03
P
dsp/d(ln dte)
-3
-2
-1
0
1
2
3
0.1
1
10
100
1000
dte (min)

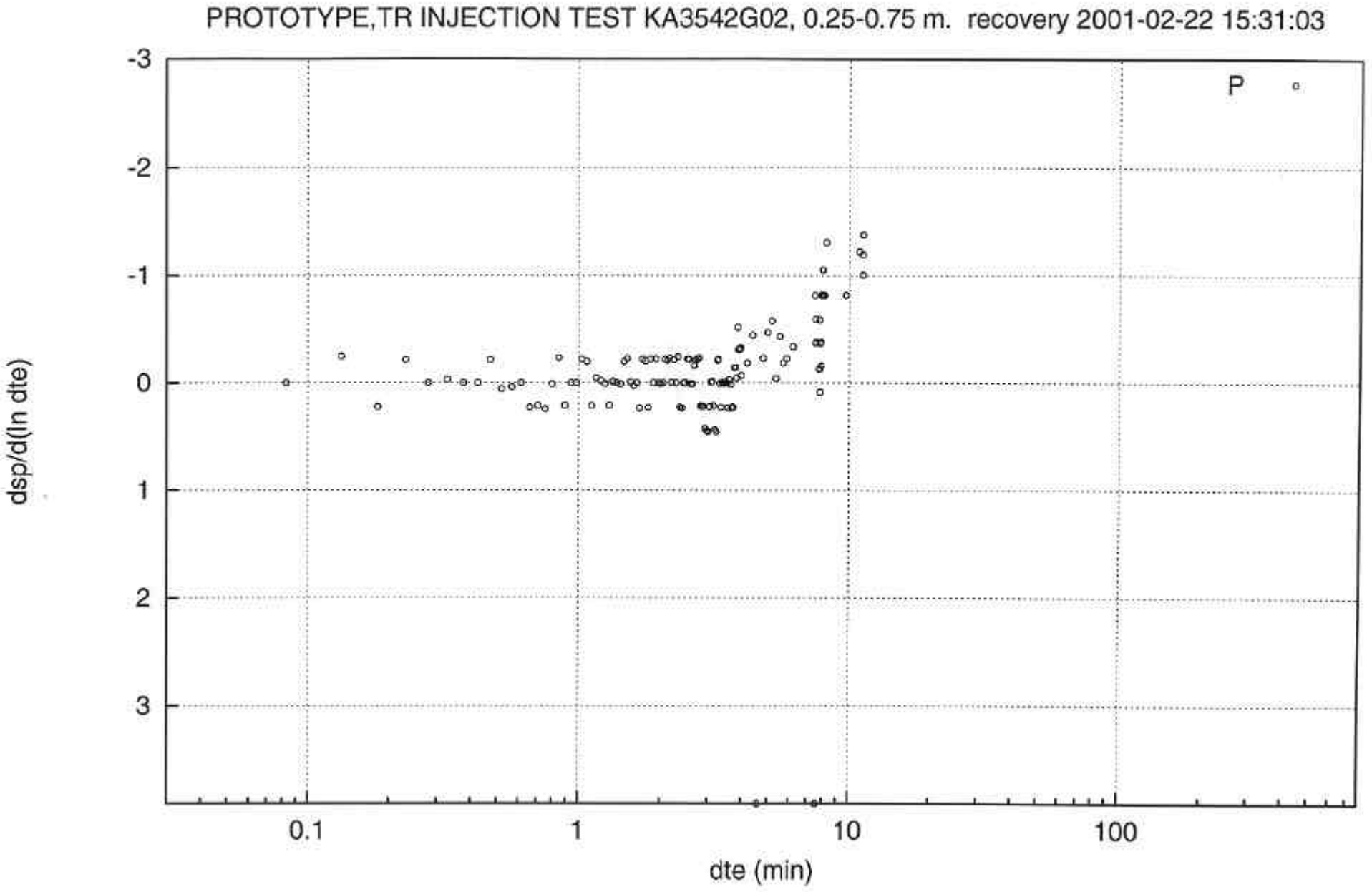

PROTOTYPE,TR INJECTION TEST KA3542G01, 1.25 - 1.75 m. recovery 2001-02-22 13:31:03
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
1000
dte (min)

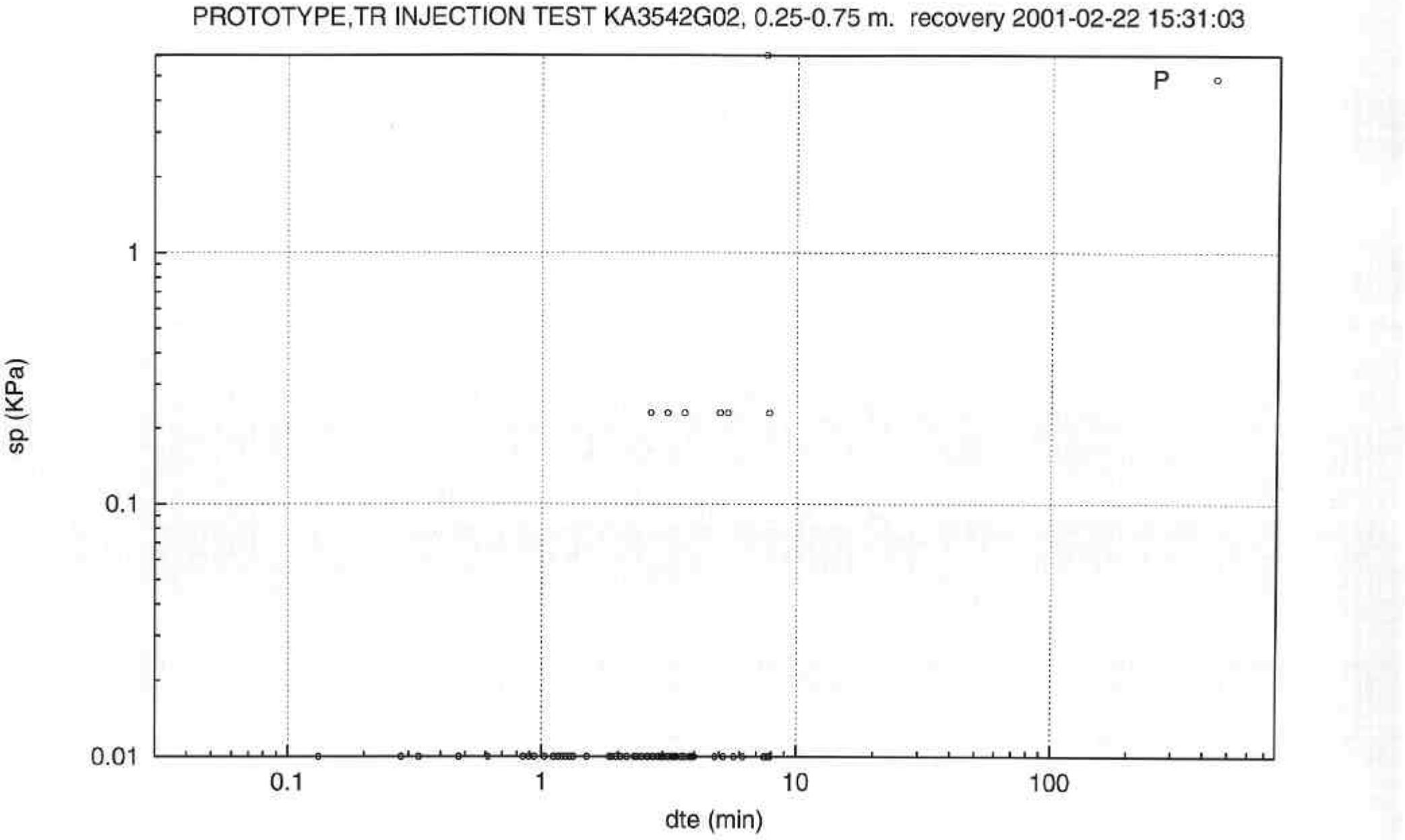
APPENDIX 3: Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3542G02. February 2001

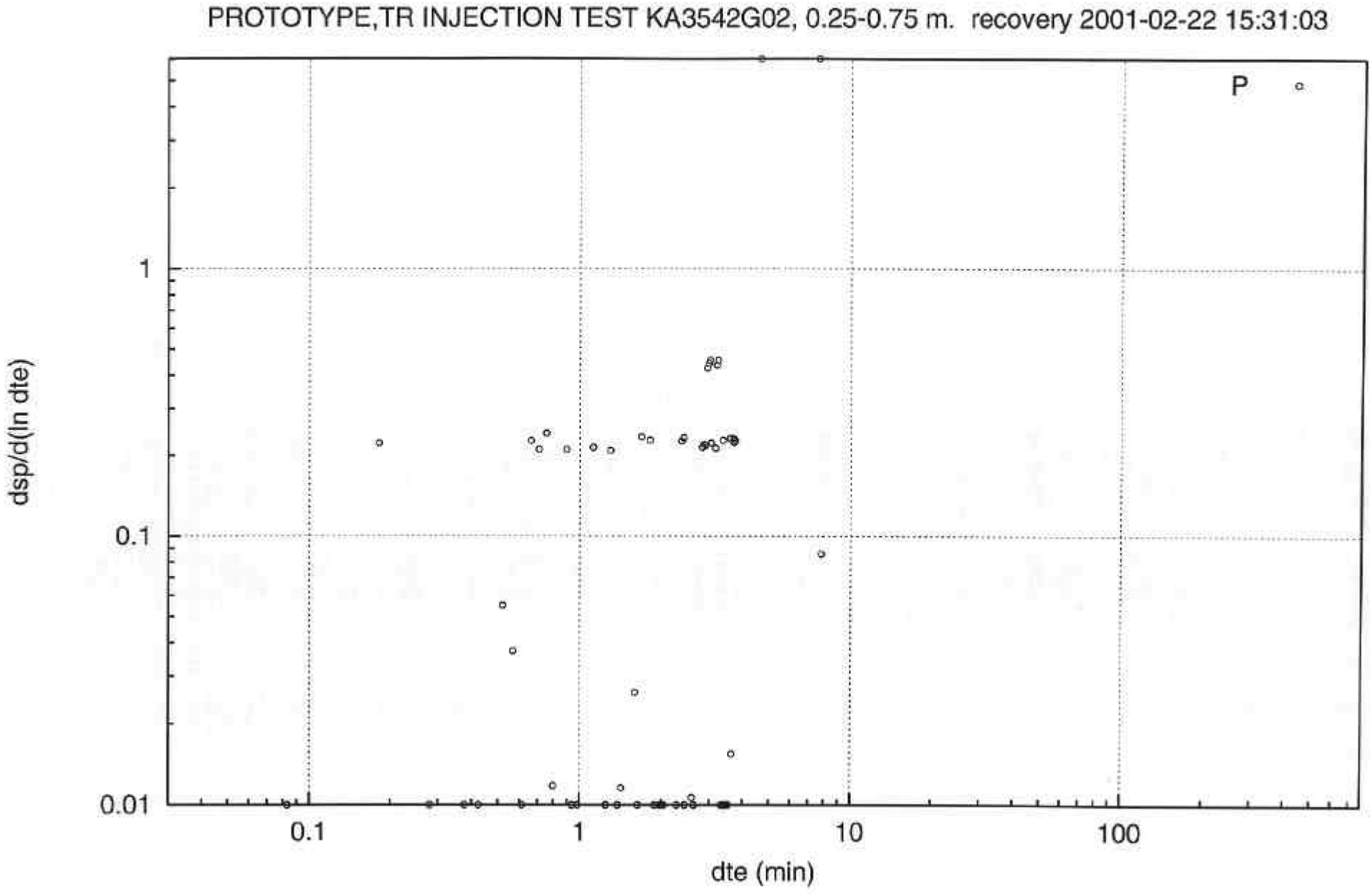

KA3542G02,0.25-0.75m. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
14:50
15:00
10
20
30
40
50
16:00
Start: 2001-02-22 14:49:00
hour:min

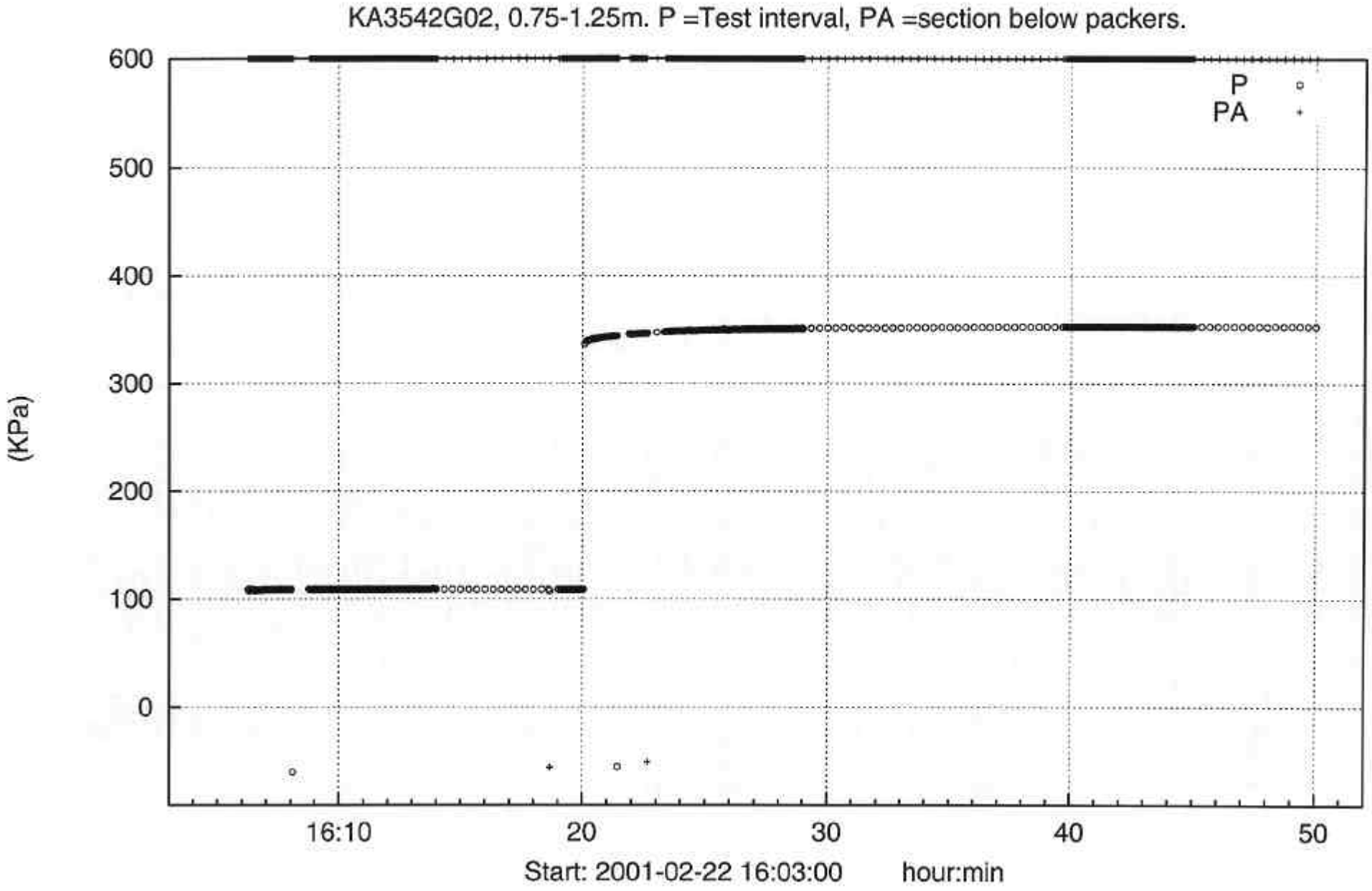

KA3542G02,0.25-0.75m. P =Test interval, PA =section below packers.
P
PA
2500
2000
1500
1000
500
0
(KPa)
14:50
15:00
10
20
30
40
50
16:00
Start: 2001-02-22 14:49:00
hour:min

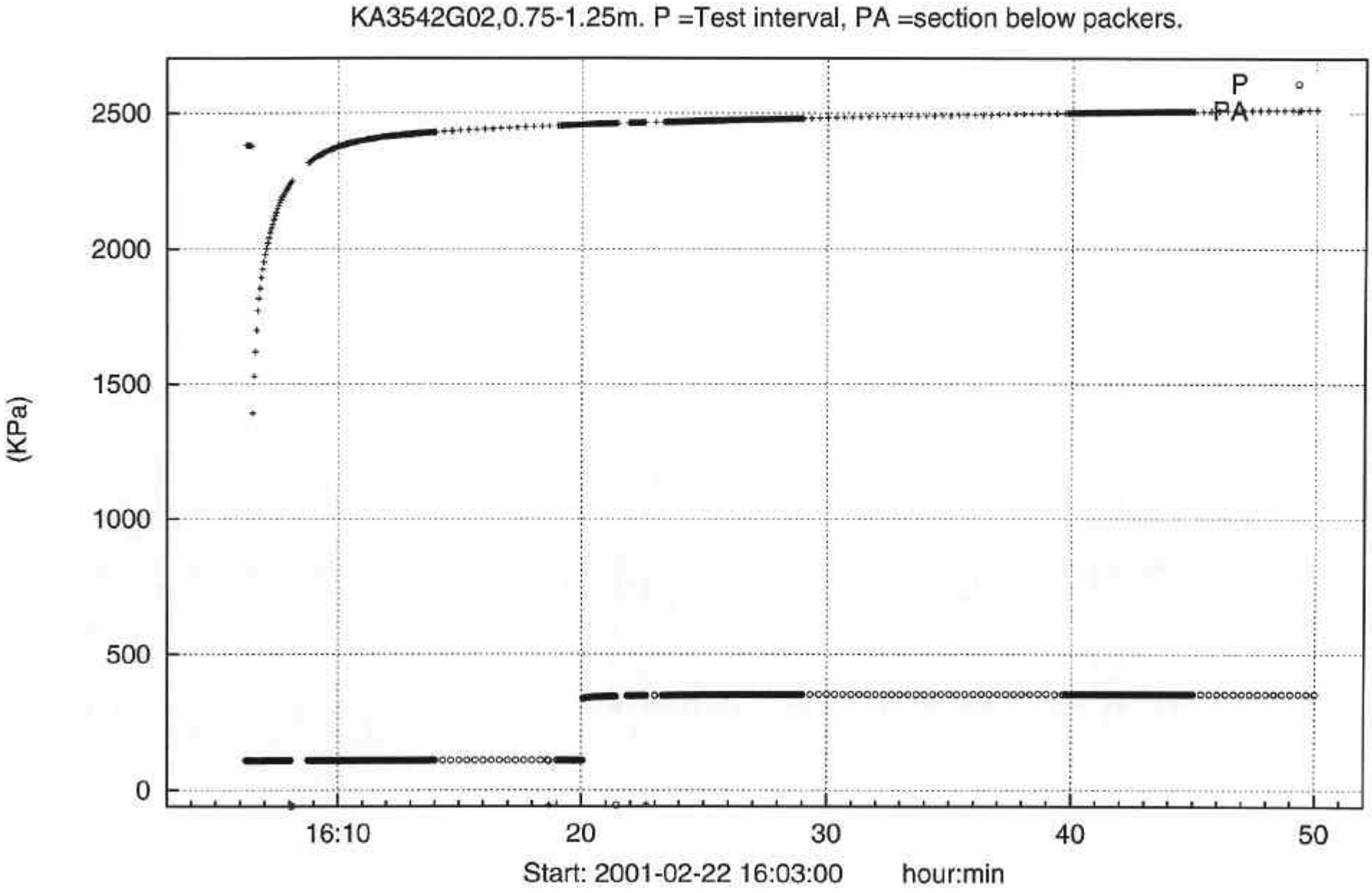

PROTOTYPE,TR INJECTION TEST KA3542G02, 0.25-0.75 m. recovery 2001-02-22 15:31:03
P
sp (KPa)
-3
-2
-1
0
1
2
3
0.1
1
10
100
dte (min)

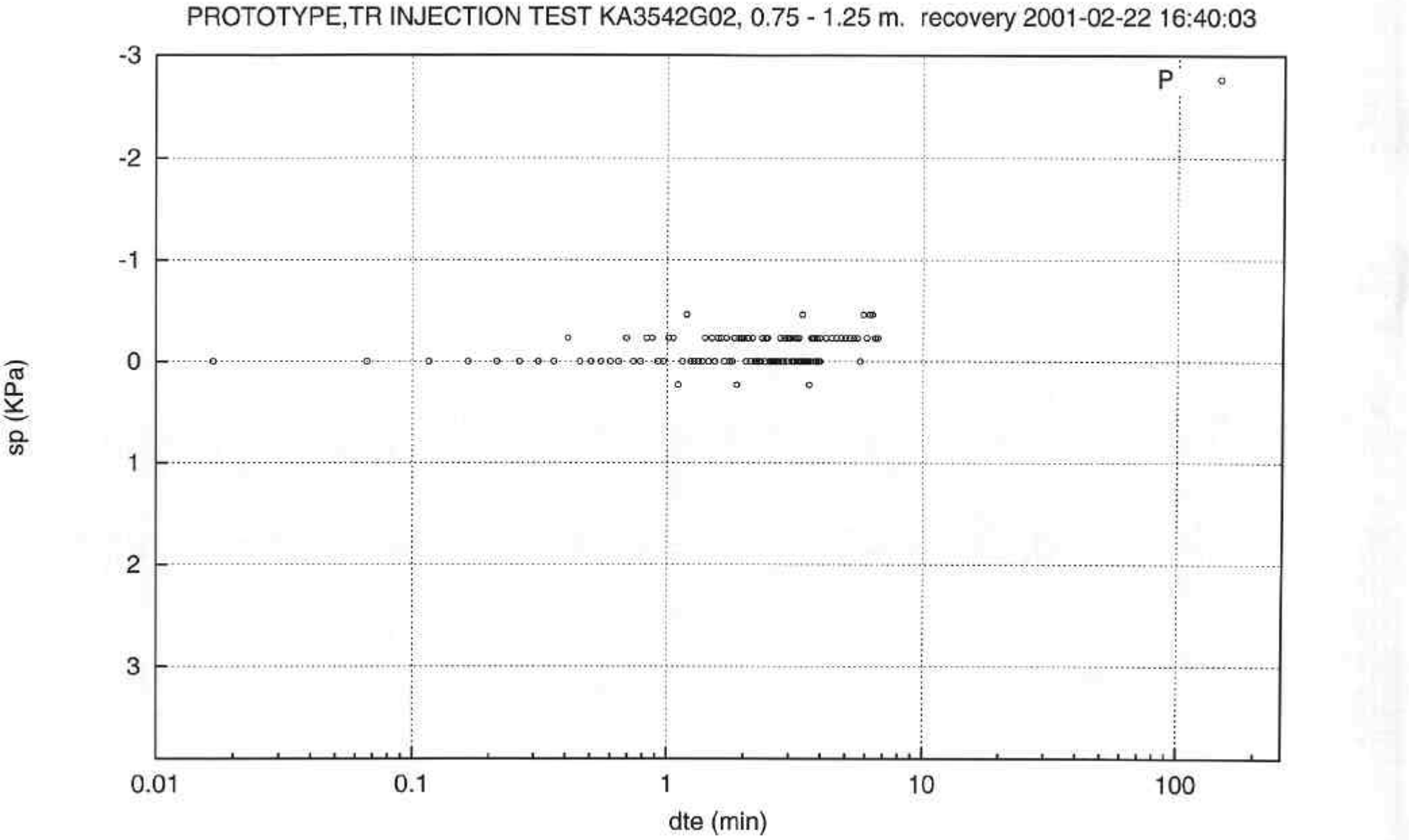

PROTOTYPE,TR INJECTION TEST KA3542G02, 0.25-0.75 m. recovery 2001-02-22 15:31:03
P
dsp/d(ln dte)
-3
-2
-1
0
1
2
3
0.1
1
10
100
dte (min)

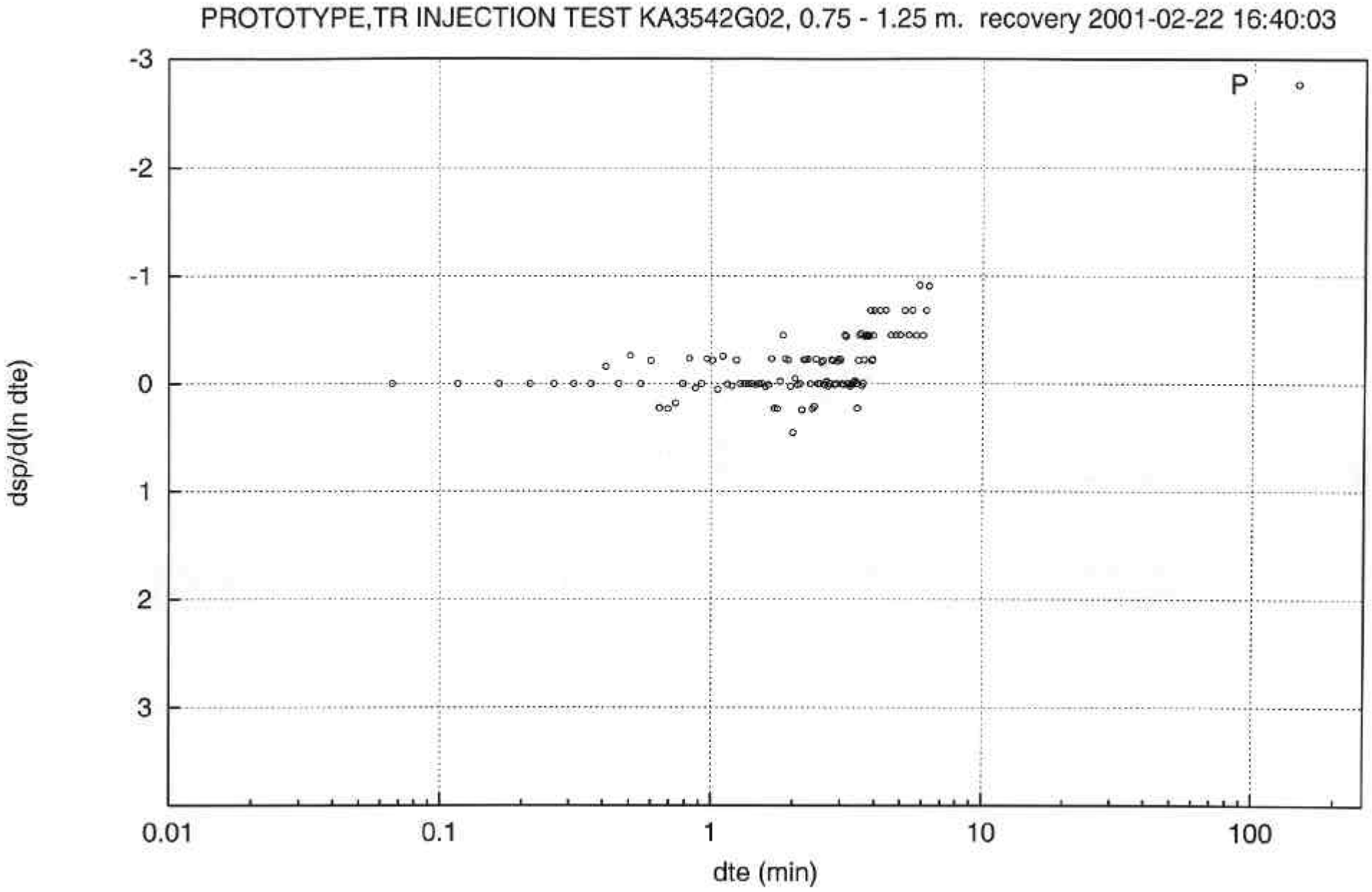

PROTOTYPE,TR INJECTION TEST KA3542G02, 0.25-0.75 m. recovery 2001-02-22 15:31:03
P
sp (KPa)
1
0.1
0.01
0.1
1
10
100
dte (min)

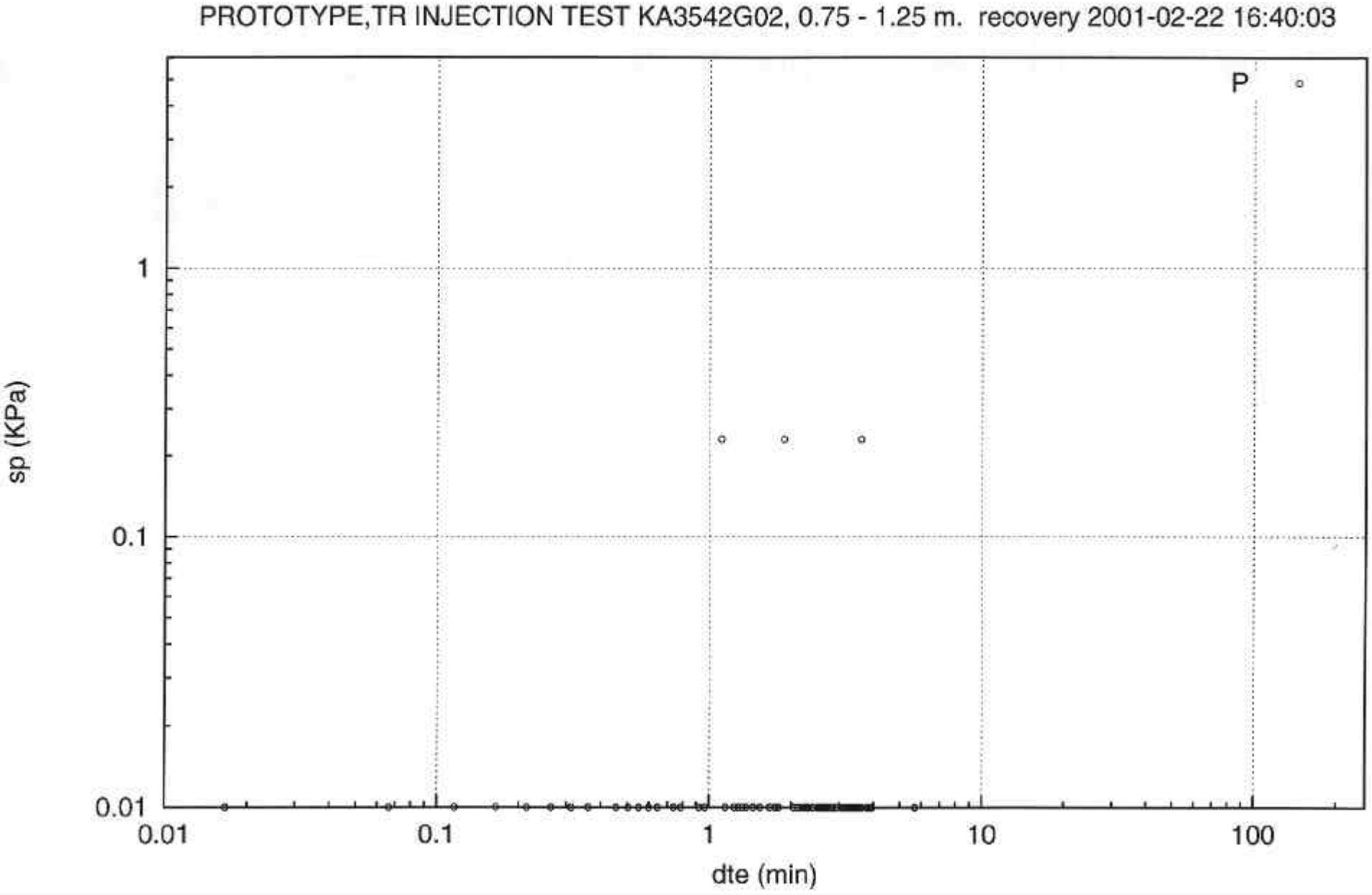

PROTOTYPE,TR INJECTION TEST KA3542G02, 0.25-0.75 m. recovery 2001-02-22 15:31:03
P
dsp/d(ln dte)
1
0.1
0.01
0.1
1
10
100
dte (min)

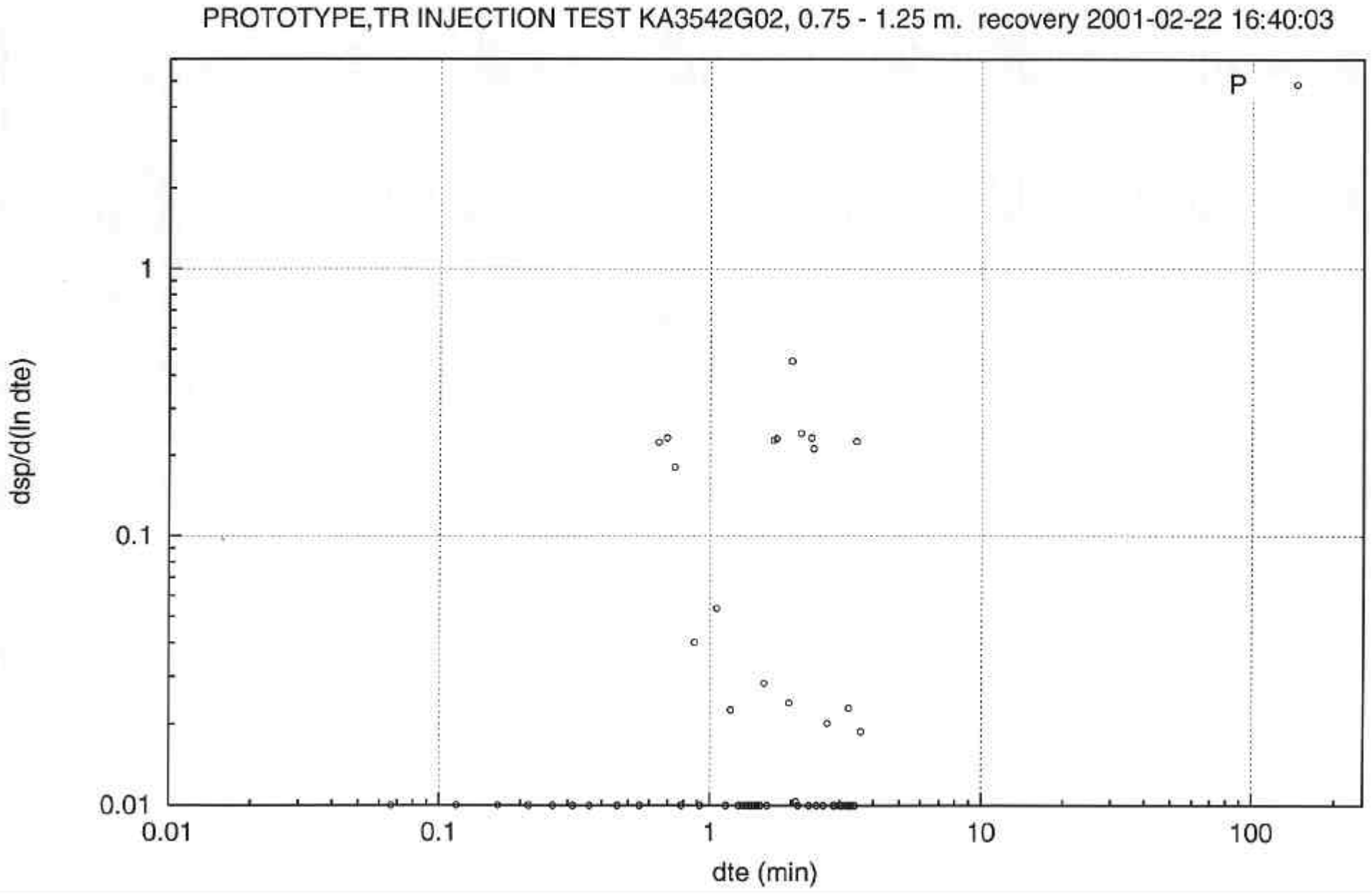

KA3542G02, 0.75-1.25m. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
16:10
20
30
40
50
Start: 2001-02-22 16:03:00
hour:min

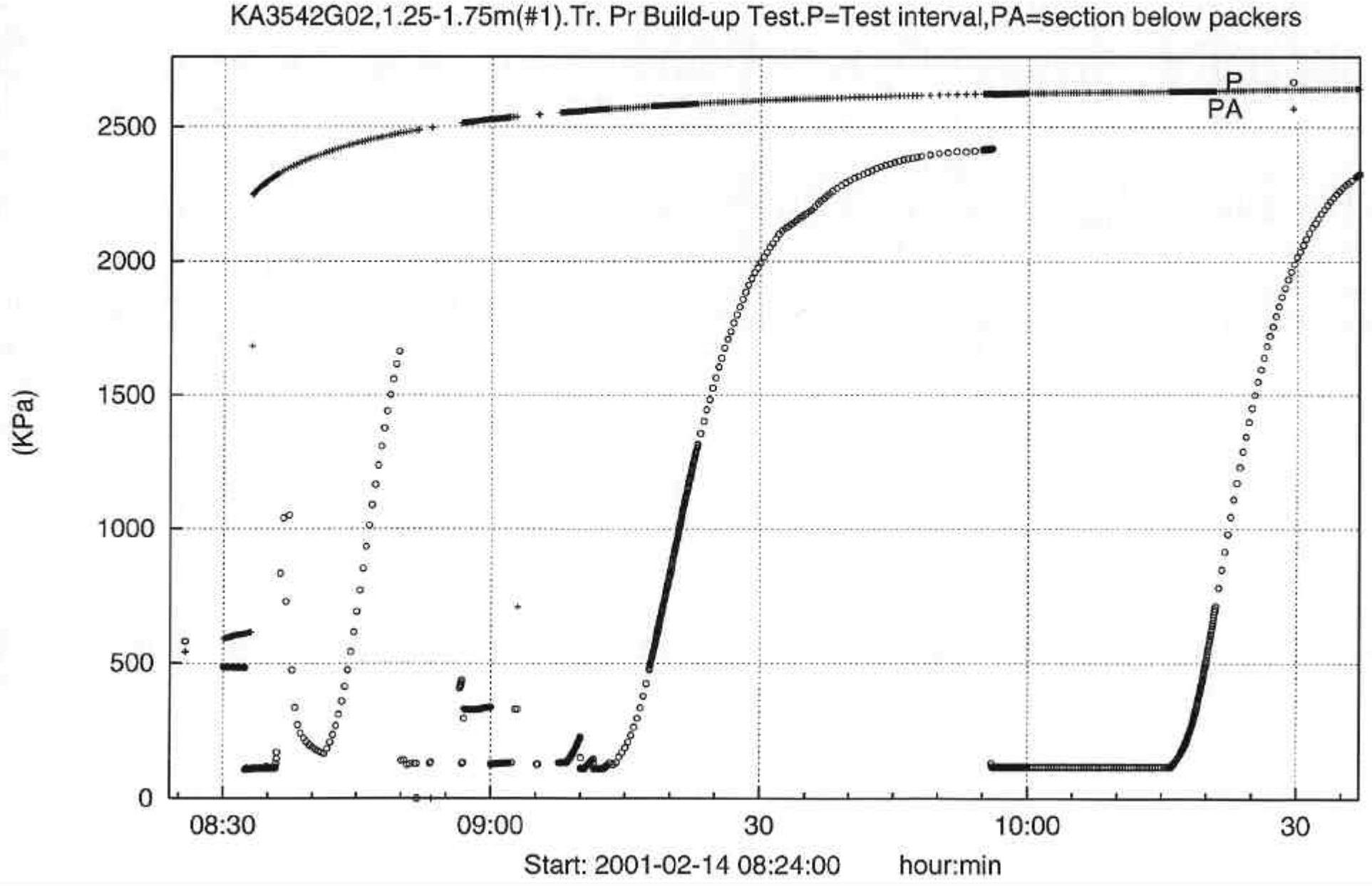

KA3542G02,0.75-1.25m. P =Test interval, PA =section below packers.
P
PA
2500
2000
1500
1000
500
0
(KPa)
16:10
20
30
40
50
Start: 2001-02-22 16:03:00
hour:min

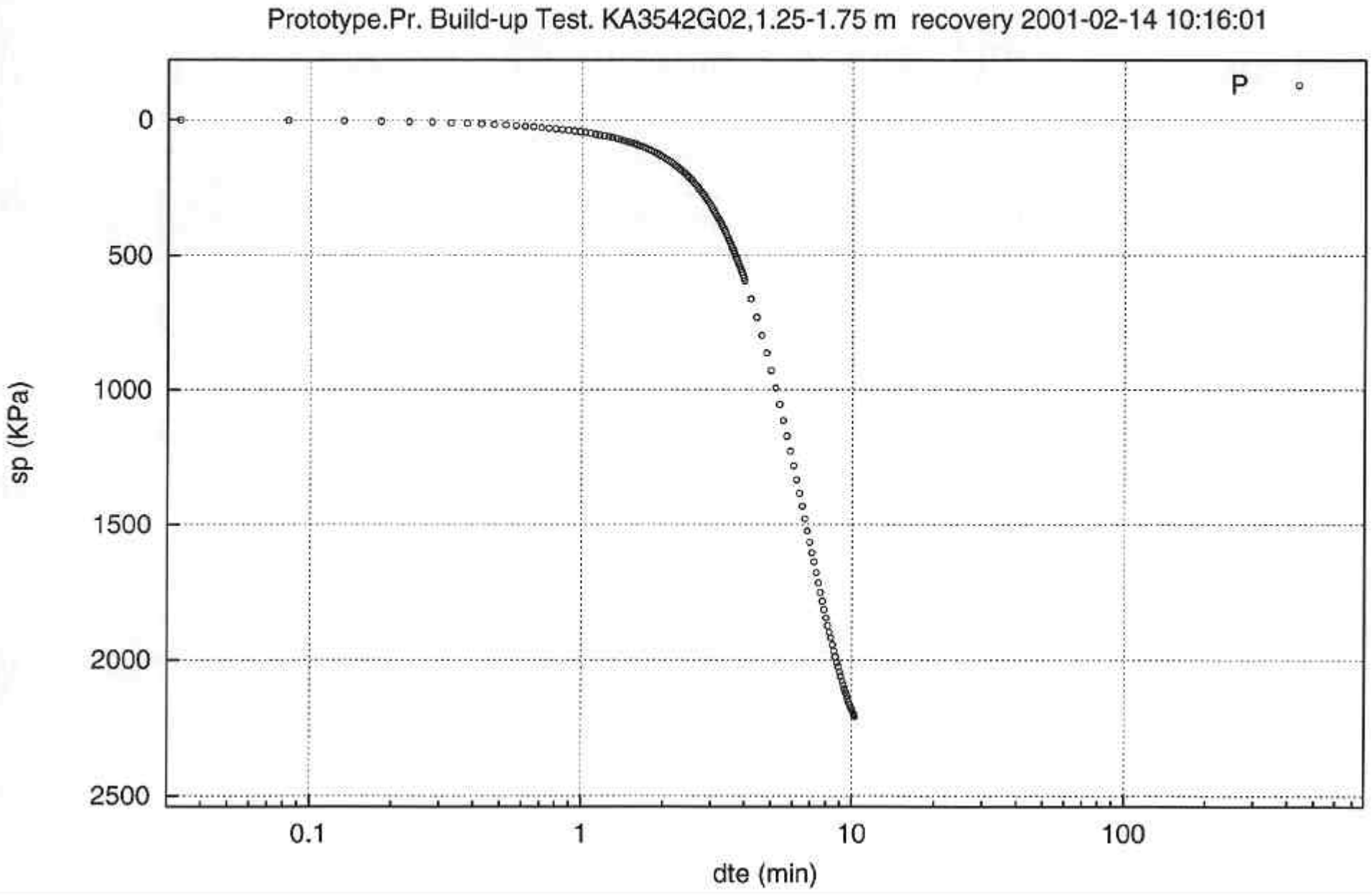

PROTOTYPE,TR INJECTION TEST KA3542G02, 0.75 - 1.25 m. recovery 2001-02-22 16:40:03
P'
-3
-2
-1
0
1
2
3
sp (KPa)
0.01
0.1
1
10
100
dte (min)

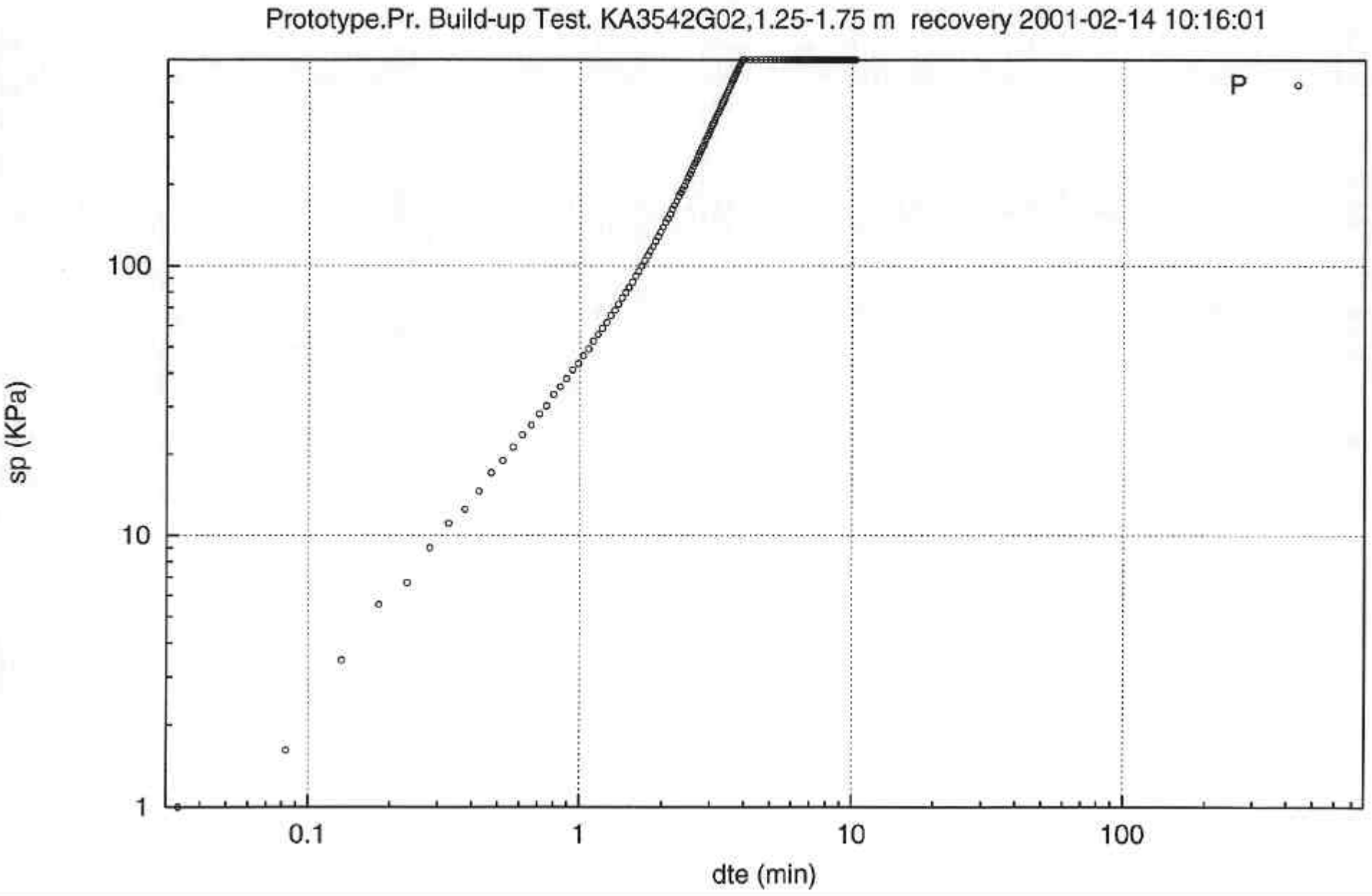

PROTOTYPE,TR INJECTION TEST KA3542G02, 0.75 - 1.25 m. recovery 2001-02-22 16:40:03
P
-3
-2
-1
0
1
2
3
dsp/d(ln dte)
0.01
0.1
1
10
100
dte (min)

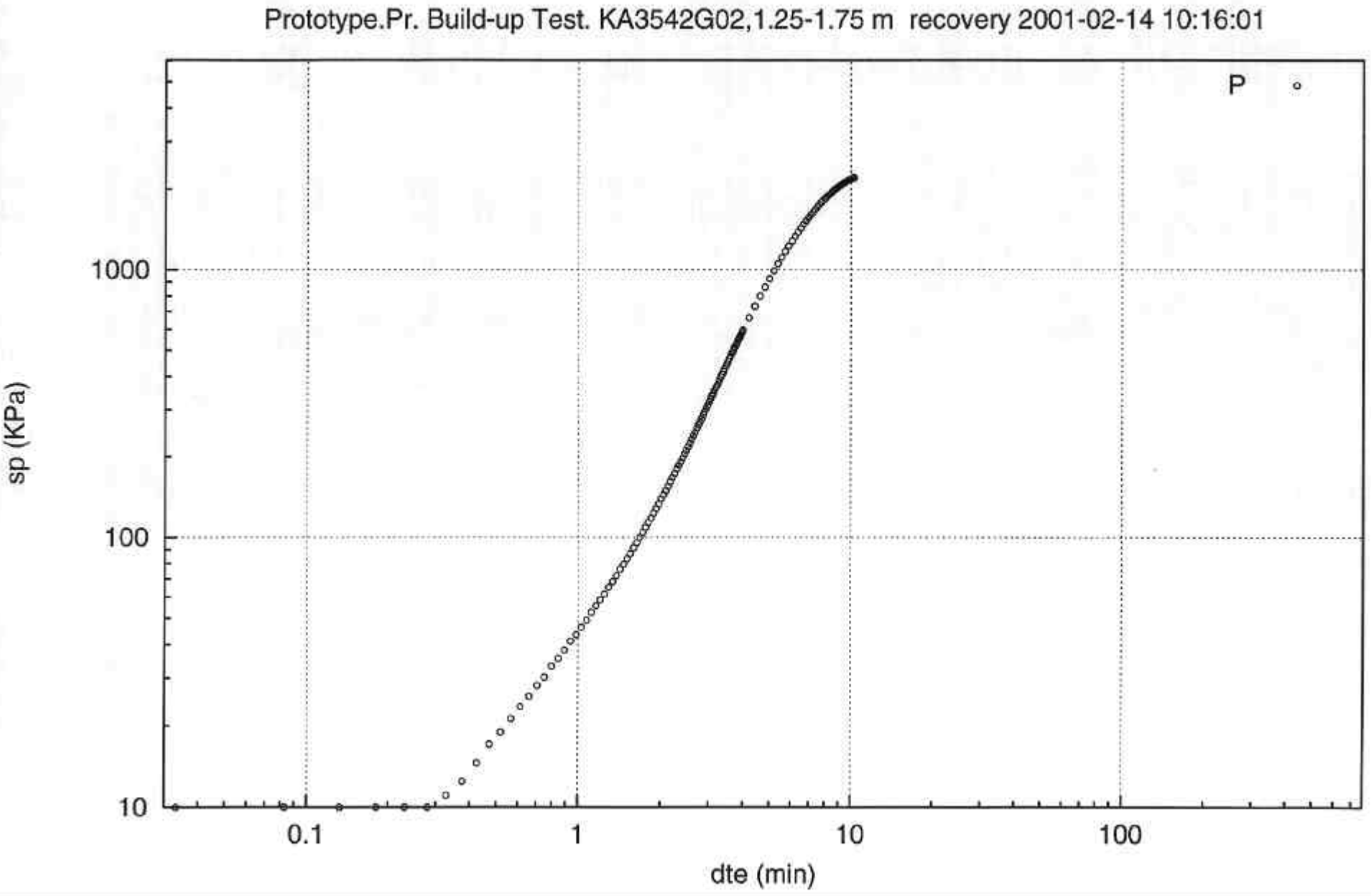

PROTOTYPE,TR INJECTION TEST KA3542G02, 0.75 - 1.25 m. recovery 2001-02-22 16:40:03
P
sp (KPa)
1
0.1
0.01
0.01
0.1
1
10
100
dte (min)

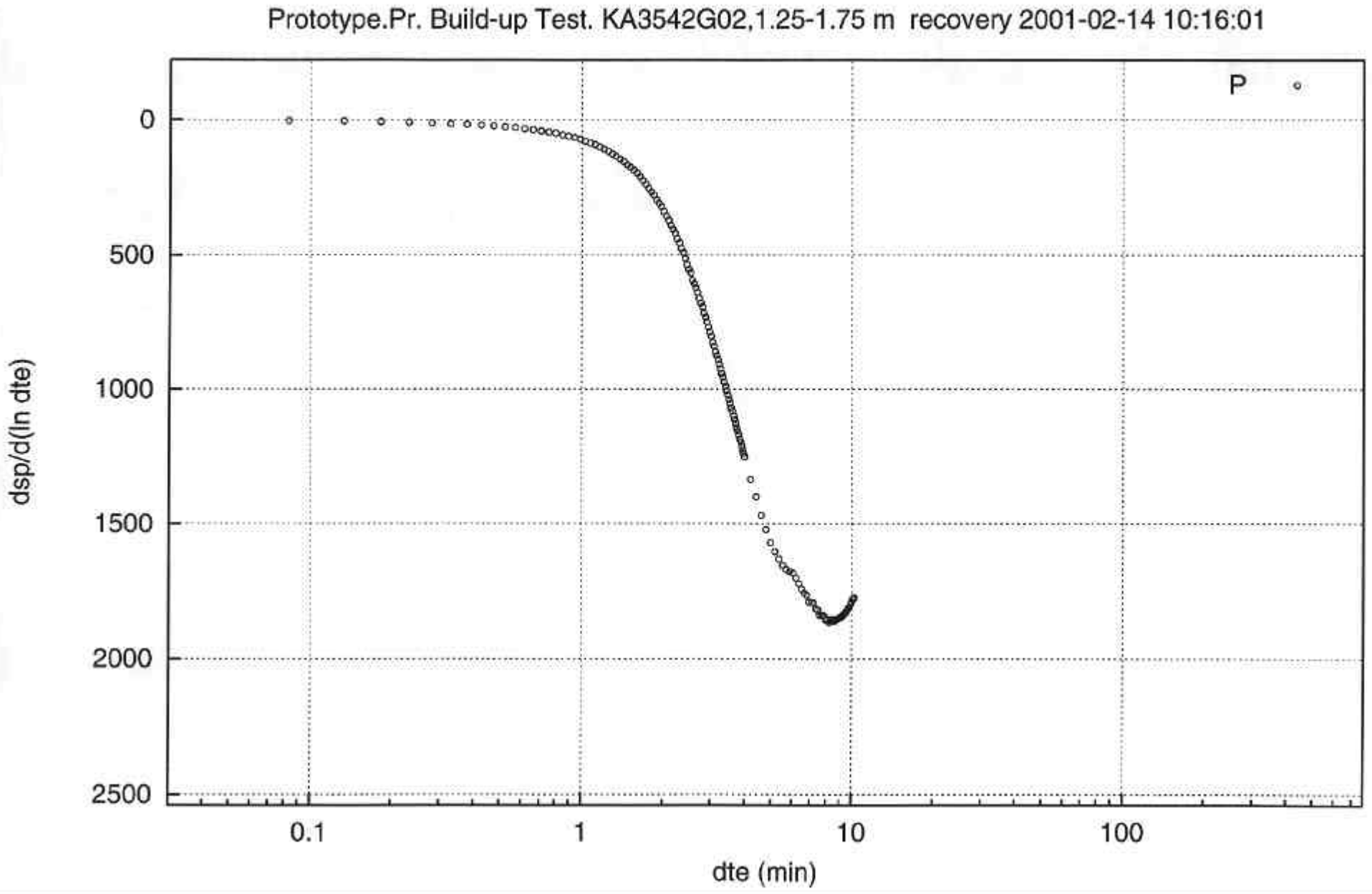

PROTOTYPE,TR INJECTION TEST KA3542G02, 0.75 - 1.25 m. recovery 2001-02-22 16:40:03
P
dsp/d(ln dte)
1
0.1
0.01
0.01
0.1
1
10
100
dte (min)

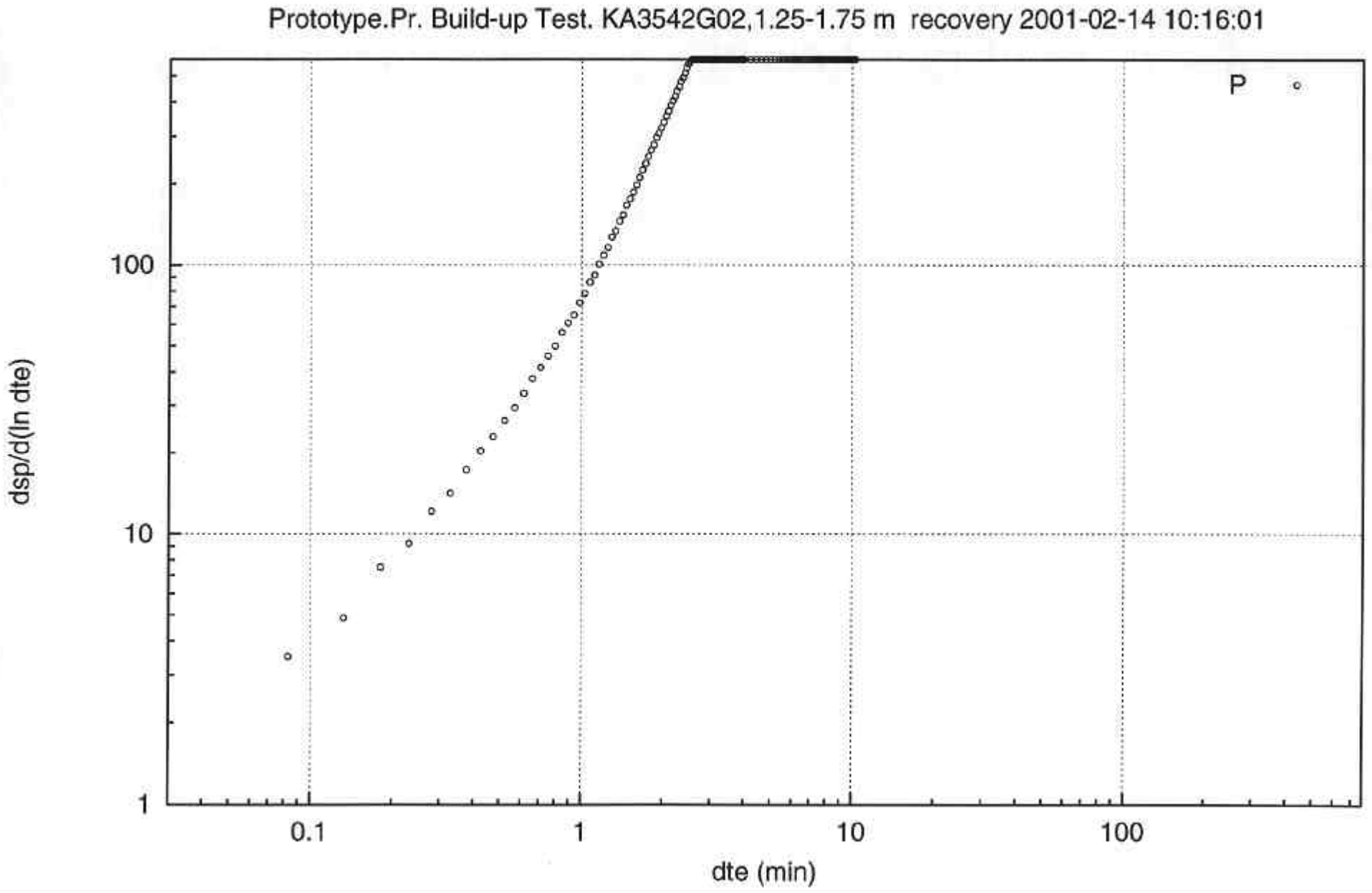

KA3542G02,1.25-1.75m(#1).Tr. Pr Build-up Test.P=Test interval,PA=section below packers
P
PA
2500
2000
1500
1000
500
0
(KPa)
08:30
09:00
30
10:00
30
Start: 2001-02-14 08:24:00
hour:min

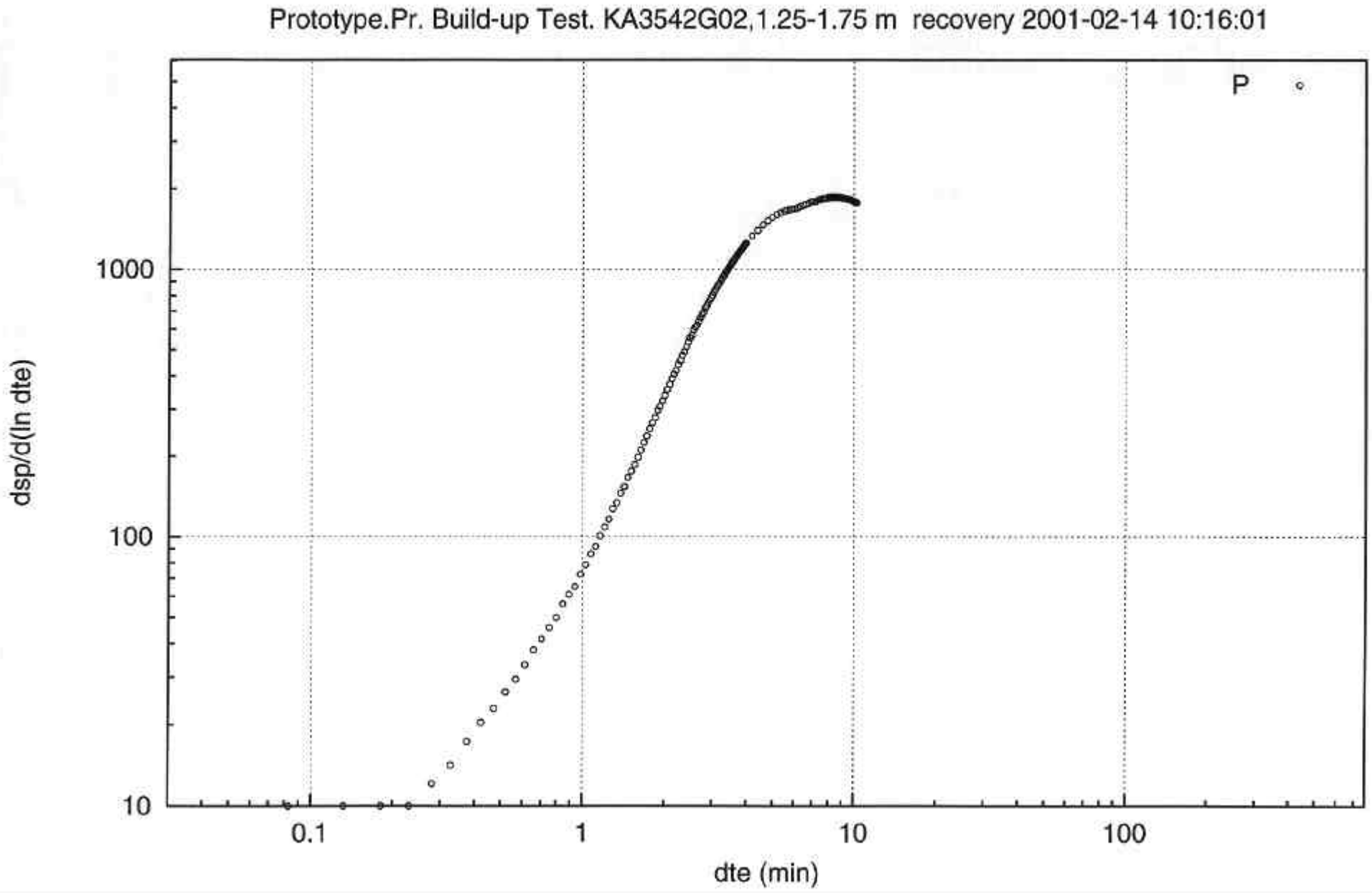

Prototype.Pr. Build-up Test. KA3542G02,1.25-1.75 m recovery 2001-02-14 10:16:01
P
0
500
1000
1500
2000
2500
sp (KPa)
0.1
1
10
100
dte (min)


Prototype.Pr. Build-up Test. KA3542G02,1.25-1.75 m recovery 2001-02-14 10:16:01
P
100
10
1
sp (KPa)
0.1
1
10
100
dte (min)

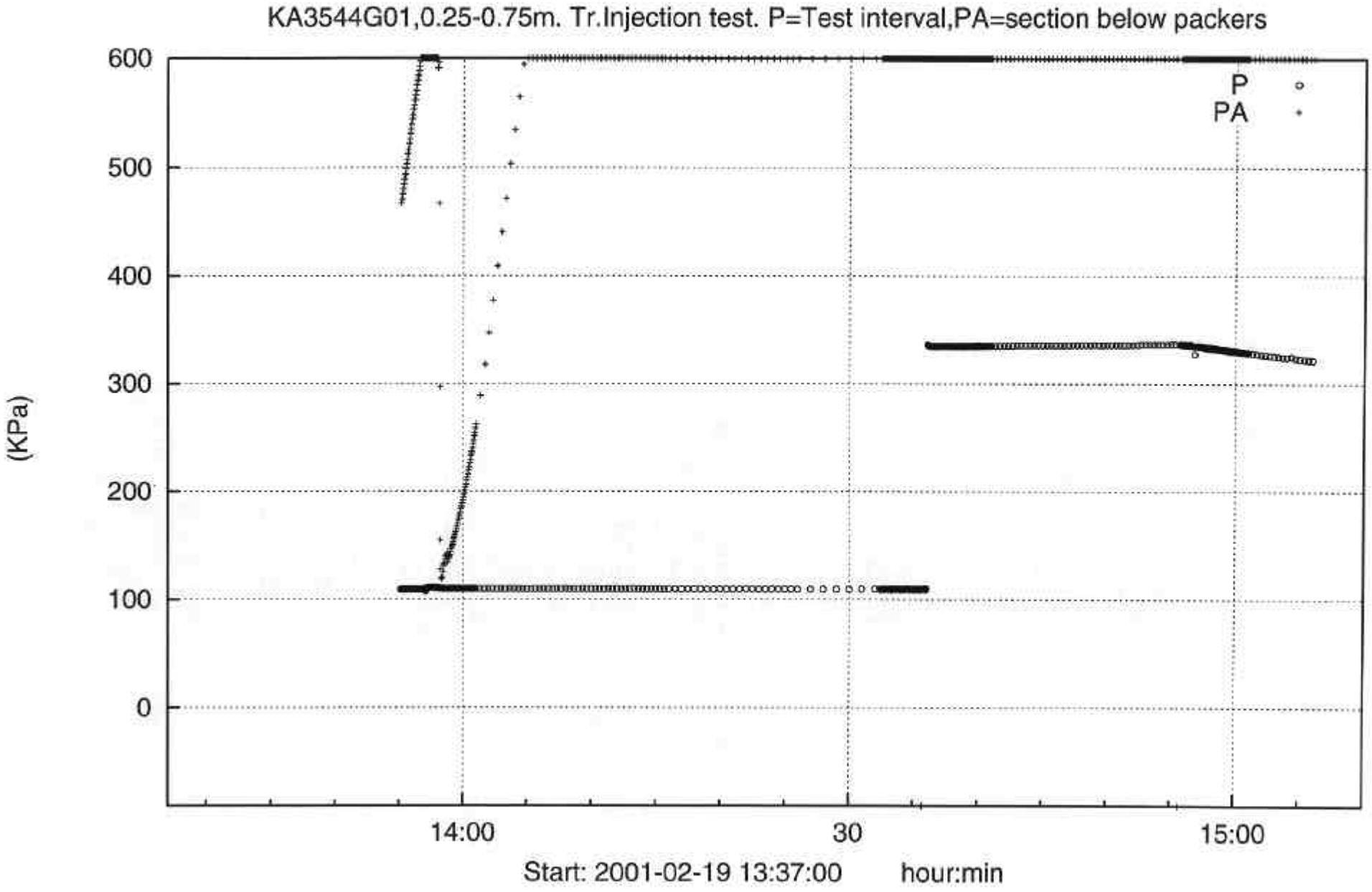

Prototype.Pr. Build-up Test. KA3542G02,1.25-1.75 m recovery 2001-02-14 10:16:01
P
1000
100
10
sp (KPa)
0.1
1
10
100
dte (min)

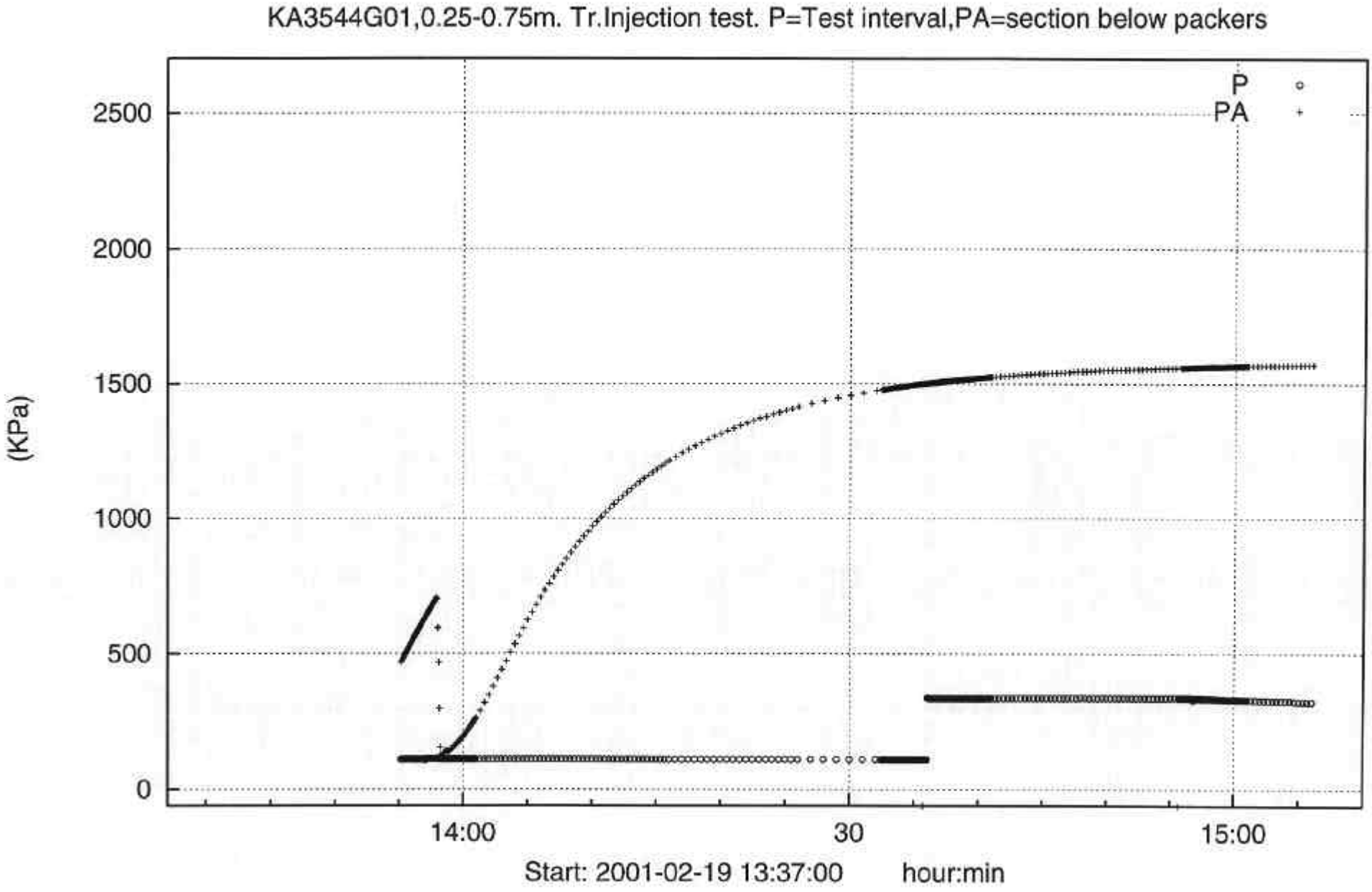

Prototype.Pr. Build-up Test. KA3542G02,1.25-1.75 m recovery 2001-02-14 10:16:01
P
0
500
1000
1500
2000
2500
dsp/d(ln dte)
0.1
1
10
100
dte (min)

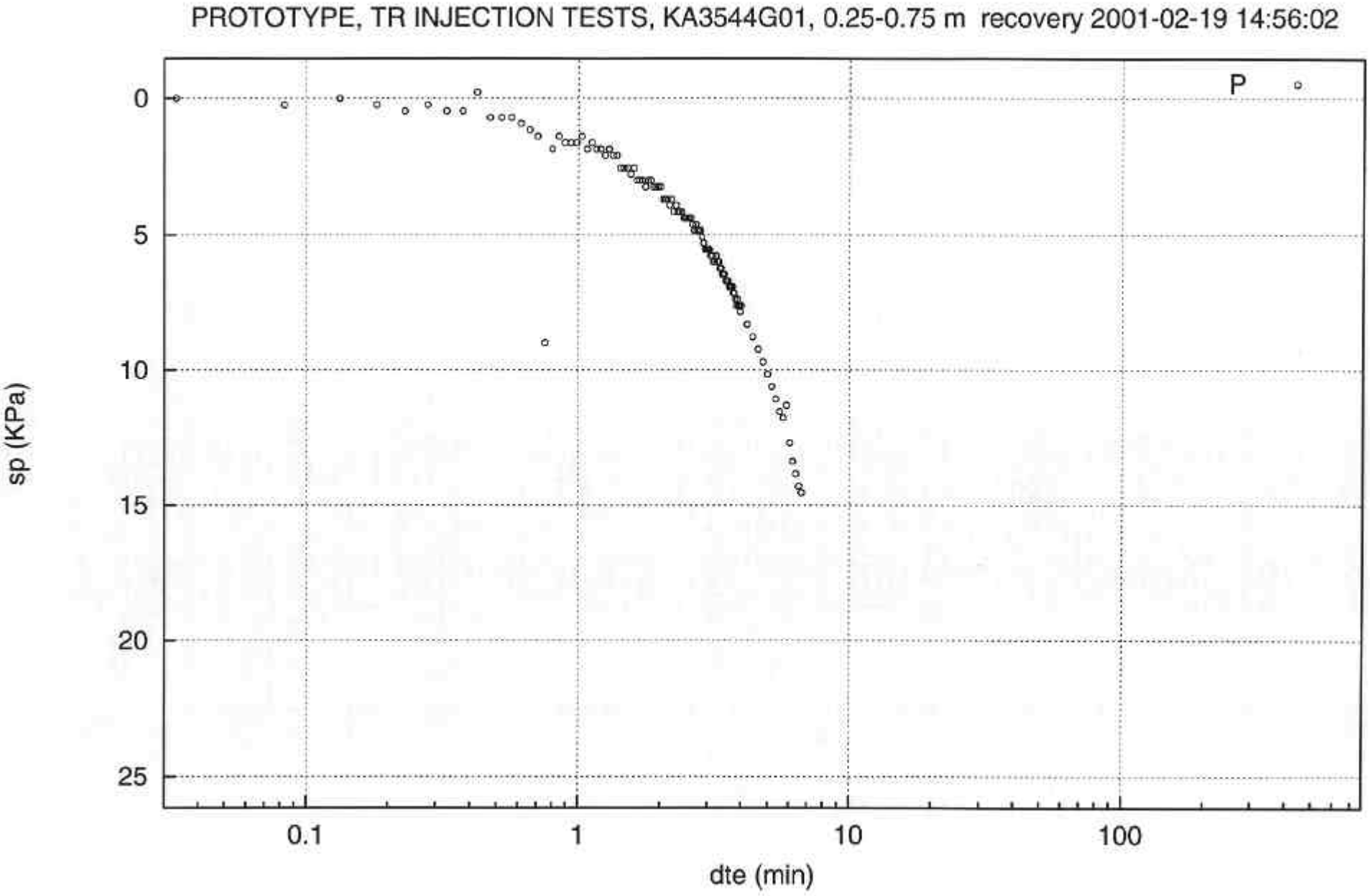

Prototype.Pr. Build-up Test. KA3542G02,1.25-1.75 m recovery 2001-02-14 10:16:01
P
dsp/d(ln dte)
100
10
1
0.1
1
10
100
dte (min)

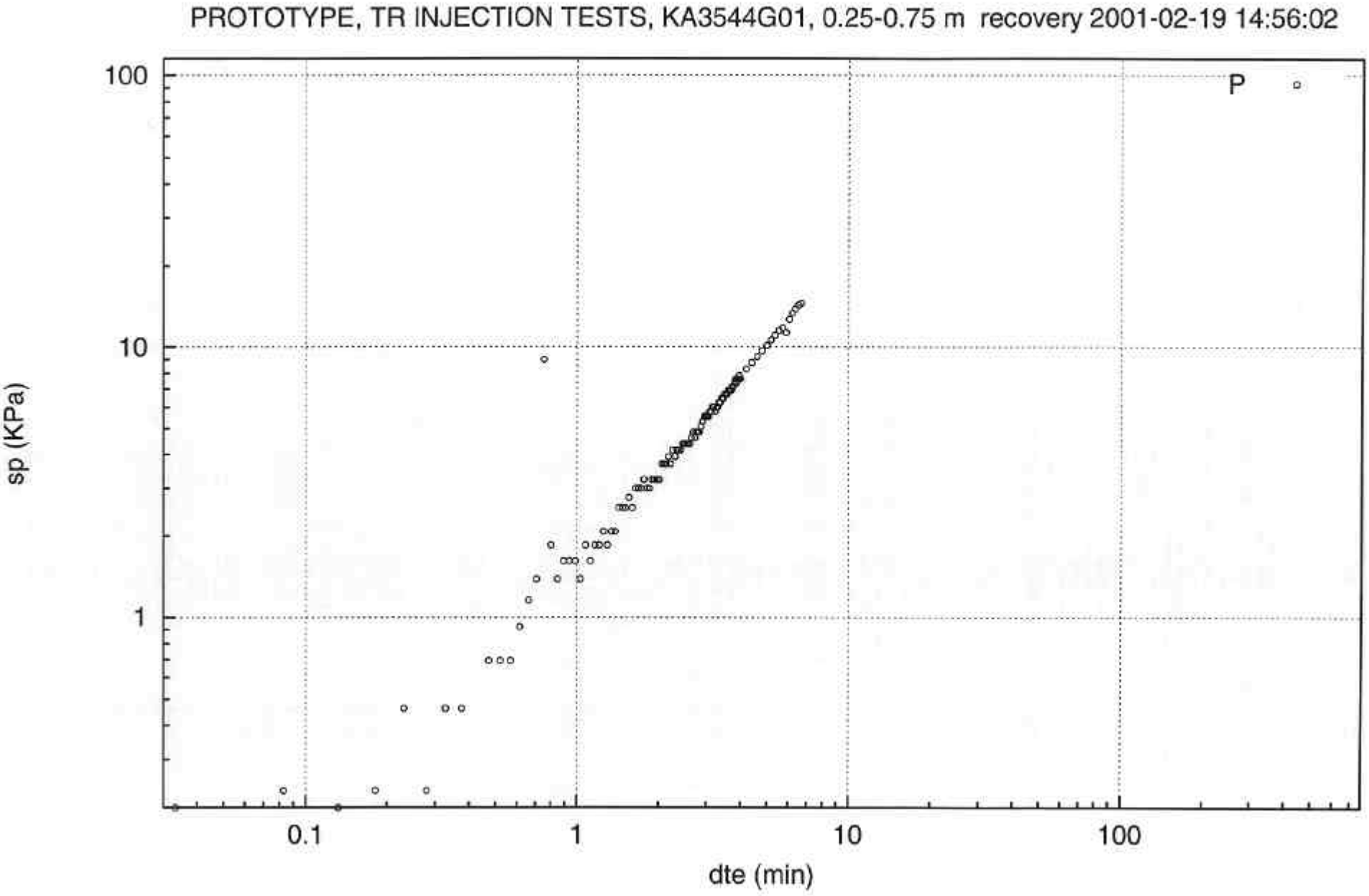

Prototype.Pr. Build-up Test. KA3542G02,1.25-1.75 m recovery 2001-02-14 10:16:01
P
1000
100
10
dsp/d(ln dte)
0.1
1
10
100
dte (min)

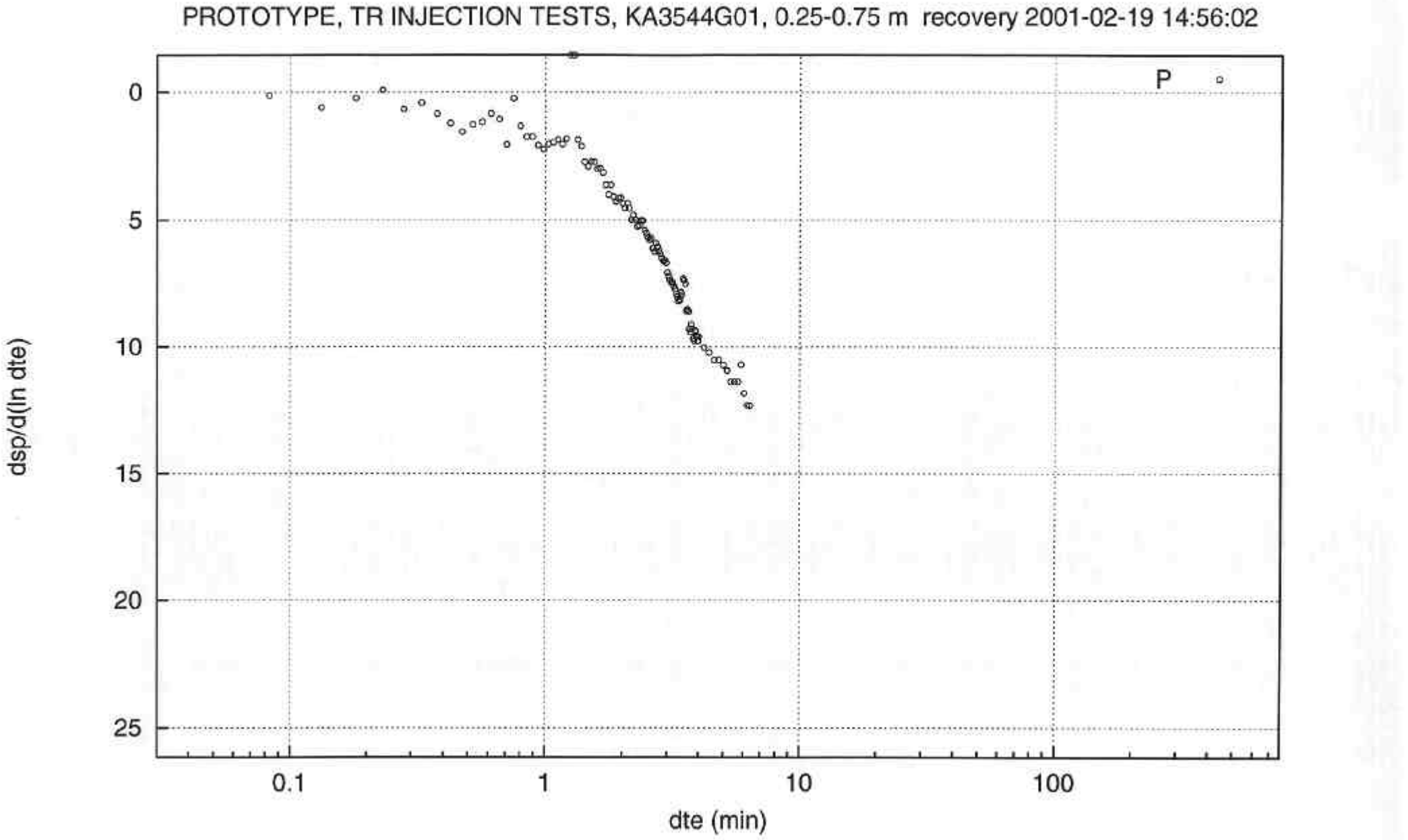
APPENDIX 4: Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3544G01. February 2001

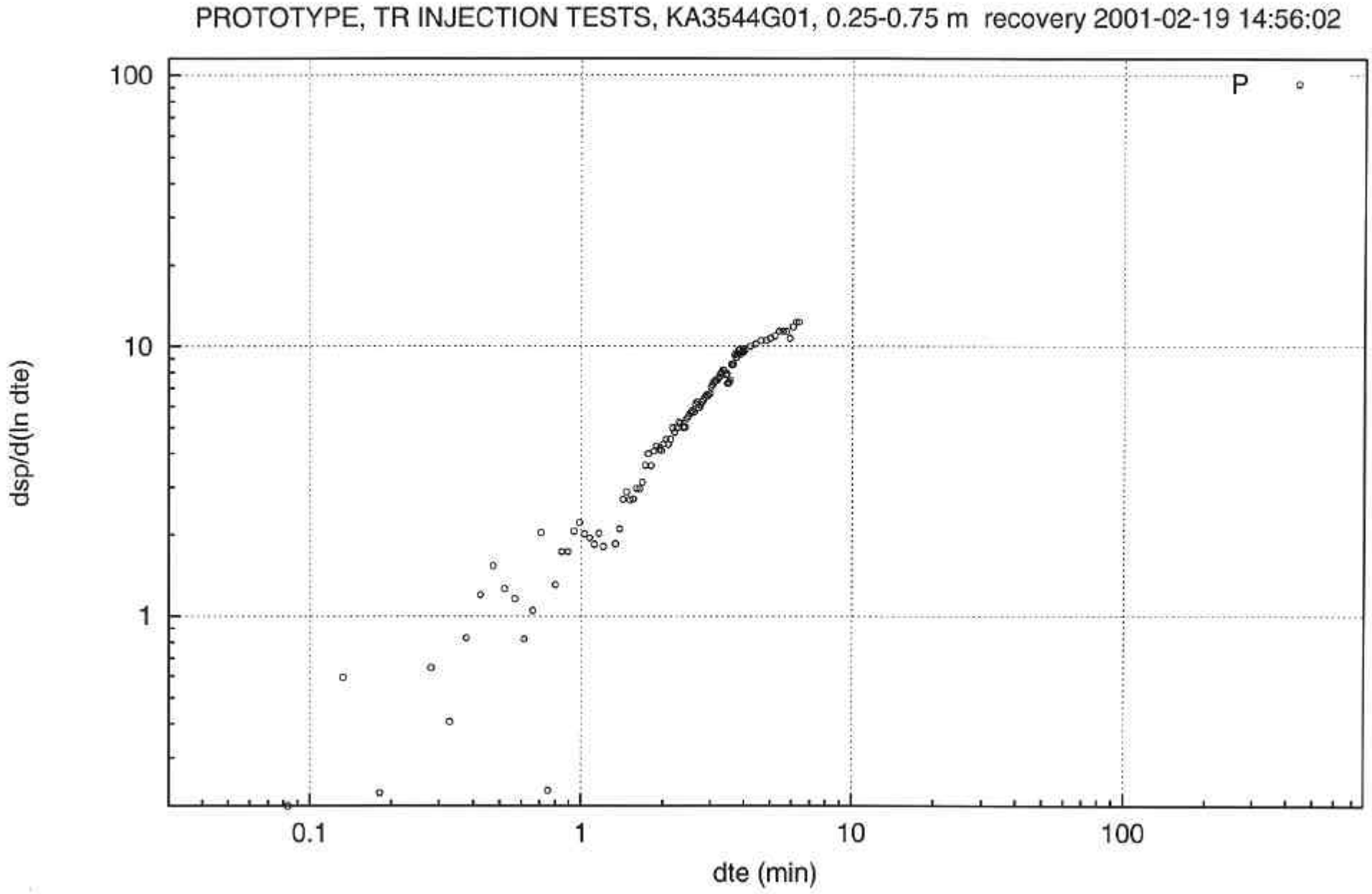

KA3544G01,0.25-0.75m. Tr.Injection test. P=Test interval,PA=section below packers
600
500
400
300
200
100
0
(KPa)
P
PA
14:00
30
15:00
Start: 2001-02-19 13:37:00
hour:min

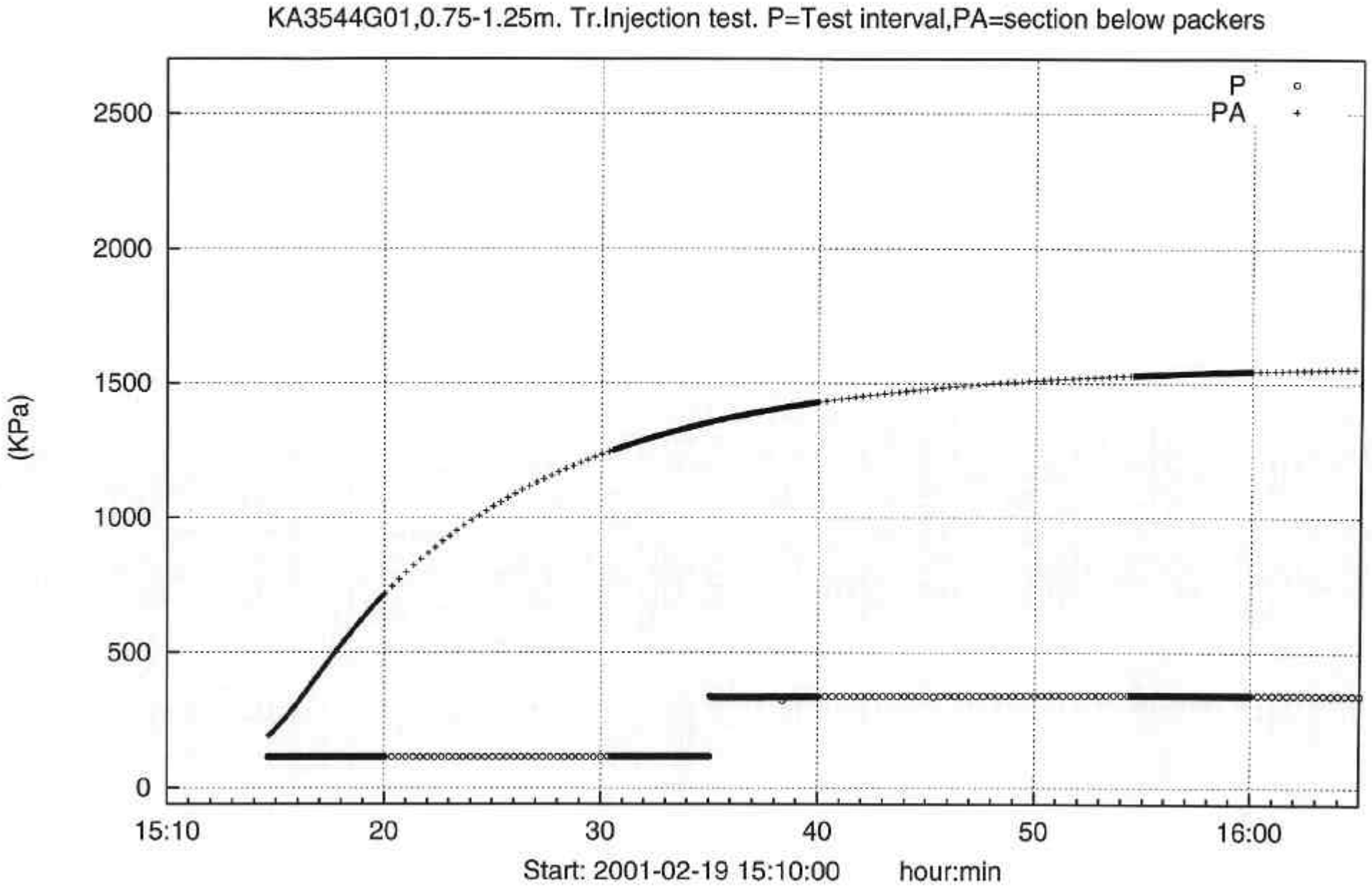

KA3544G01,0.25-0.75m. Tr.Injection test. P=Test interval,PA=section below packers
P
PA
2500
2000
1500
1000
500
0
(KPa)
14:00
30
15:00
Start: 2001-02-19 13:37:00
hour:min

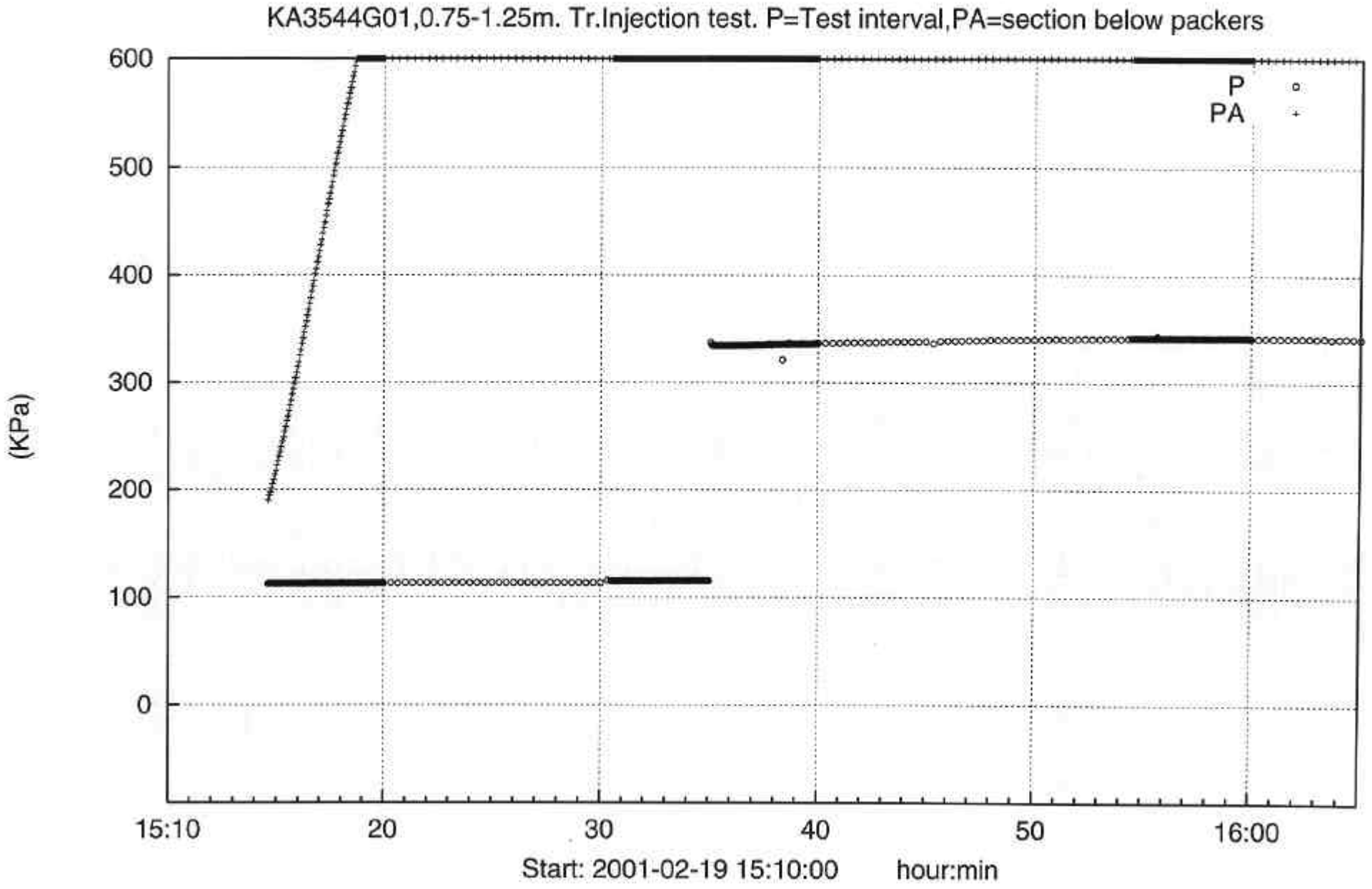

PROTOTYPE, TR INJECTION TESTS, KA3544G01, 0.25-0.75 m recovery 2001-02-19 14:56:02
P
sp (KPa)
0
5
10
15
20
25
0.1
1
10
100
dte (min)

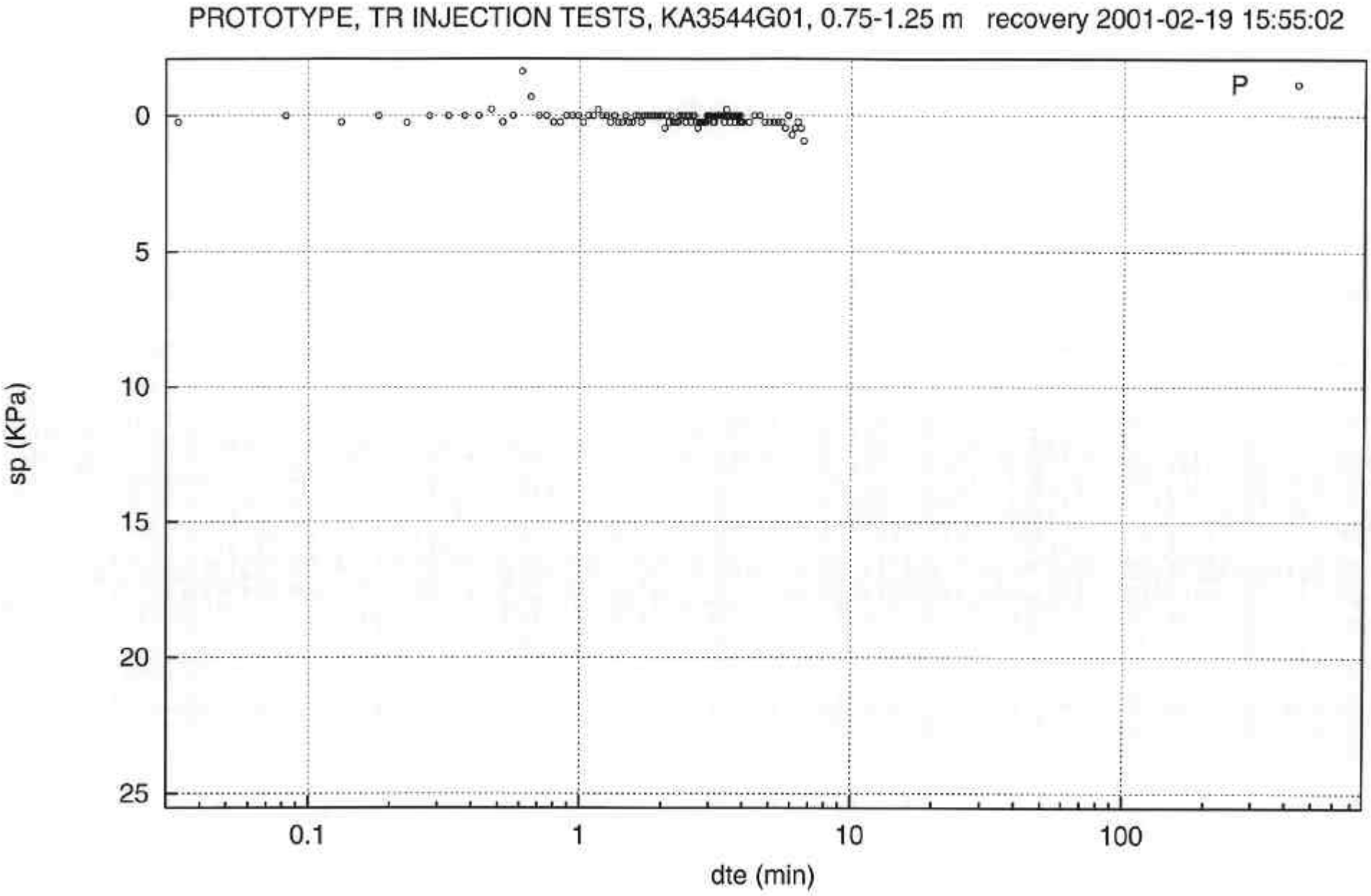

PROTOTYPE, TR INJECTION TESTS, KA3544G01, 0.25-0.75 m recovery 2001-02-19 14:56:02
P
100
10
1
sp (KPa)
0.1
1
10
100
dte (min)

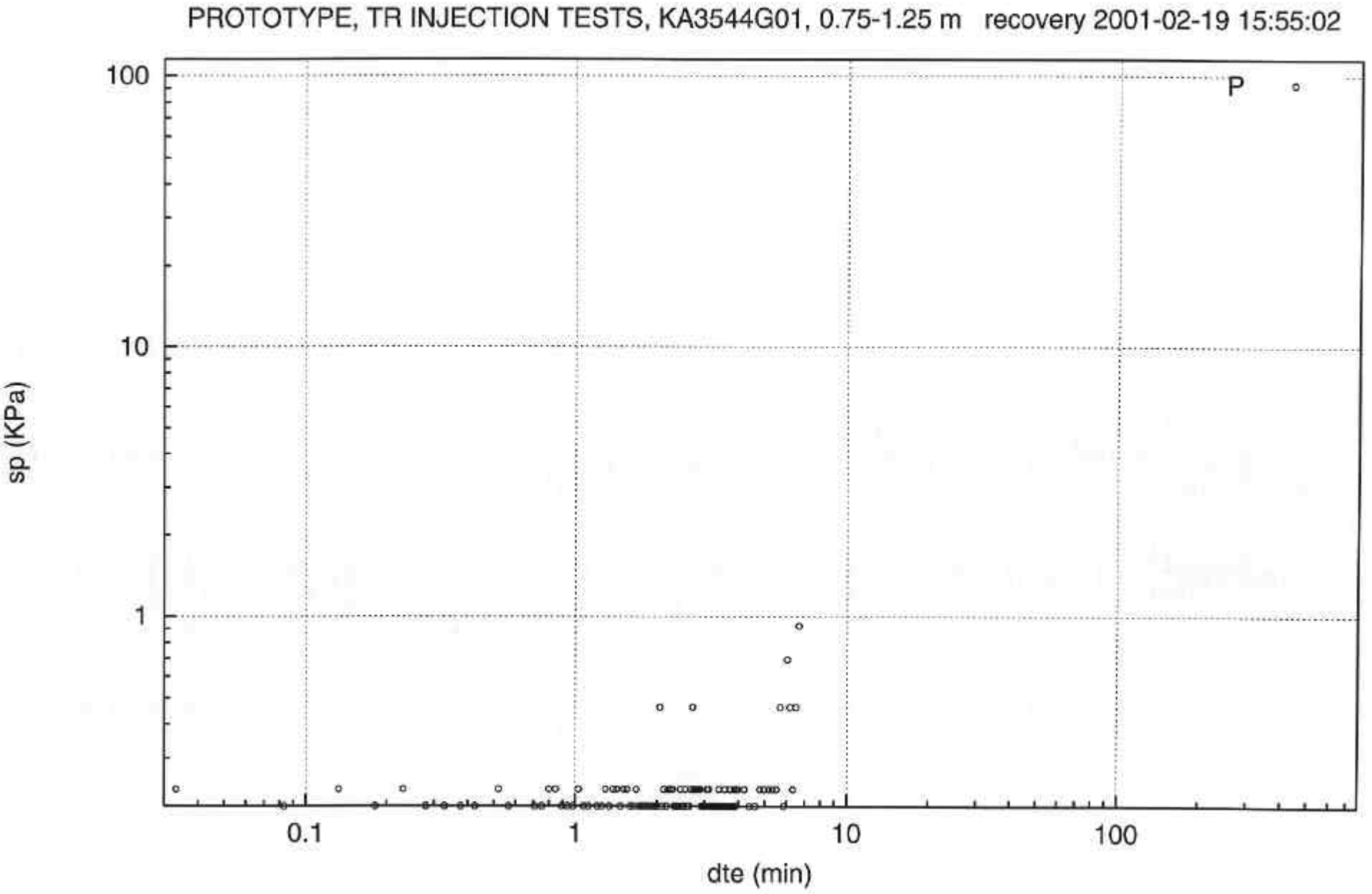

PROTOTYPE, TR INJECTION TESTS, KA3544G01, 0.25-0.75 m recovery 2001-02-19 14:56:02
P
dsp/d(ln dte)
0
5
10
15
20
25
0.1
1
10
100
dte (min)

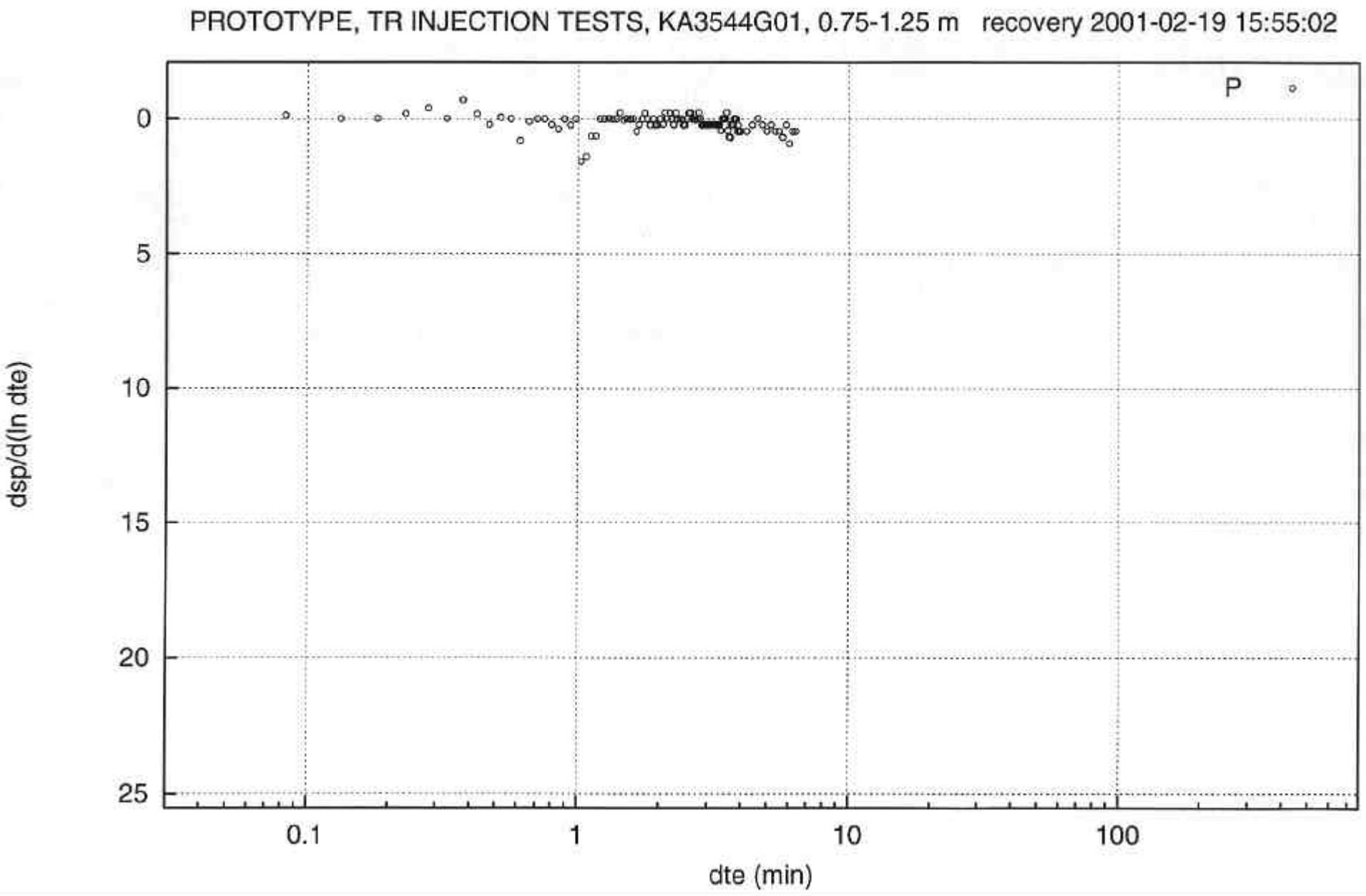

PROTOTYPE, TR INJECTION TESTS, KA3544G01, 0.25-0.75 m recovery 2001-02-19 14:56:02
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
dte (min)

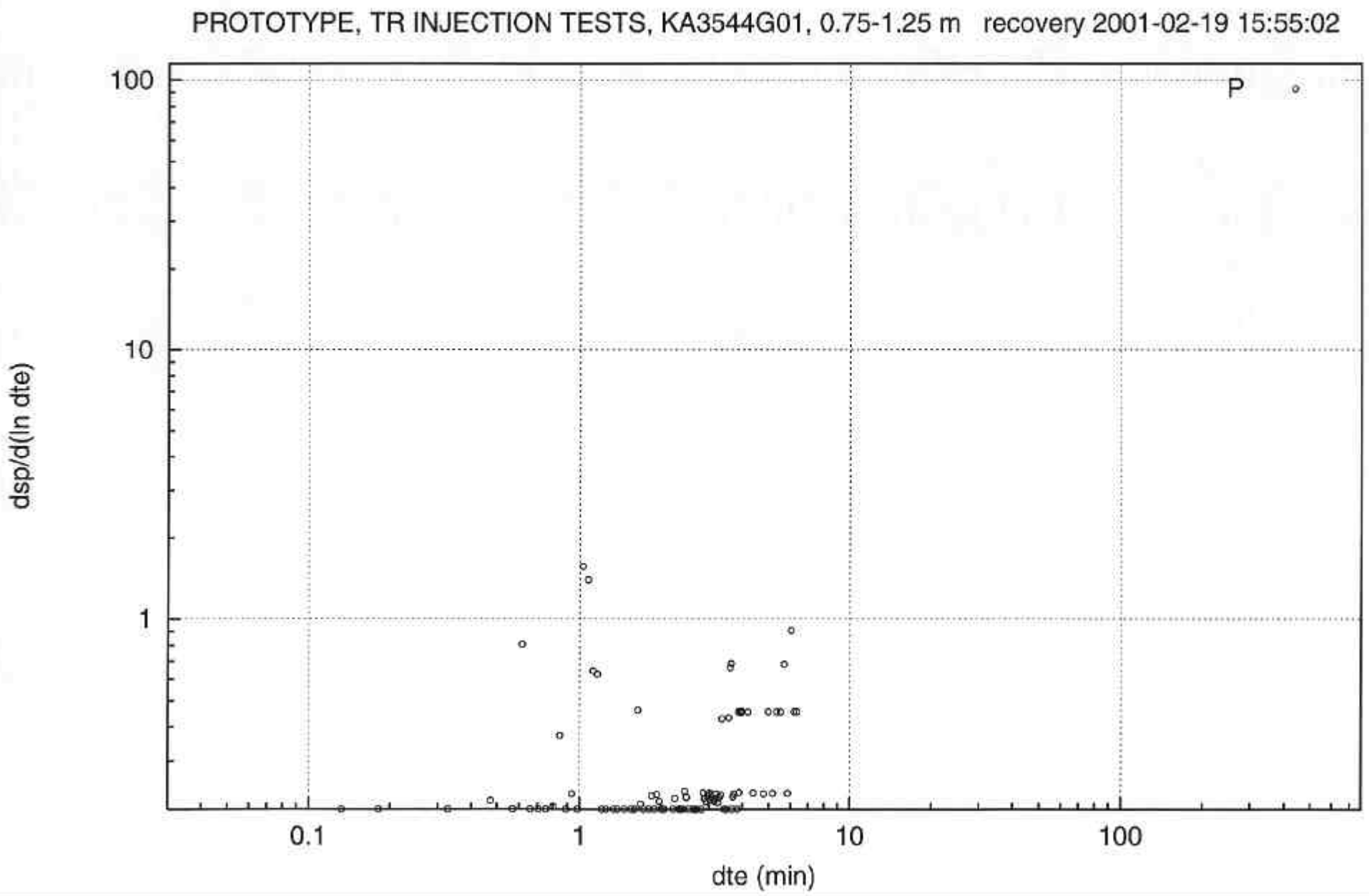

KA3544G01,0.75-1.25m. Tr.Injection test. P=Test interval,PA=section below packers
P
PA
2500
2000
1500
1000
500
0
(KPa)
15:10
20
30
40
50
16:00
Start: 2001-02-19 15:10:00
hour:min

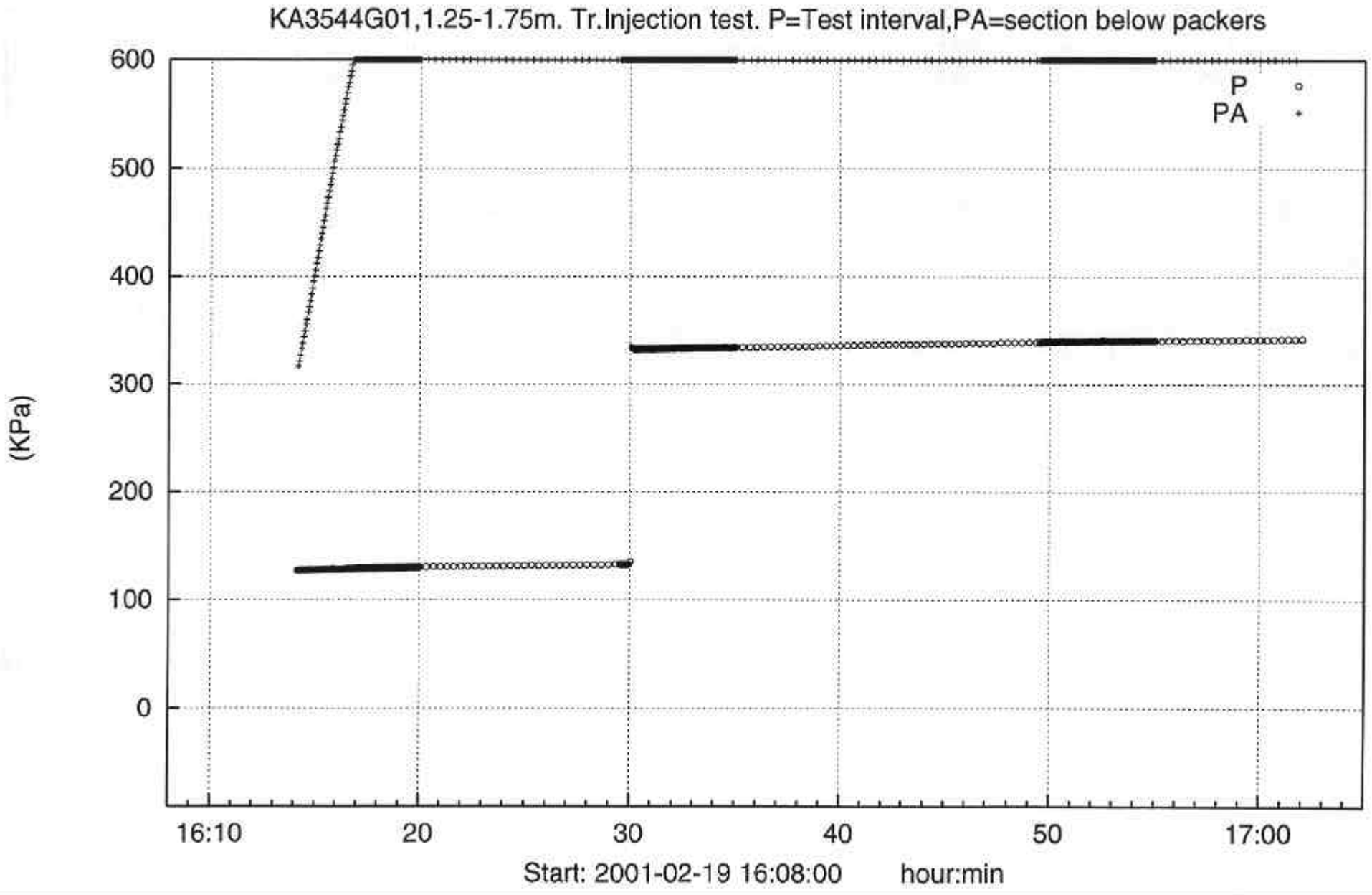

KA3544G01,0.75-1.25m. Tr.Injection test. P=Test interval,PA=section below packers
600
500
400
300
200
100
0
(KPa)
P
PA
15:10
20
30
40
50
16:00
Start: 2001-02-19 15:10:00
hour:min

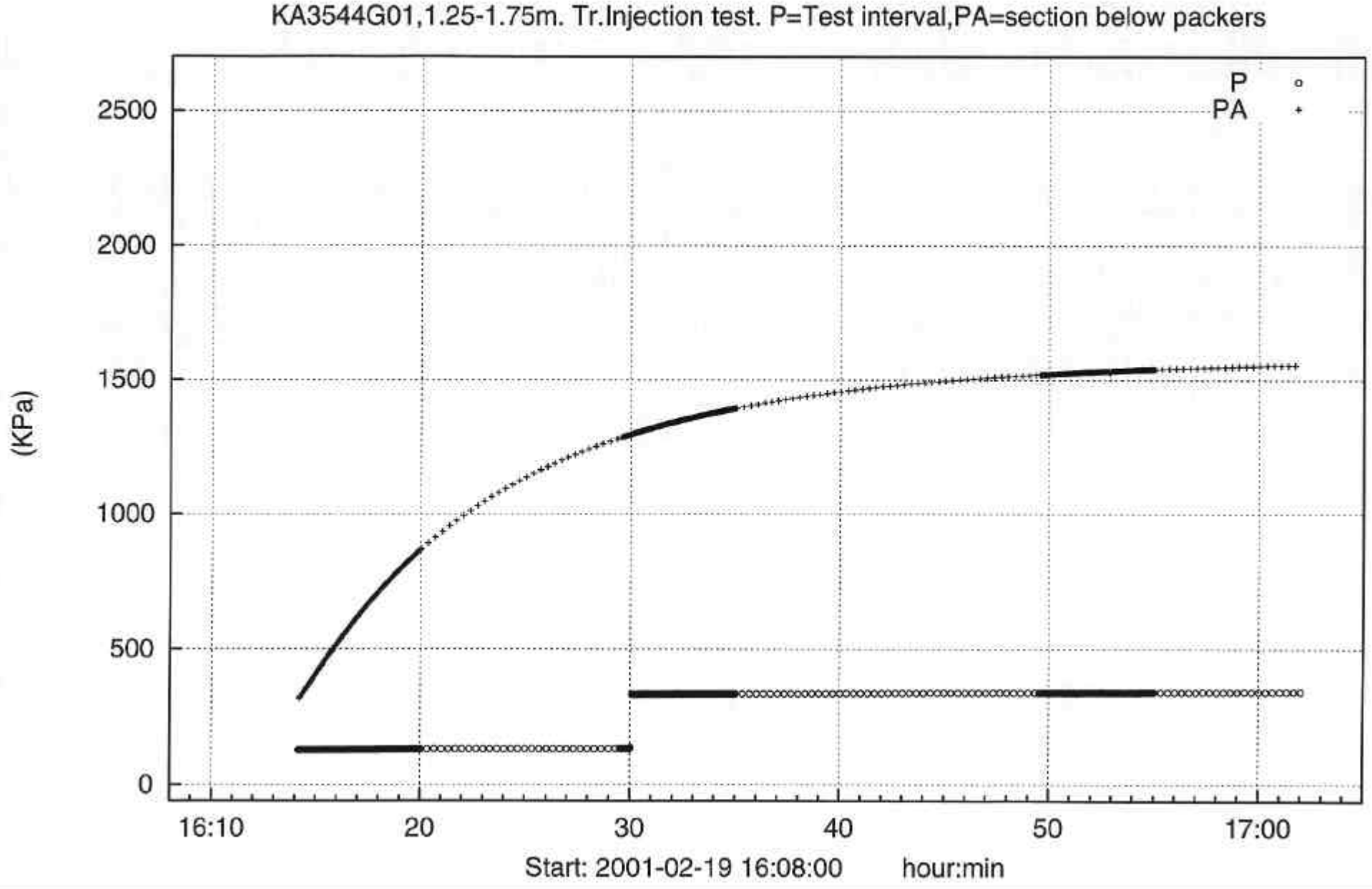

PROTOTYPE, TR INJECTION TESTS, KA3544G01, 0.75-1.25 m recovery 2001-02-19 15:55:02
P
sp (KPa)
0
5
10
15
20
25
0.1
1
10
100
dte (min)

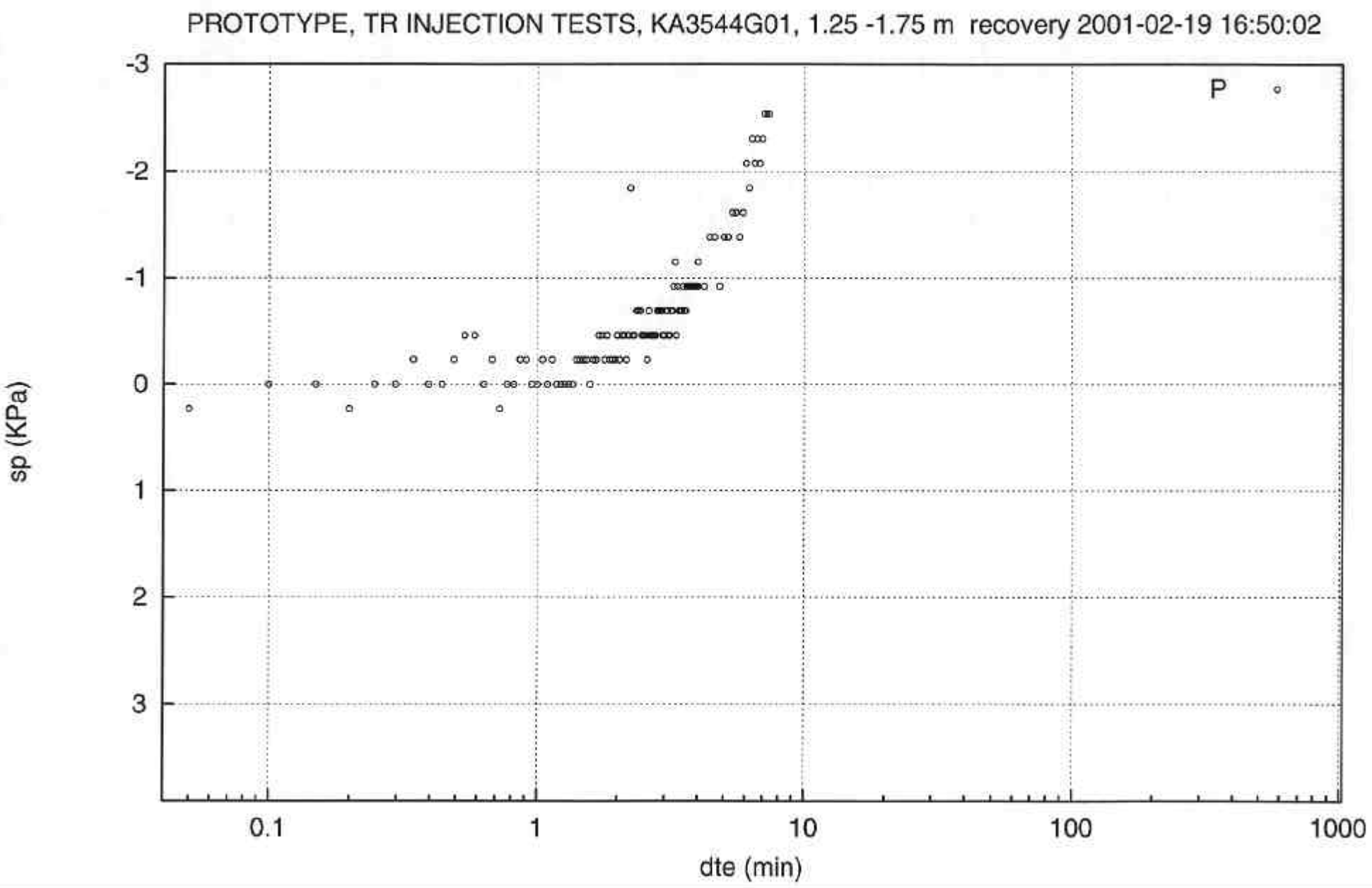

PROTOTYPE, TR INJECTION TESTS, KA3544G01, 0.75-1.25 m recovery 2001-02-19 15:55:02
P
100
10
1
sp (KPa)
0.1
1
10
100
dte (min)

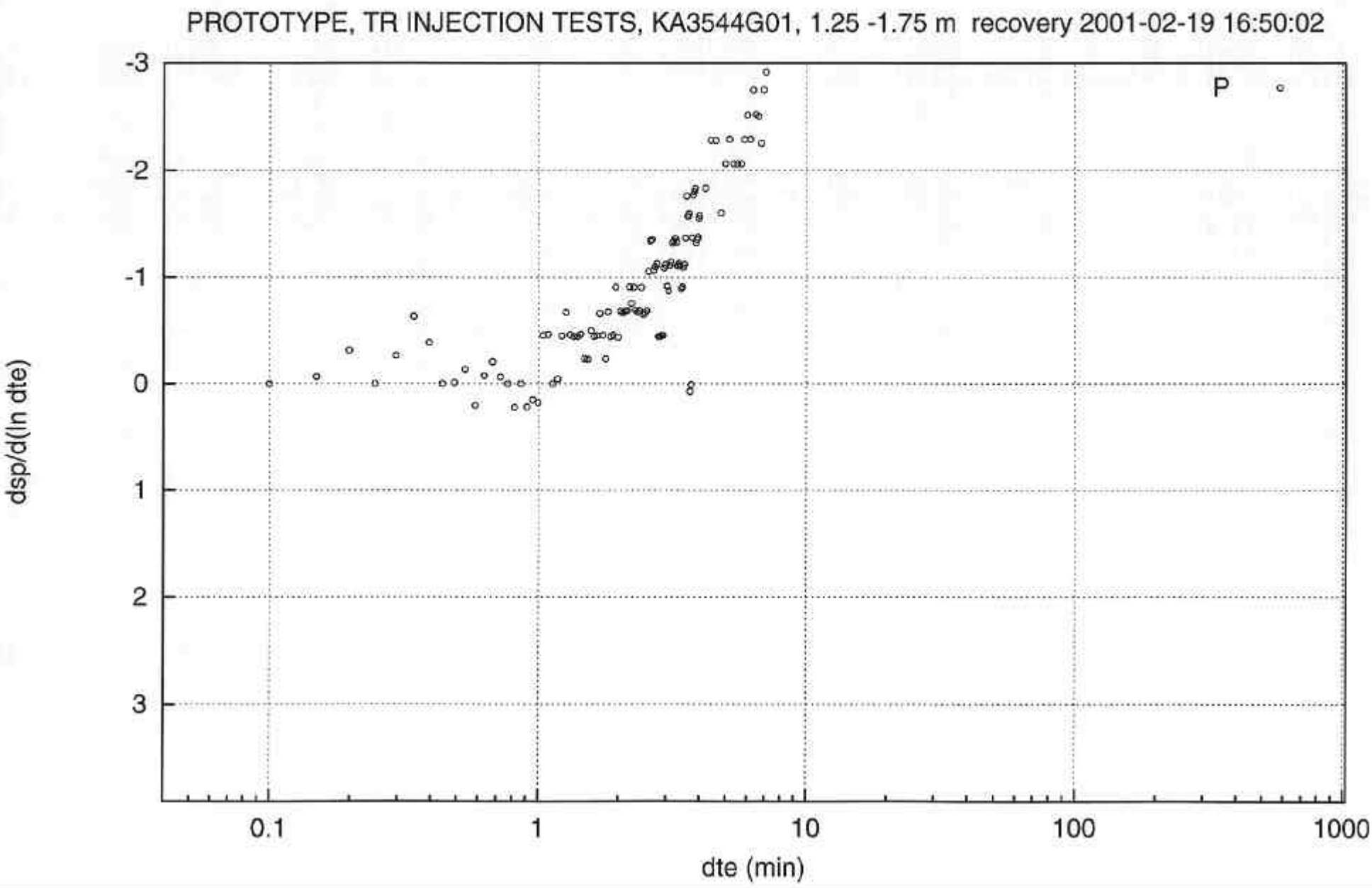

PROTOTYPE, TR INJECTION TESTS, KA3544G01, 0.75-1.25 m recovery 2001-02-19 15:55:02
P
dsp/d(ln dte)
0
5
10
15
20
25
0.1
1
10
100
dte (min)

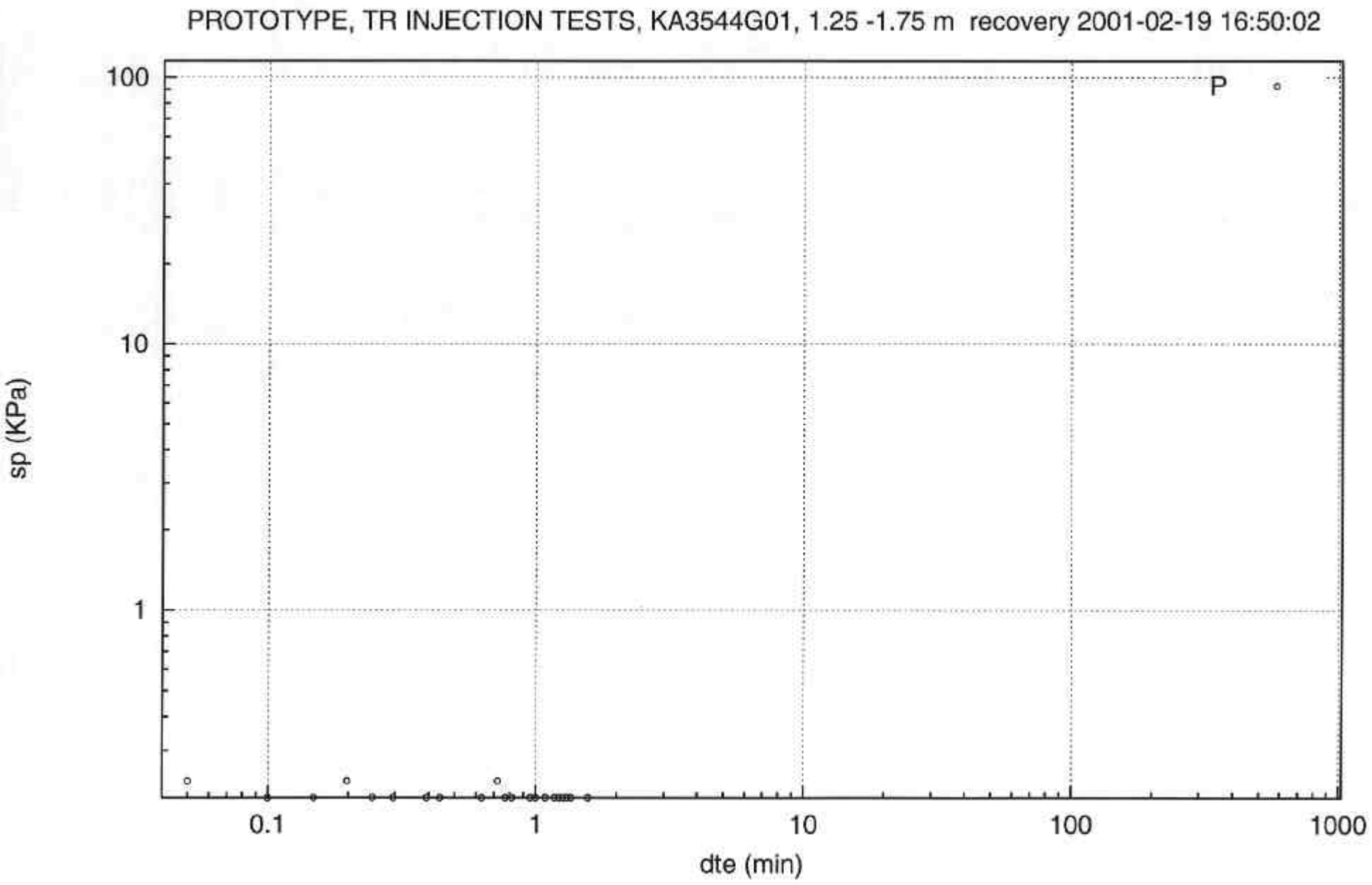

PROTOTYPE, TR INJECTION TESTS, KA3544G01, 0.75-1.25 m recovery 2001-02-19 15:55:02
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
dte (min)

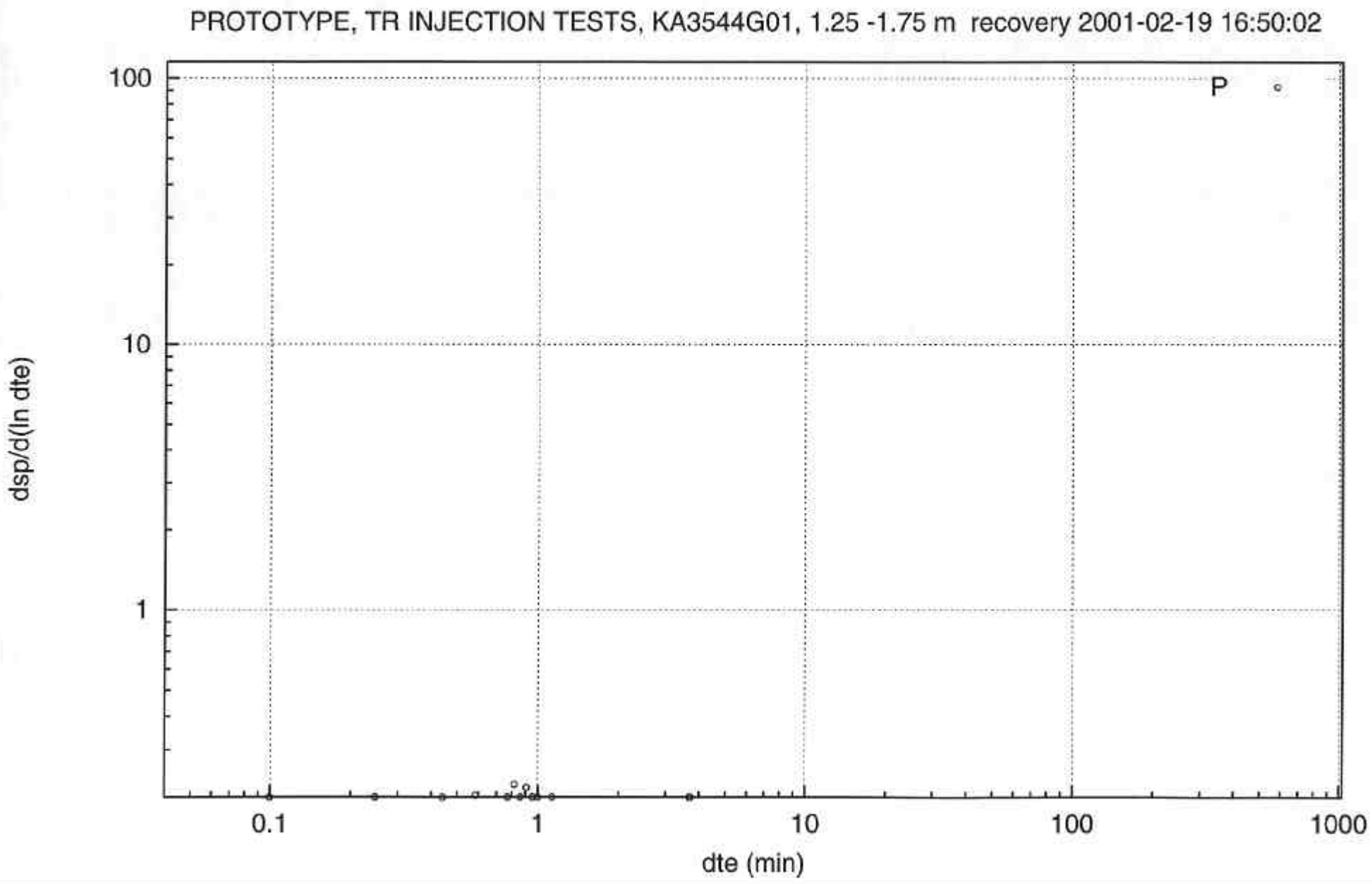

KA3544G01,1.25-1.75m. Tr.Injection test. P=Test interval,PA=section below packers
600
500
400
300
200
100
0
(KPa)
P
PA
16:10
20
30
40
50
17:00
Start: 2001-02-19 16:08:00
hour:min


KA3544G01,1.25-1.75m. Tr.Injection test. P=Test interval,PA=section below packers
P
PA
2500
2000
1500
1000
500
0
(KPa)
16:10
20
30
40
50
17:00
Start: 2001-02-19 16:08:00
hour:min

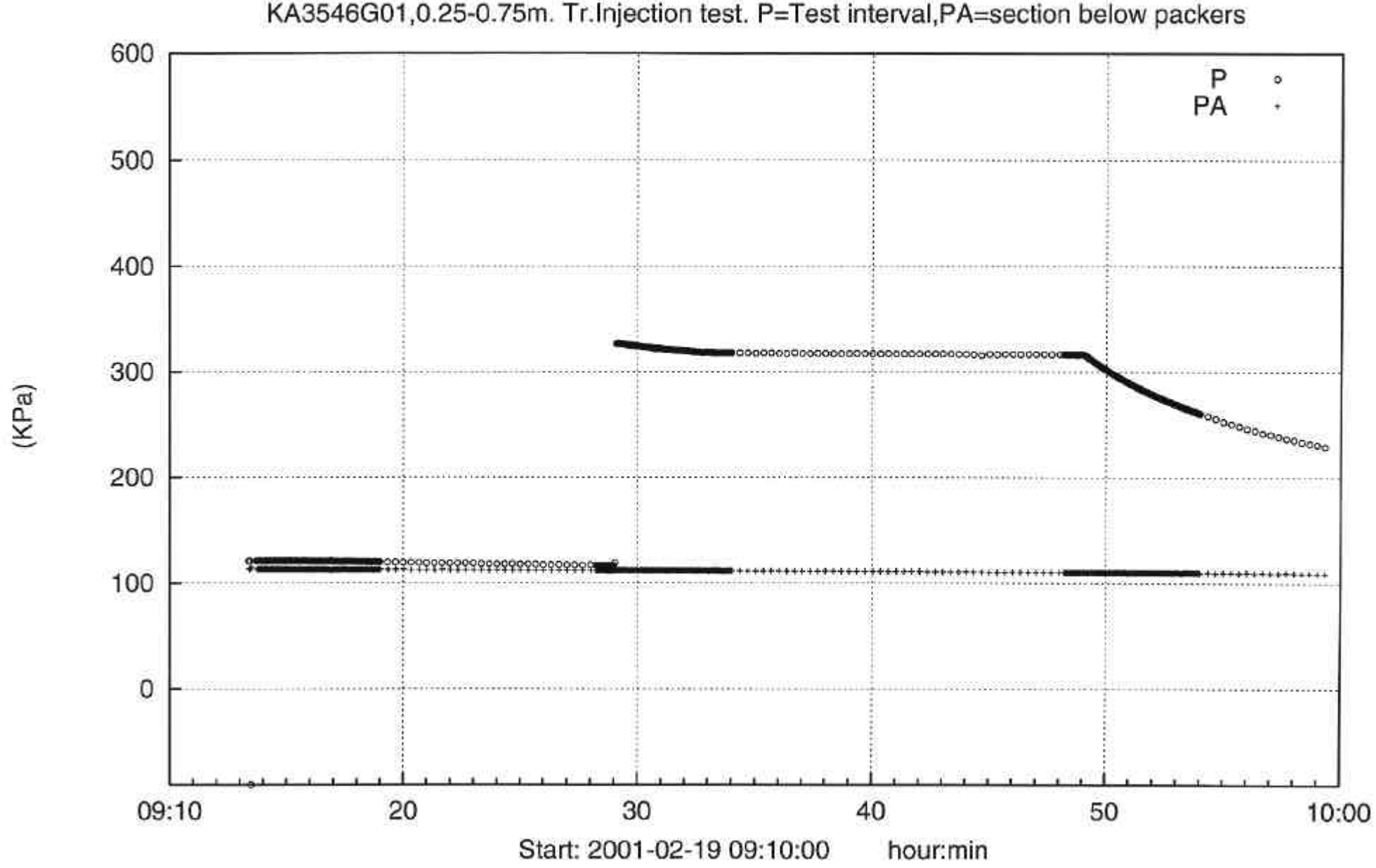

PROTOTYPE, TR INJECTION TESTS, KA3544G01, 1.25 -1.75 m recovery 2001-02-19 16:50:02
P
sp (KPa)
-3
-2
-1
0
1
2
3
0.1
1
10
100
1000
dte (min)

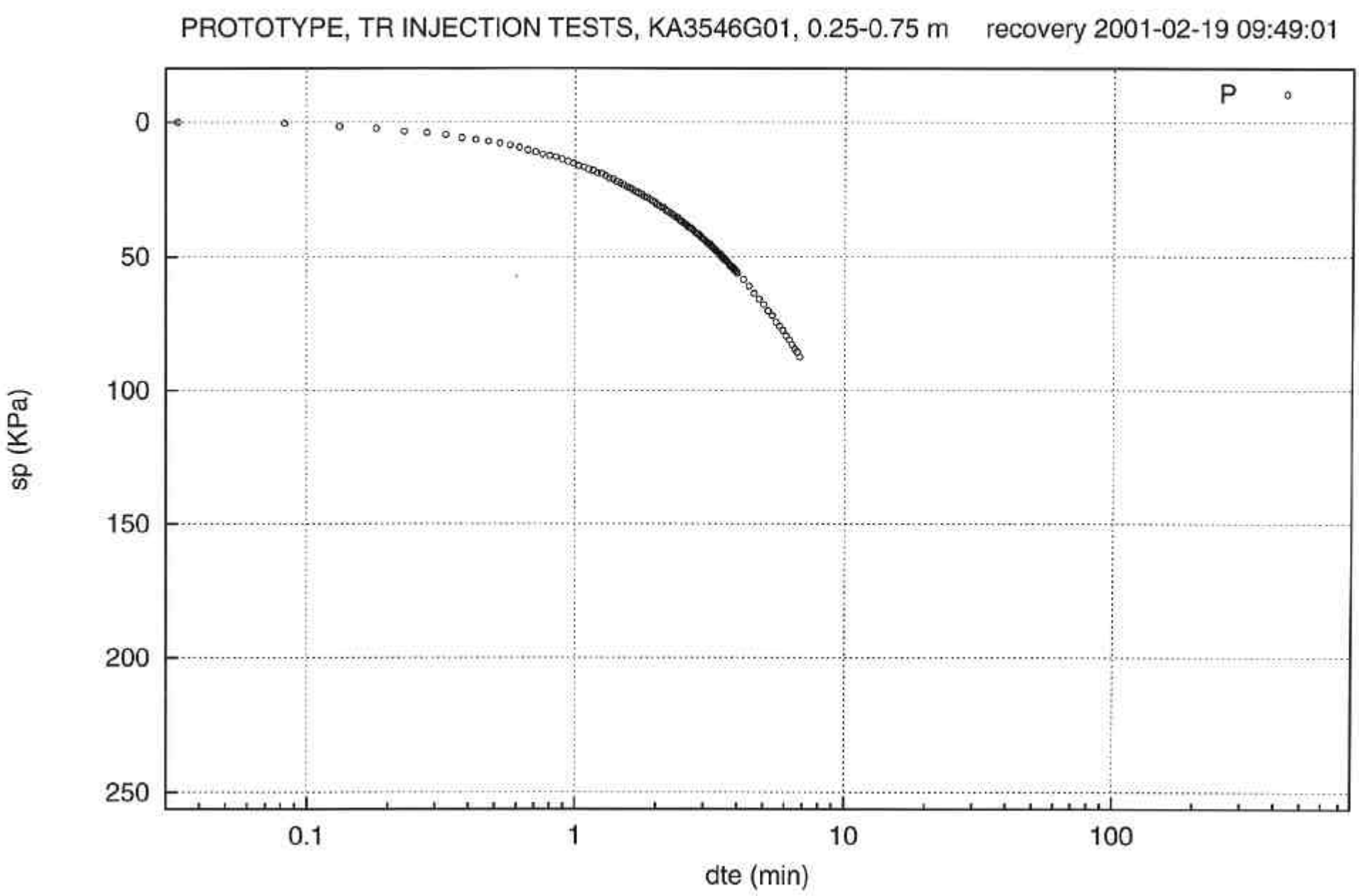

PROTOTYPE, TR INJECTION TESTS, KA3544G01, 1.25 -1.75 m recovery 2001-02-19 16:50:02
P
dsp/d(ln dte)
-3
-2
-1
0
1
2
3
0.1
1
10
100
1000
dte (min)

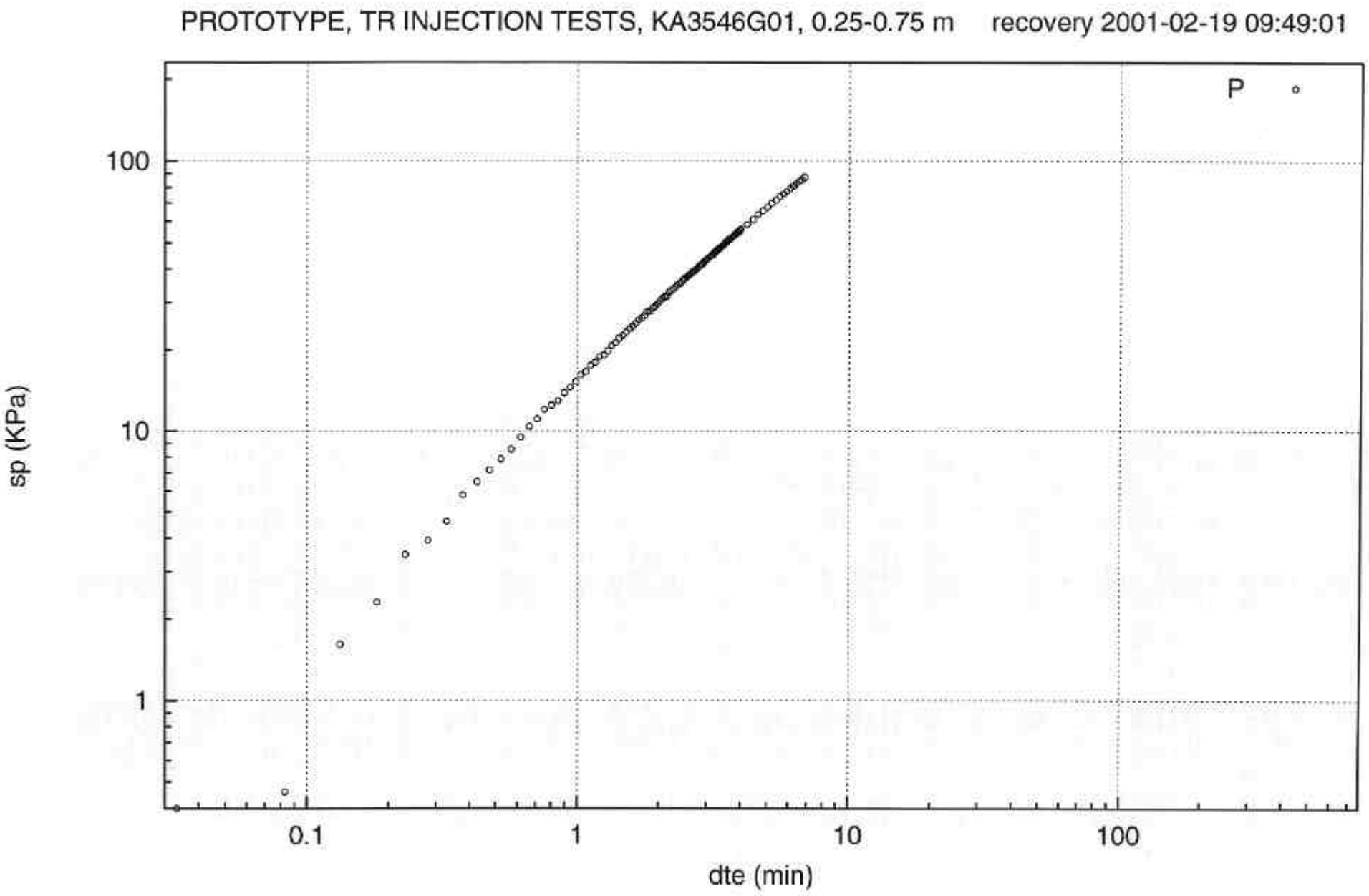

PROTOTYPE, TR INJECTION TESTS, KA3544G01, 1.25 -1.75 m recovery 2001-02-19 16:50:02
P
100
10
1
sp (KPa)
0.1
1
10
100
1000
dte (min)

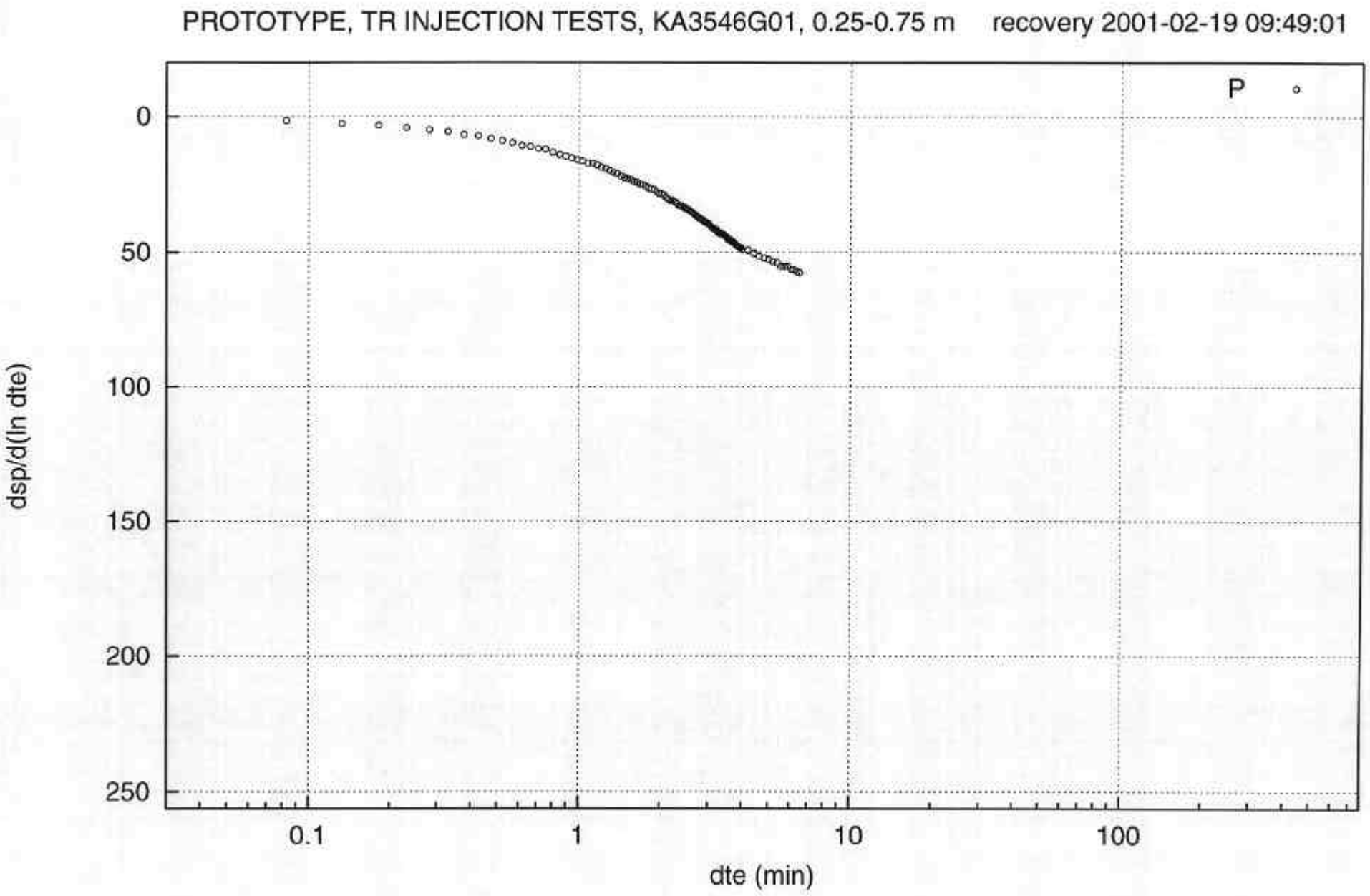

PROTOTYPE, TR INJECTION TESTS, KA3544G01, 1.25 -1.75 m recovery 2001-02-19 16:50:02
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
1000
dte (min)

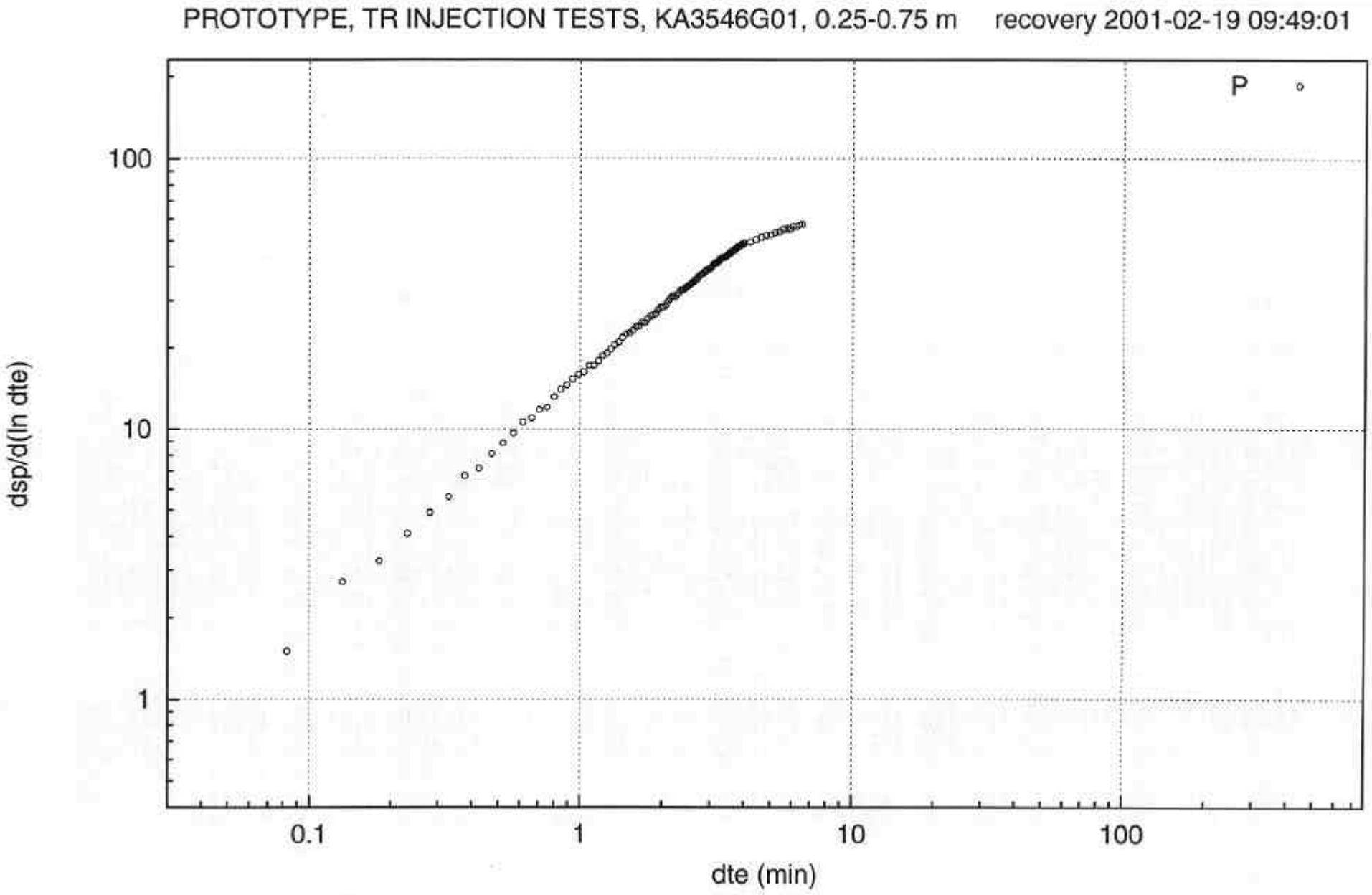
APPENDIX 5: Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3546G01. February 2001

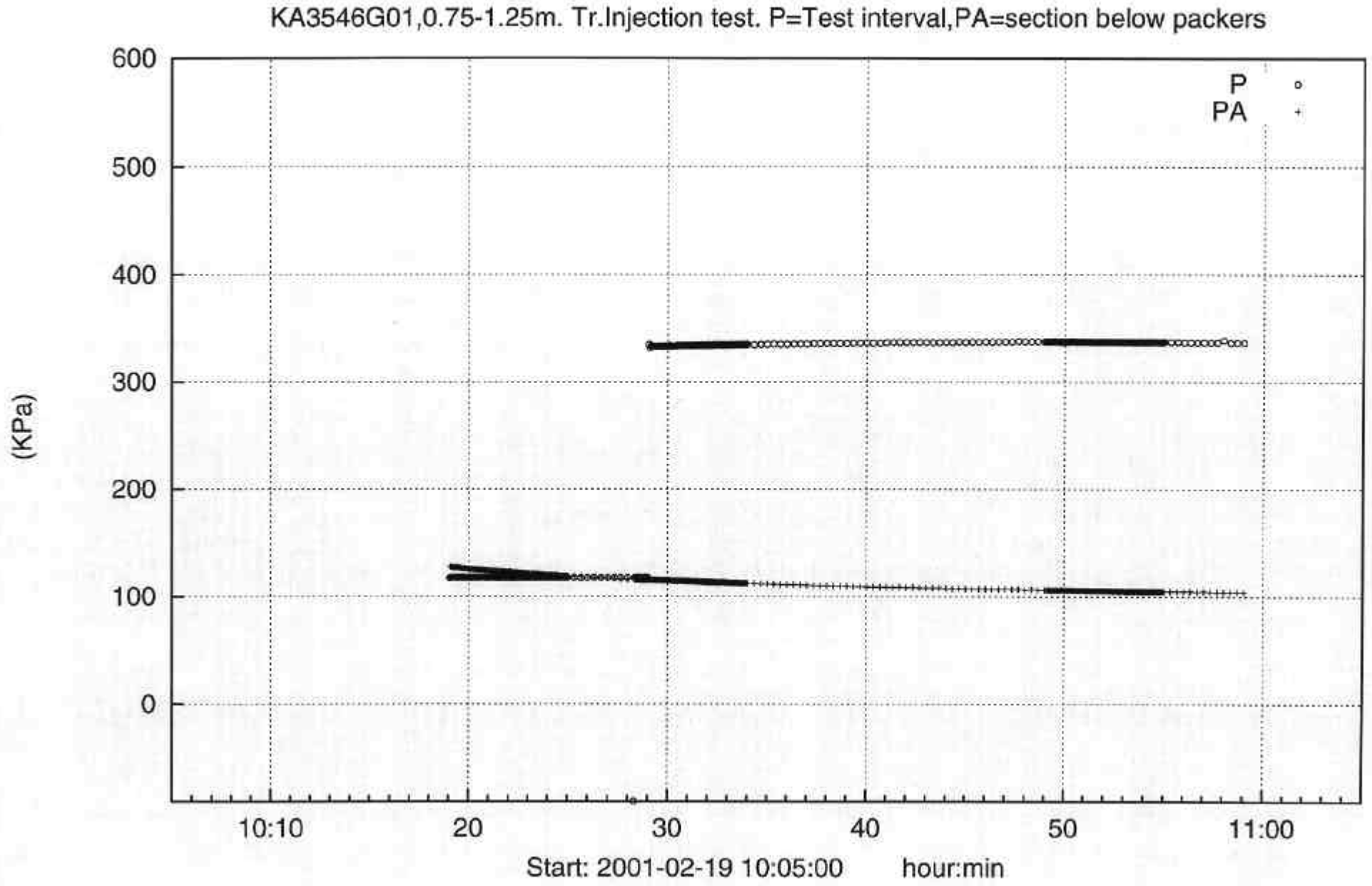

KA3546G01,0.25-0.75m. Tr.Injection test. P=Test interval,PA=section below packers
600
500
400
300
200
100
0
(KPa)
P
PA
09:10
20
30
40
50
10:00
Start: 2001-02-19 09:10:00
hour:min

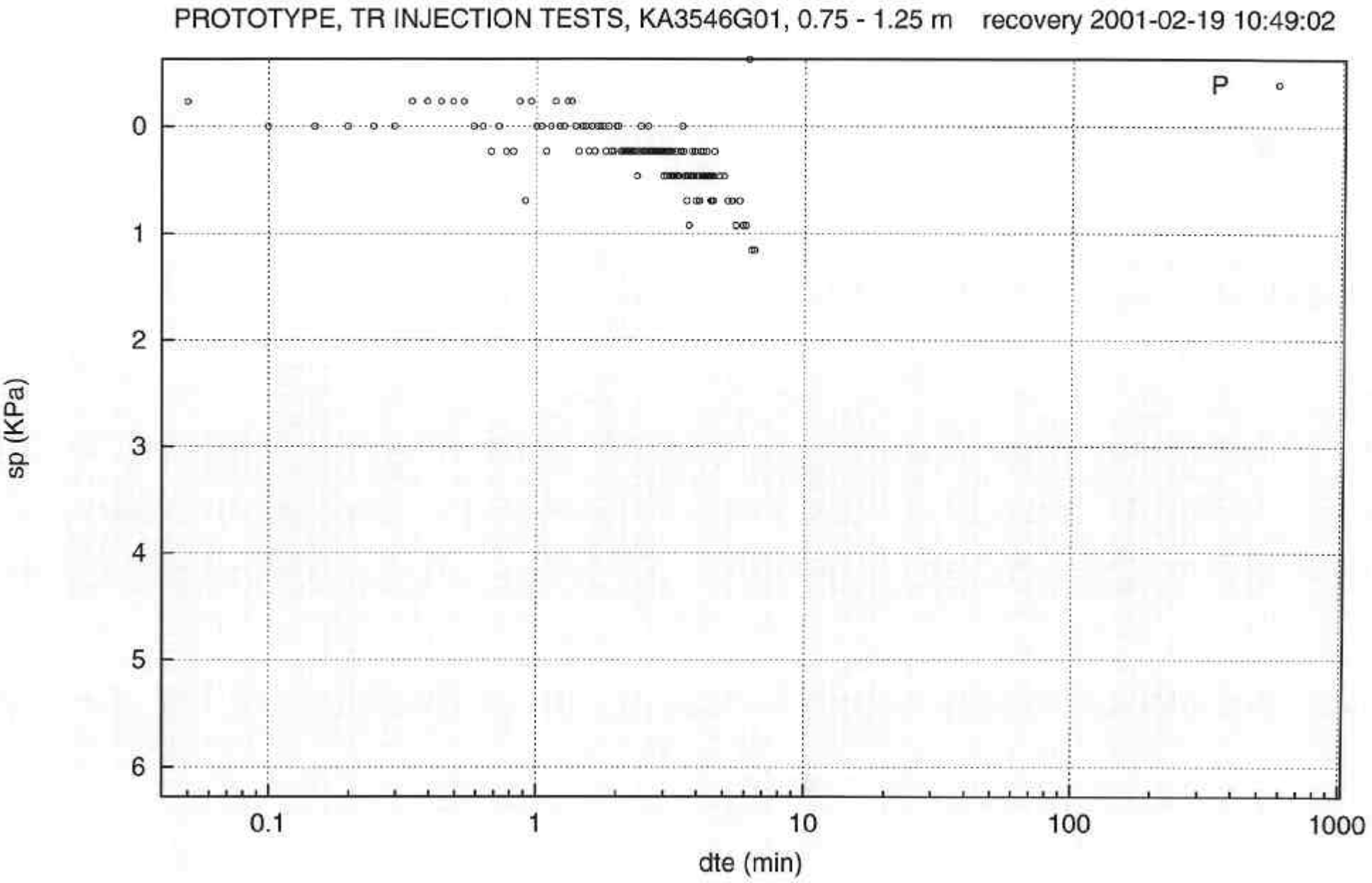

PROTOTYPE, TR INJECTION TESTS, KA3546G01, 0.25-0.75 m recovery 2001-02-19 09:49:01
P
0
50
100
150
200
250
sp (KPa)
0.1
1
10
100
dte (min)

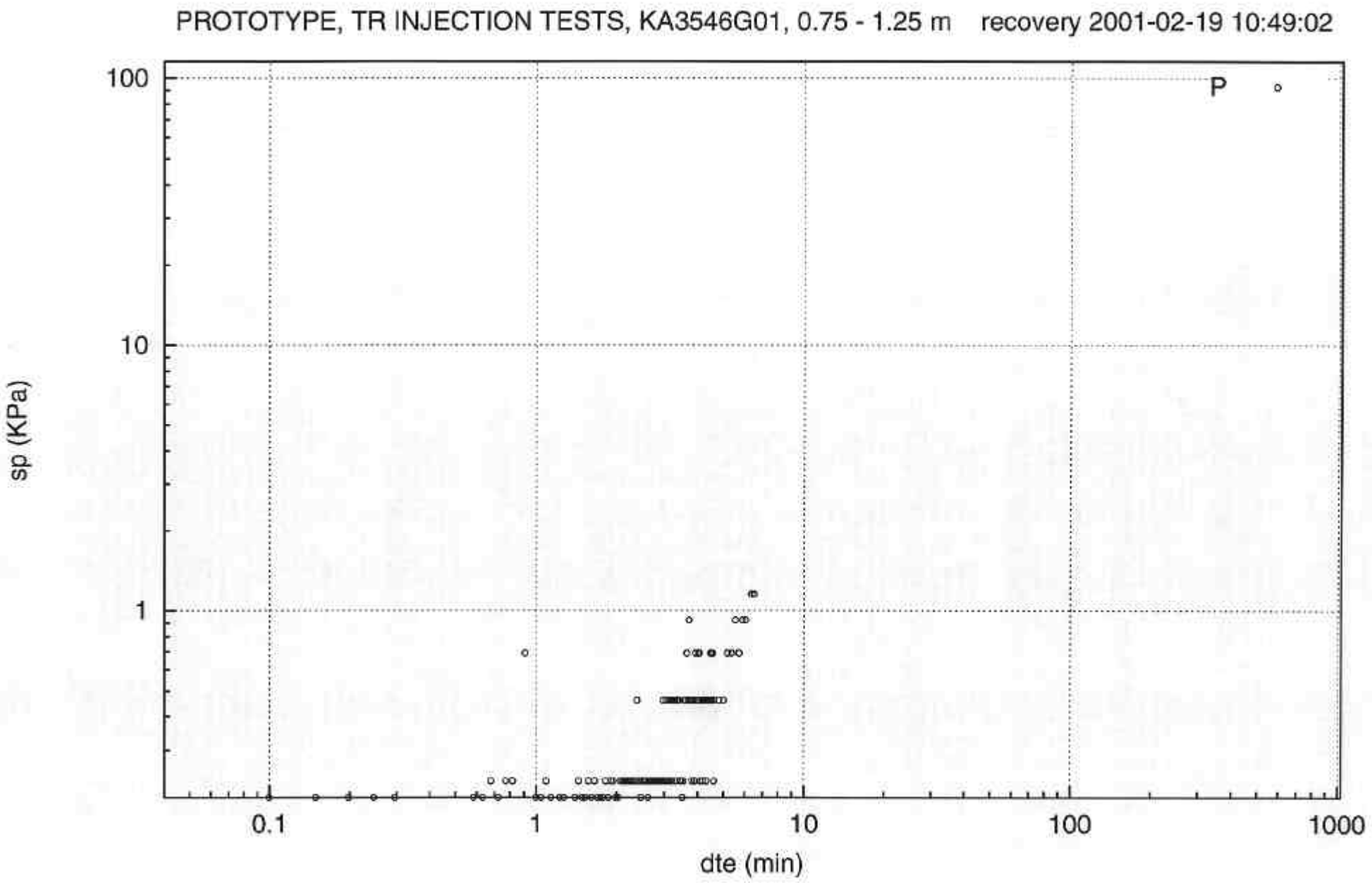

PROTOTYPE, TR INJECTION TESTS, KA3546G01, 0.25-0.75 m recovery 2001-02-19 09:49:01
P
100
10
1
sp (KPa)
0.1
1
10
100
dte (min)

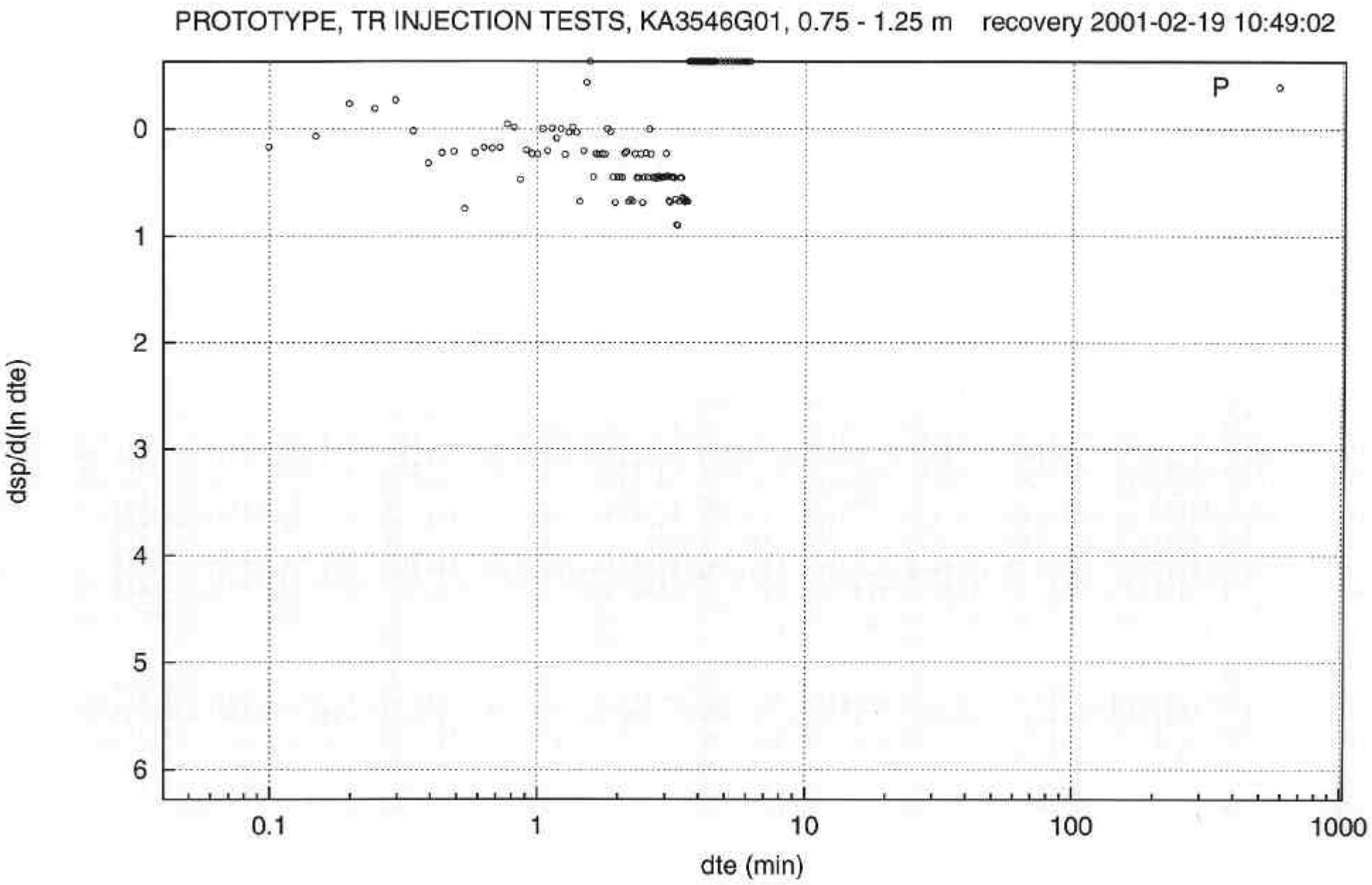

PROTOTYPE, TR INJECTION TESTS, KA3546G01, 0.25-0.75 m recovery 2001-02-19 09:49:01
P
0
50
100
150
200
250
dsp/d(ln dte)
0.1
1
10
100
dte (min)

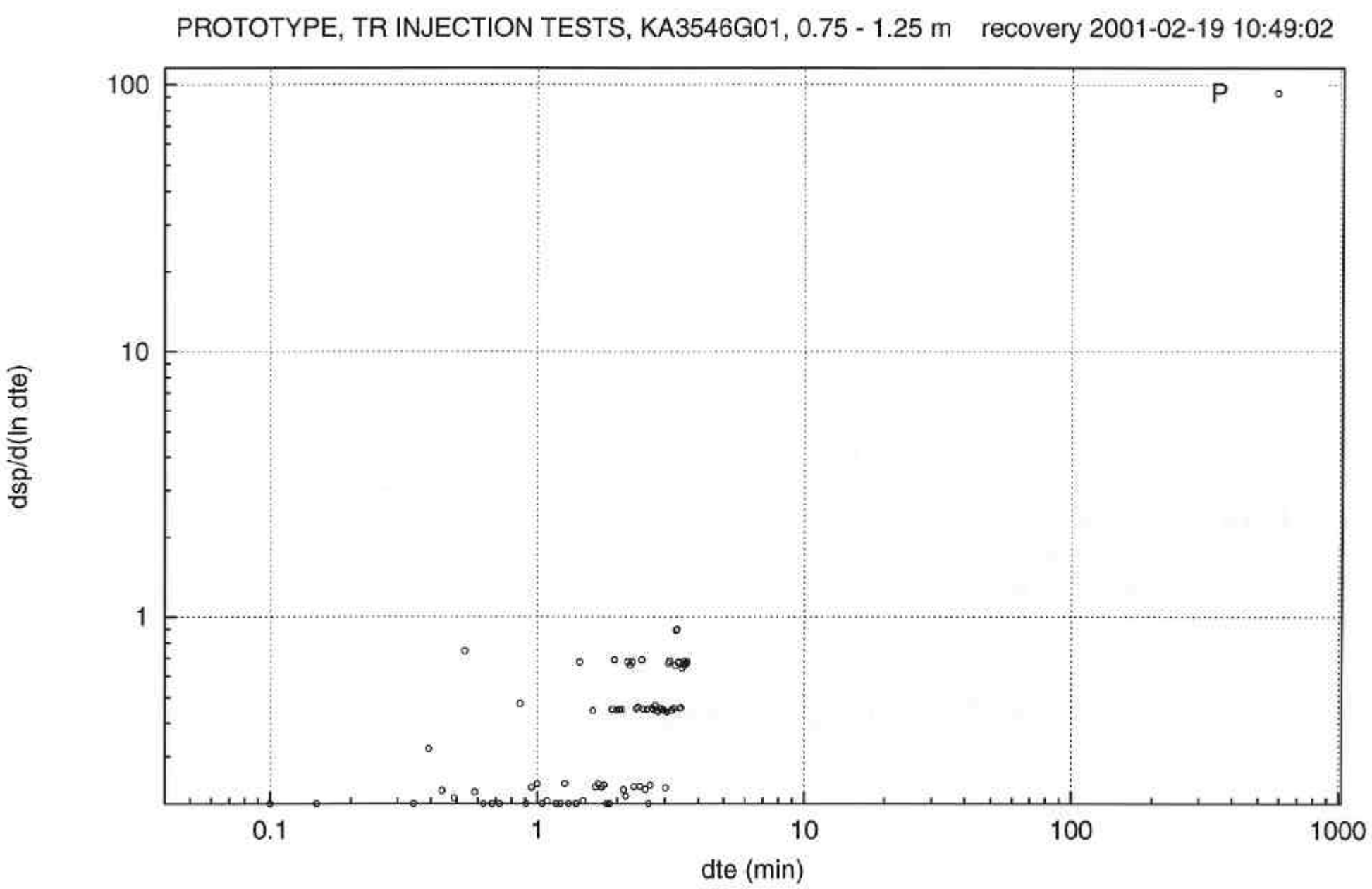

PROTOTYPE, TR INJECTION TESTS, KA3546G01, 0.25-0.75 m recovery 2001-02-19 09:49:01
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
dte (min)

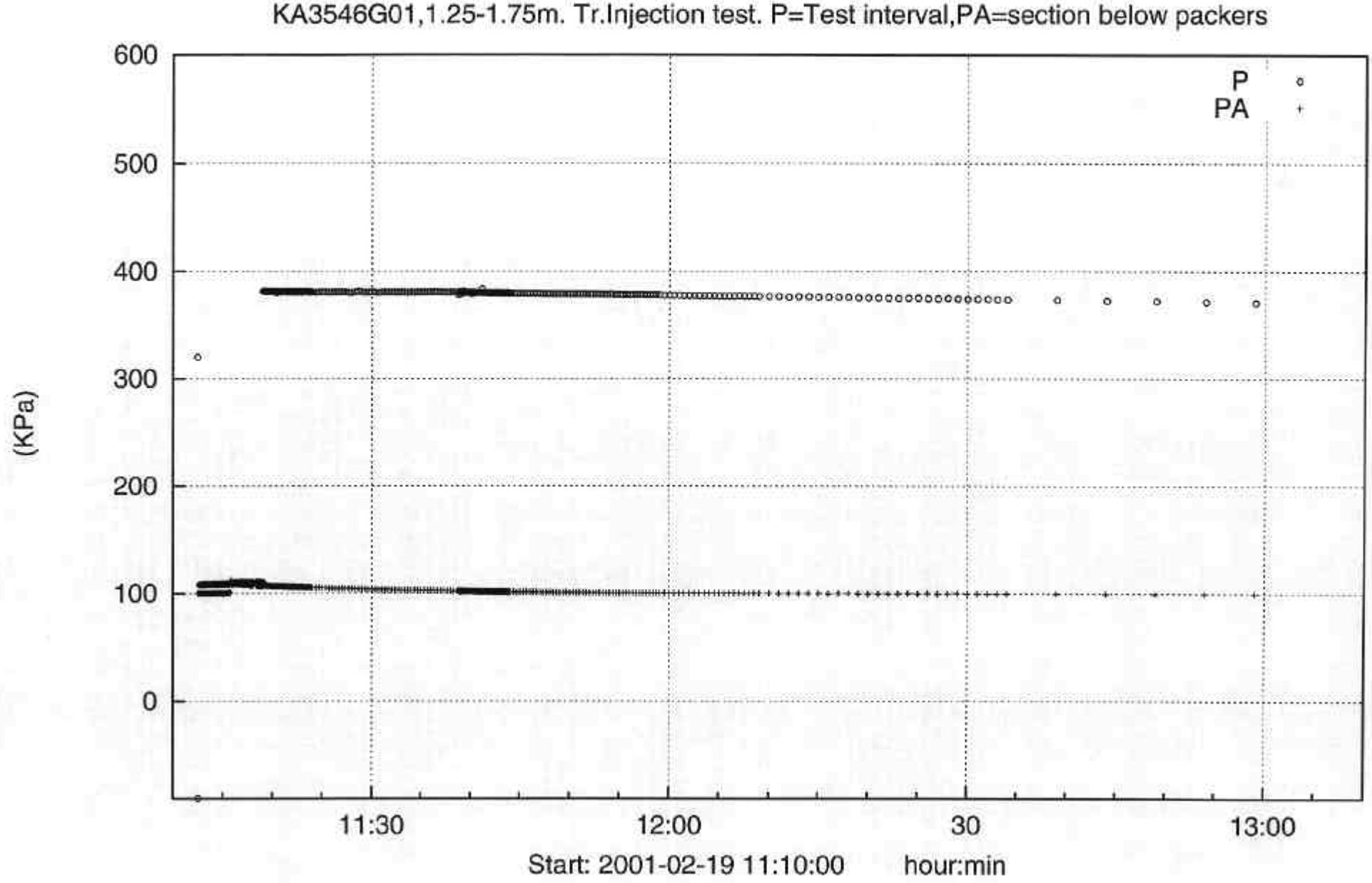

KA3546G01,0.75-1.25m. Tr.Injection test. P=Test interval,PA=section below packers
600
500
400
300
200
100
0
(KPa)
P
PA
10:10
20
30
40
50
11:00
Start: 2001-02-19 10:05:00
hour:min

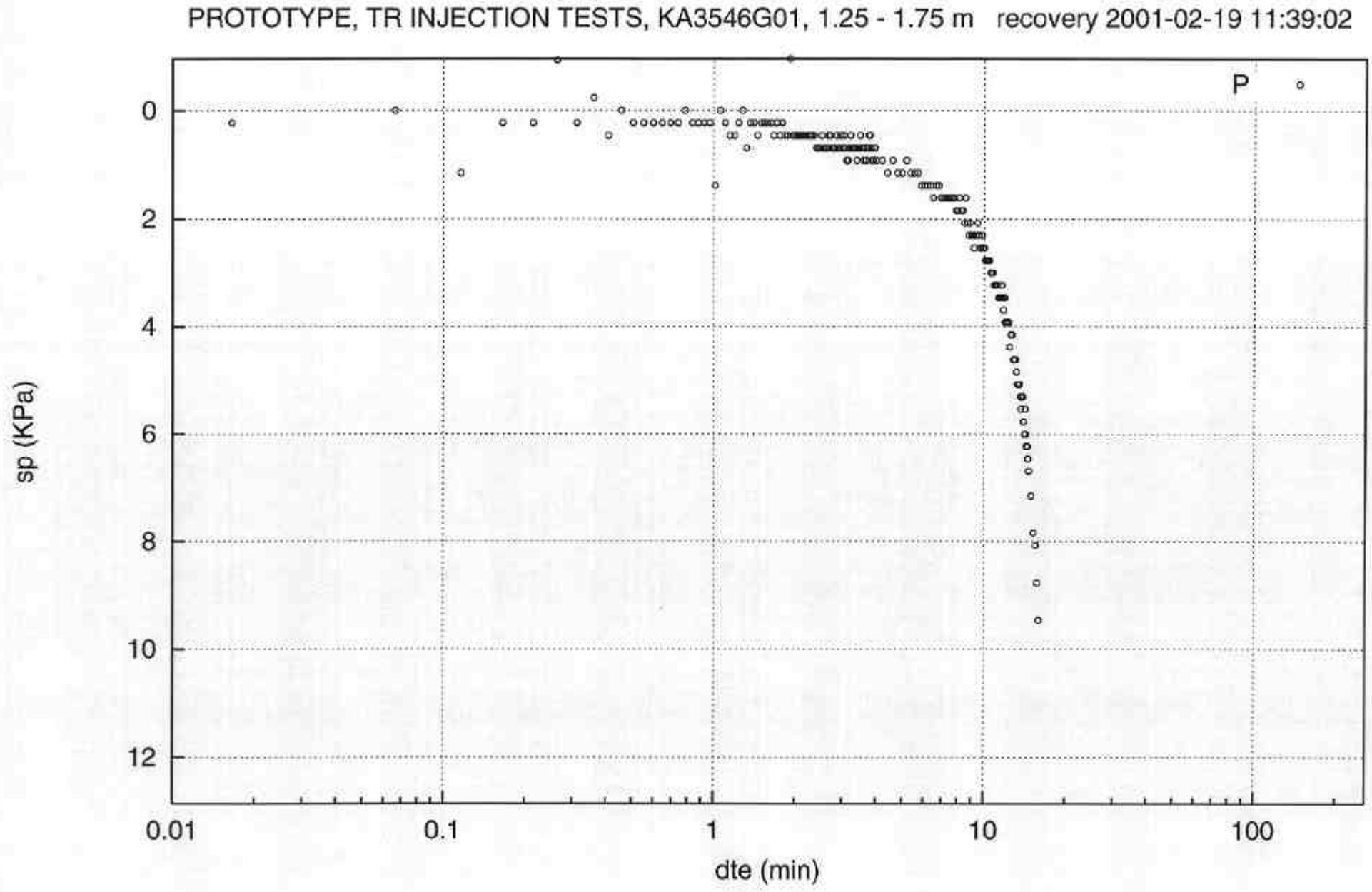

PROTOTYPE, TR INJECTION TESTS, KA3546G01, 0.75 - 1.25 m recovery 2001-02-19 10:49:02
P
sp (KPa)
0
1
2
3
4
5
6
0.1
1
10
100
1000
dte (min)

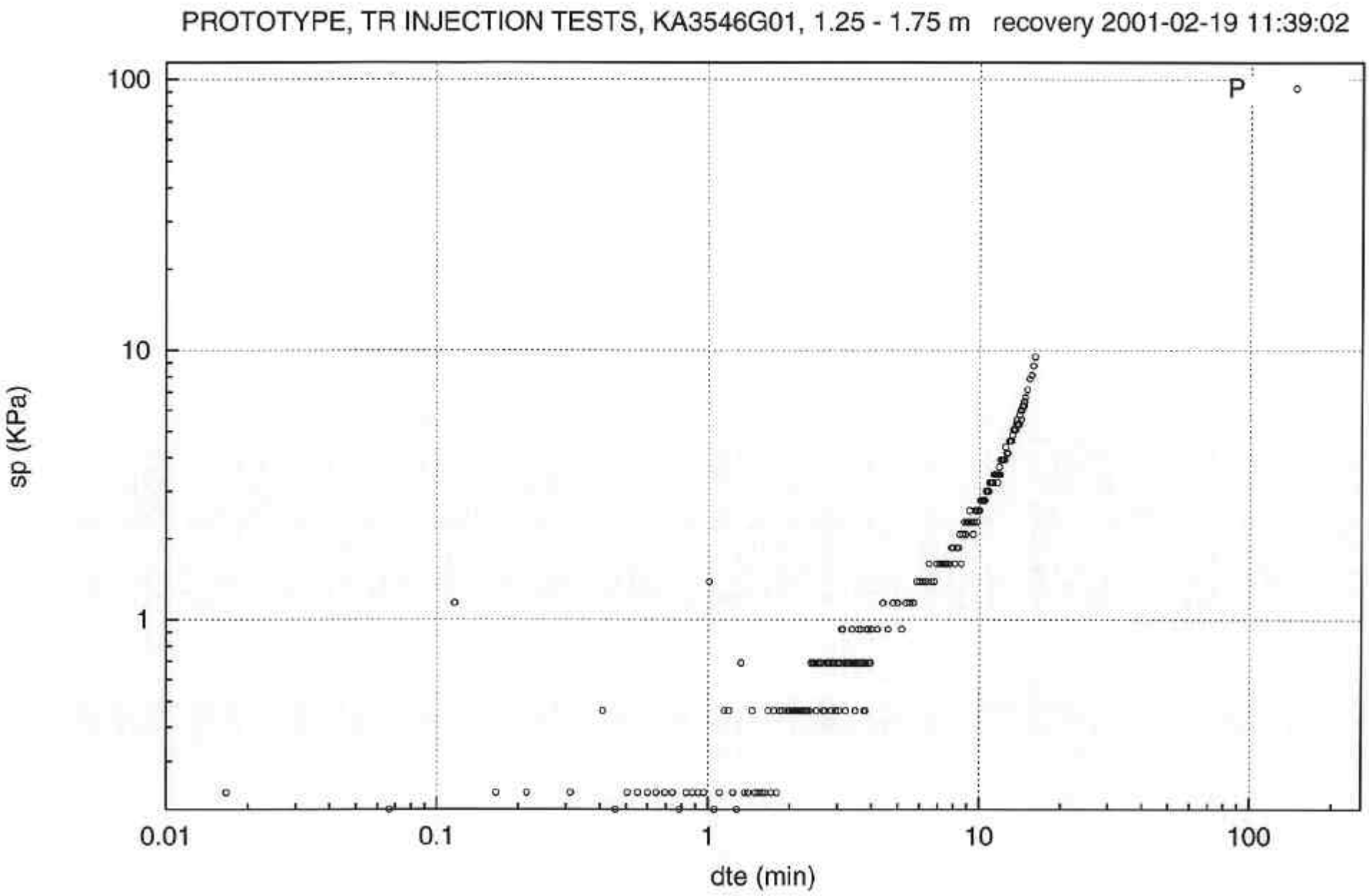

PROTOTYPE, TR INJECTION TESTS, KA3546G01, 0.75 - 1.25 m recovery 2001-02-19 10:49:02
P
100
10
1
sp (KPa)
0.1
1
10
100
1000
dte (min)

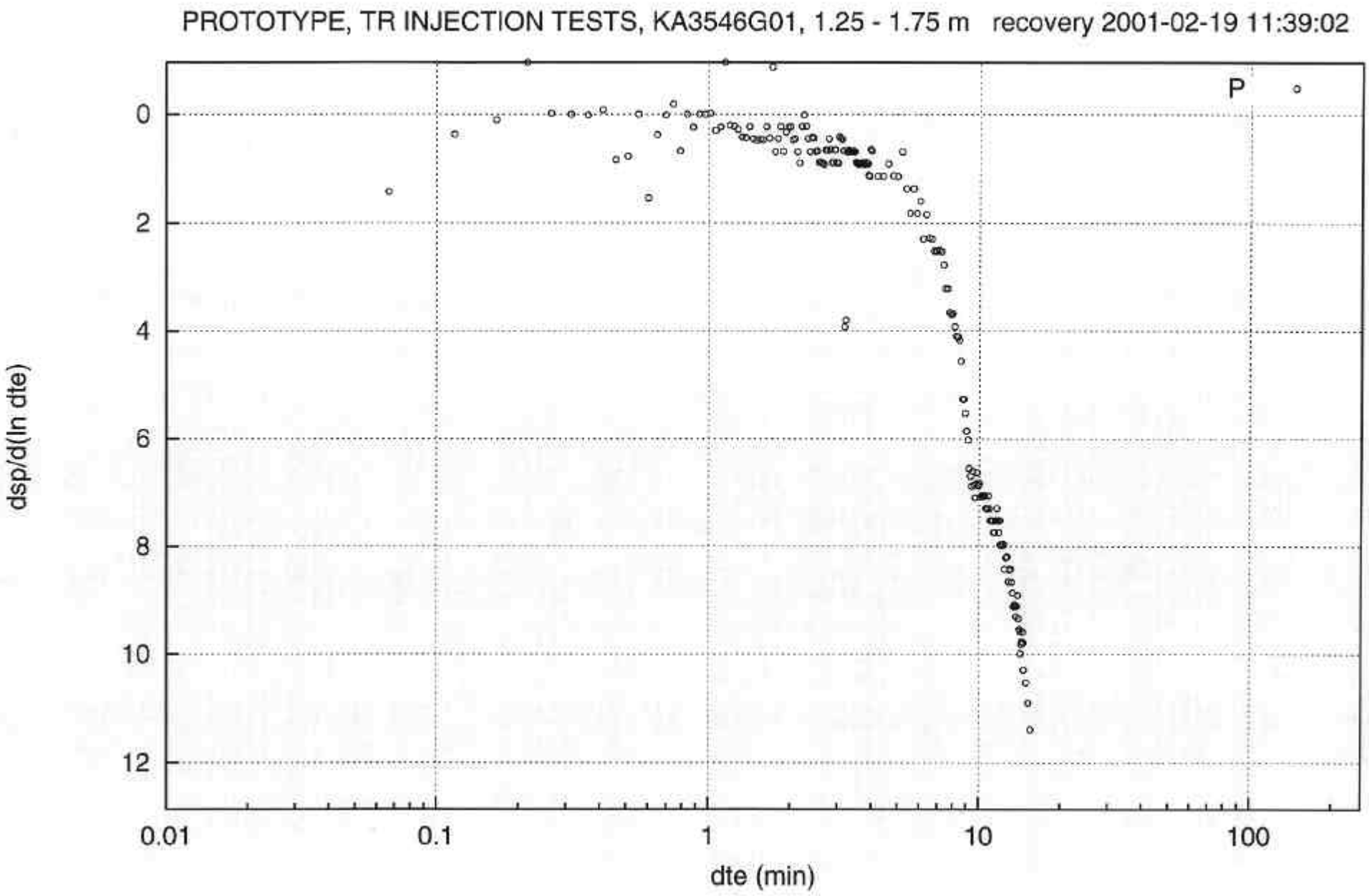

PROTOTYPE, TR INJECTION TESTS, KA3546G01, 0.75 - 1.25 m recovery 2001-02-19 10:49:02
P
dsp/d(ln dte)
0
1
2
3
4
5
6
0.1
1
10
100
1000
dte (min)

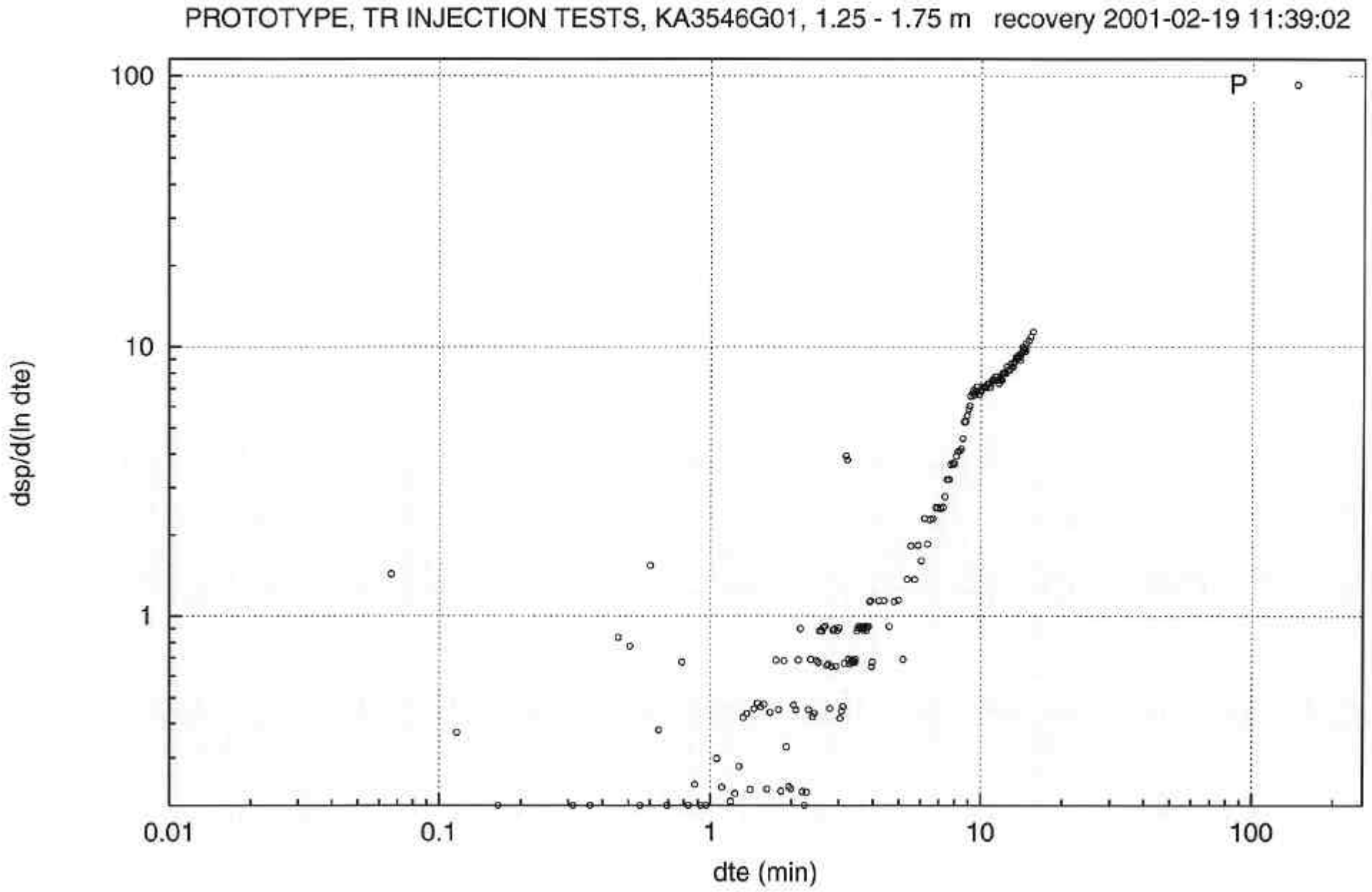

PROTOTYPE, TR INJECTION TESTS, KA3546G01, 0.75 - 1.25 m recovery 2001-02-19 10:49:02
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
1000
dte (min)


KA3546G01,1.25-1.75m. Tr.Injection test. P=Test interval,PA=section below packers
600
500
400
300
200
100
0
(KPa)
P
PA
11:30
12:00
30
13:00
Start: 2001-02-19 11:10:00
hour:min

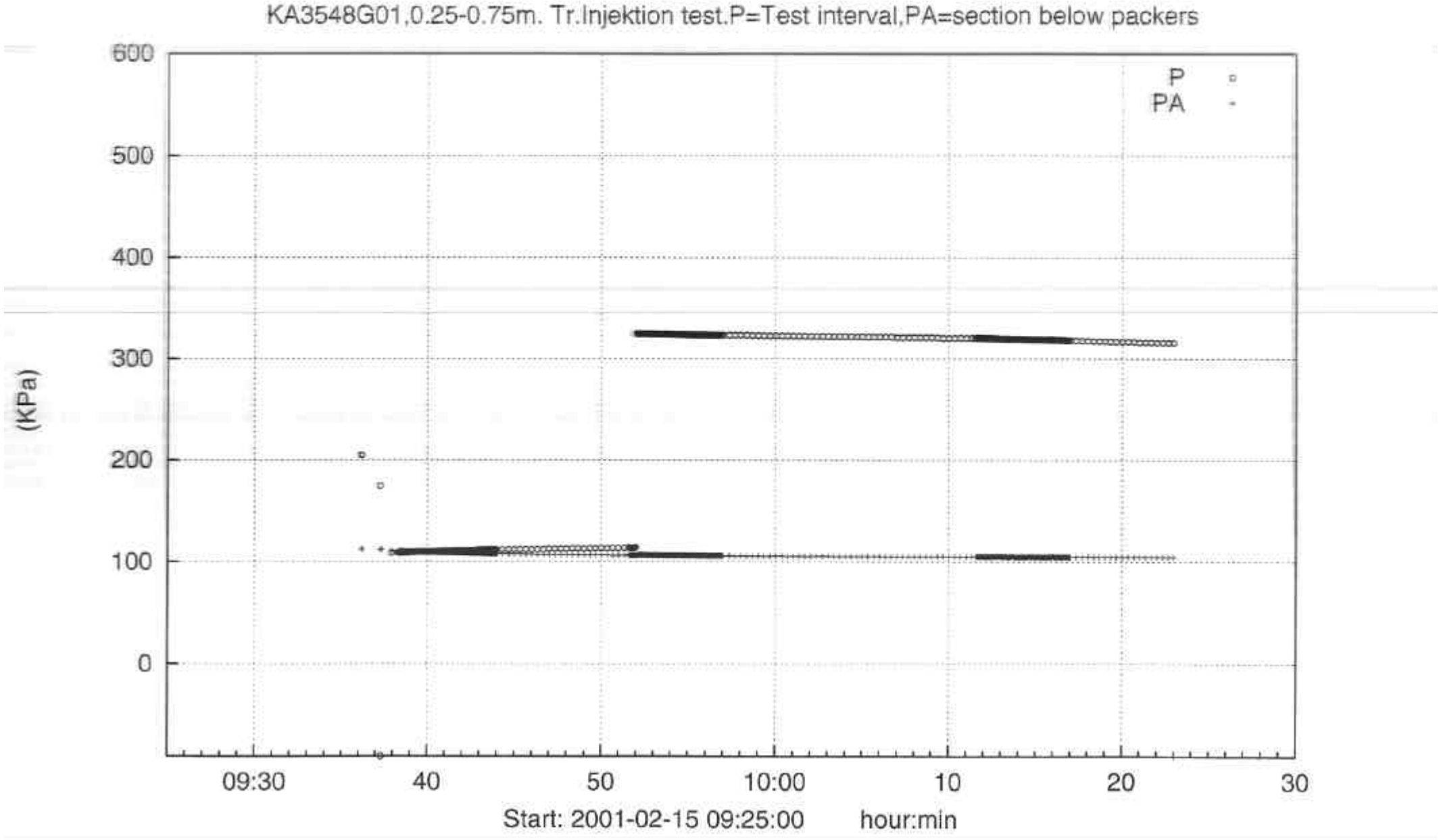

PROTOTYPE, TR INJECTION TESTS, KA3546G01, 1.25 - 1.75 m recovery 2001-02-19 11:39:02
P
sp (KPa)
0
2
4
6
8
10
12
0.01
0.1
1
10
100
dte (min)

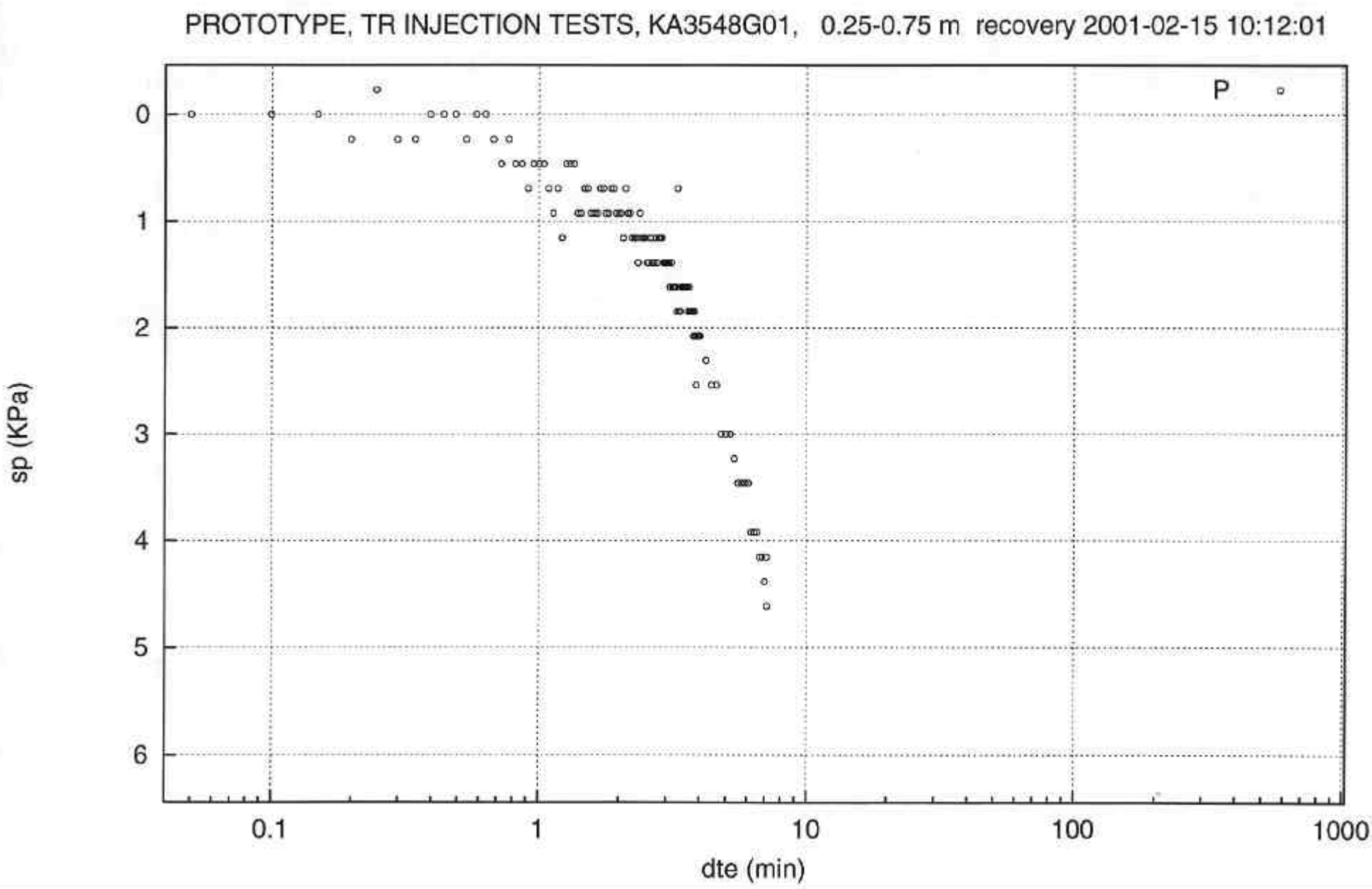

PROTOTYPE, TR INJECTION TESTS, KA3546G01, 1.25 - 1.75 m recovery 2001-02-19 11:39:02
P
100
10
1
sp (KPa)
0.01
0.1
1
10
100
dte (min)

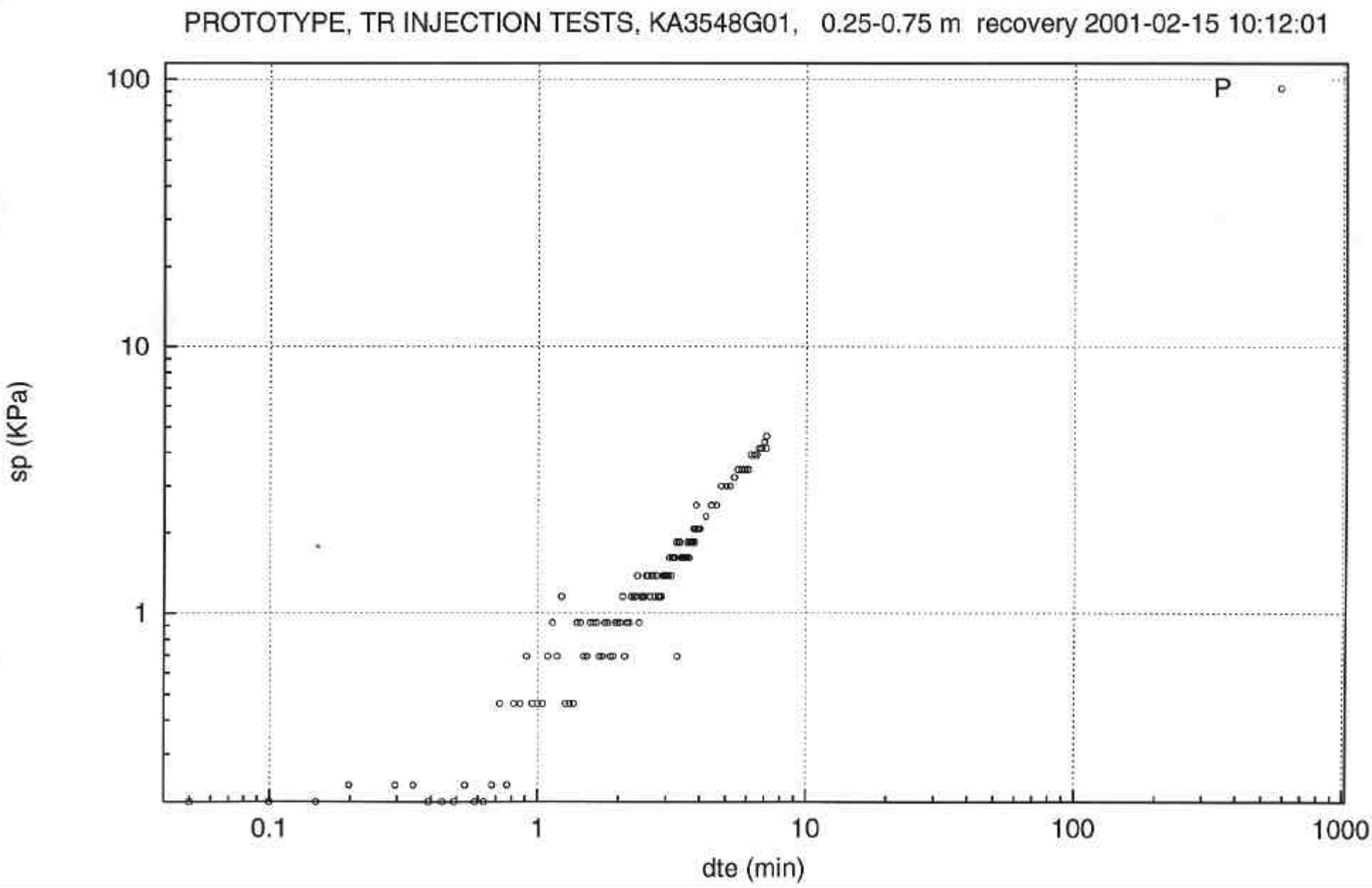

PROTOTYPE, TR INJECTION TESTS, KA3546G01, 1.25 - 1.75 m recovery 2001-02-19 11:39:02
P
dsp/d(ln dte)
0
2
4
6
8
10
12
0.01
0.1
1
10
100
dte (min)

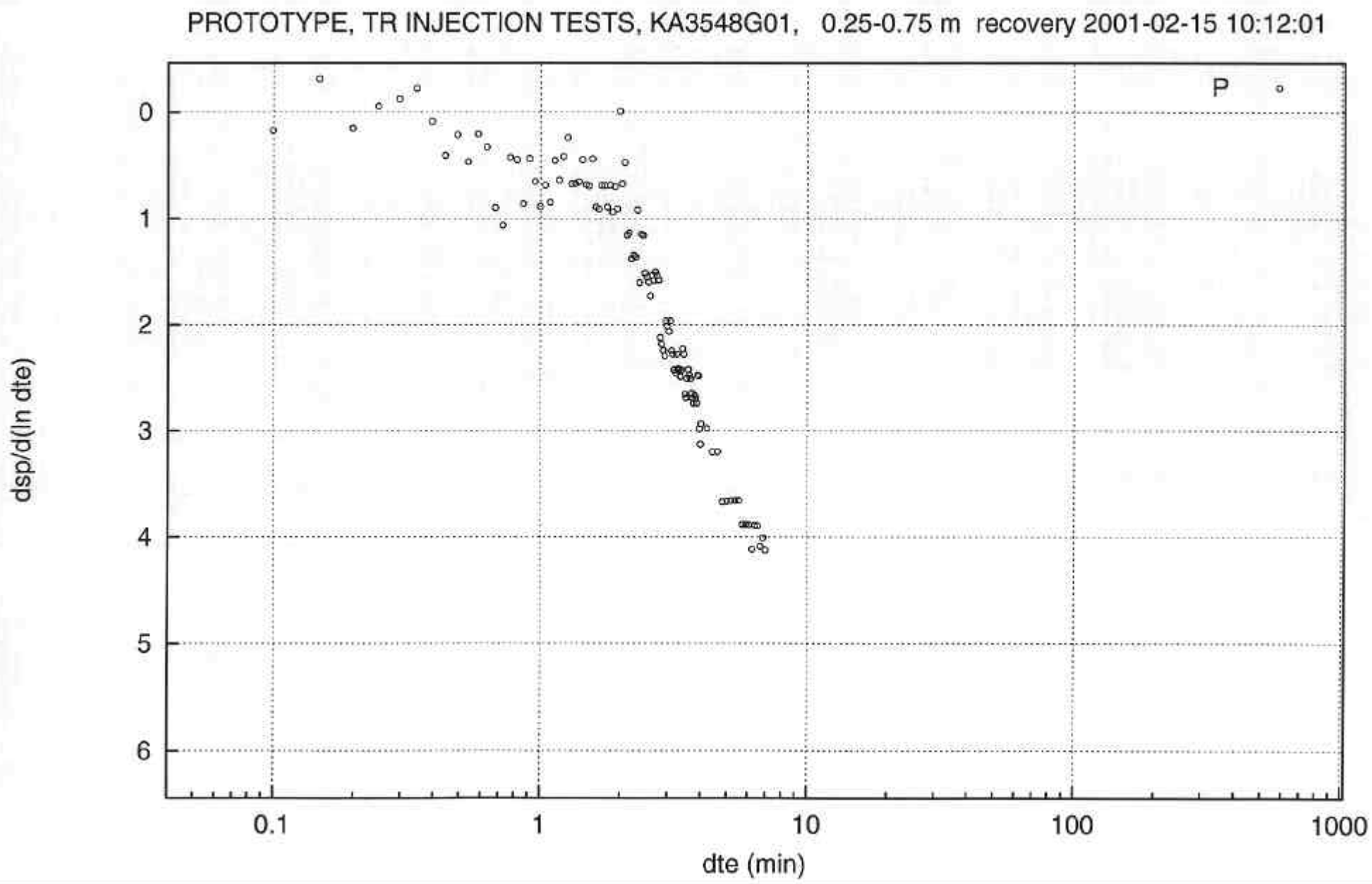

PROTOTYPE, TR INJECTION TESTS, KA3546G01, 1.25 - 1.75 m recovery 2001-02-19 11:39:02
P
100
10
1
dsp/d(ln dte)
0.01
0.1
1
10
100
dte (min)

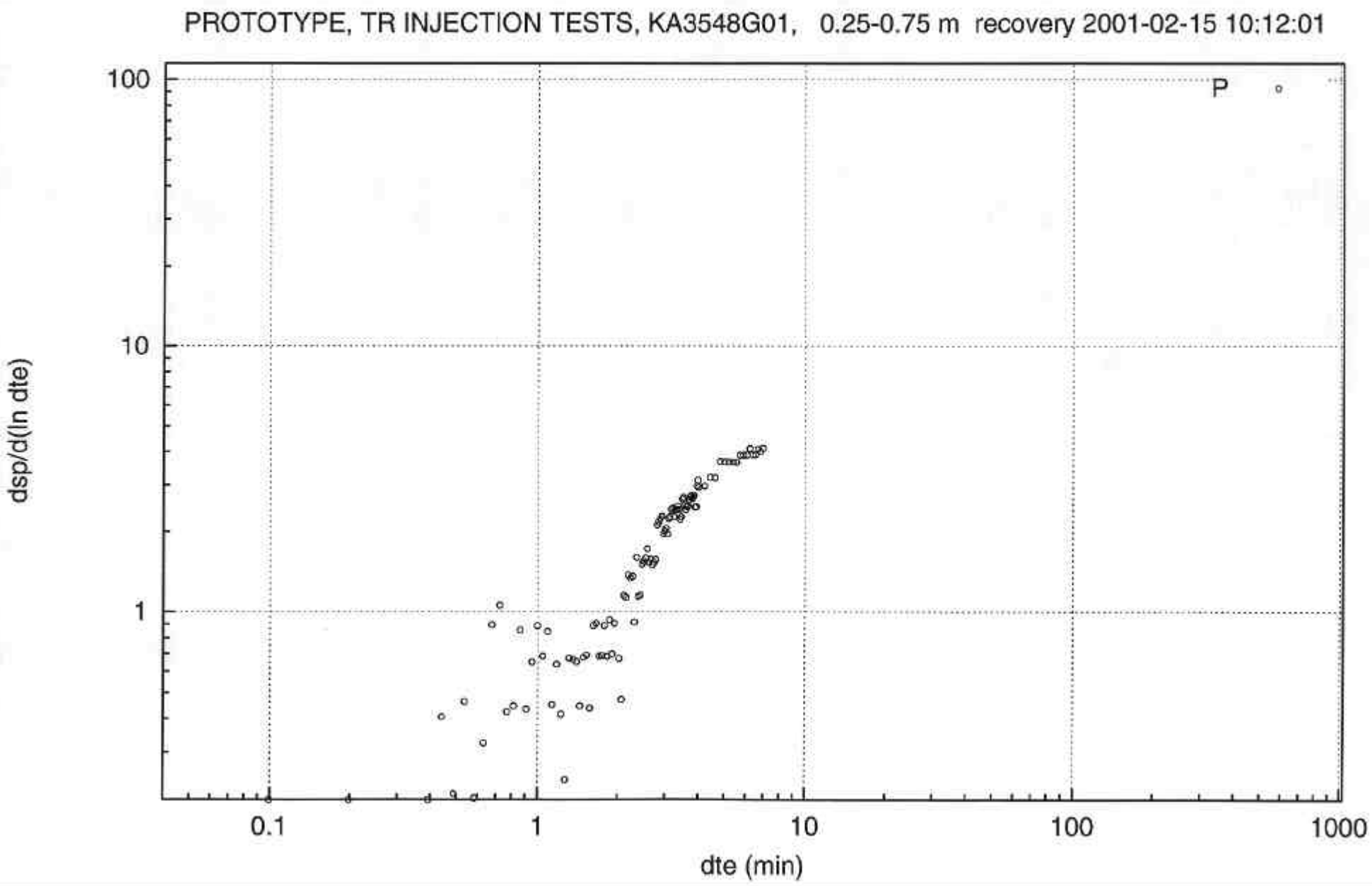
APPENDIX 6: Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3548G01. February 2001

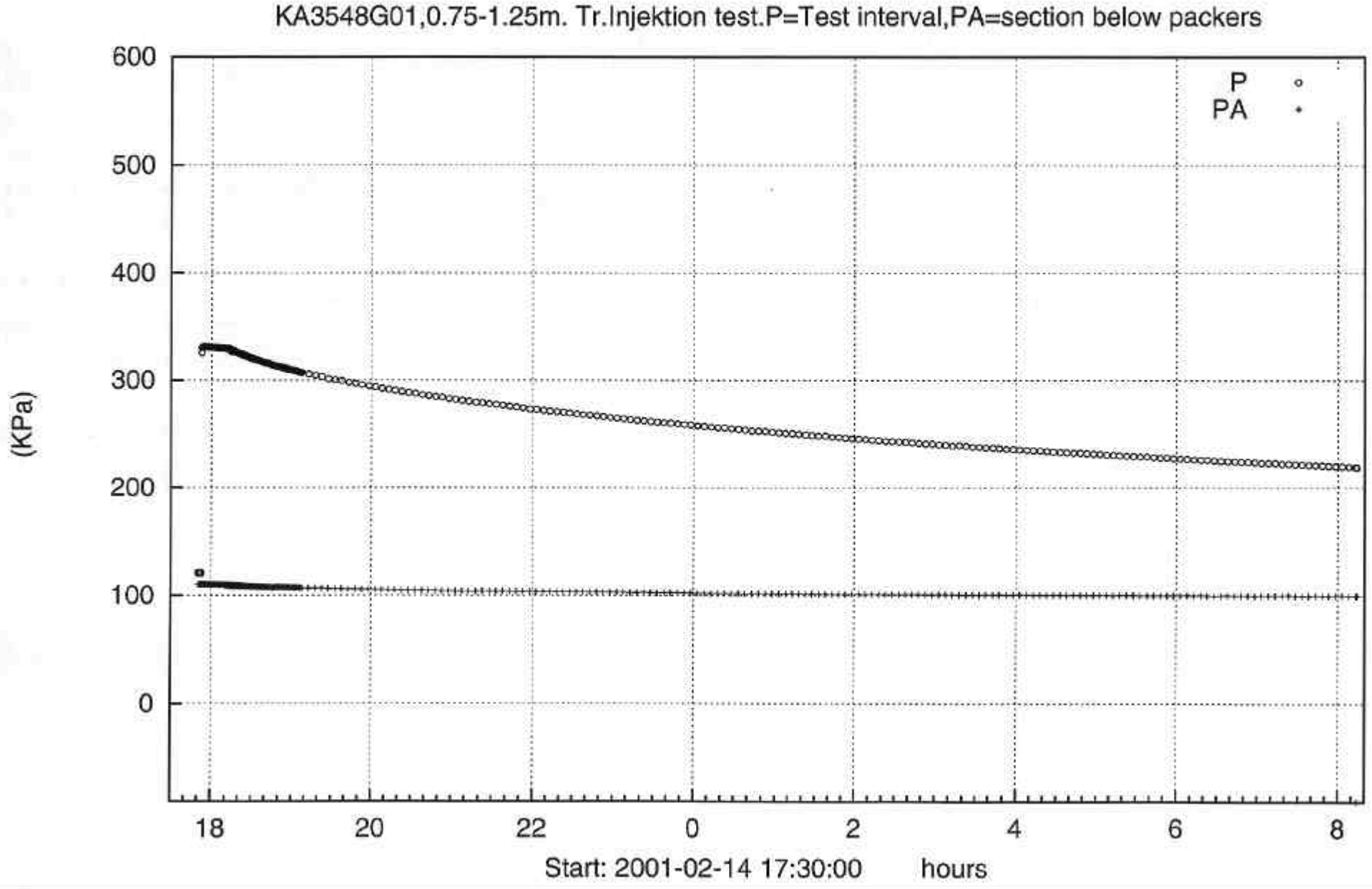

KA3548G01,0.25-0.75m. Tr.Injektion test.P=Test interval,PA=section below packers
600
500
400
300
200
100
0
(KPa)
P
PA
09:30
40
50
10:00
10
20
30
Start: 2001-02-15 09:25:00
hour:min

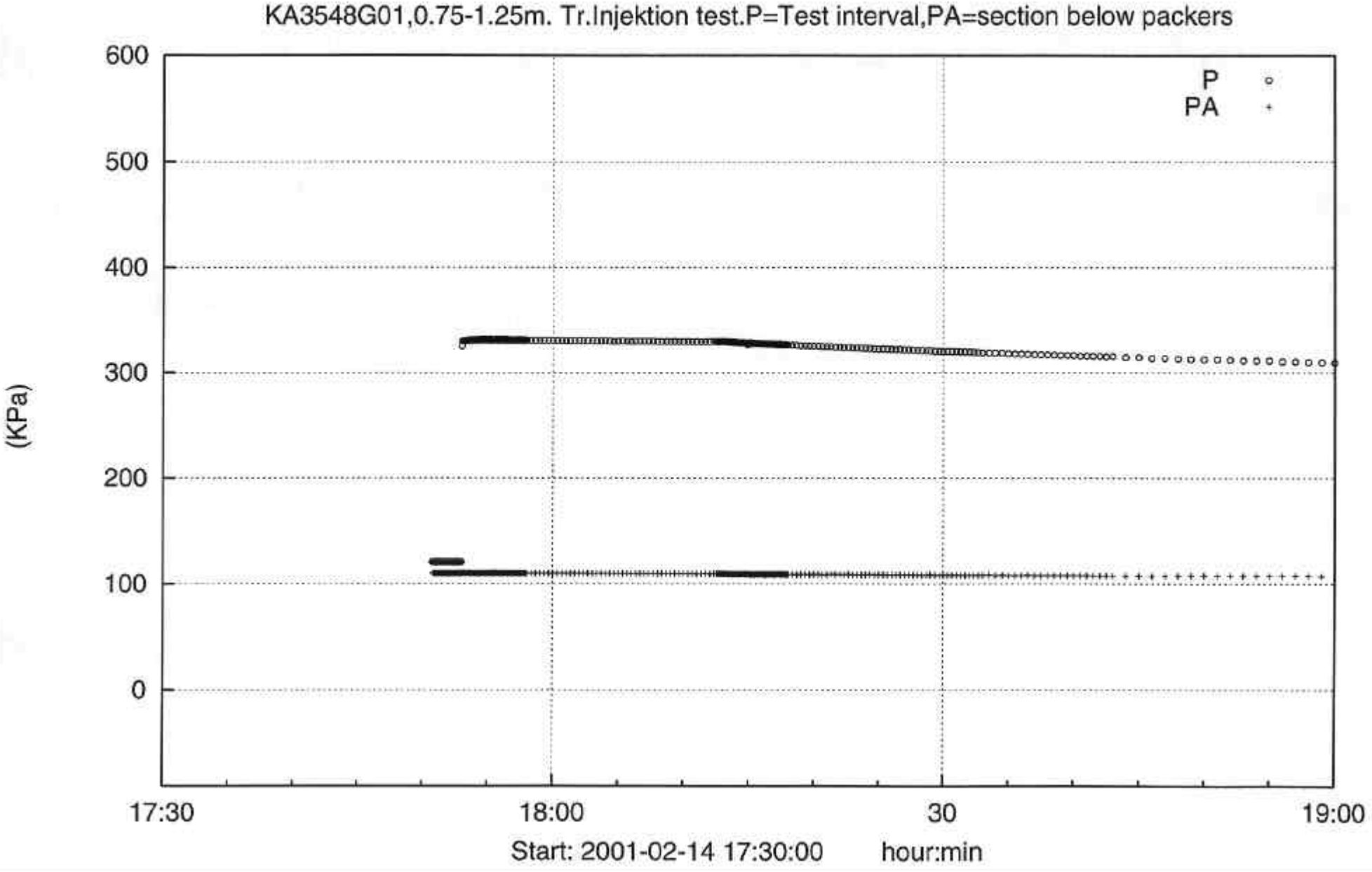

PROTOTYPE, TR INJECTION TESTS, KA3548G01, 0.25-0.75 m recovery 2001-02-15 10:12:01
P
sp (KPa)
0
1
2
3
4
5
6
0.1
1
10
100
1000
dte (min)

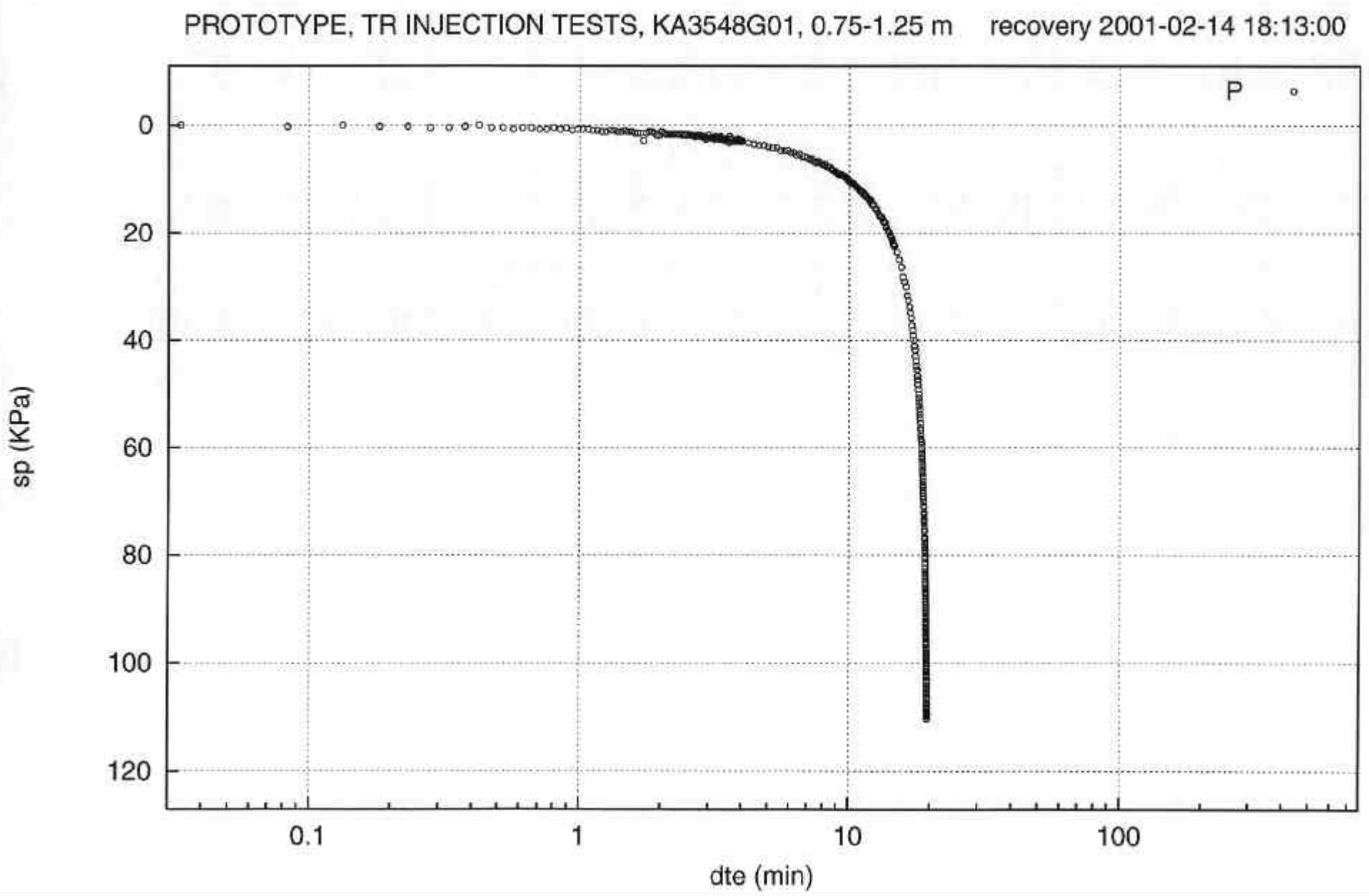

PROTOTYPE, TR INJECTION TESTS, KA3548G01, 0.25-0.75 m recovery 2001-02-15 10:12:01
P
100
10
1
sp (KPa)
0.1
1
10
100
1000
dte (min)

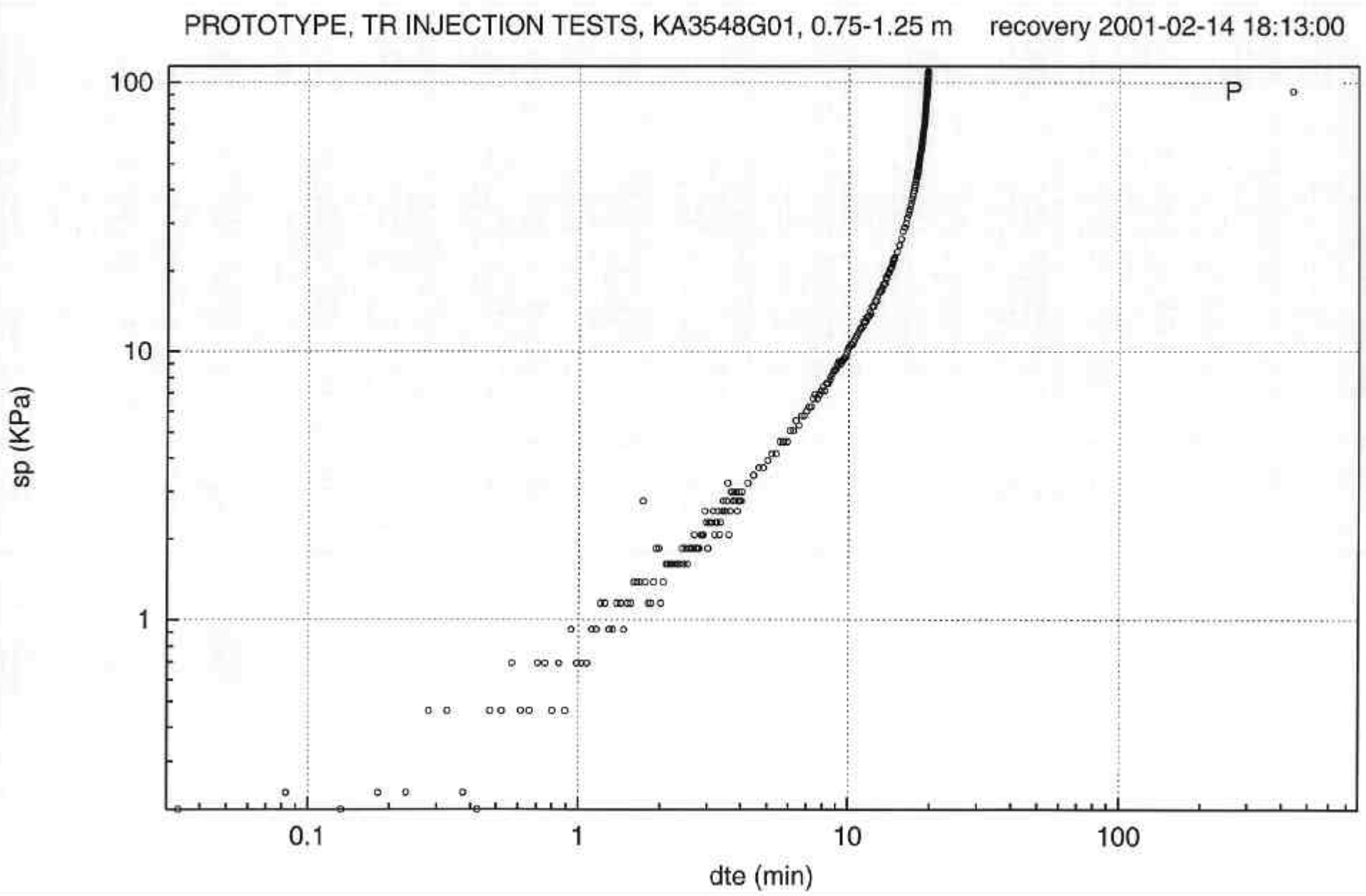

PROTOTYPE, TR INJECTION TESTS, KA3548G01, 0.25-0.75 m recovery 2001-02-15 10:12:01
P
dsp/d(ln dte)
0
1
2
3
4
5
6
0.1
1
10
100
1000
dte (min)

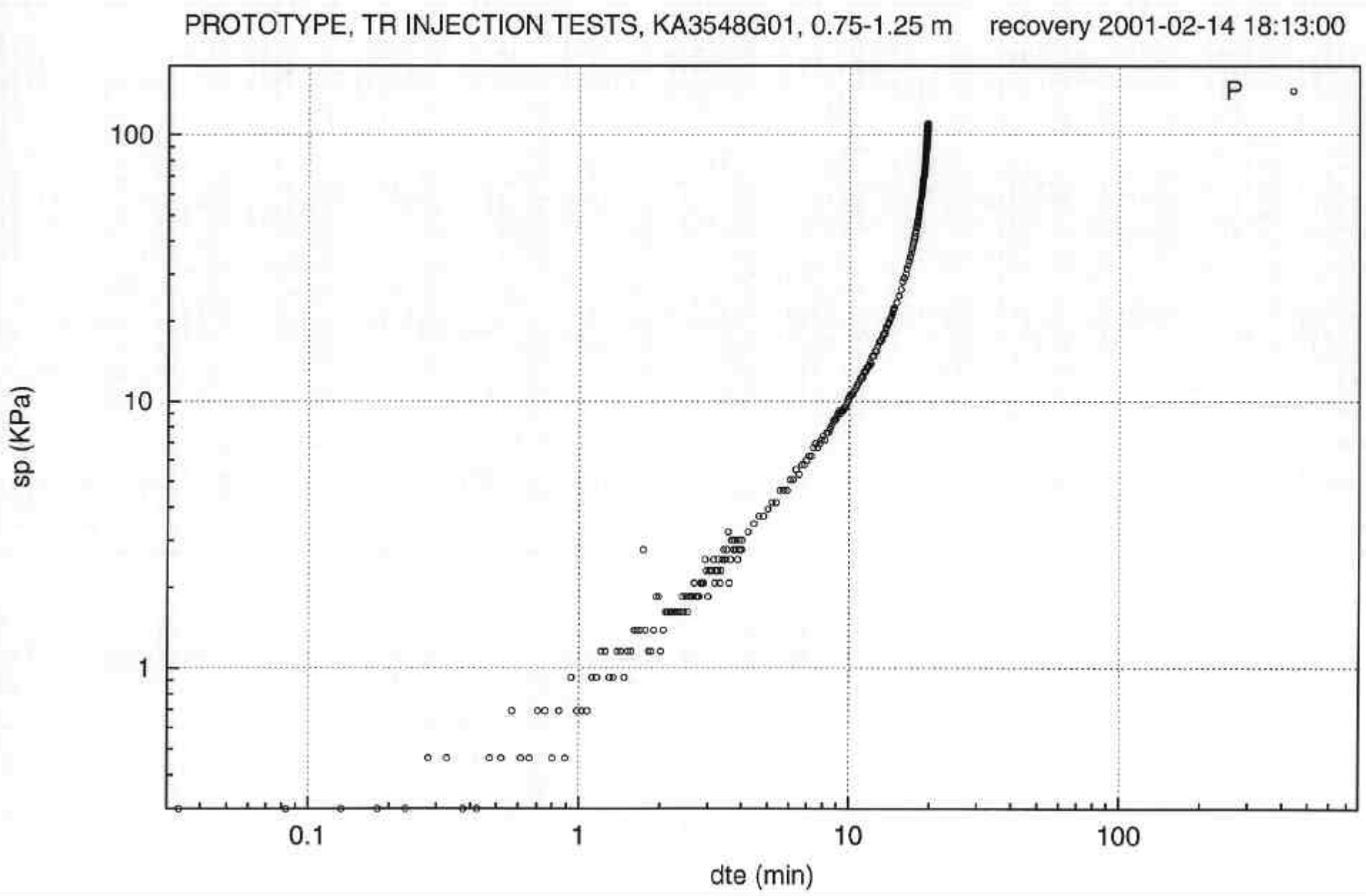

PROTOTYPE, TR INJECTION TESTS, KA3548G01, 0.25-0.75 m recovery 2001-02-15 10:12:01
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
1000
dte (min)

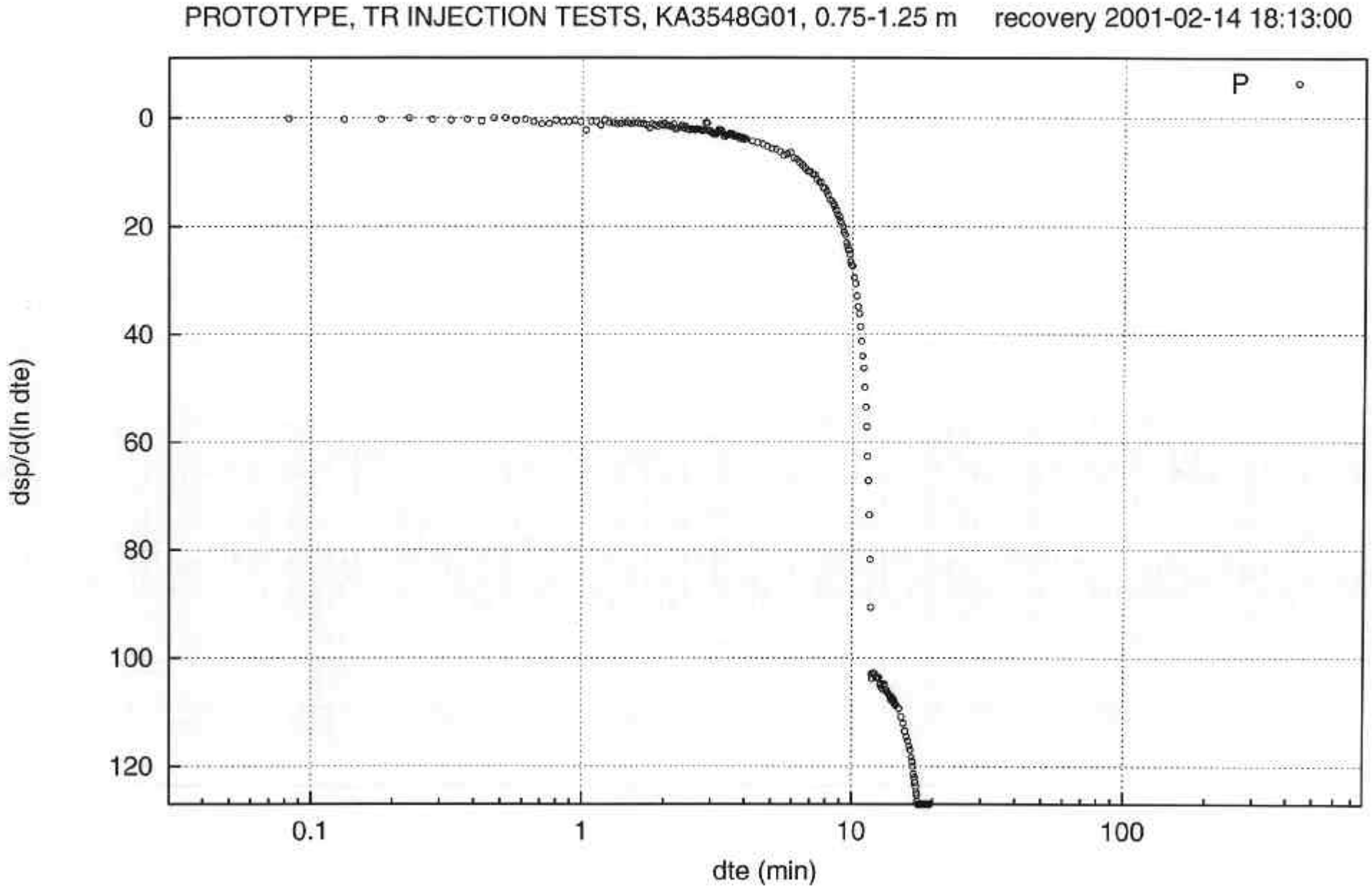

KA3548G01,0.75-1.25m. Tr.Injektion test.P=Test interval,PA=section below packers
600
500
400
300
200
100
0
(KPa)
P
PA
18
20
22
0
2
4
6
8
Start: 2001-02-14 17:30:00
hours

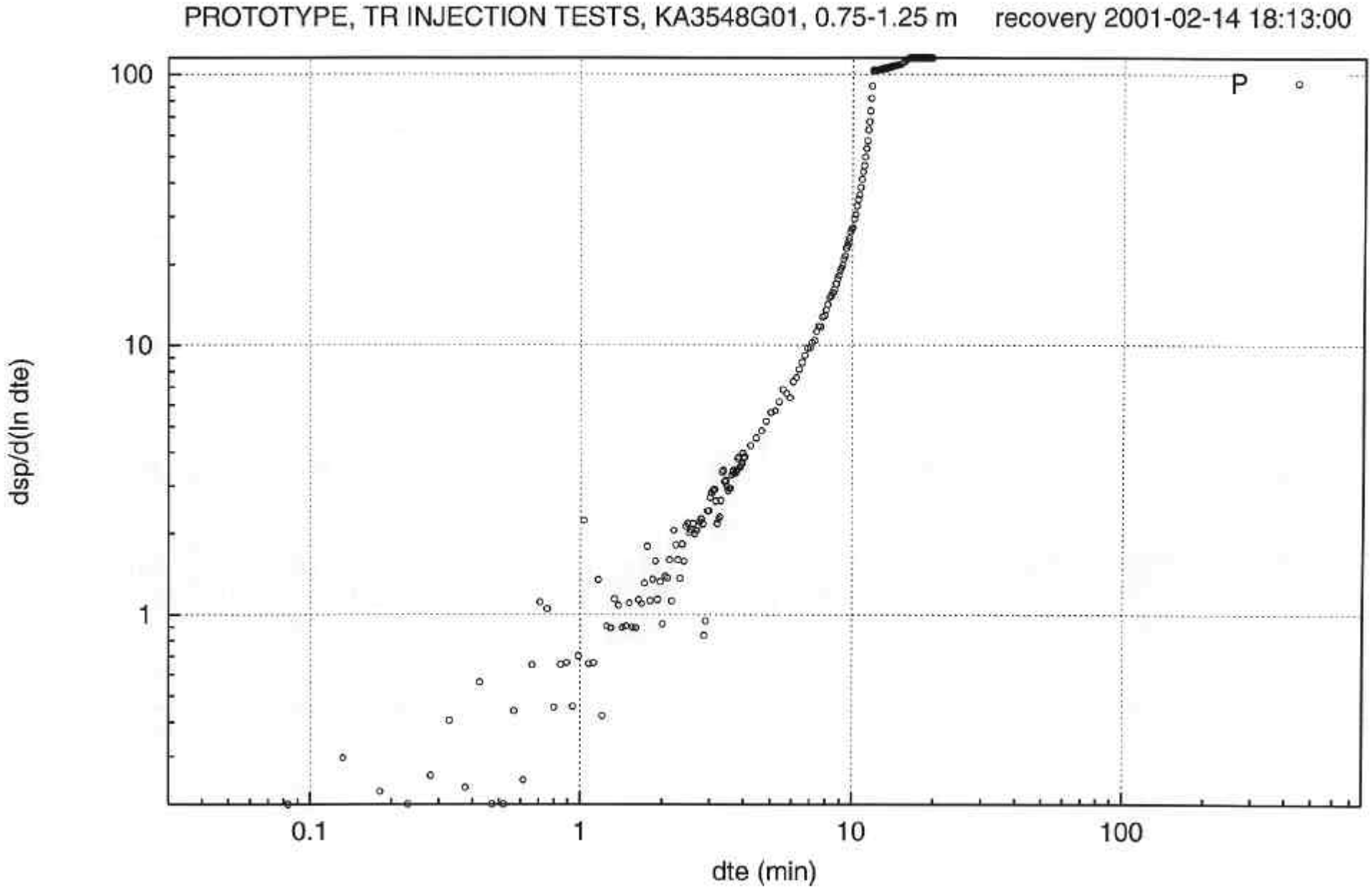

KA3548G01,0.75-1.25m. Tr.Injektion test.P=Test interval,PA=section below packers
600
500
400
300
200
100
0
(KPa)
P
PA
17:30
18:00
30
19:00
Start: 2001-02-14 17:30:00
hour:min

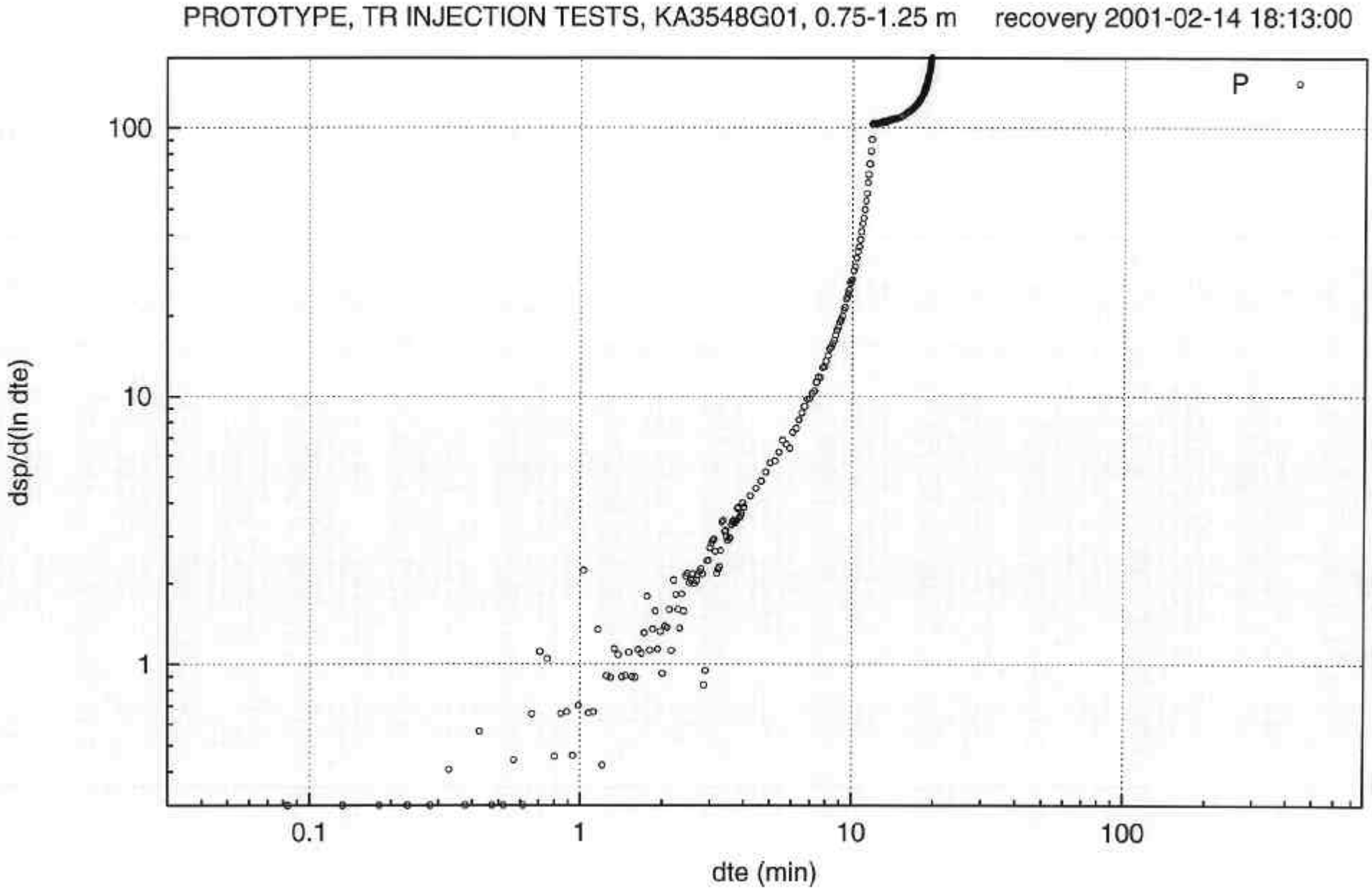

PROTOTYPE, TR INJECTION TESTS, KA3548G01, 0.75-1.25 m recovery 2001-02-14 18:13:00
P
sp (KPa)
0
20
40
60
80
100
120
0.1
1
10
100
dte (min)

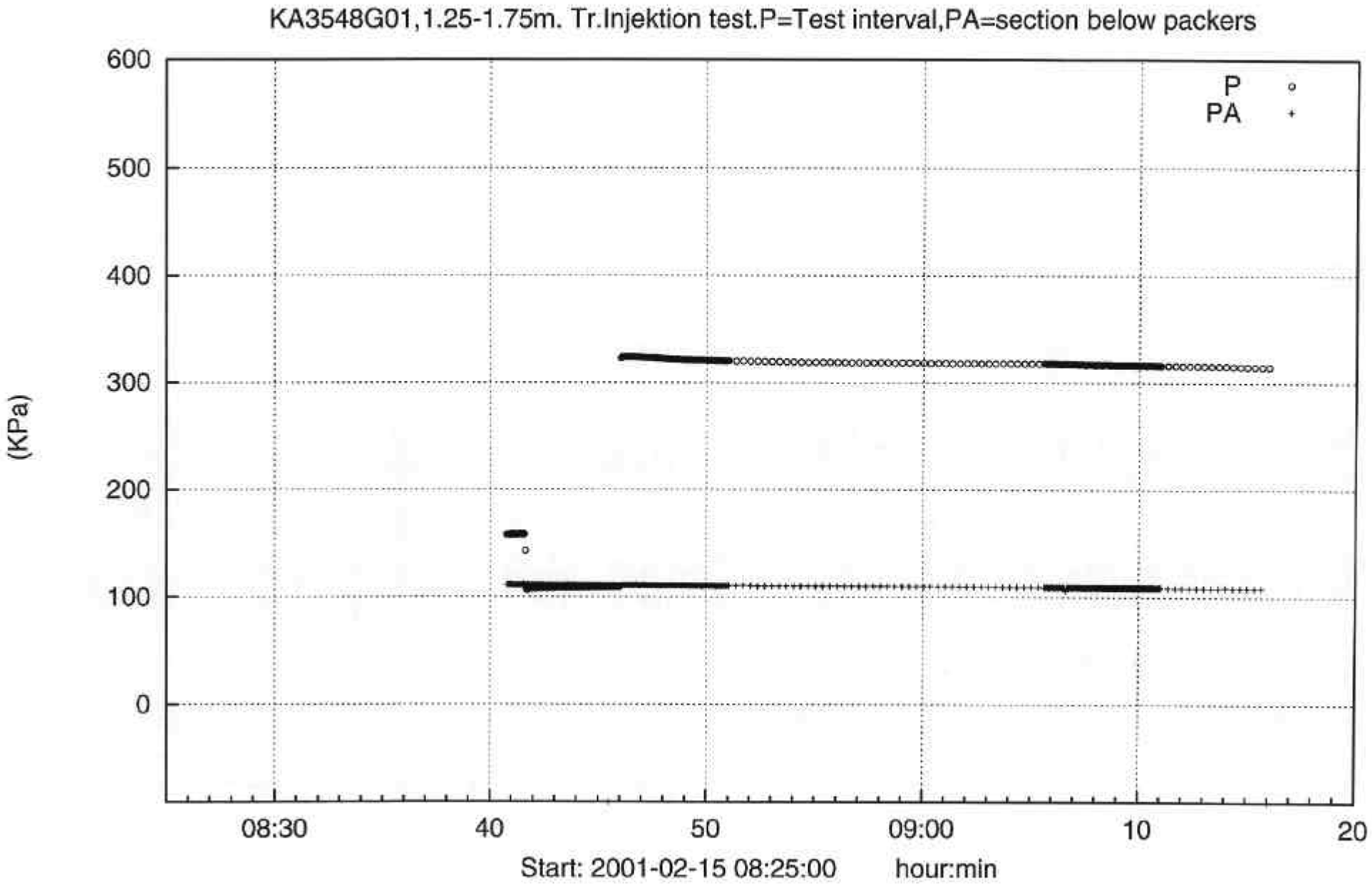

PROTOTYPE, TR INJECTION TESTS, KA3548G01, 0.75-1.25 m recovery 2001-02-14 18:13:00
P
100
10
1
sp (KPa)
0.1
1
10
100
dte (min)

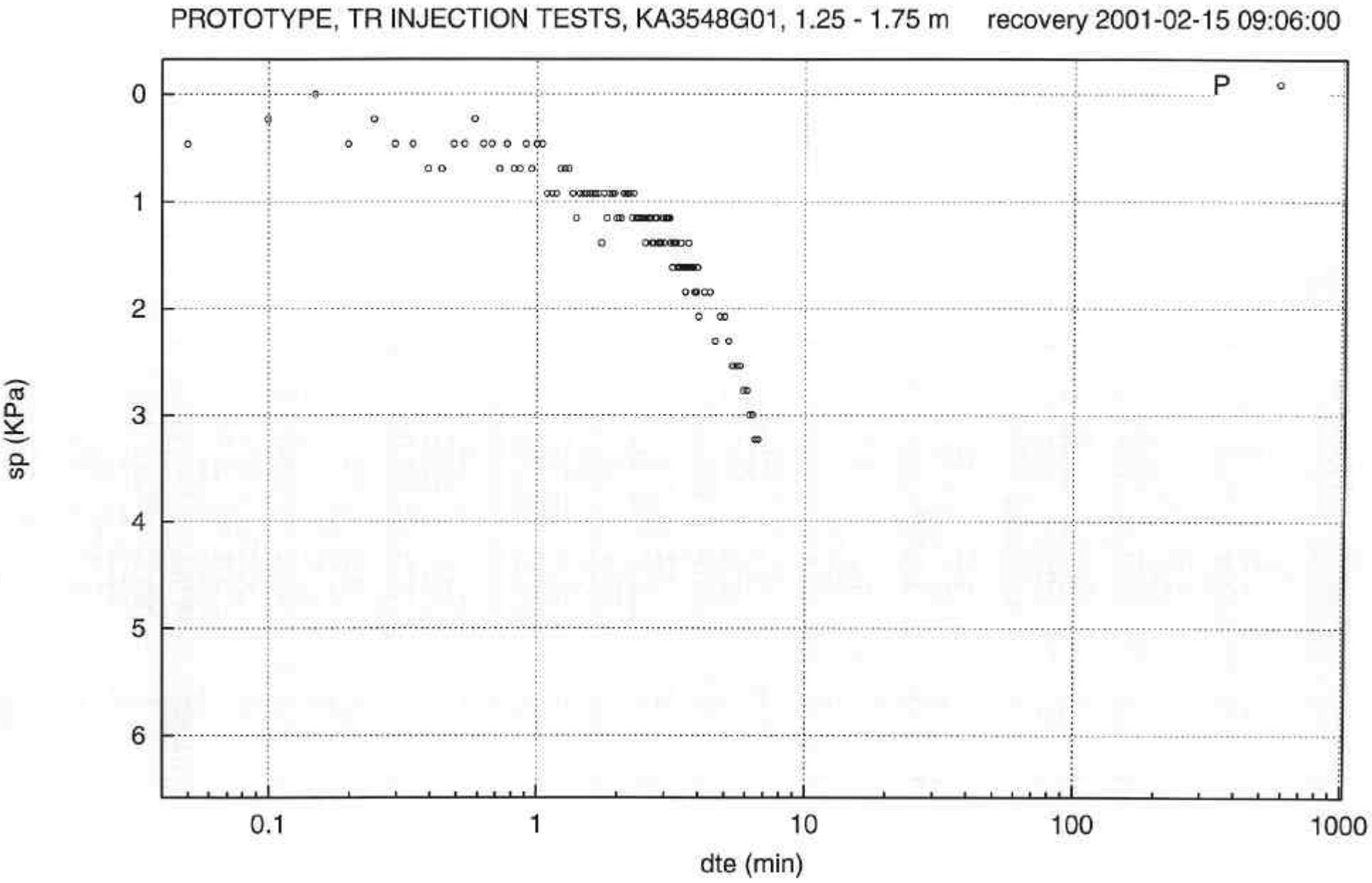

PROTOTYPE, TR INJECTION TESTS, KA3548G01, 0.75-1.25 m recovery 2001-02-14 18:13:00
P
100
10
1
sp (KPa)
0.1
1
10
100
dte (min)

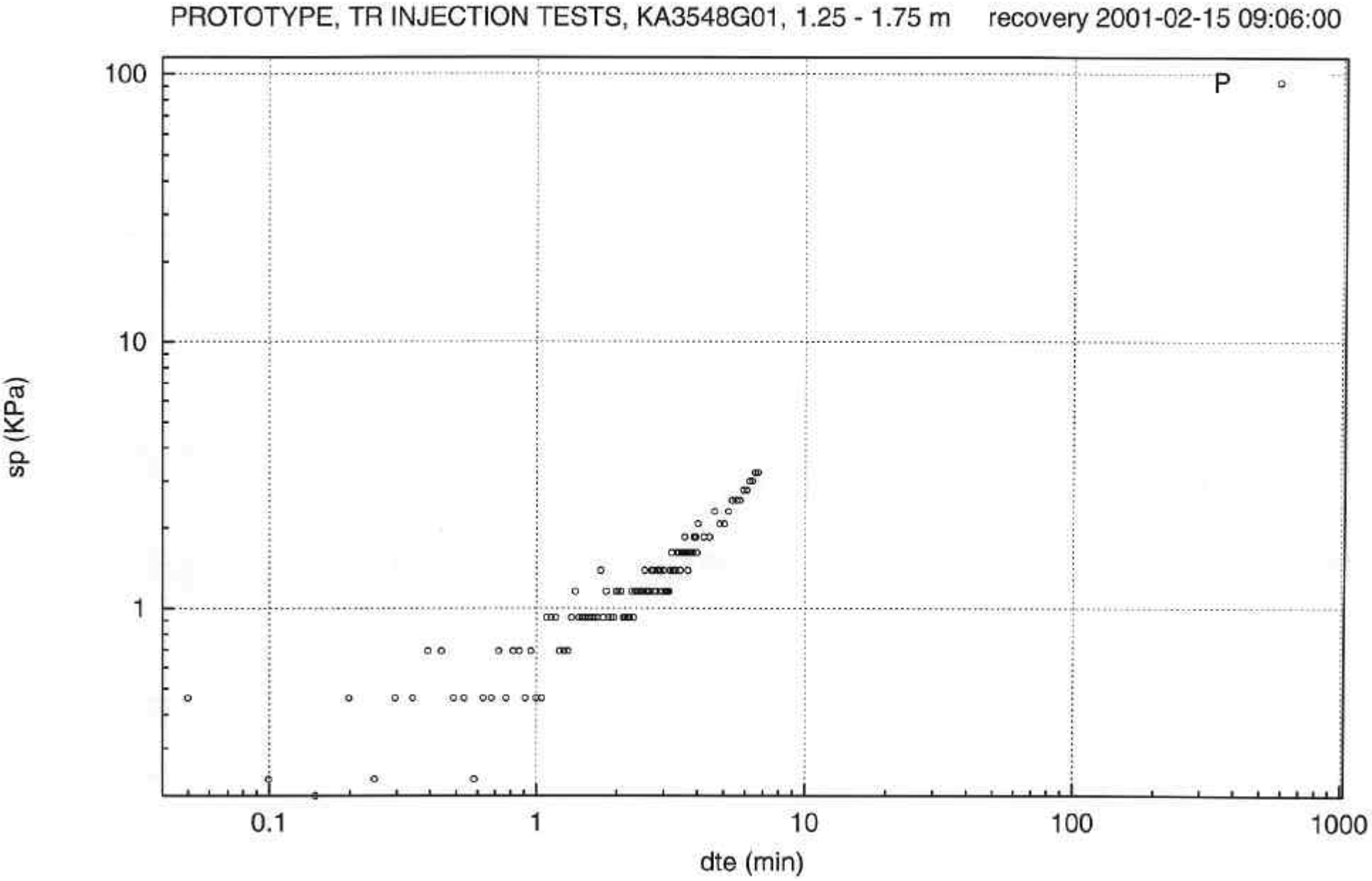

PROTOTYPE, TR INJECTION TESTS, KA3548G01, 0.75-1.25 m recovery 2001-02-14 18:13:00
P
0
20
40
60
80
100
120
dsp/d(ln dte)
0.1
1
10
100
dte (min)

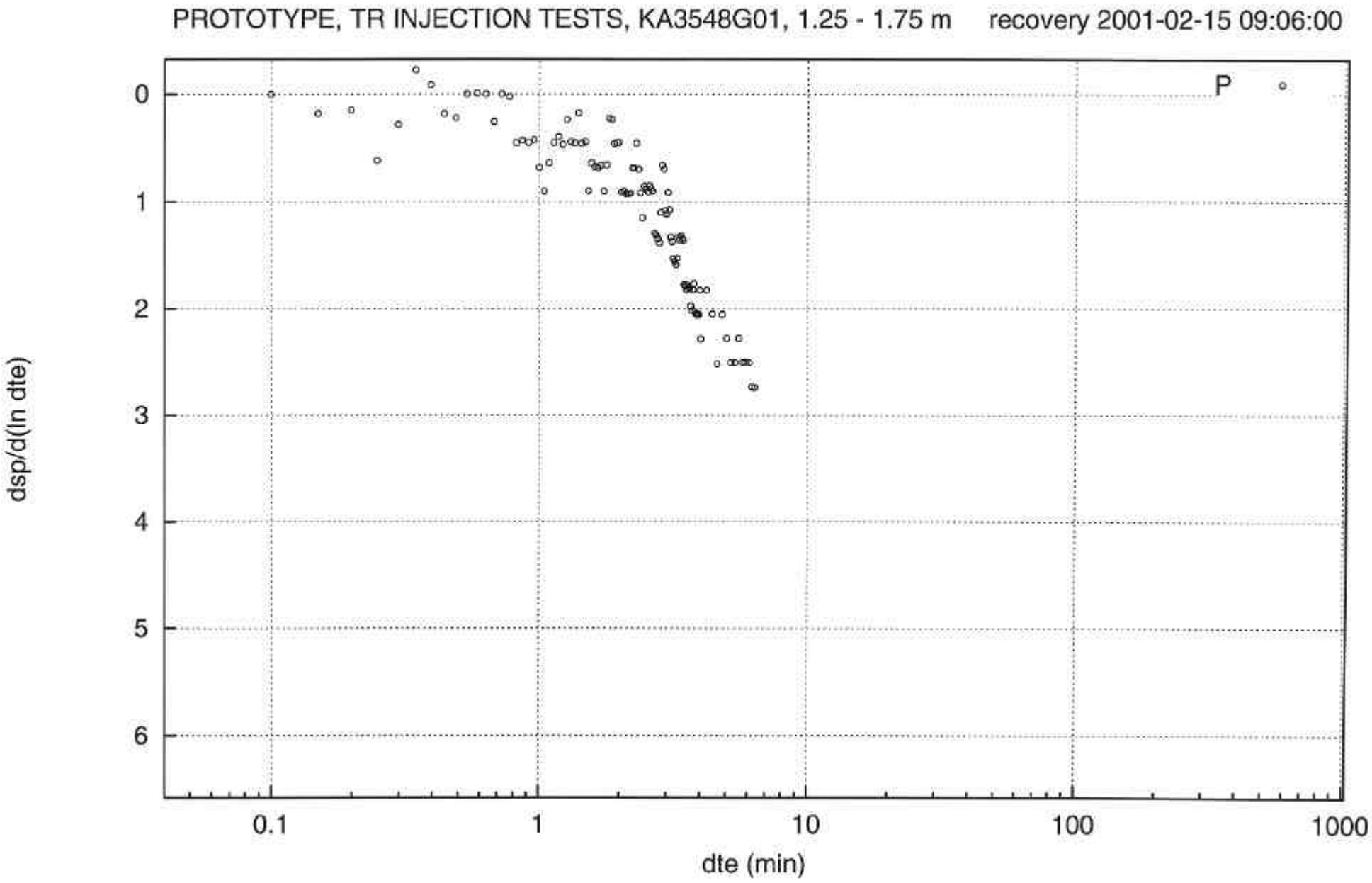

PROTOTYPE, TR INJECTION TESTS, KA3548G01, 0.75-1.25 m recovery 2001-02-14 18:13:00
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
dte (min)

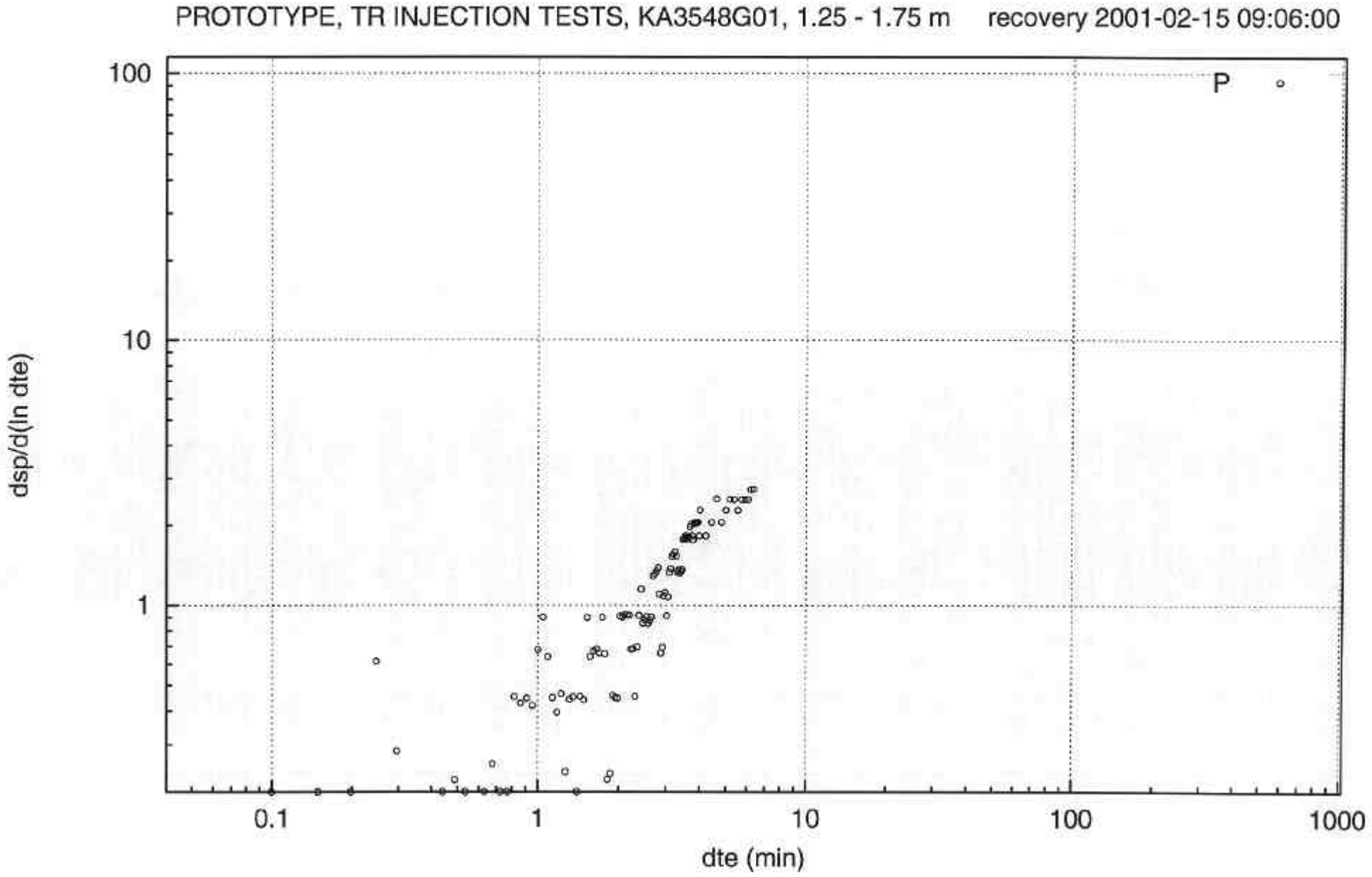

PROTOTYPE, TR INJECTION TESTS, KA3548G01, 0.75-1.25 m recovery 2001-02-14 18:13:00
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
dte (min)


KA3548G01,1.25-1.75m. Tr.Injektion test.P=Test interval,PA=section below packers
600
500
400
300
200
100
0
(KPa)
P
PA
08:30
40
50
09:00
10
20
Start: 2001-02-15 08:25:00
hour:min

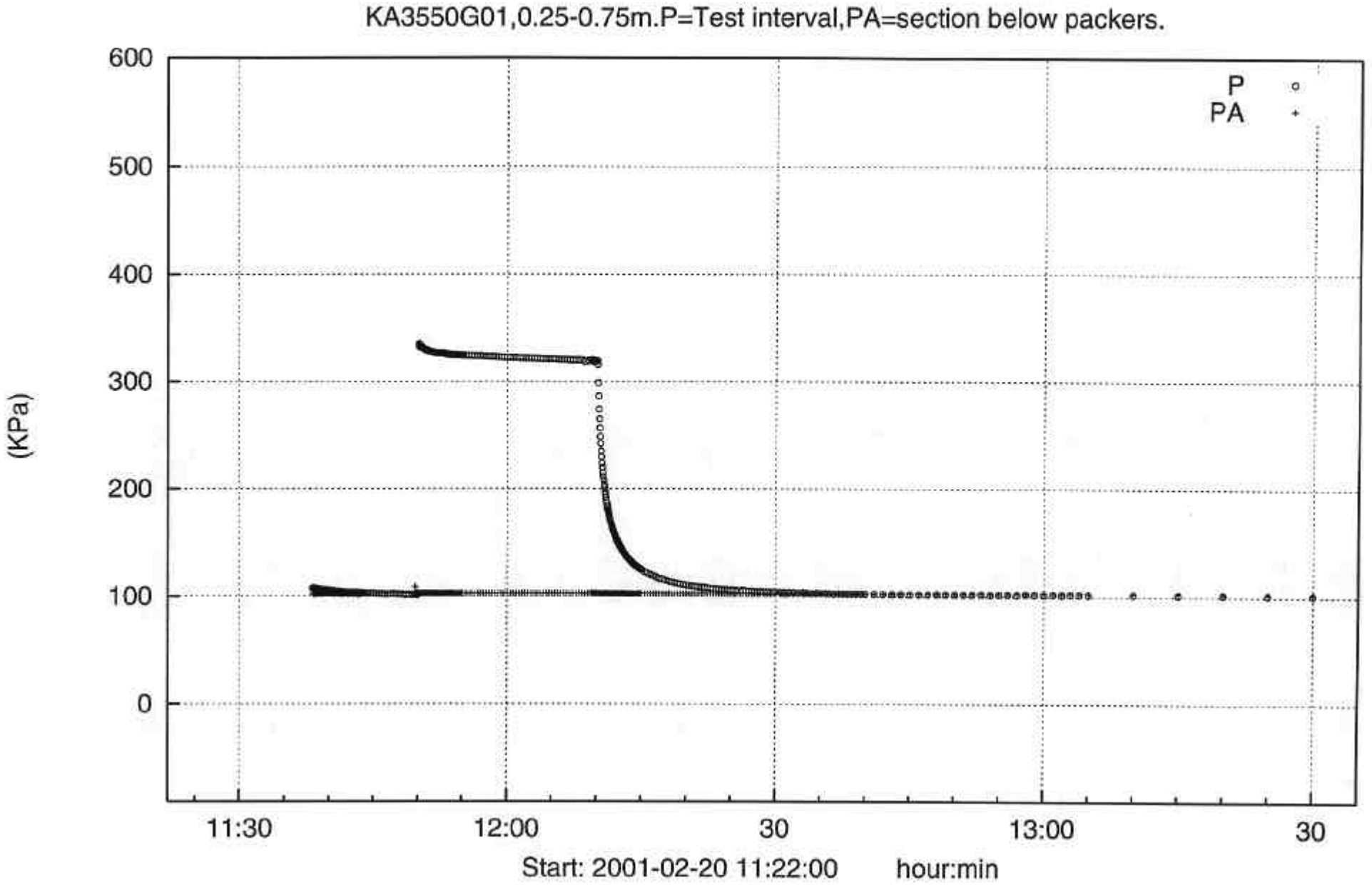

PROTOTYPE, TR INJECTION TESTS, KA3548G01, 1.25 - 1.75 m recovery 2001-02-15 09:06:00
P
sp (KPa)
0
1
2
3
4
5
6
0.1
1
10
100
1000
dte (min)

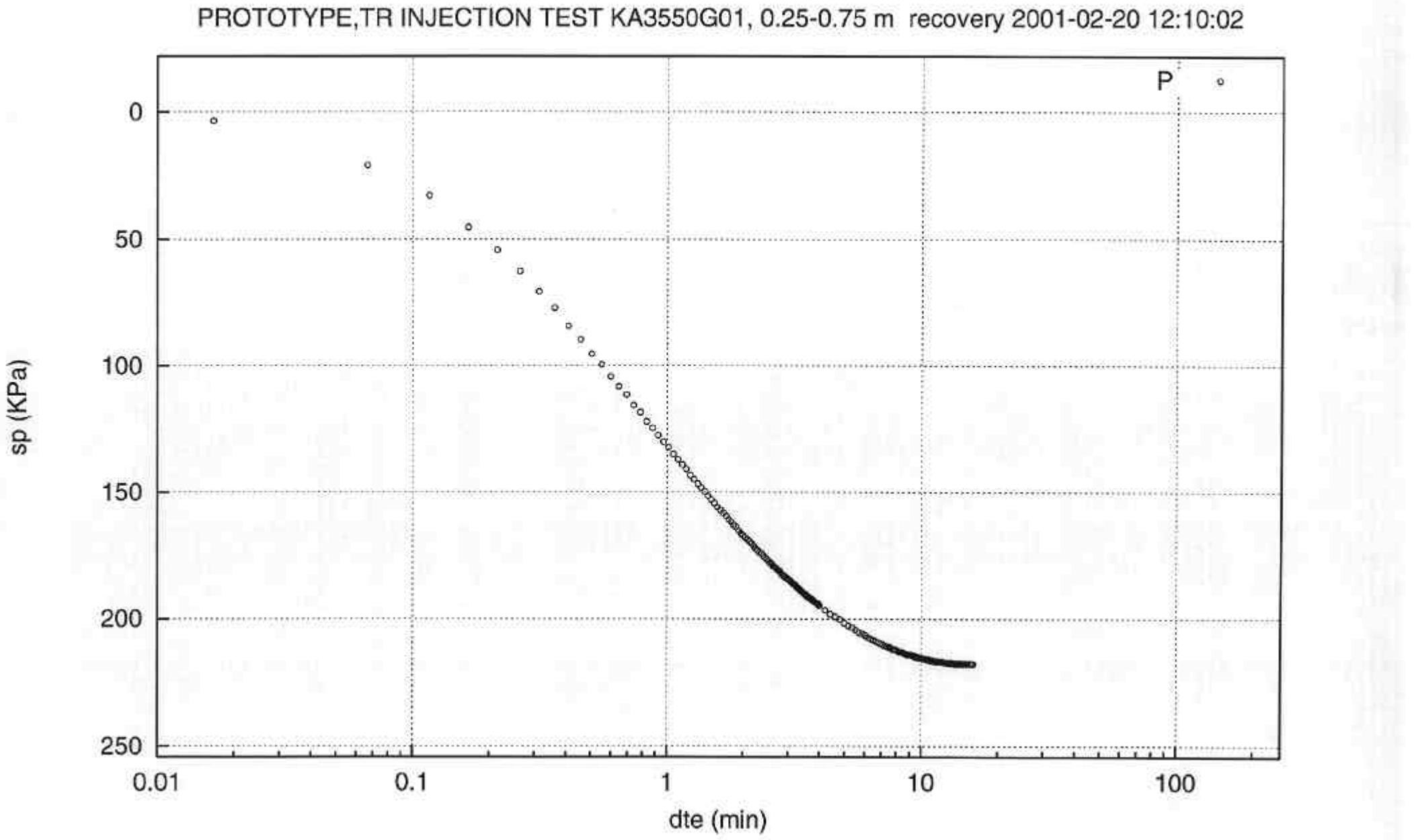

PROTOTYPE, TR INJECTION TESTS, KA3548G01, 1.25 - 1.75 m recovery 2001-02-15 09:06:00
P
100
10
1
sp (KPa)
0.1
1
10
100
1000
dte (min)

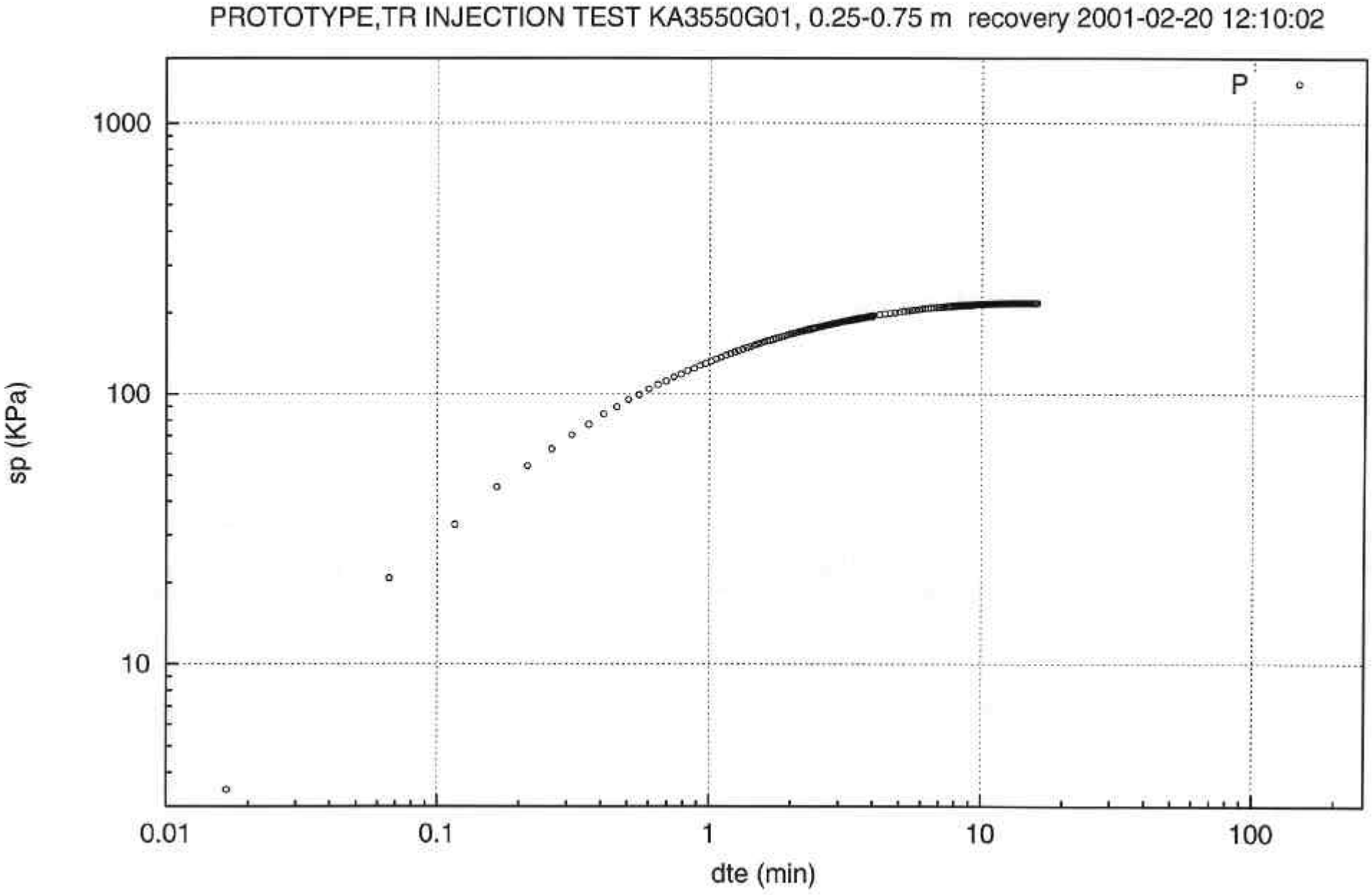

PROTOTYPE, TR INJECTION TESTS, KA3548G01, 1.25 - 1.75 m recovery 2001-02-15 09:06:00
P
dsp/d(ln dte)
0
1
2
3
4
5
6
0.1
1
10
100
1000
dte (min)

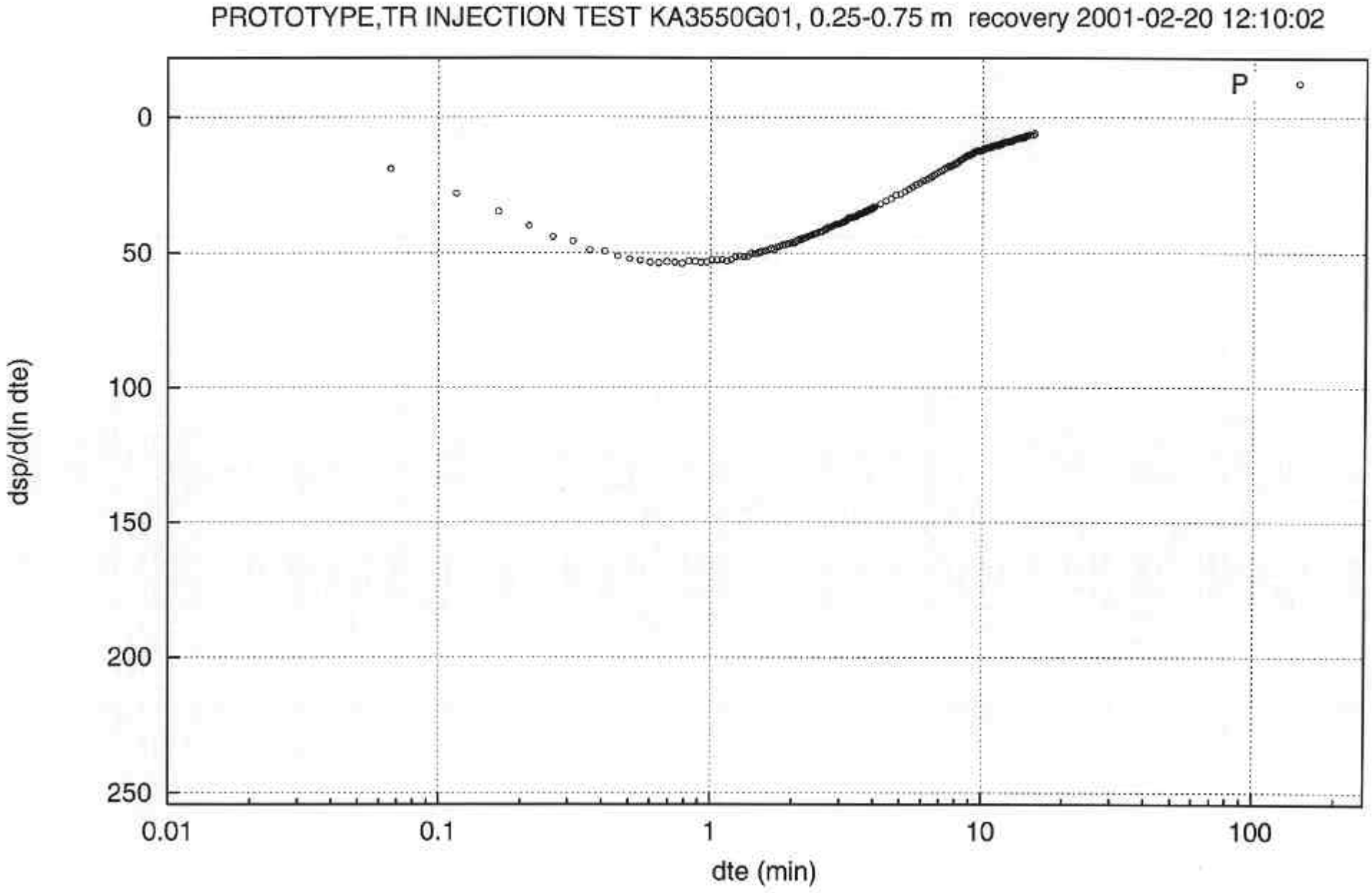

PROTOTYPE, TR INJECTION TESTS, KA3548G01, 1.25 - 1.75 m recovery 2001-02-15 09:06:00
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
1000
dte (min)

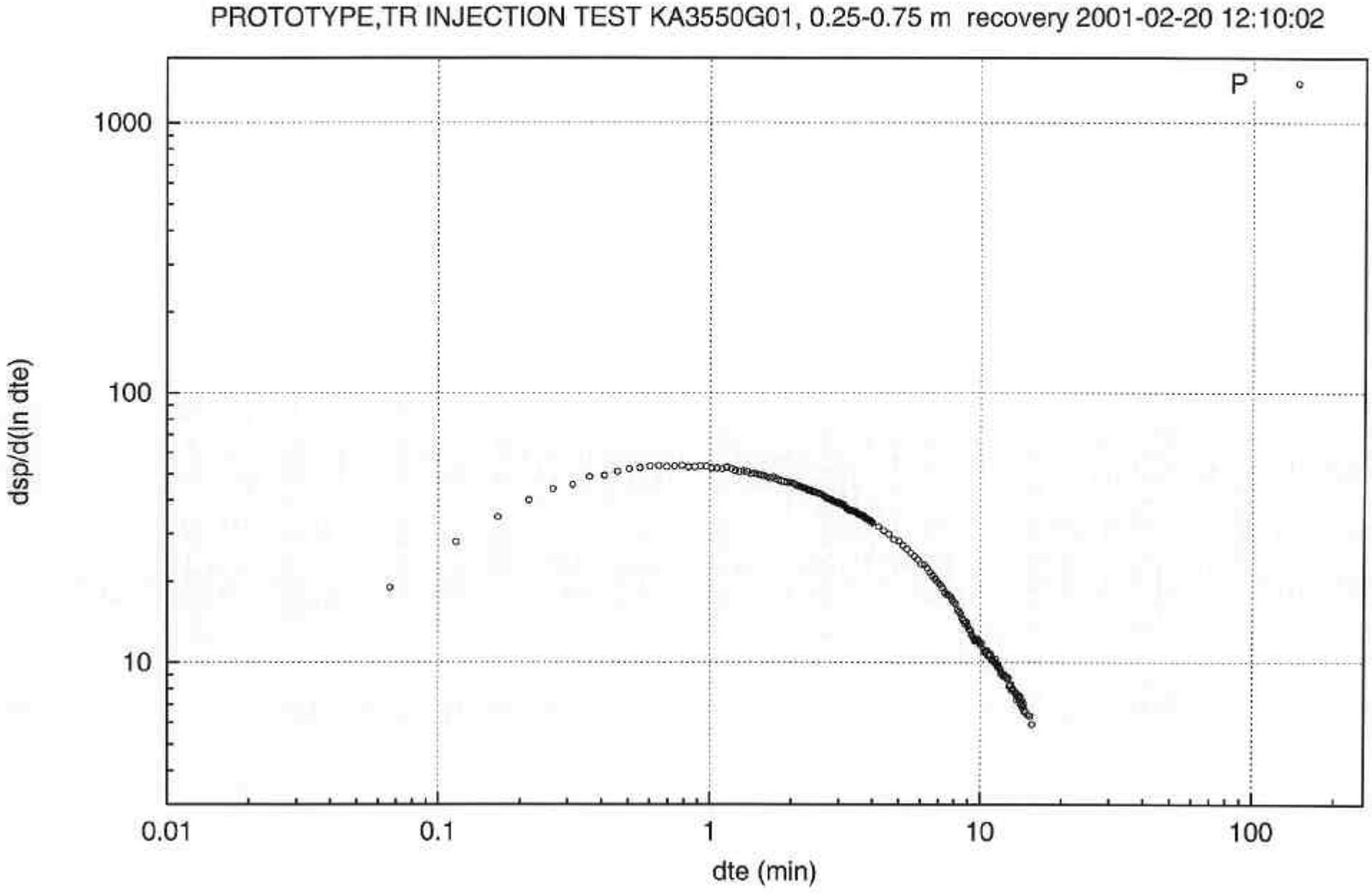
APPENDIX 7: Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3550G01. February 2001

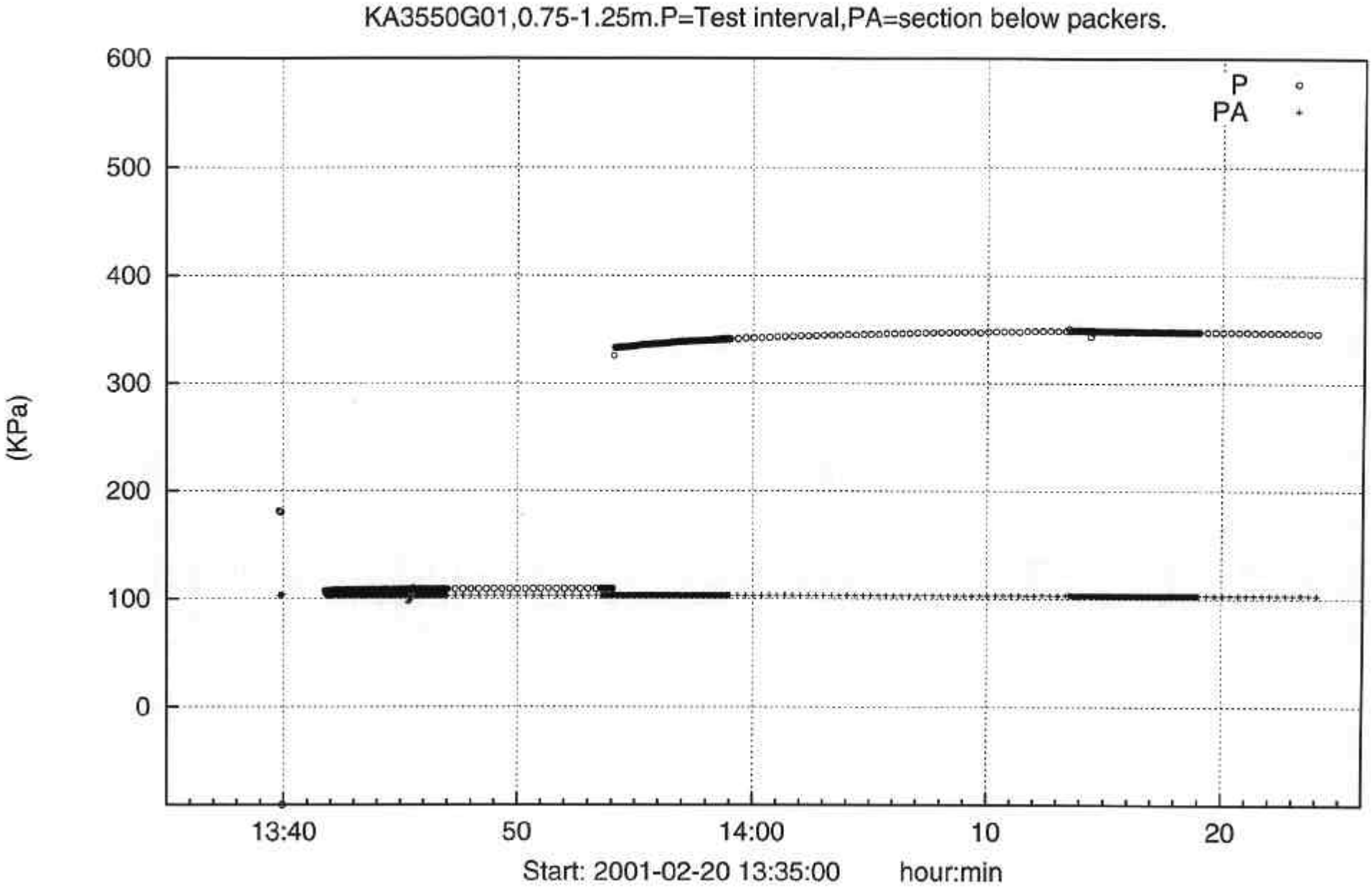

KA3550G01,0.25-0.75m.P=Test interval,PA=section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
11:30
12:00
30
13:00
30
Start: 2001-02-20 11:22:00
hour:min

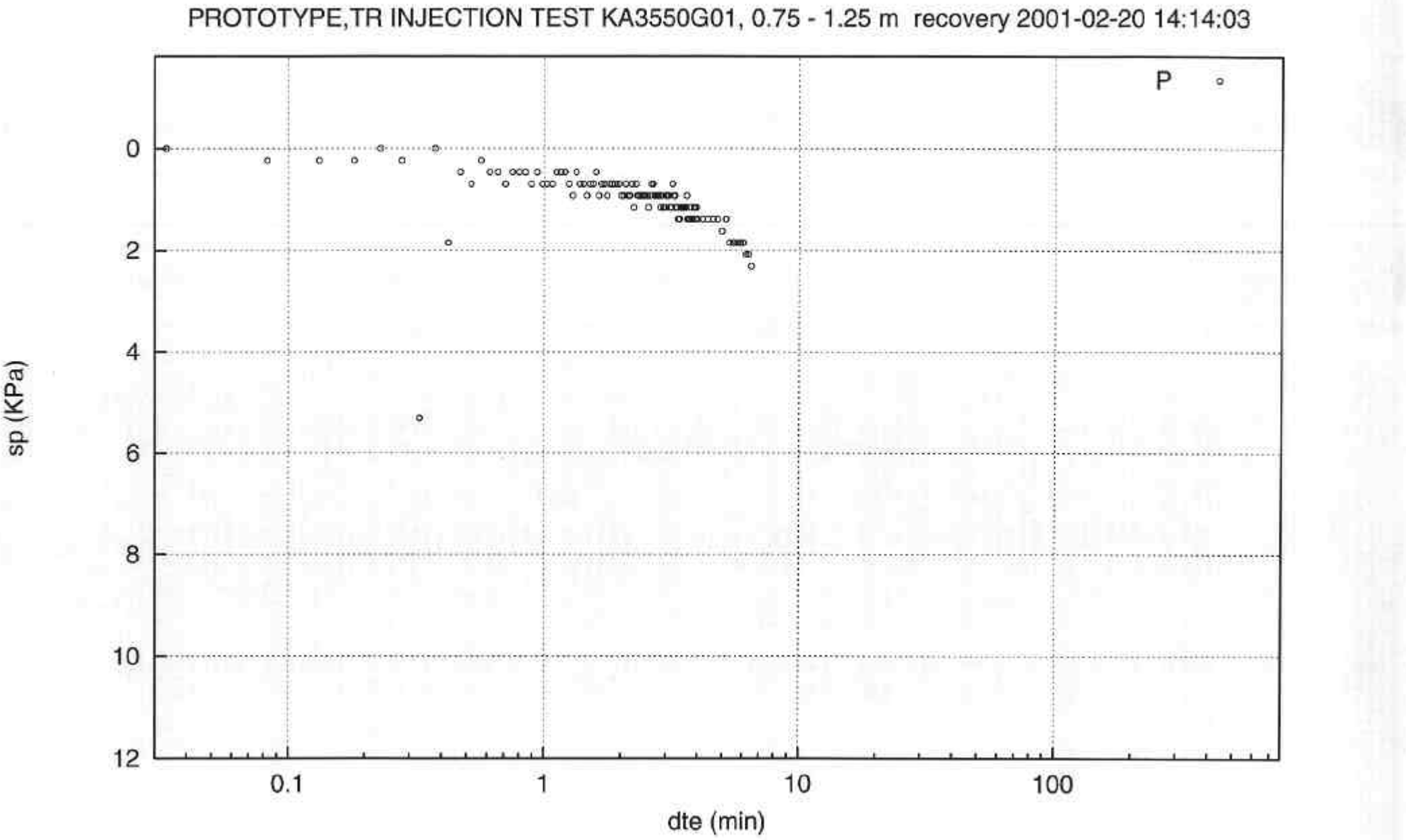

PROTOTYPE,TR INJECTION TEST KA3550G01, 0.25-0.75 m recovery 2001-02-20 12:10:02
P
sp (KPa)
0
50
100
150
200
250
0.01
0.1
1
10
100
dte (min)

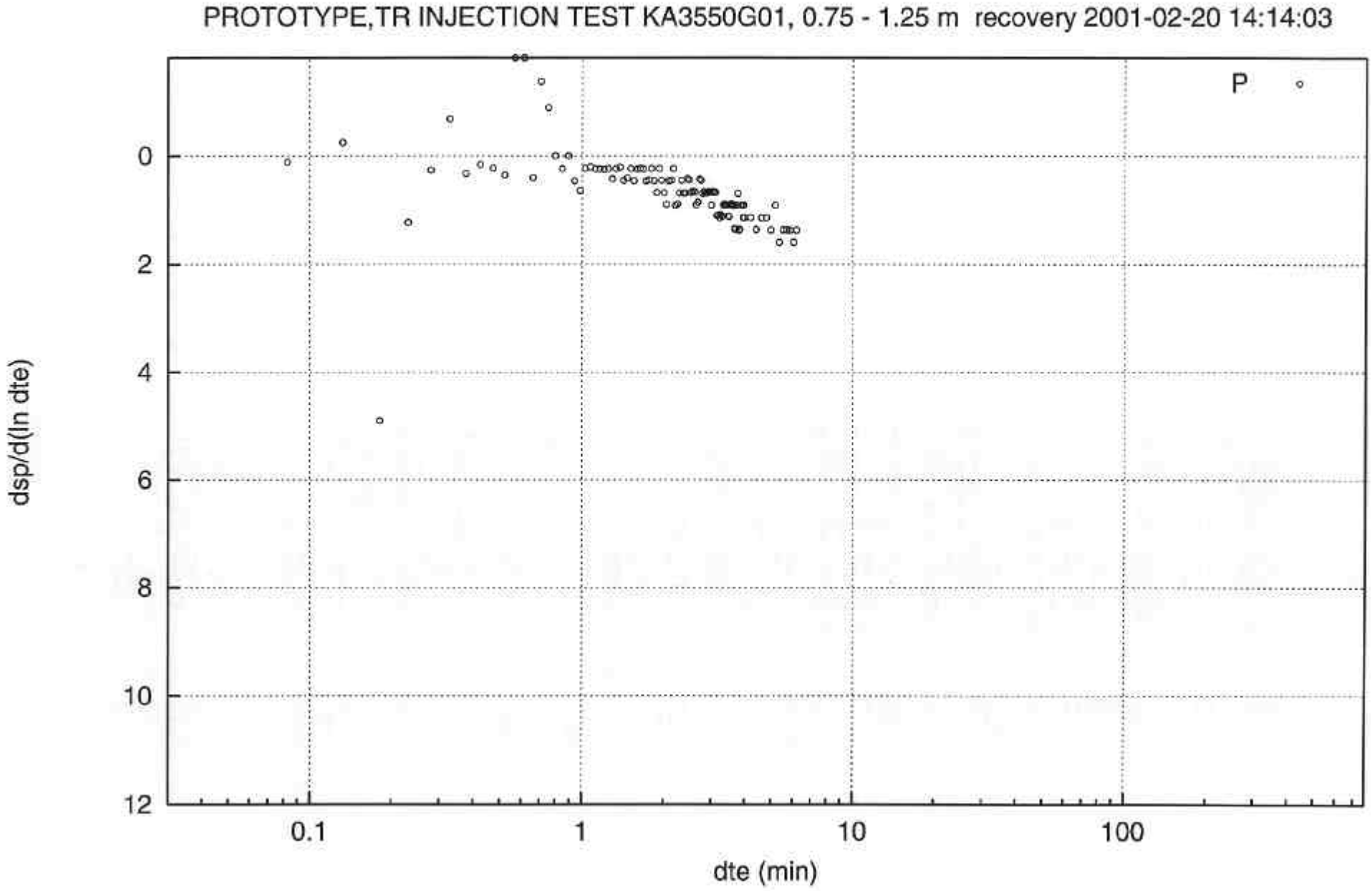

PROTOTYPE,TR INJECTION TEST KA3550G01, 0.25-0.75 m recovery 2001-02-20 12:10:02
P
1000
100
10
sp (KPa)
0.01
0.1
1
10
100
dte (min)

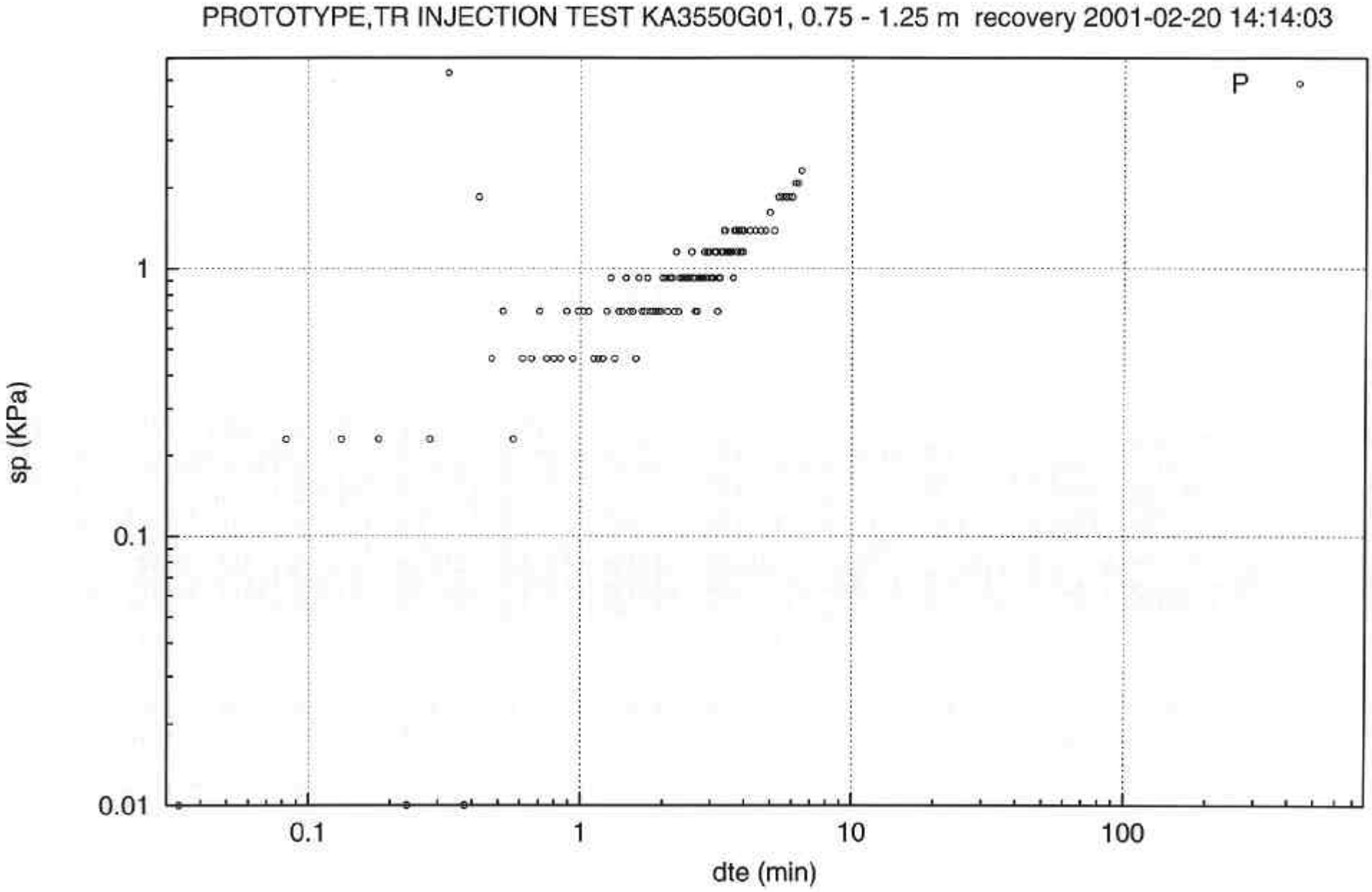

PROTOTYPE,TR INJECTION TEST KA3550G01, 0.25-0.75 m recovery 2001-02-20 12:10:02
P
0
50
100
150
200
250
dsp/d(ln dte)
0.01
0.1
1
10
100
dte (min)

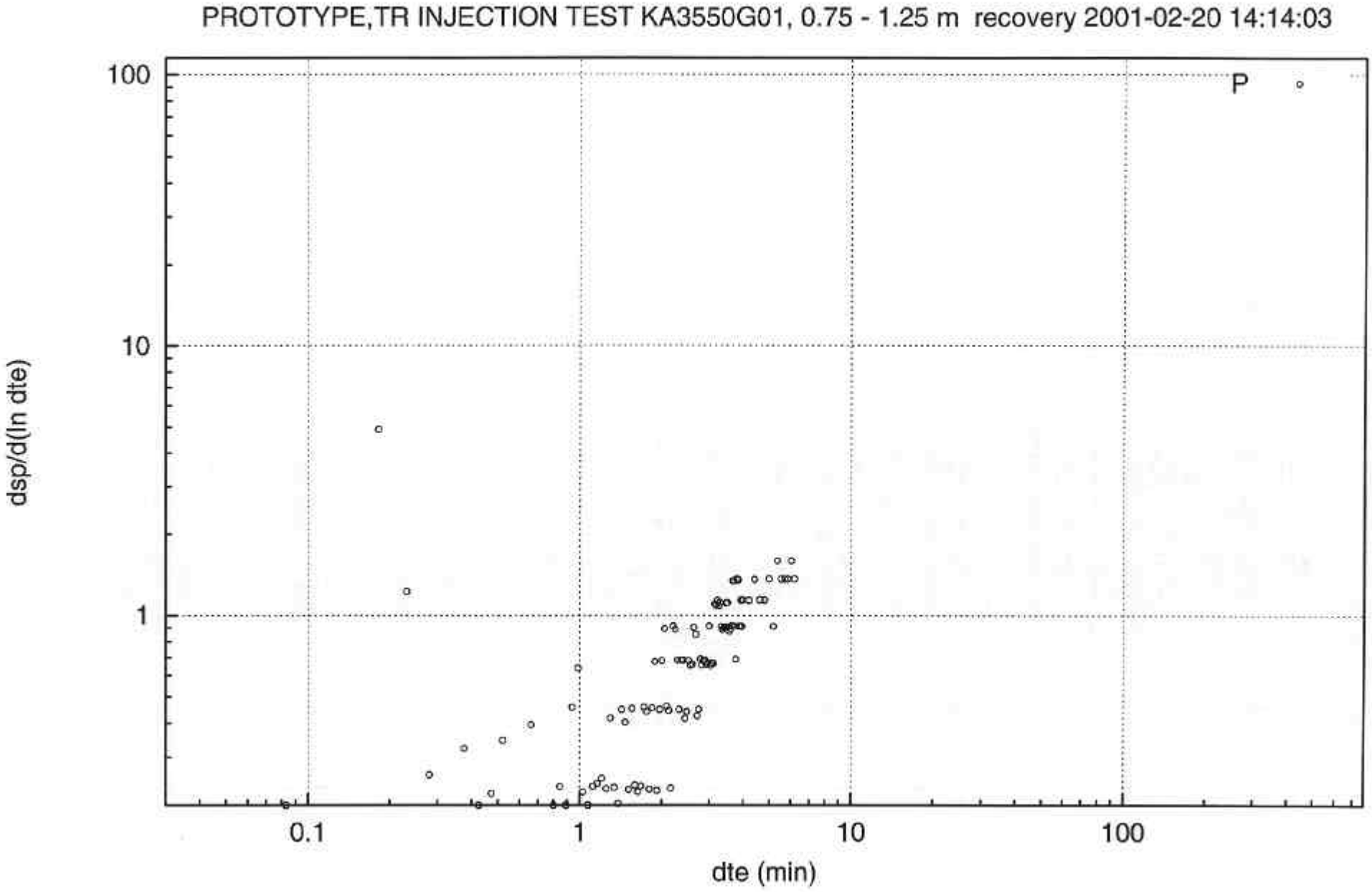

PROTOTYPE,TR INJECTION TEST KA3550G01, 0.25-0.75 m recovery 2001-02-20 12:10:02
P
1000
100
10
dsp/d(ln dte)
0.01
0.1
1
10
100
dte (min)

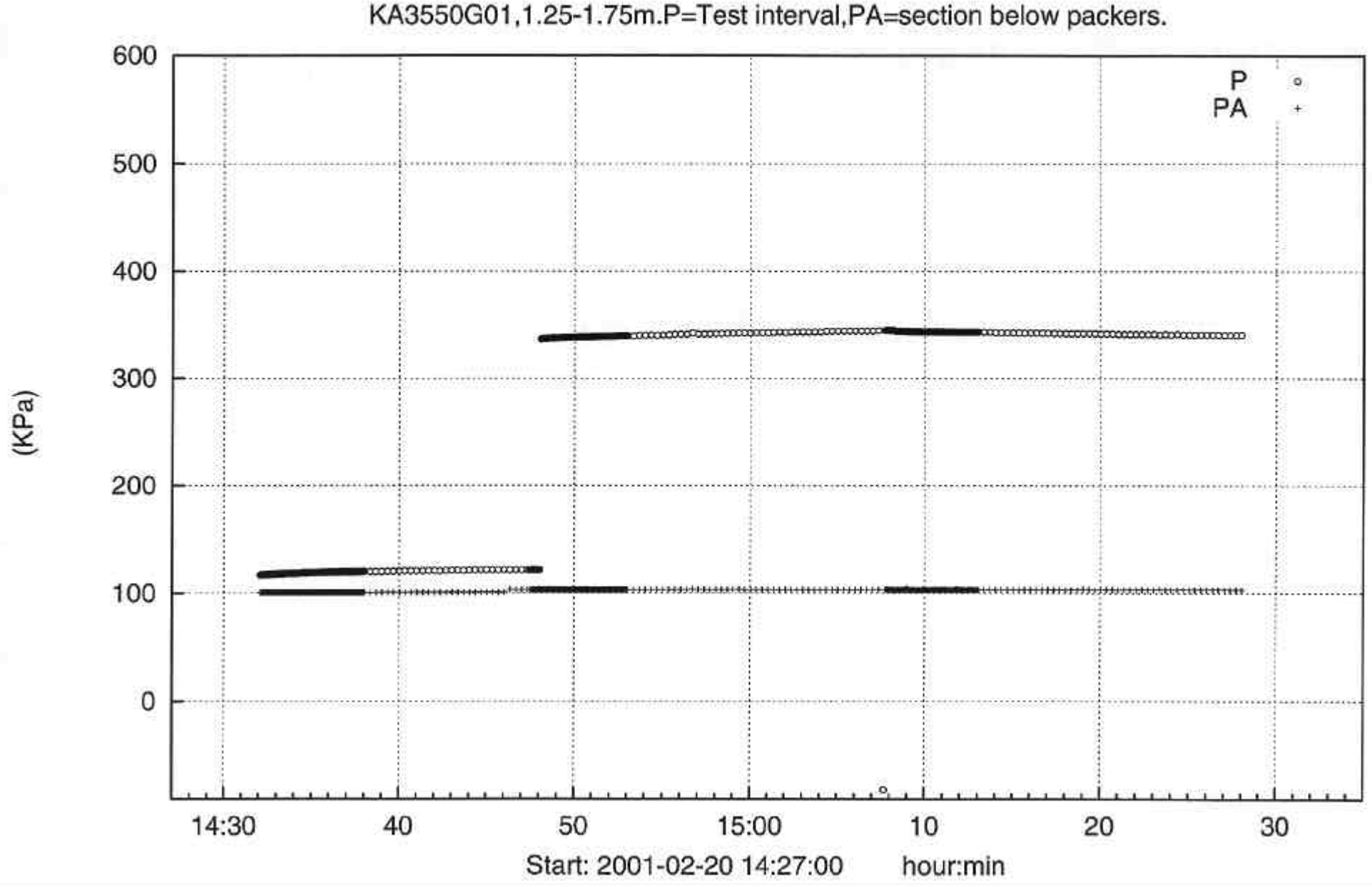

KA3550G01,0.75-1.25m.P=Test interval,PA=section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
13:40
50
14:00
10
20
Start: 2001-02-20 13:35:00
hour:min

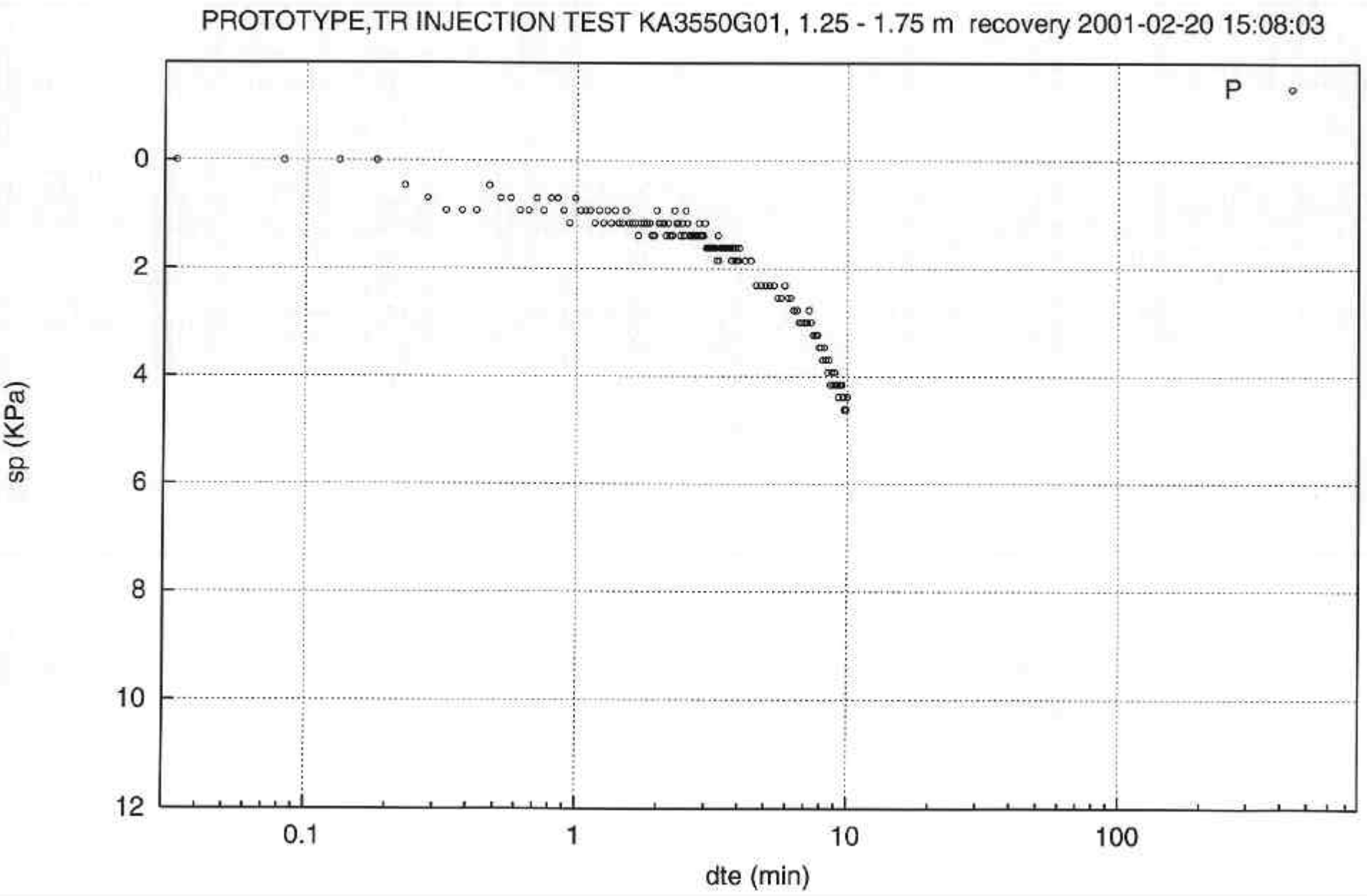

PROTOTYPE,TR INJECTION TEST KA3550G01, 0.75 - 1.25 m recovery 2001-02-20 14:14:03
P
sp (KPa)
0
2
4
6
8
10
12
0.1
1
10
100
dte (min)

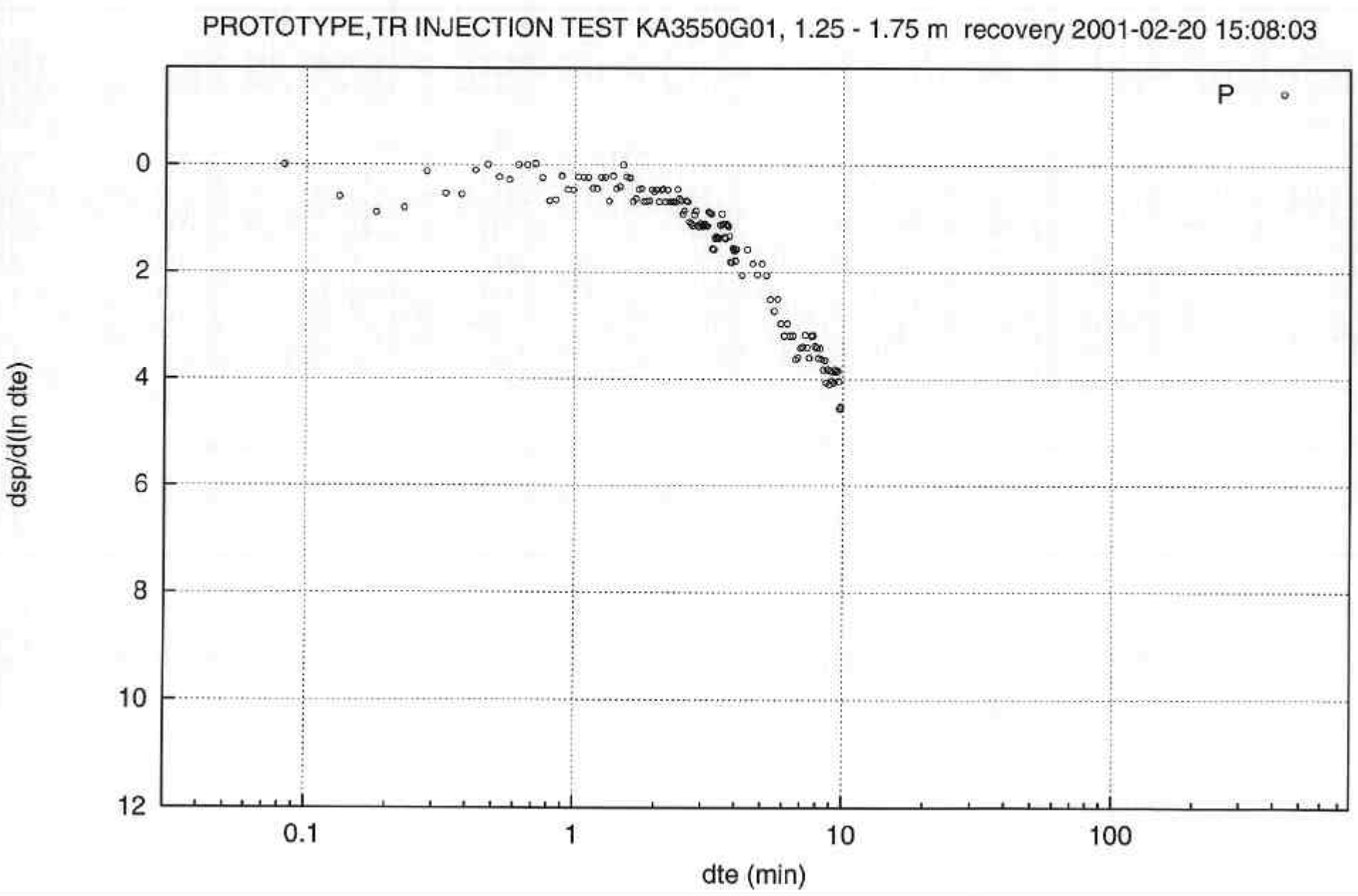

PROTOTYPE,TR INJECTION TEST KA3550G01, 0.75 - 1.25 m recovery 2001-02-20 14:14:03
P
dsp/d(ln dte)
0
2
4
6
8
10
12
0.1
1
10
100
dte (min)

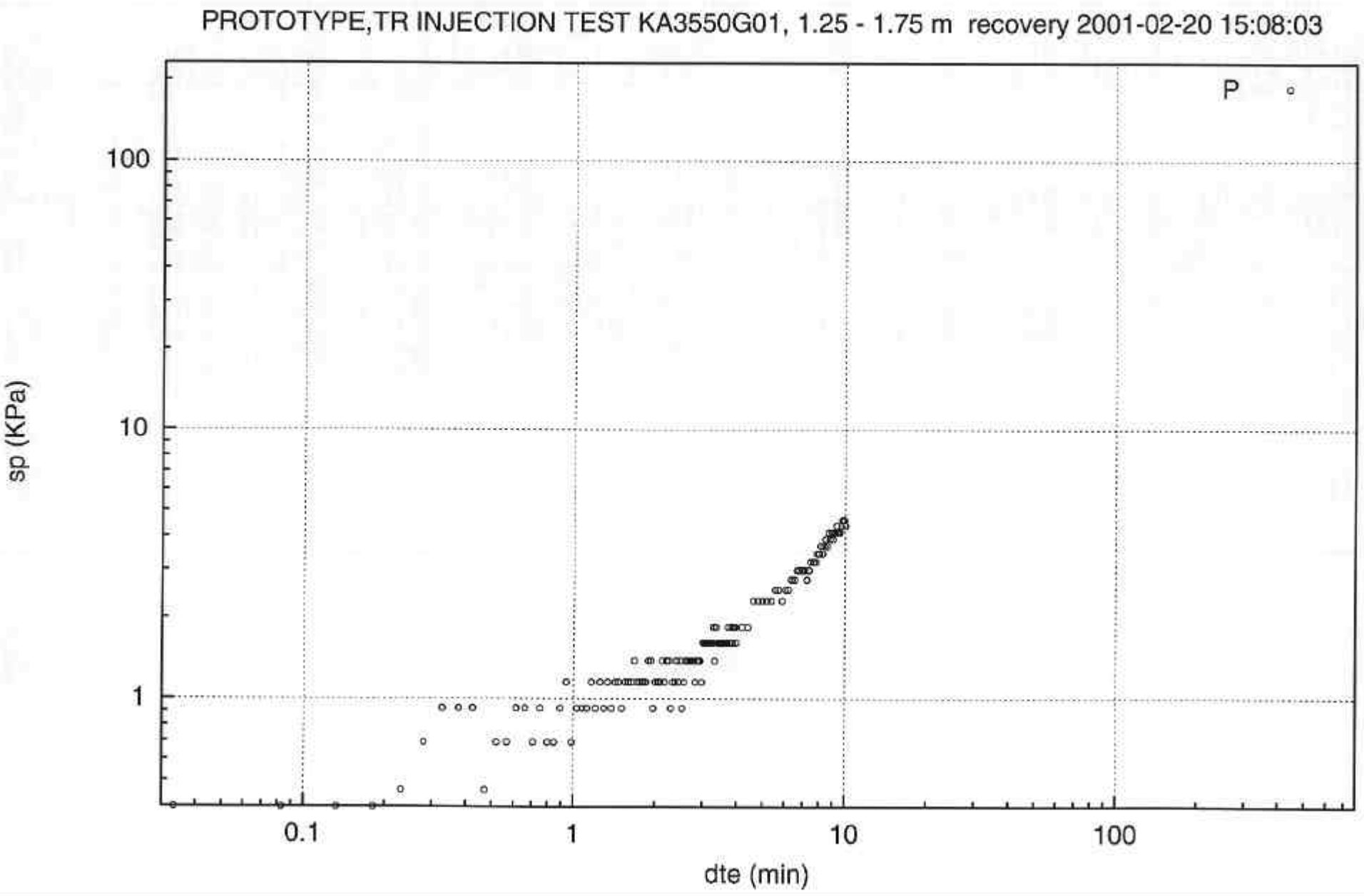

PROTOTYPE,TR INJECTION TEST KA3550G01, 0.75 - 1.25 m recovery 2001-02-20 14:14:03
P
sp (KPa)
1
0.1
0.01
0.1
1
10
100
dte (min)

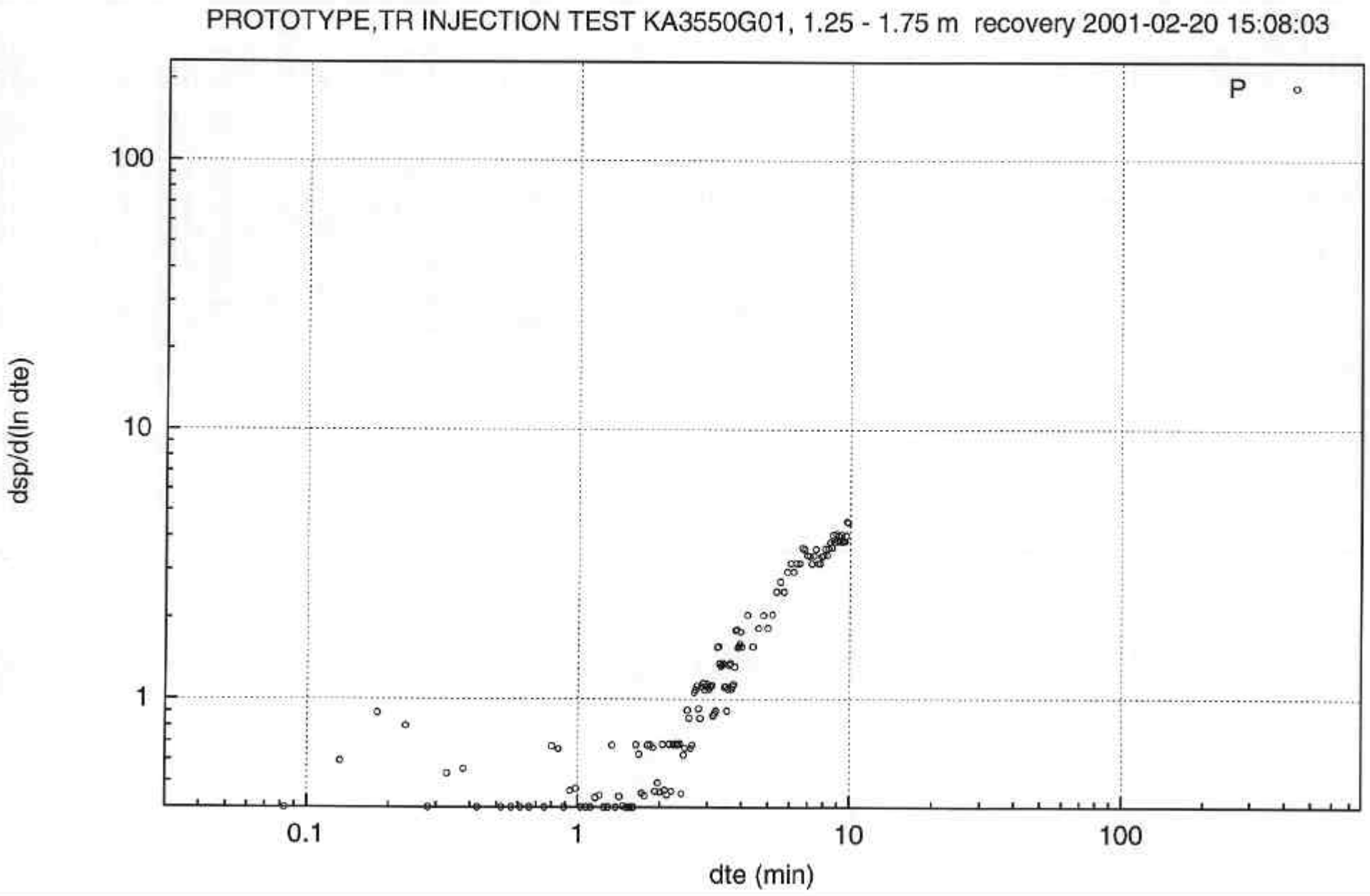

PROTOTYPE,TR INJECTION TEST KA3550G01, 0.75 - 1.25 m recovery 2001-02-20 14:14:03
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
dte (min)


KA3550G01,1.25-1.75m.P=Test interval,PA=section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
14:30
40
50
15:00
10
20
30
Start: 2001-02-20 14:27:00
hour:min

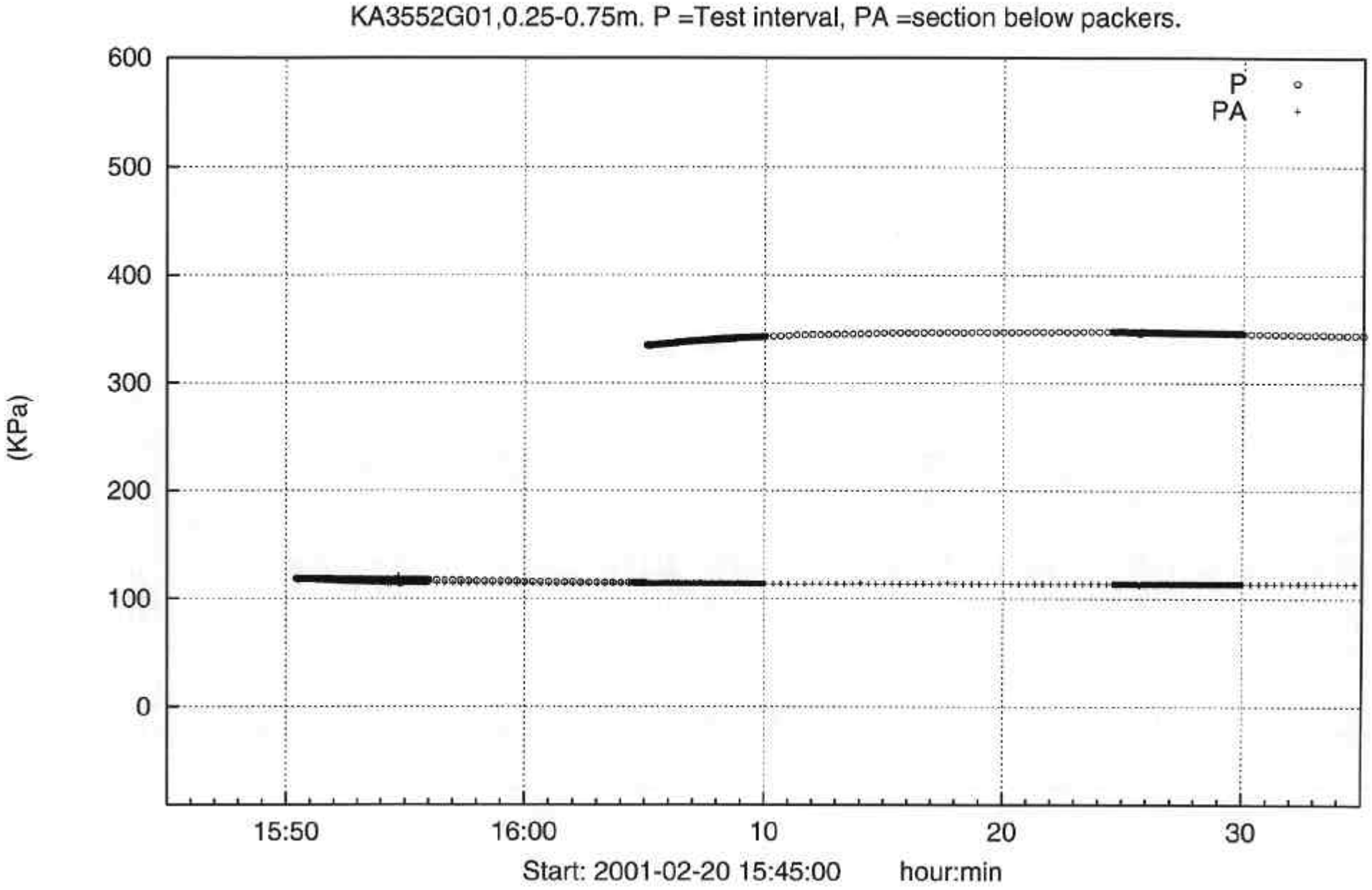

PROTOTYPE,TR INJECTION TEST KA3550G01, 1.25 - 1.75 m recovery 2001-02-20 15:08:03
P
sp (KPa)
0
2
4
6
8
10
12
0.1
1
10
100
dte (min)

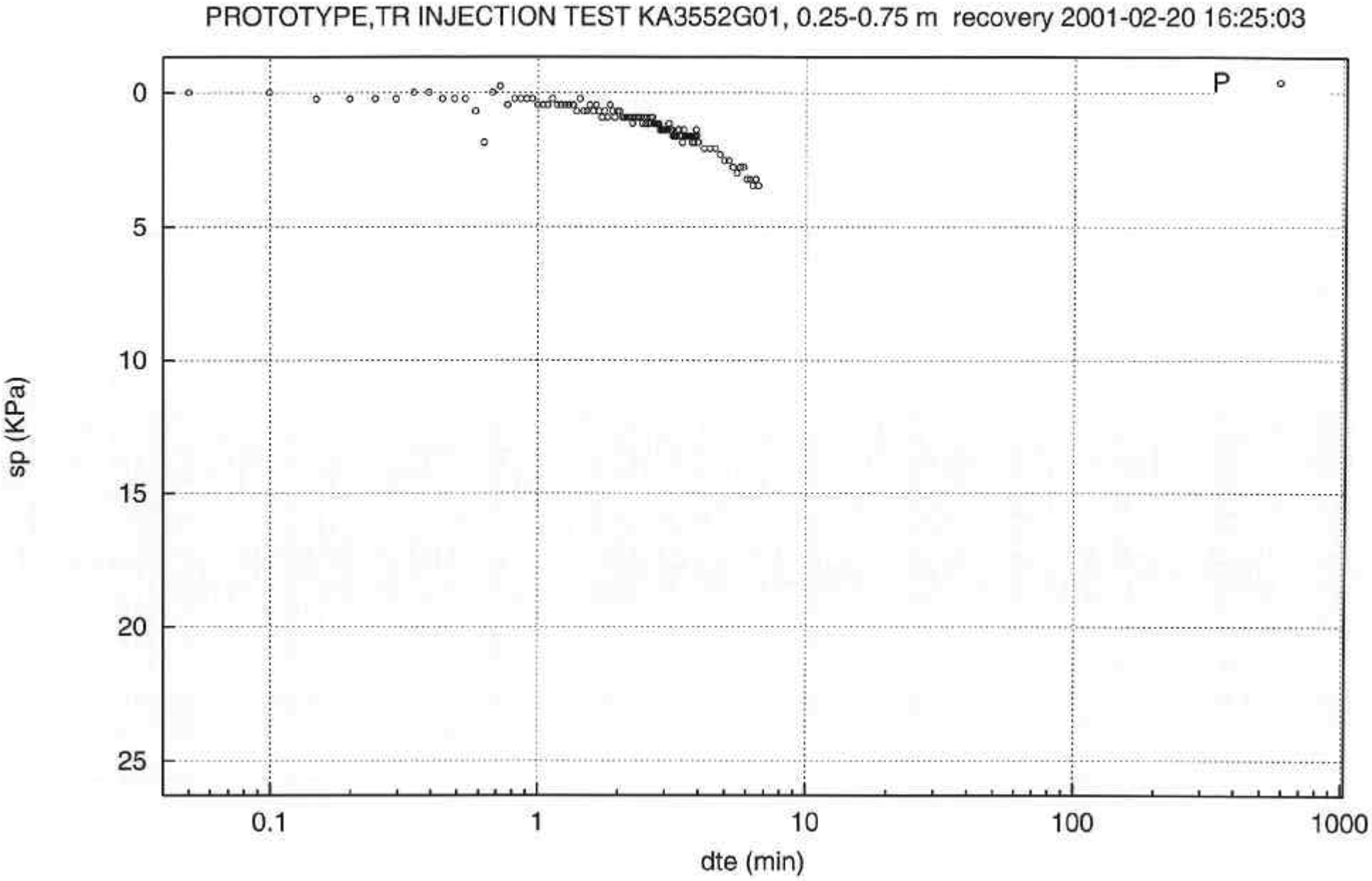

PROTOTYPE,TR INJECTION TEST KA3550G01, 1.25 - 1.75 m recovery 2001-02-20 15:08:03
P
dsp/d(ln dte)
0
2
4
6
8
10
12
0.1
1
10
100
dte (min)

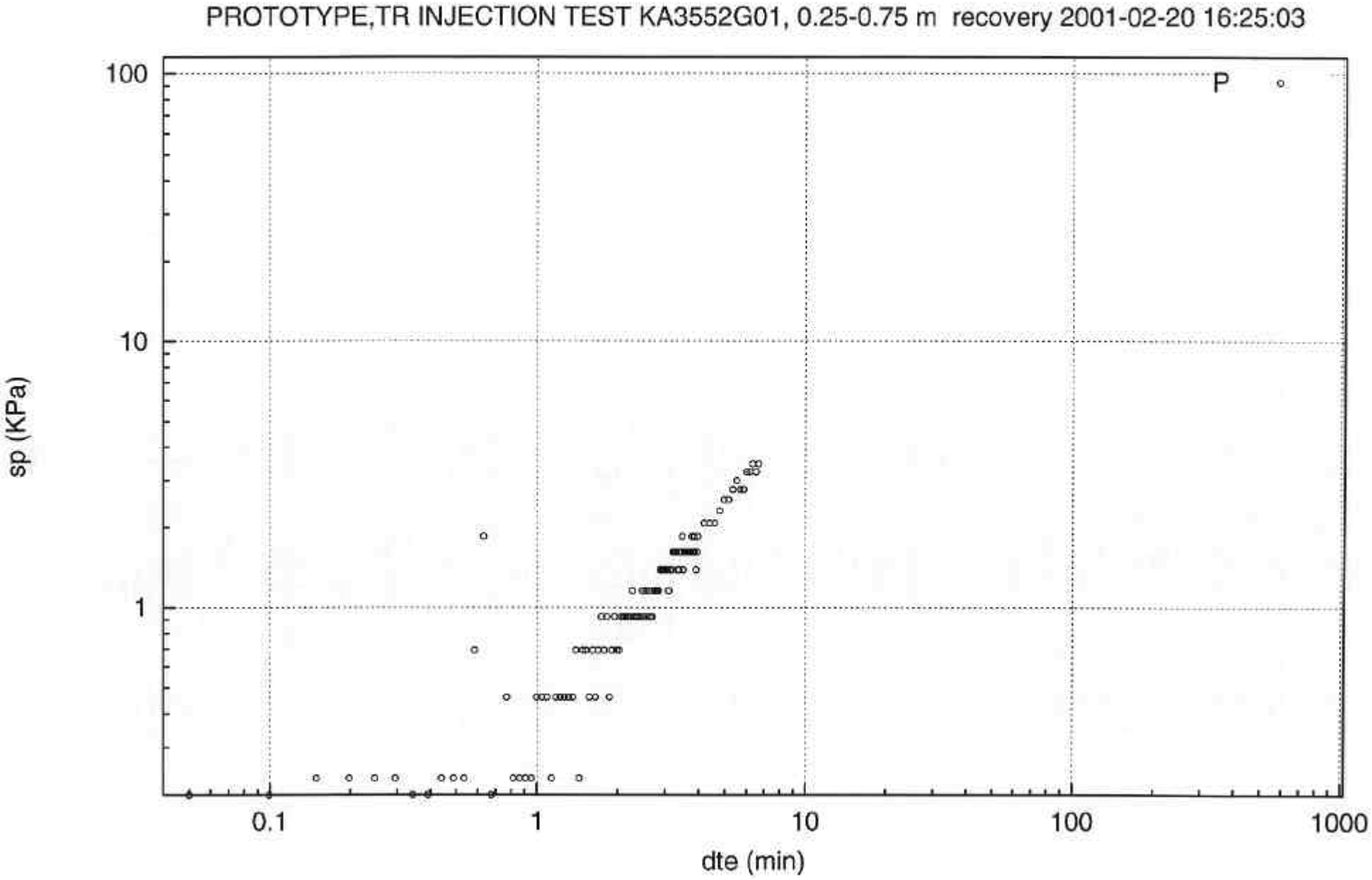

PROTOTYPE,TR INJECTION TEST KA3550G01, 1.25 - 1.75 m recovery 2001-02-20 15:08:03
P
100
10
1
sp (KPa)
0.1
1
10
100
dte (min)

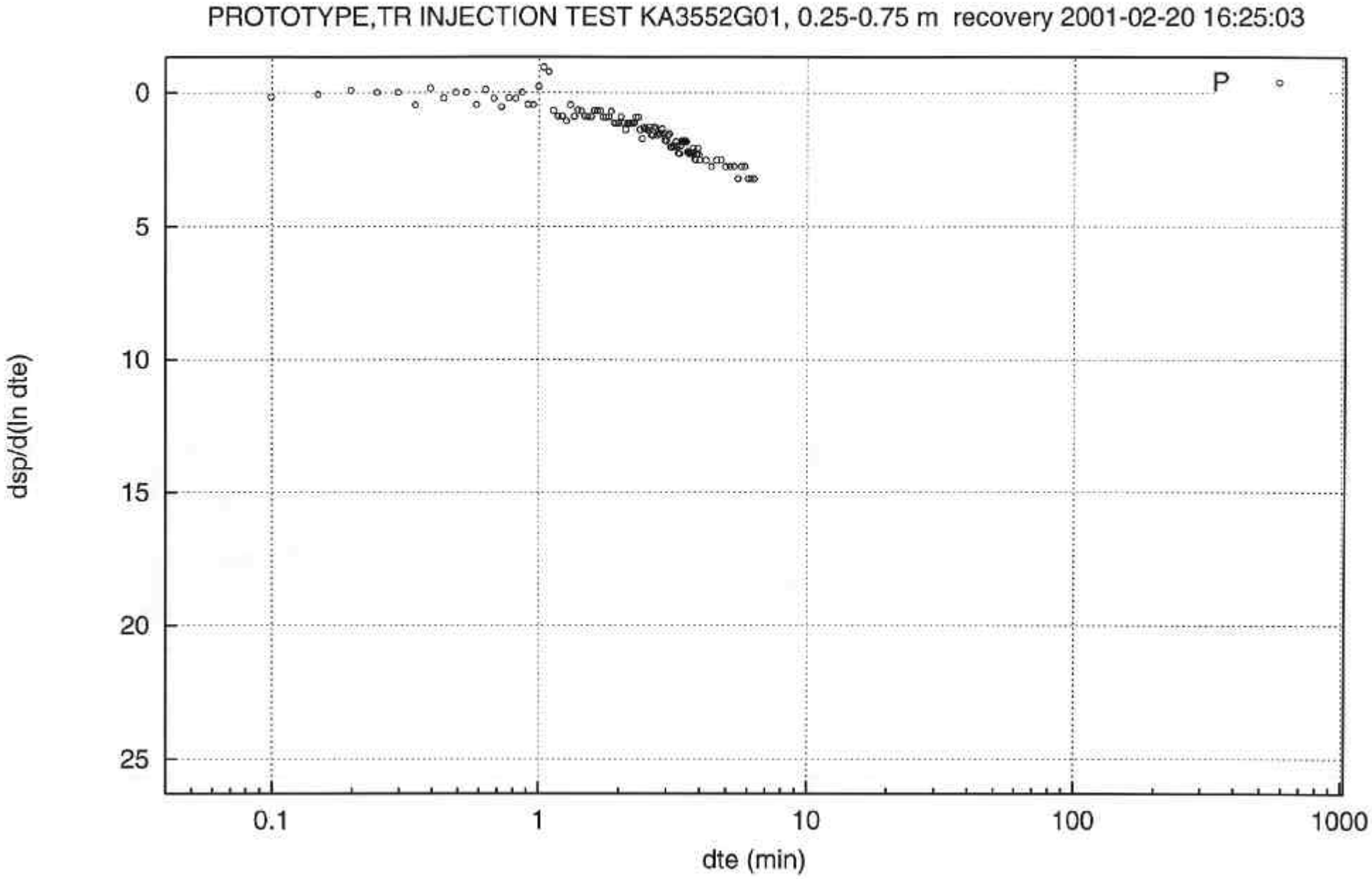

PROTOTYPE,TR INJECTION TEST KA3550G01, 1.25 - 1.75 m recovery 2001-02-20 15:08:03
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
dte (min)

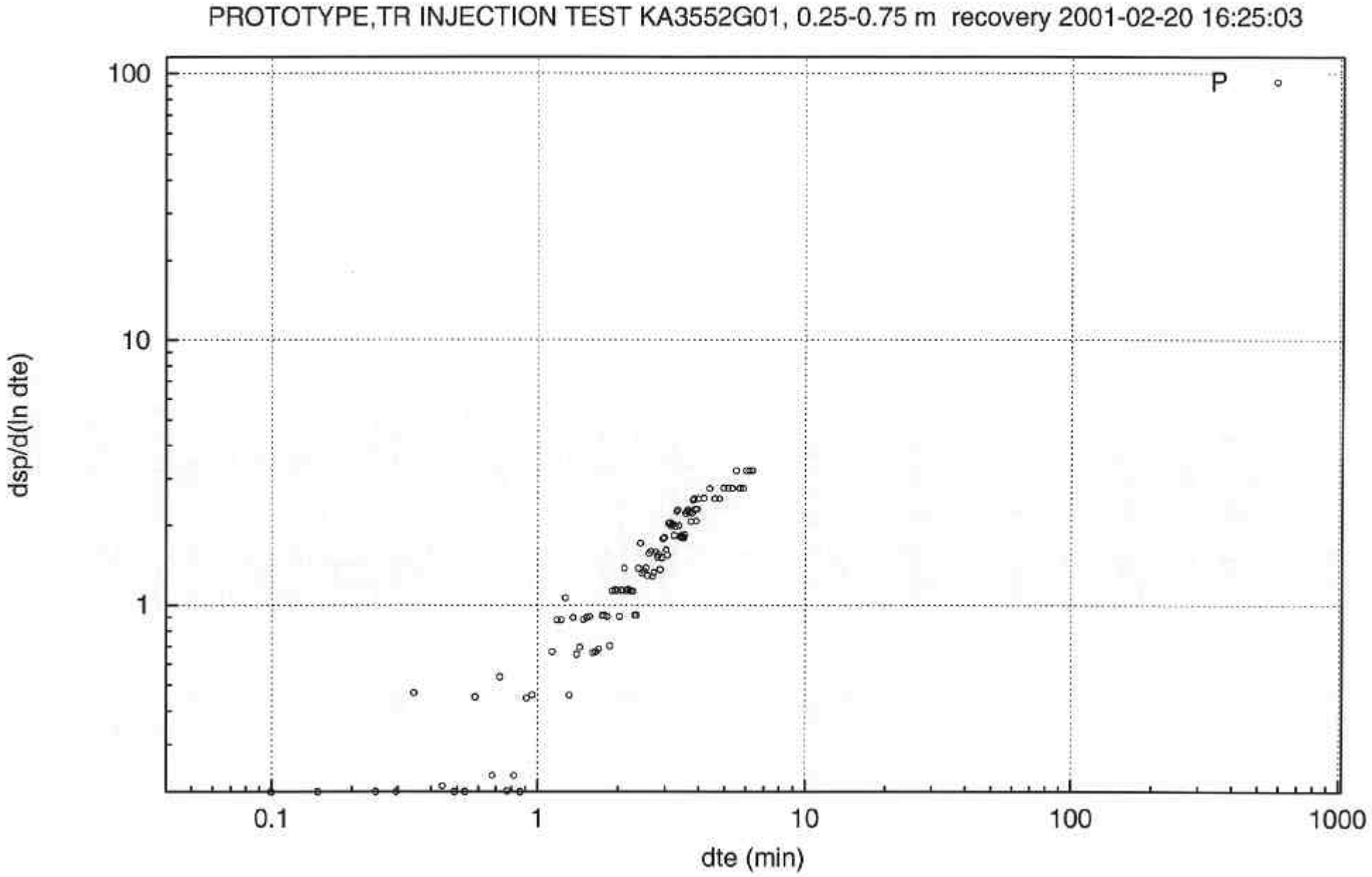
APPENDIX 8: Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3552G01. February 2001

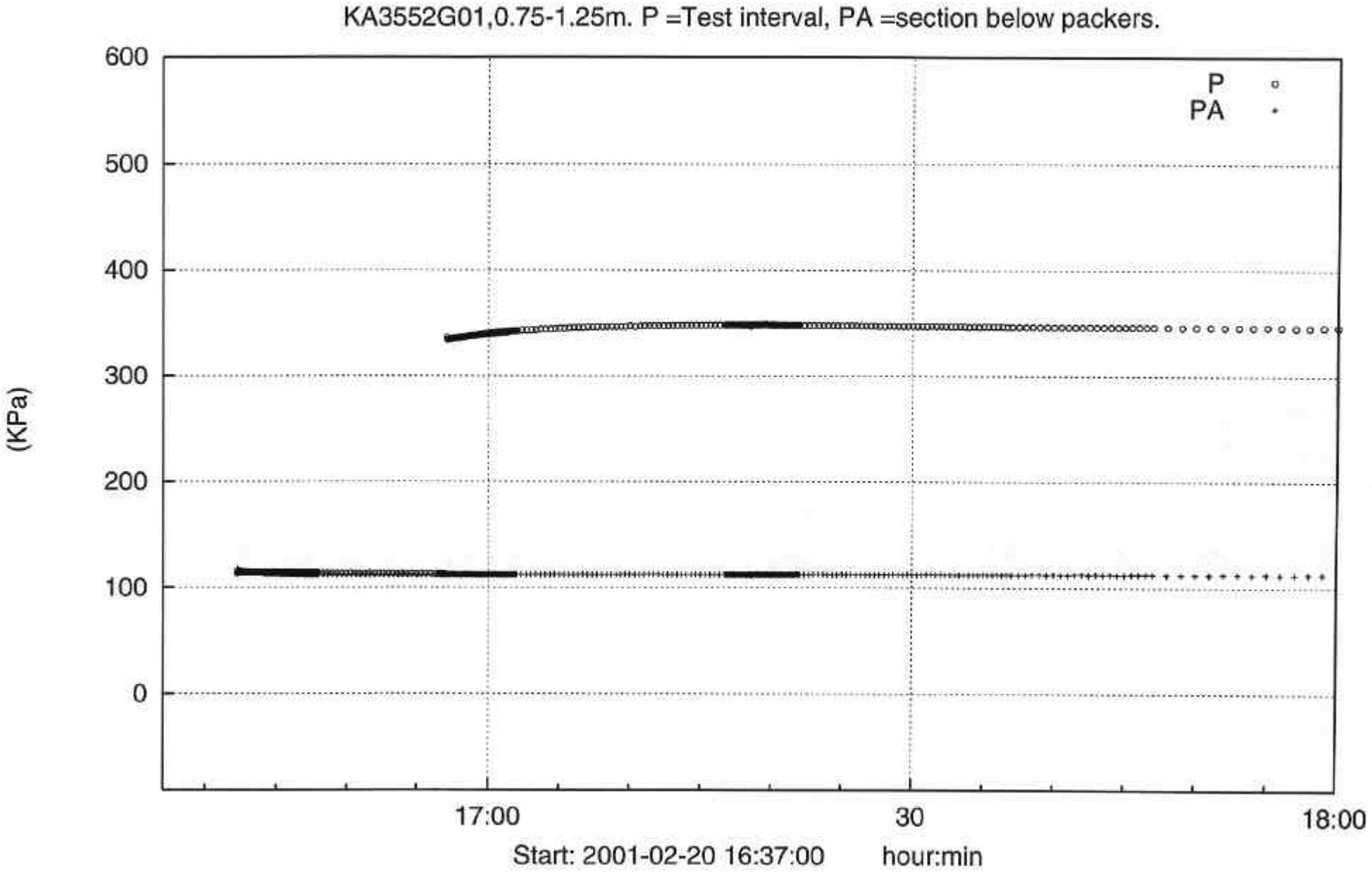

KA3552G01,0.25-0.75m. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
15:50
16:00
10
20
30
Start: 2001-02-20 15:45:00
hour:min

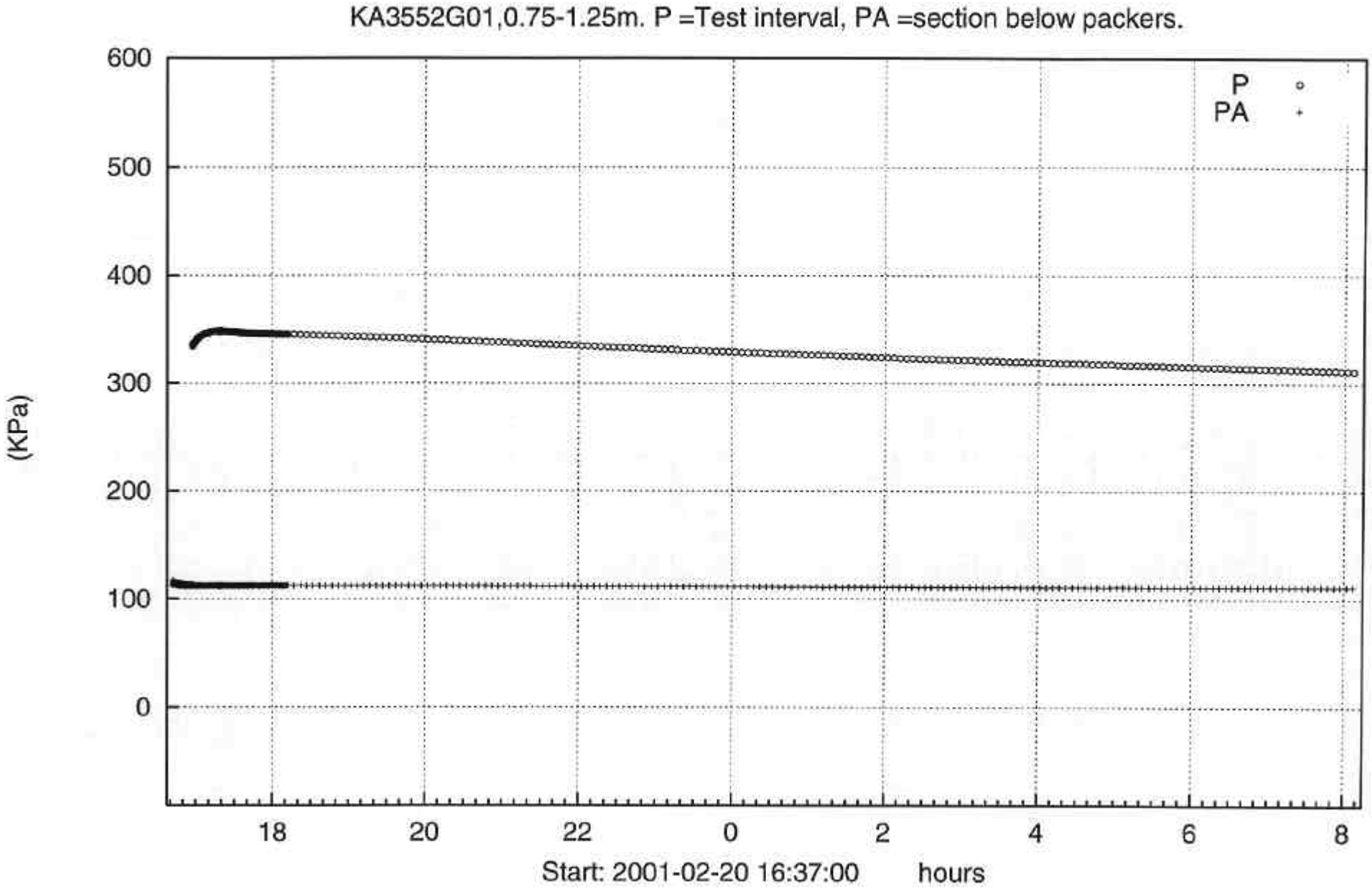

PROTOTYPE,TR INJECTION TEST KA3552G01, 0.25-0.75 m recovery 2001-02-20 16:25:03
P
sp (KPa)
0
5
10
15
20
25
0.1
1
10
100
1000
dte (min)

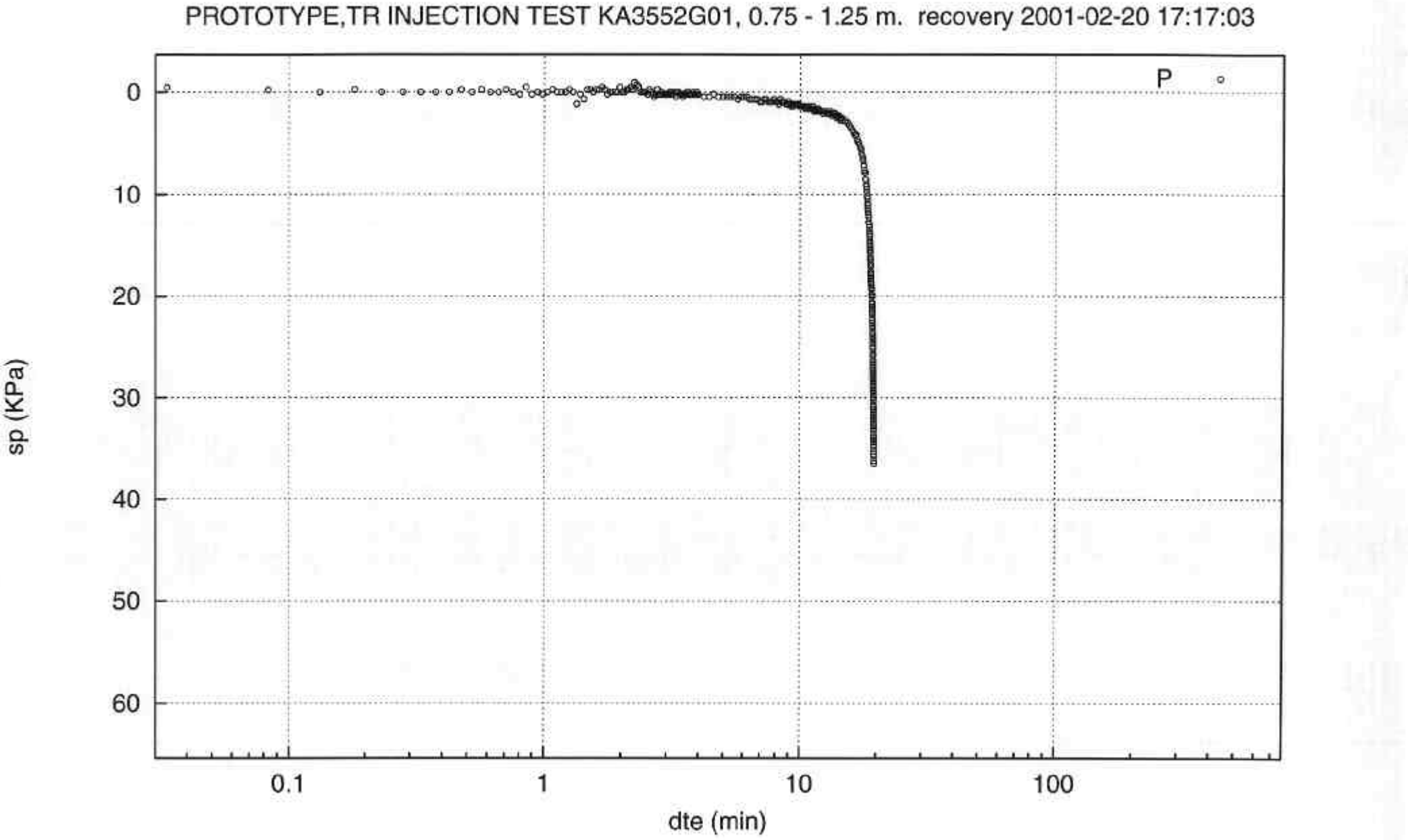

PROTOTYPE,TR INJECTION TEST KA3552G01, 0.25-0.75 m recovery 2001-02-20 16:25:03
P
100
10
1
sp (KPa)
0.1
1
10
100
1000
dte (min)

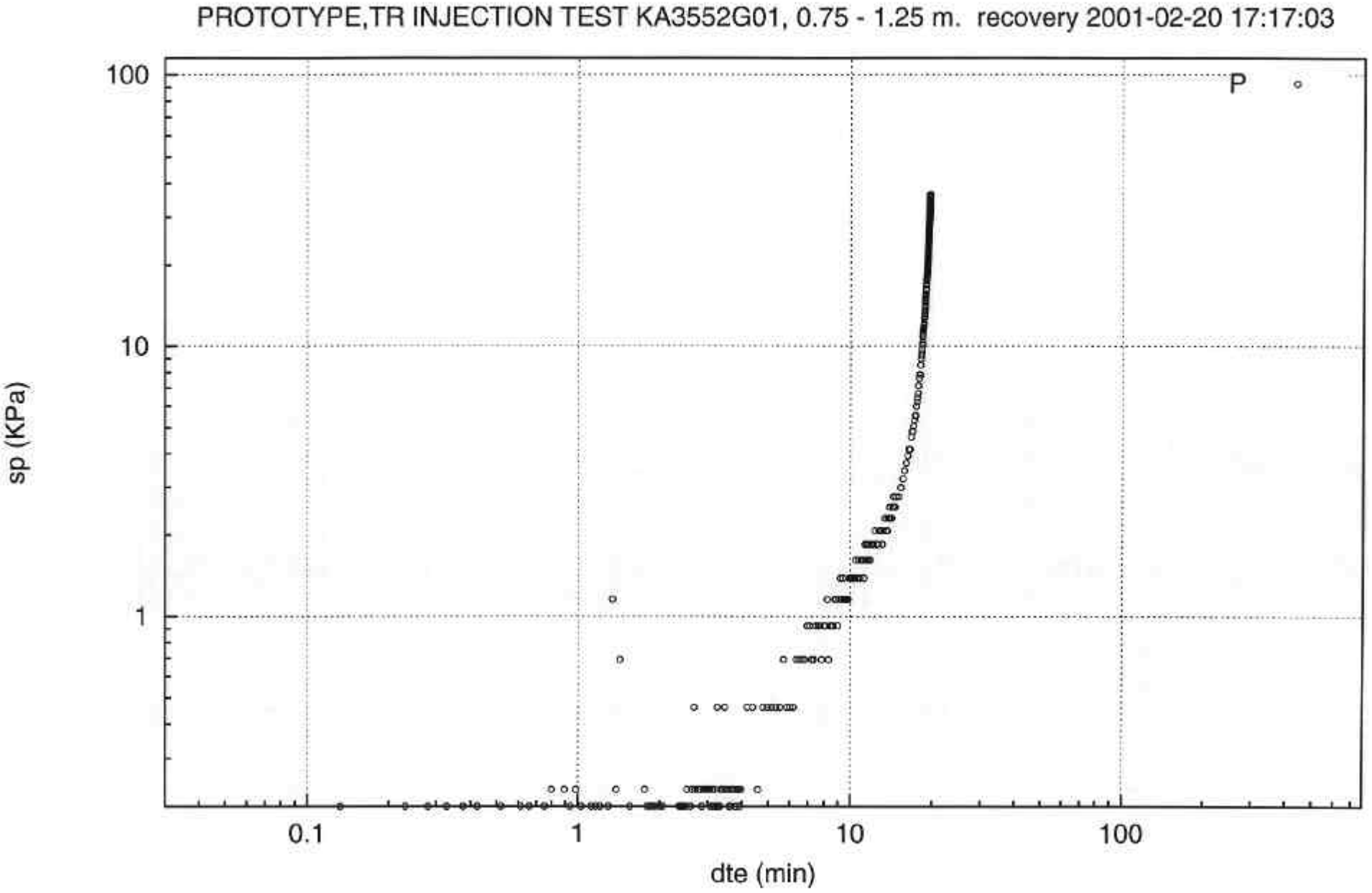

PROTOTYPE,TR INJECTION TEST KA3552G01, 0.25-0.75 m recovery 2001-02-20 16:25:03
P
dsp/d(ln dte)
0
5
10
15
20
25
0.1
1
10
100
1000
dte (min)

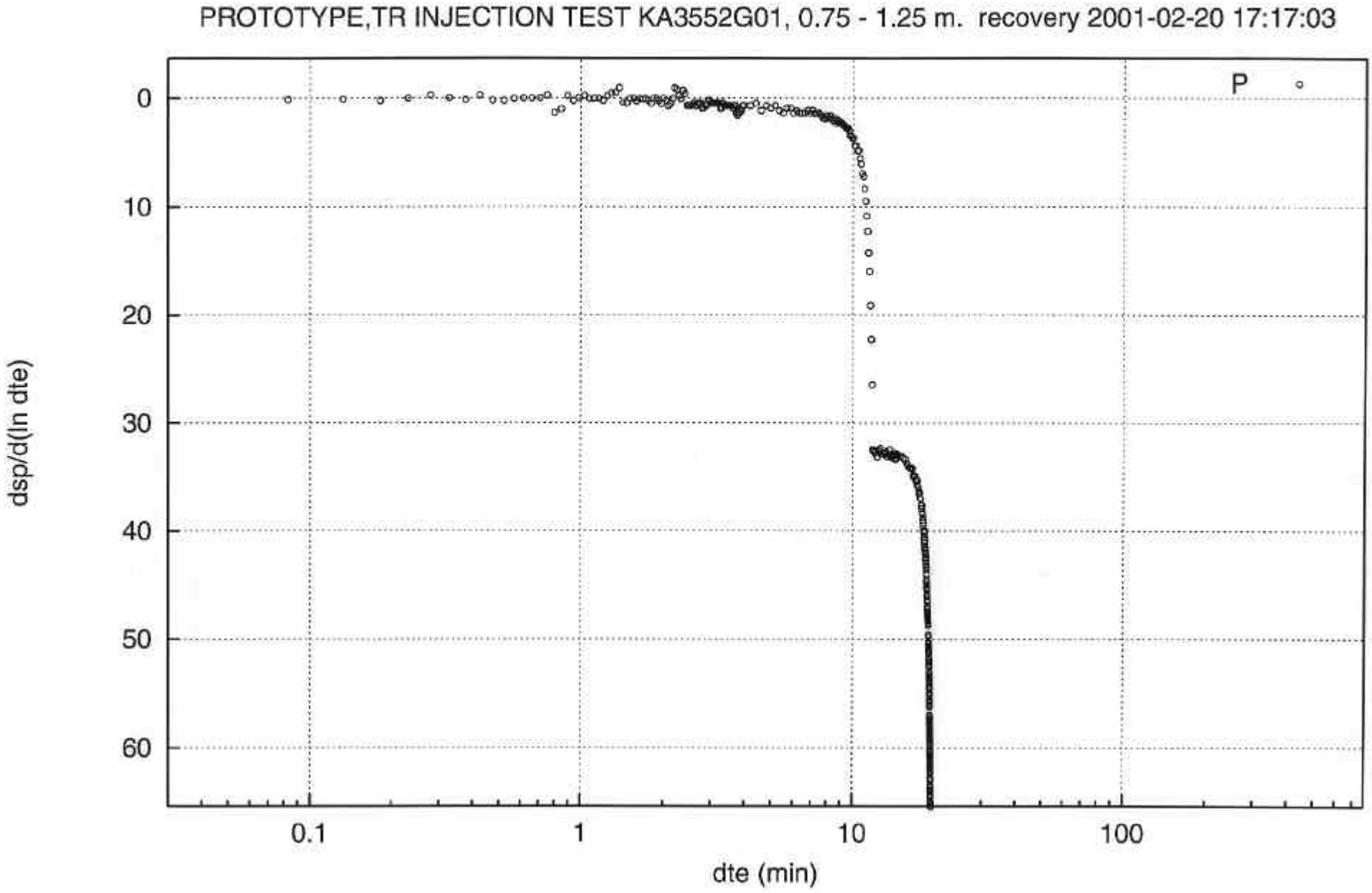

PROTOTYPE,TR INJECTION TEST KA3552G01, 0.25-0.75 m recovery 2001-02-20 16:25:03
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
1000
dte (min)

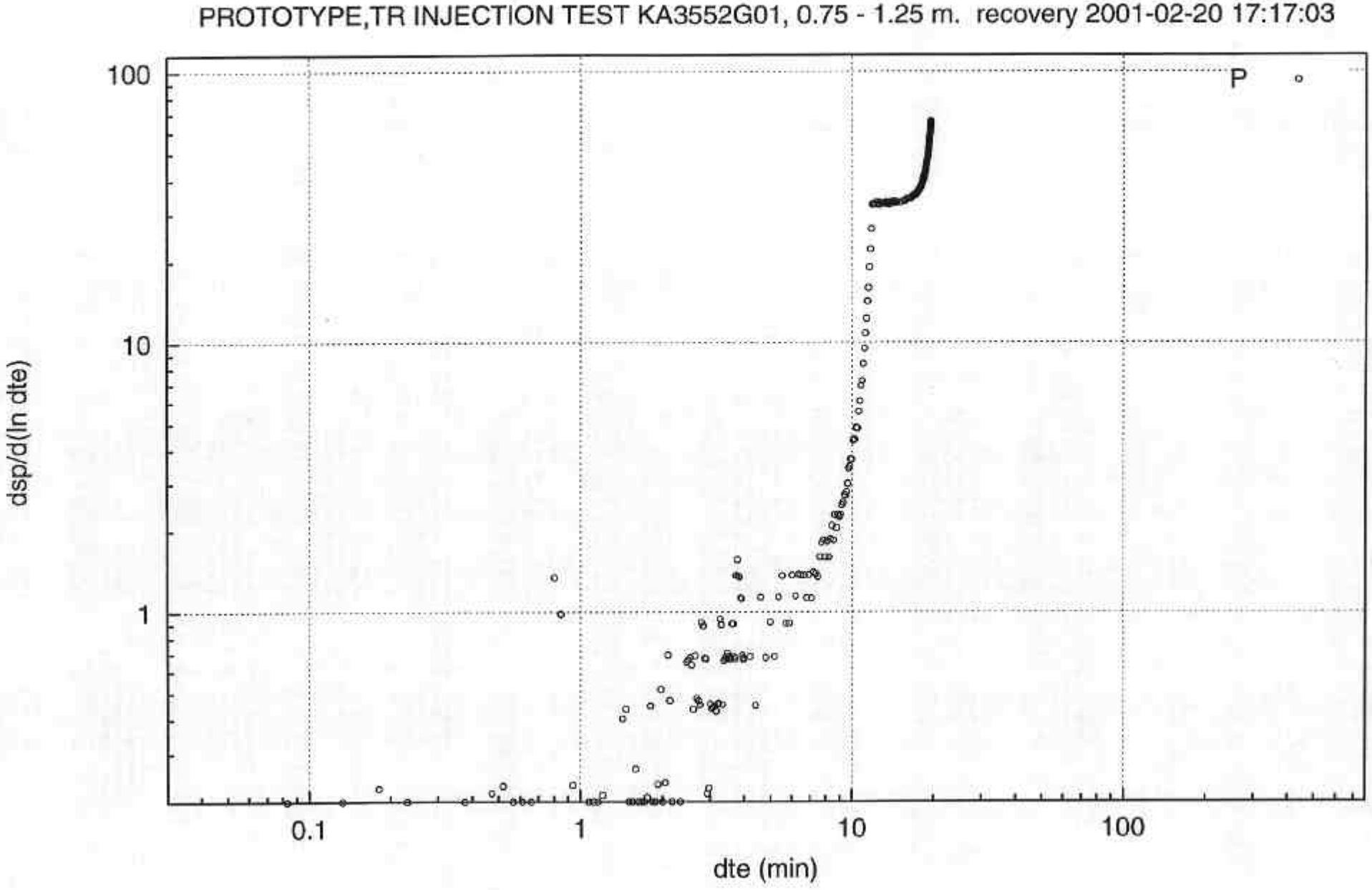

KA3552G01,0.75-1.25m. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
17:00
30
18:00
Start: 2001-02-20 16:37:00
hour:min

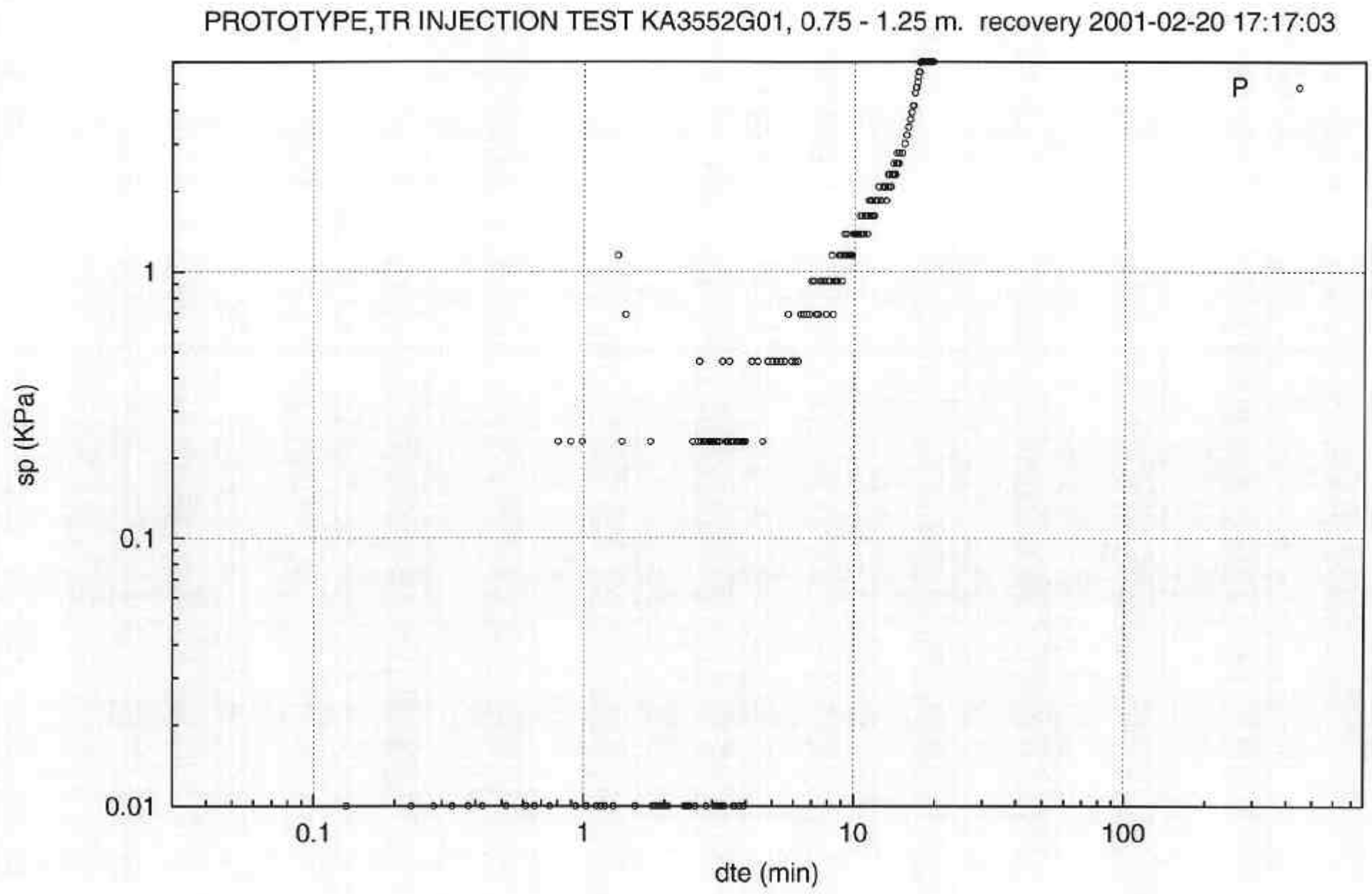

KA3552G01,0.75-1.25m. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
18
20
22
0
2
4
6
8
Start: 2001-02-20 16:37:00
hours

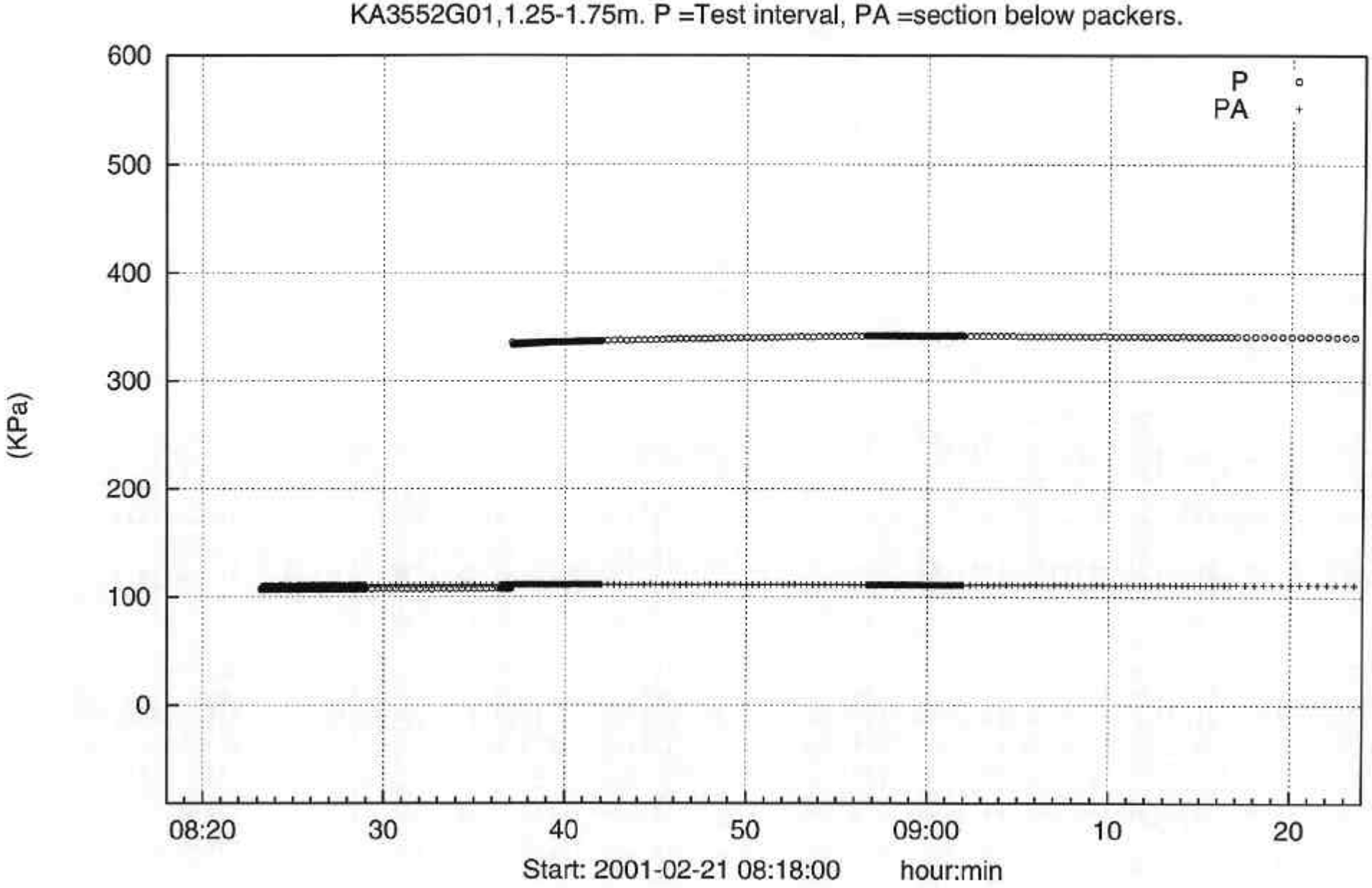

PROTOTYPE,TR INJECTION TEST KA3552G01, 0.75 - 1.25 m. recovery 2001-02-20 17:17:03
P
sp (KPa)
0
10
20
30
40
50
60
0.1
1
10
100
dte (min)

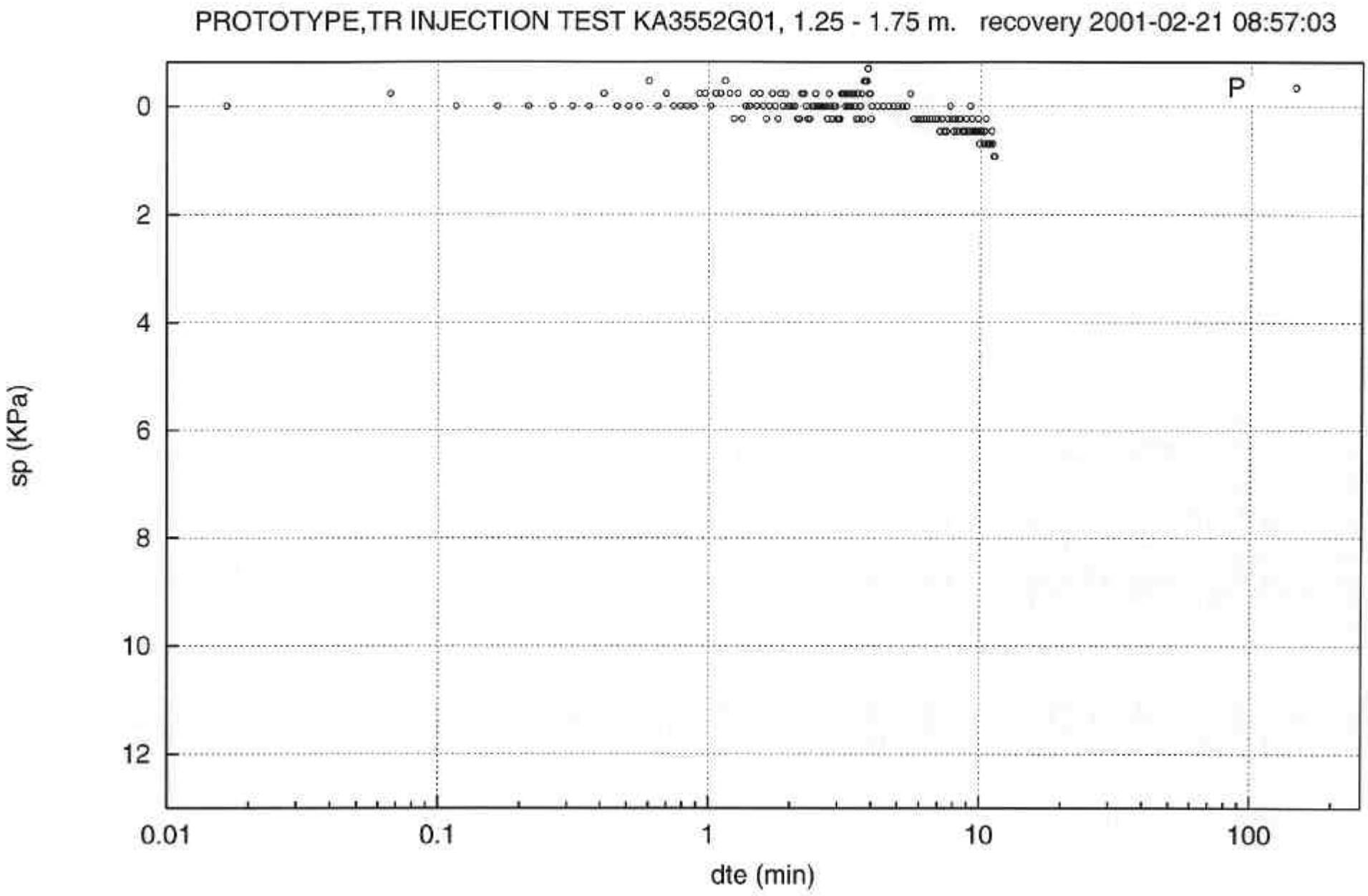

PROTOTYPE,TR INJECTION TEST KA3552G01, 0.75 - 1.25 m. recovery 2001-02-20 17:17:03
P
100
10
1
sp (KPa)
0.1
1
10
100
dte (min)

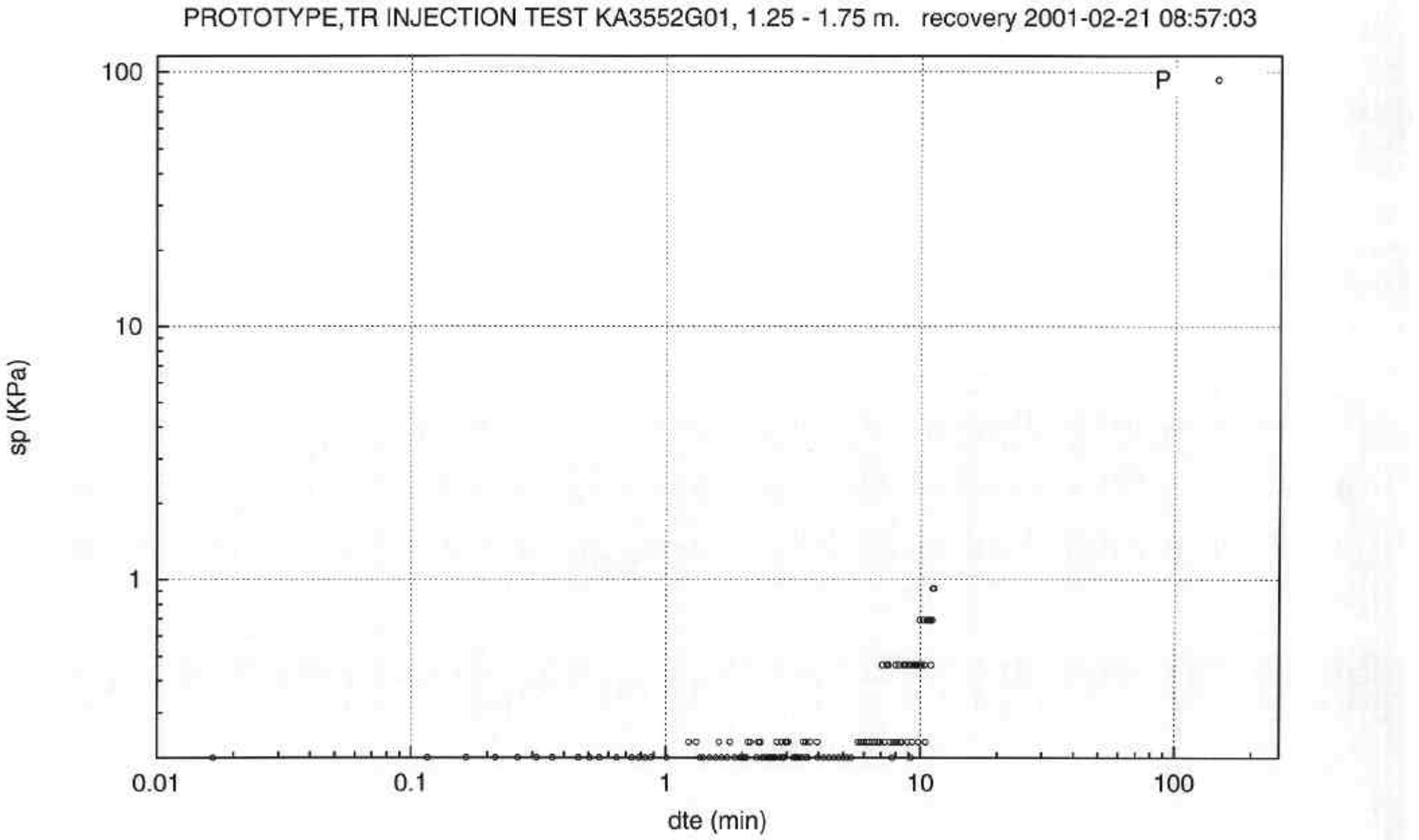

PROTOTYPE,TR INJECTION TEST KA3552G01, 0.75 - 1.25 m. recovery 2001-02-20 17:17:03
P
0
10
20
30
40
50
60
dsp/d(ln dte)
0.1
1
10
100
dte (min)

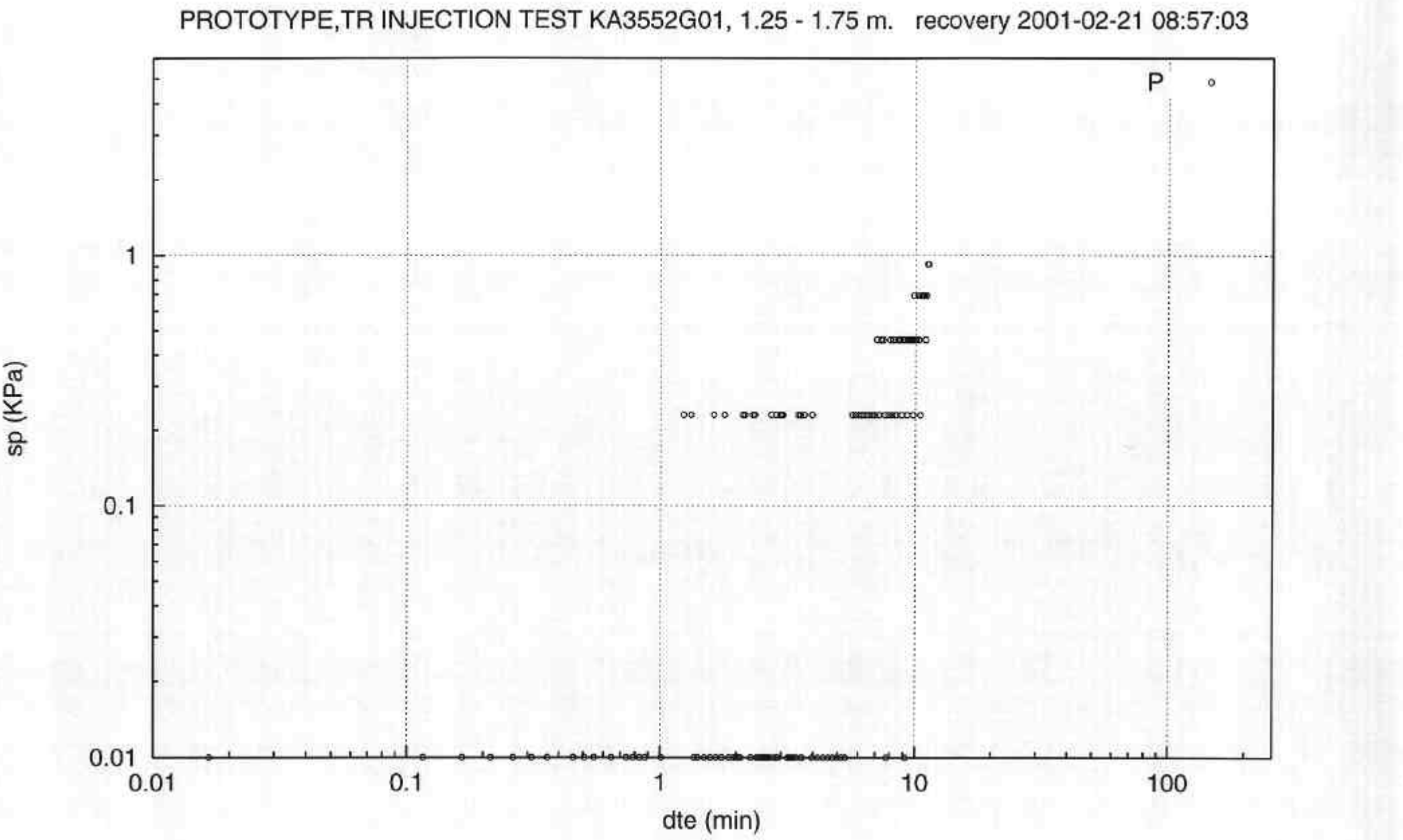

PROTOTYPE,TR INJECTION TEST KA3552G01, 0.75 - 1.25 m. recovery 2001-02-20 17:17:03
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
dte (min)

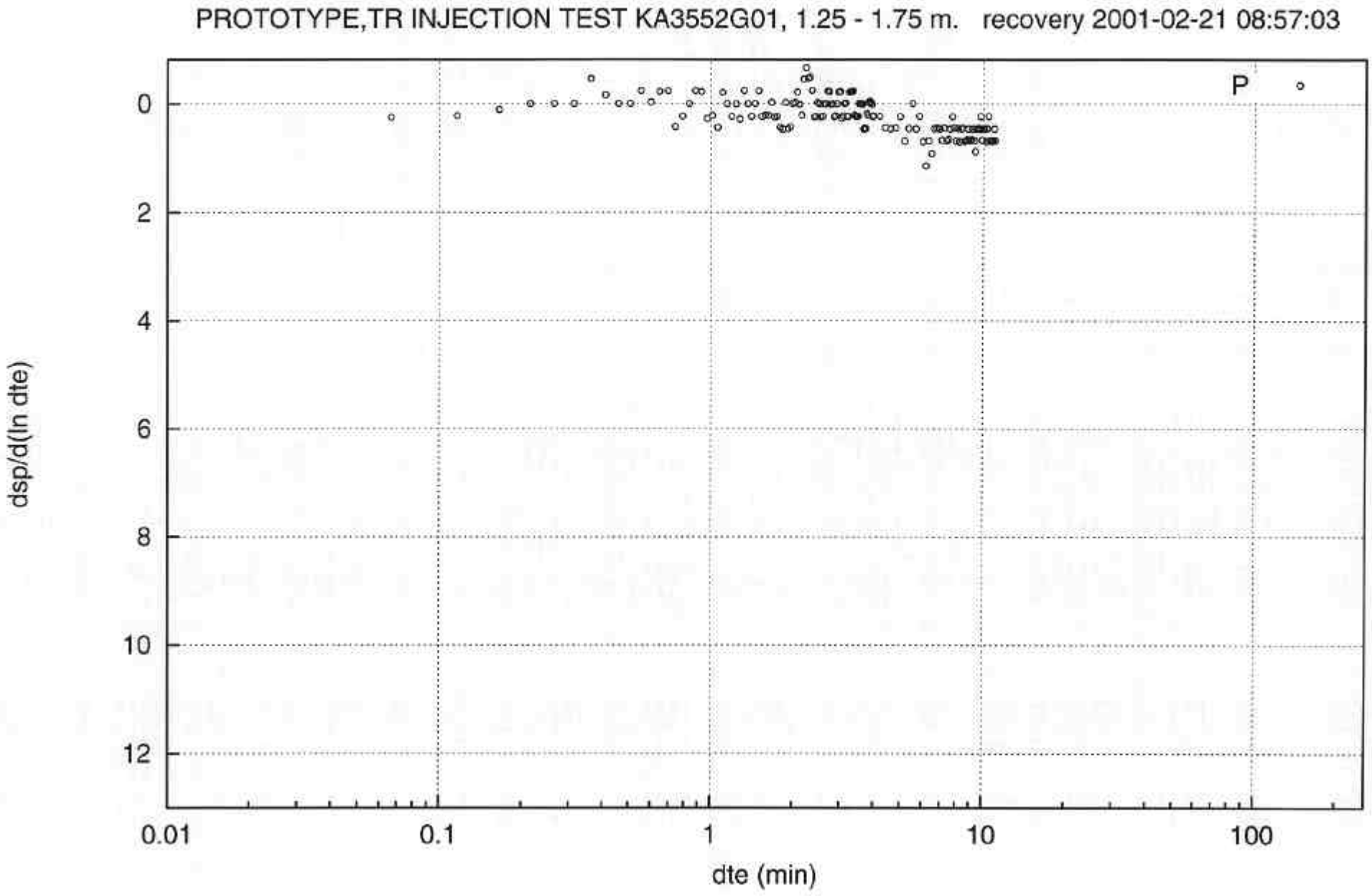

PROTOTYPE,TR INJECTION TEST KA3552G01, 0.75 - 1.25 m. recovery 2001-02-20 17:17:03
P
sp (KPa)
1
0.1
0.01
0.1
1
10
100
dte (min)

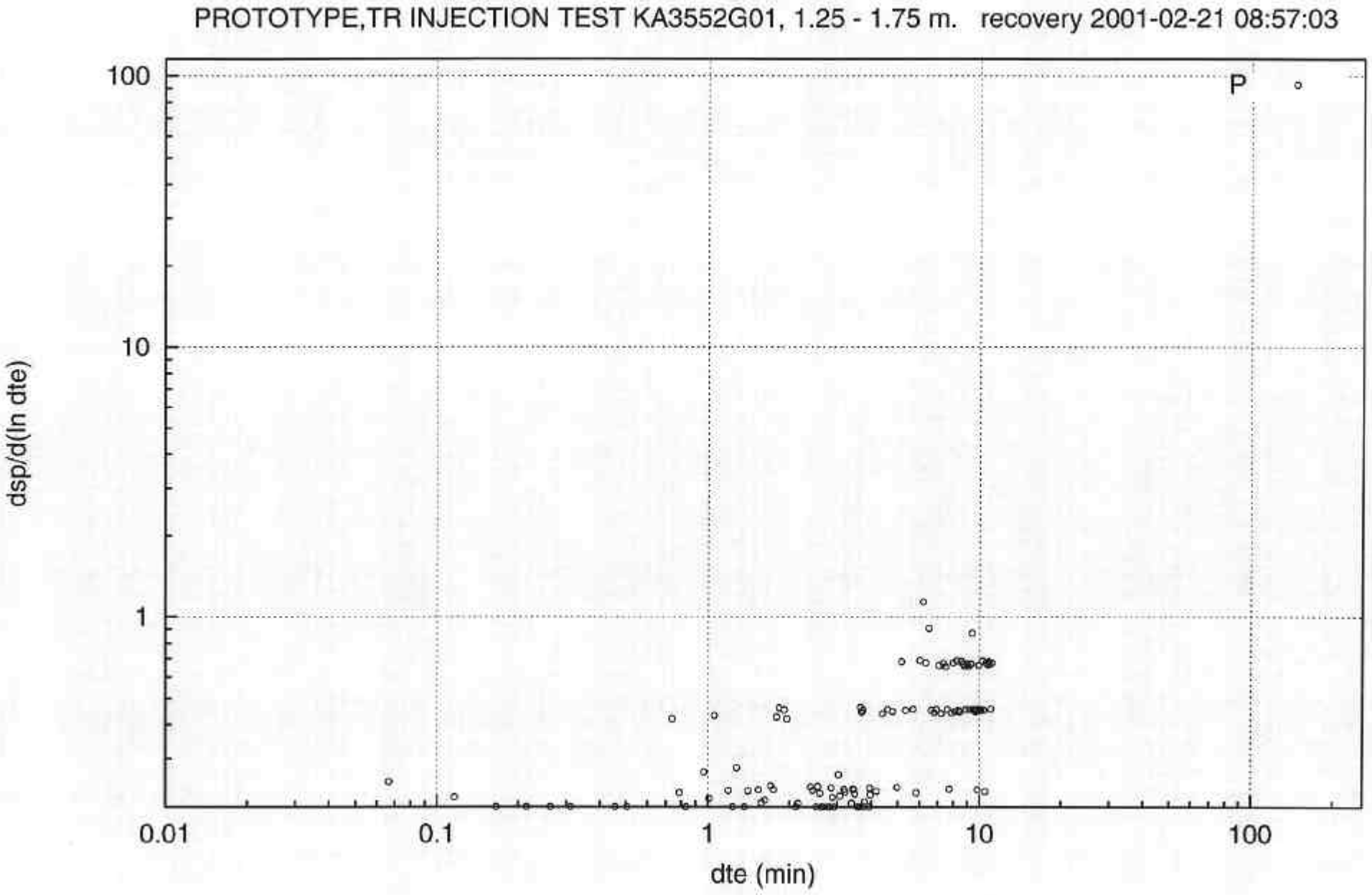

KA3552G01,1.25-1.75m. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
08:20
30
40
50
09:00
10
20
Start: 2001-02-21 08:18:00
hour:min


PROTOTYPE,TR INJECTION TEST KA3552G01, 1.25 - 1.75 m. recovery 2001-02-21 08:57:03
P
sp (KPa)
0
2
4
6
8
10
12
0.01
0.1
1
10
100
dte (min)

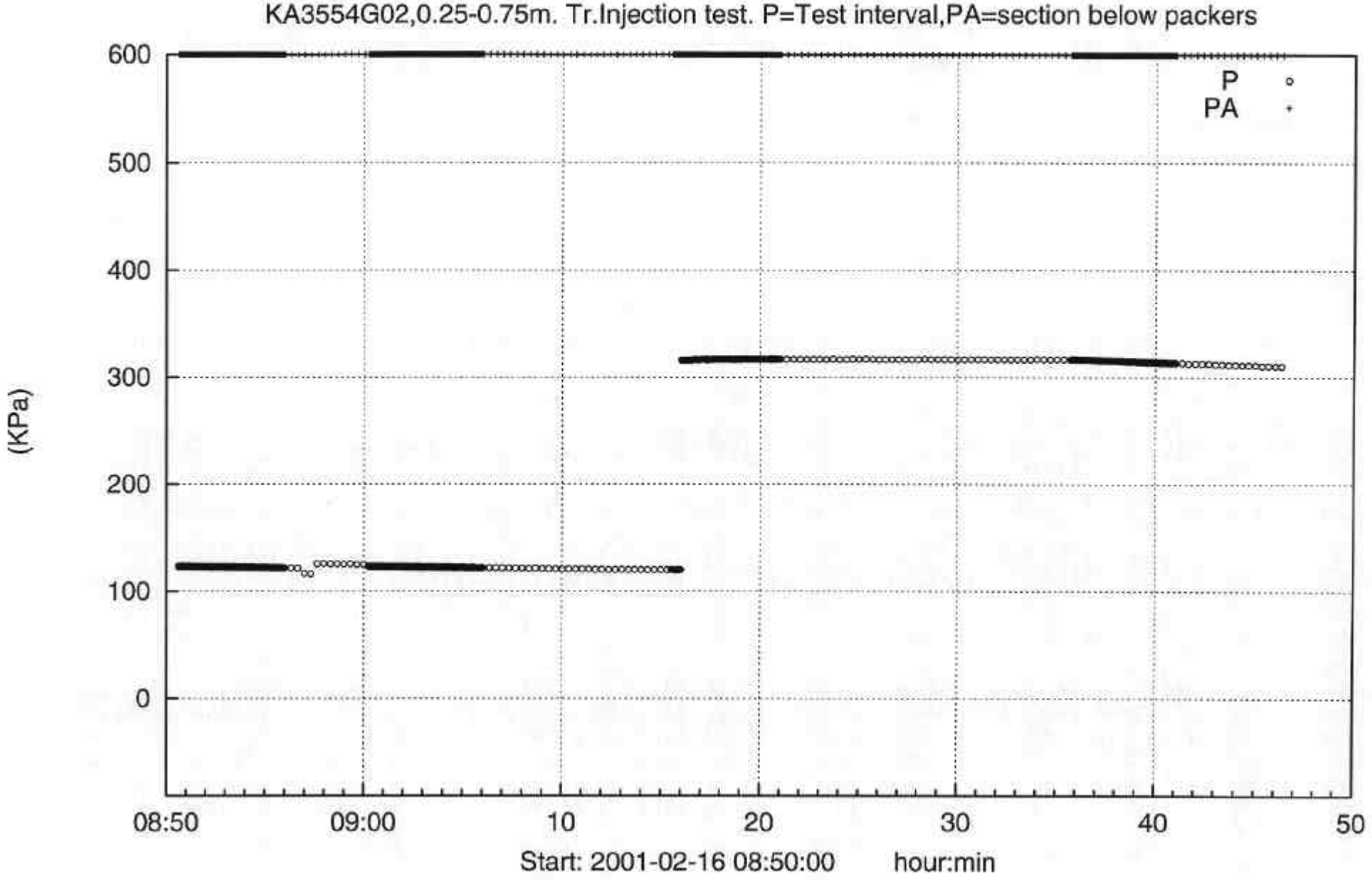

PROTOTYPE,TR INJECTION TEST KA3552G01, 1.25 - 1.75 m. recovery 2001-02-21 08:57:03
P
100
10
1
sp (KPa)
0.01
0.1
1
10
100
dte (min)

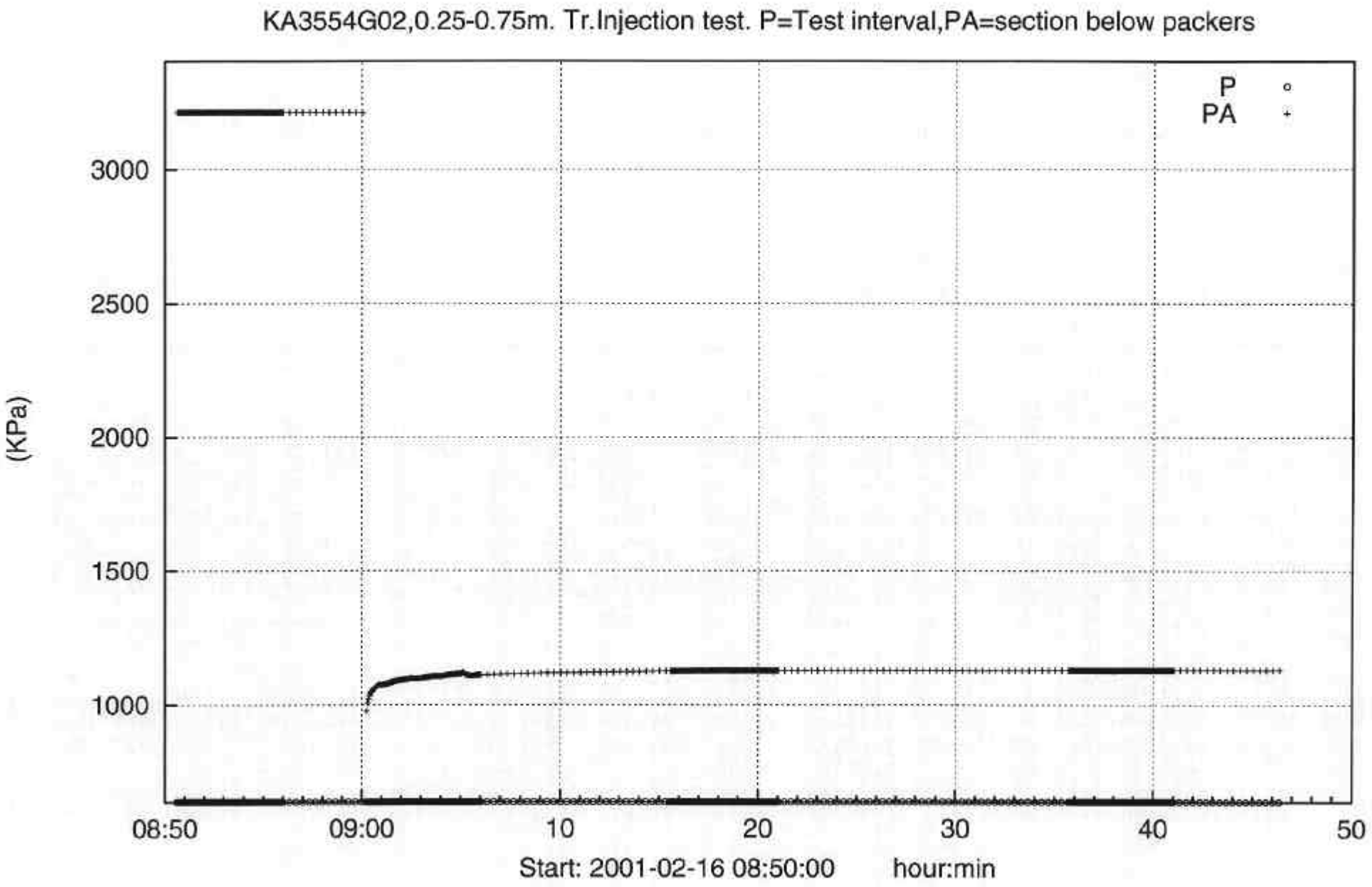

PROTOTYPE,TR INJECTION TEST KA3552G01, 1.25 - 1.75 m. recovery 2001-02-21 08:57:03
P
sp (KPa)
1
0.1
0.01
0.01
0.1
1
10
100
dte (min)

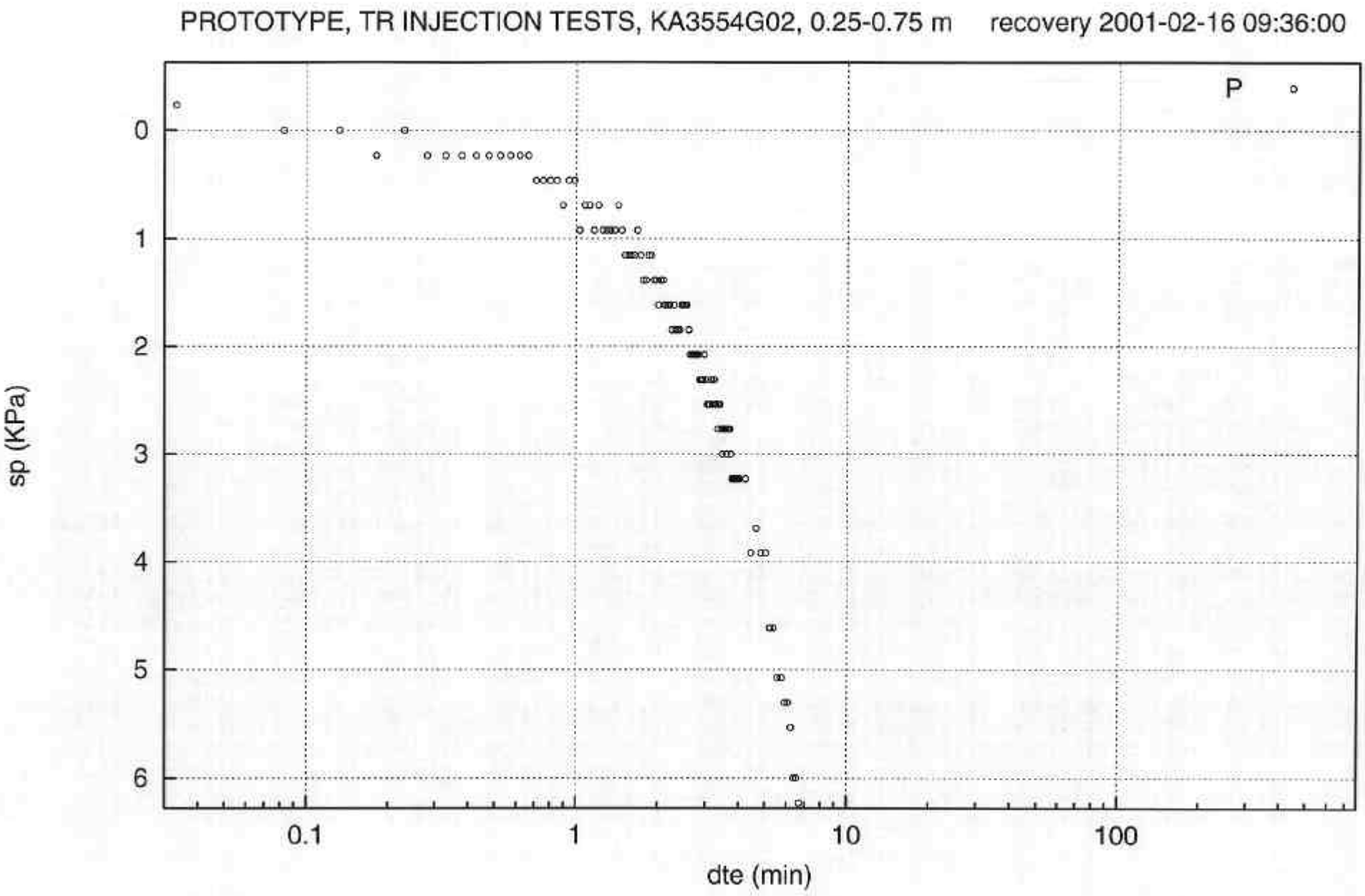

PROTOTYPE,TR INJECTION TEST KA3552G01, 1.25 - 1.75 m. recovery 2001-02-21 08:57:03
P
dsp/d(ln dte)
0
2
4
6
8
10
12
0.01
0.1
1
10
100
dte (min)

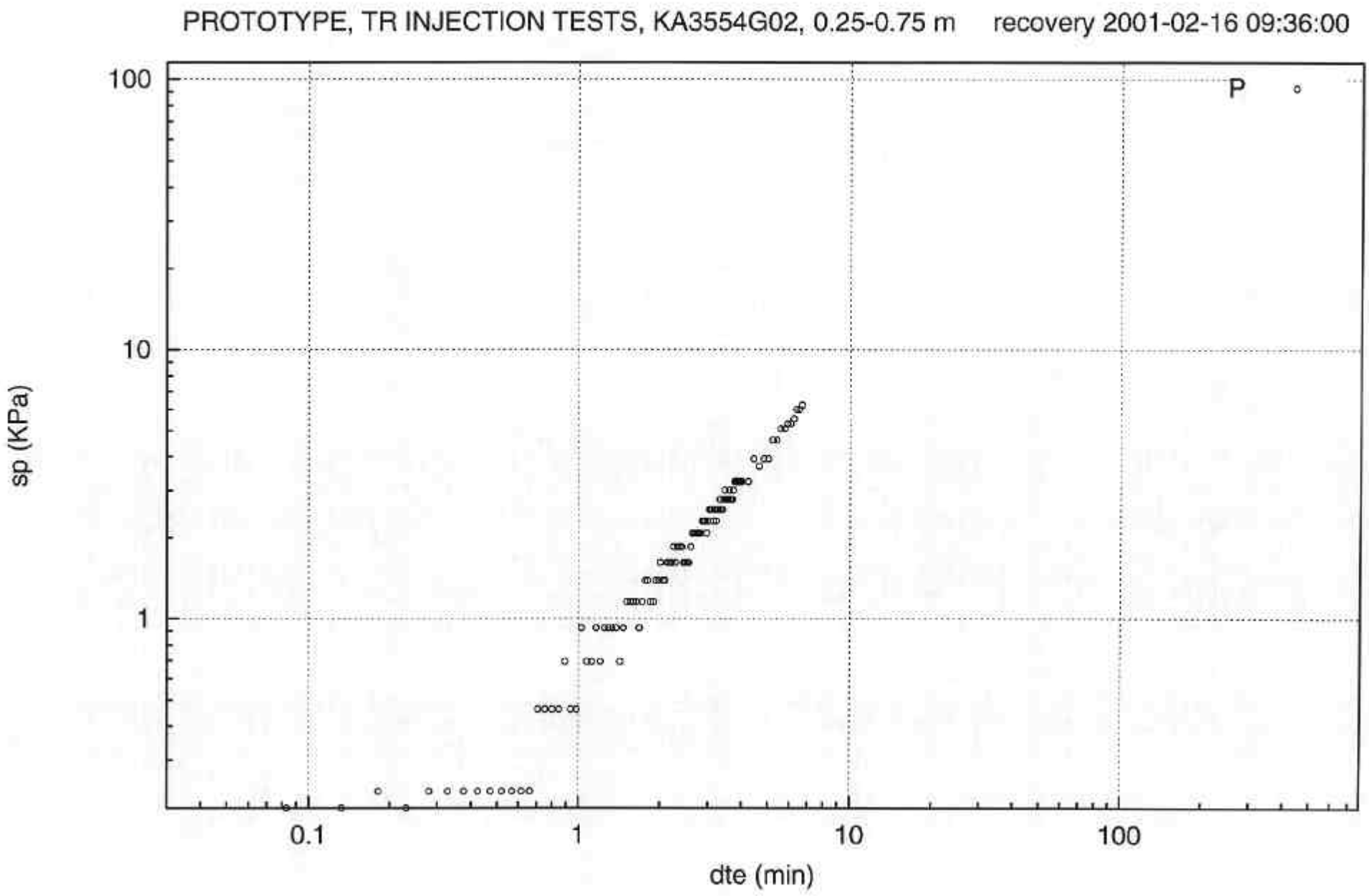

PROTOTYPE,TR INJECTION TEST KA3552G01, 1.25 - 1.75 m. recovery 2001-02-21 08:57:03
P
100
10
1
dsp/d(ln dte)
0.01
0.1
1
10
100
dte (min)

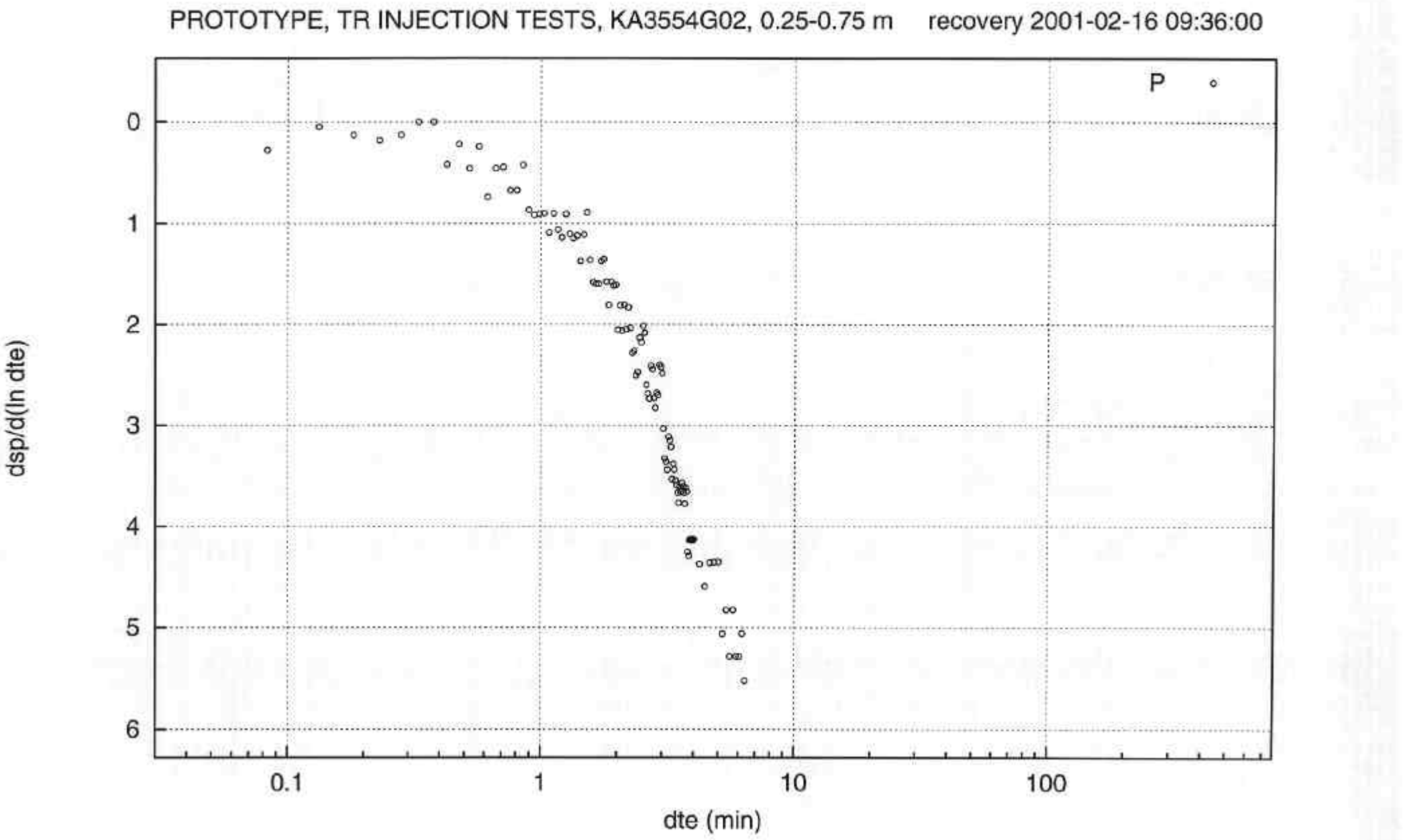
APPENDIX 9 : Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3554G02. February 2001

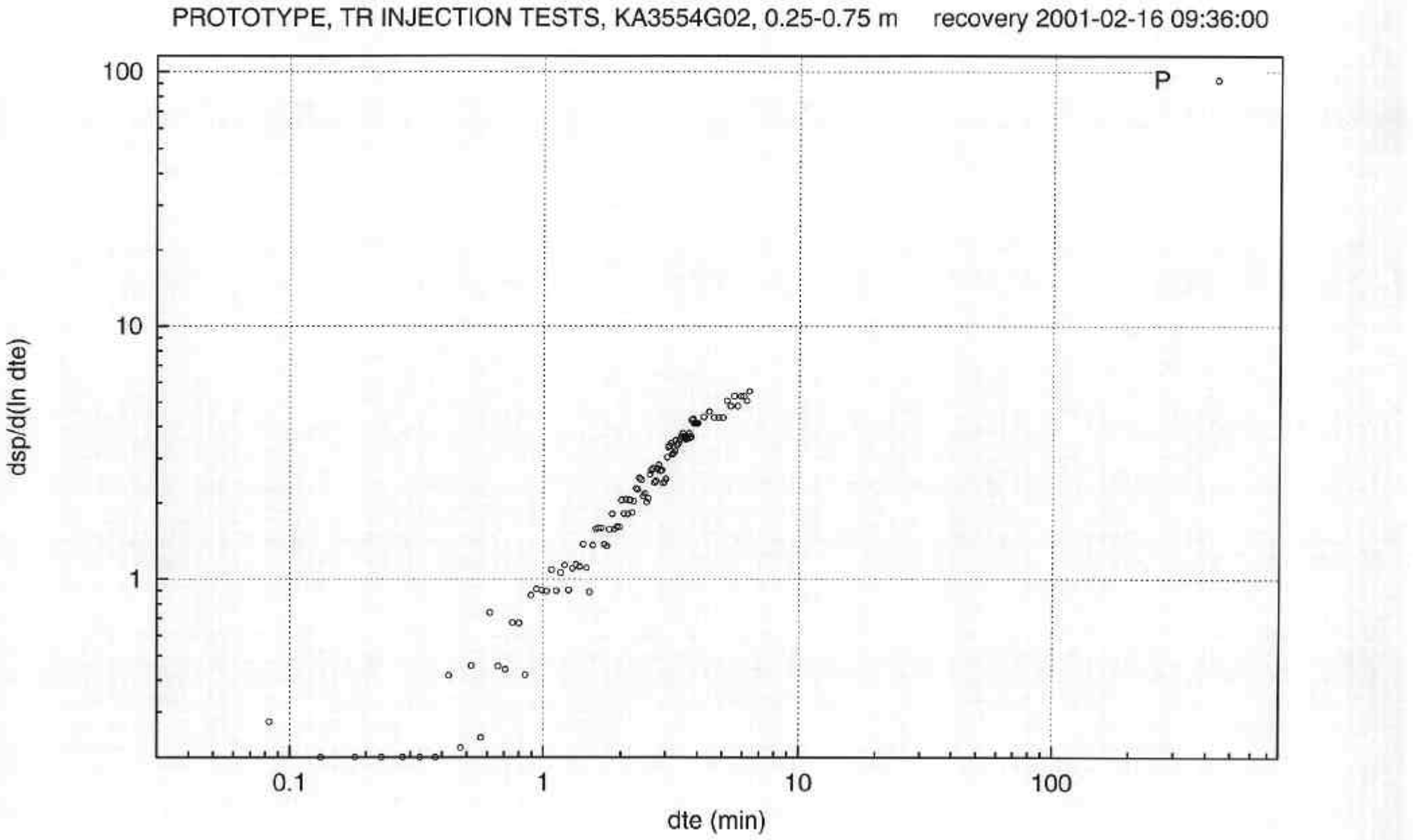

KA3554G02,0.25-0.75m. Tr.Injection test. P=Test interval,PA=section below packers
600
500
400
300
200
100
0
(KPa)
P
PA
08:50
09:00
10
20
30
40
50
Start: 2001-02-16 08:50:00
hour:min

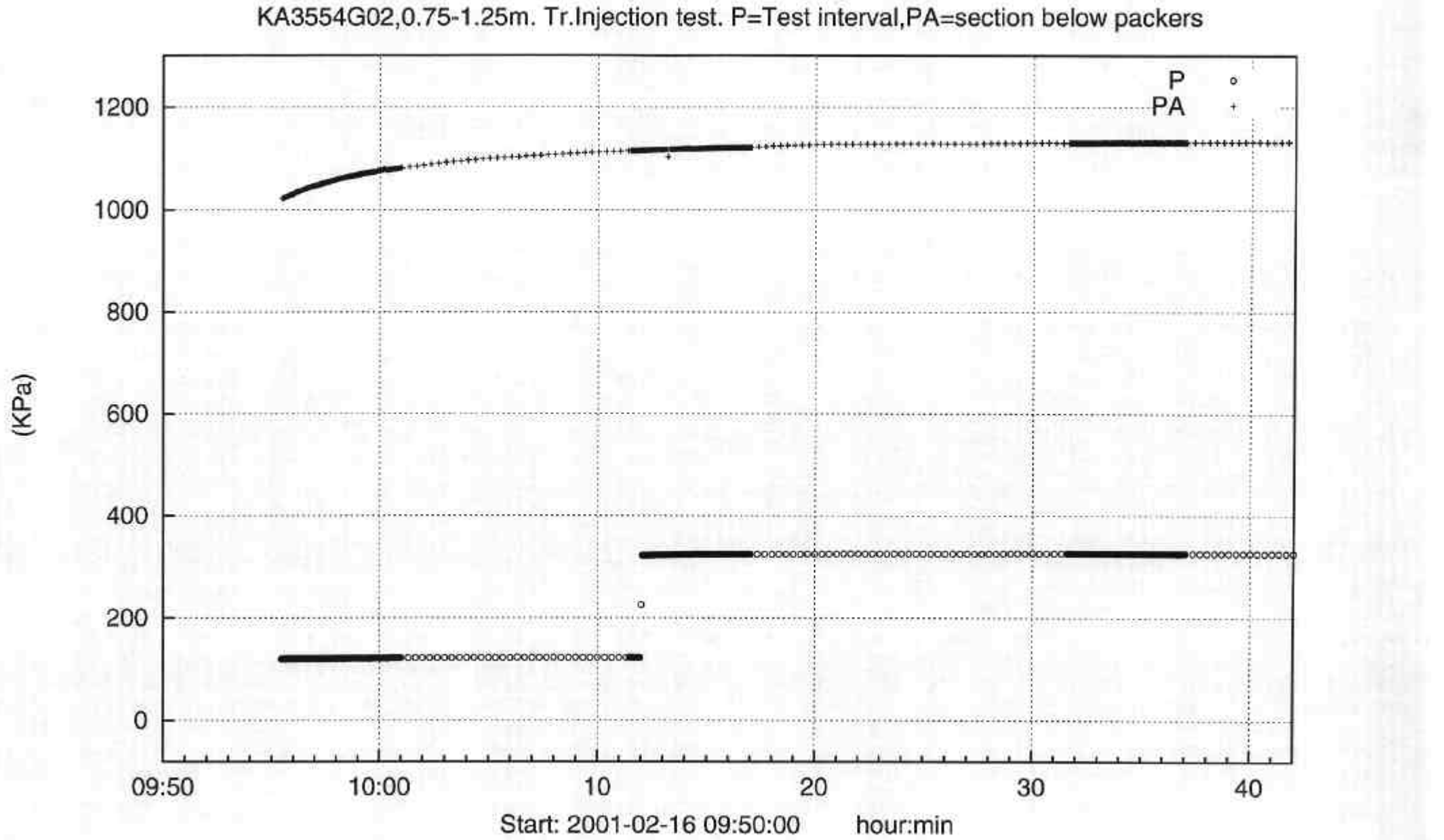

KA3554G02,0.25-0.75m. Tr.Injection test. P=Test interval,PA=section below packers
P
PA
3000
2500
2000
1500
1000
(KPa)
08:50
09:00
10
20
30
40
50
Start: 2001-02-16 08:50:00
hour:min

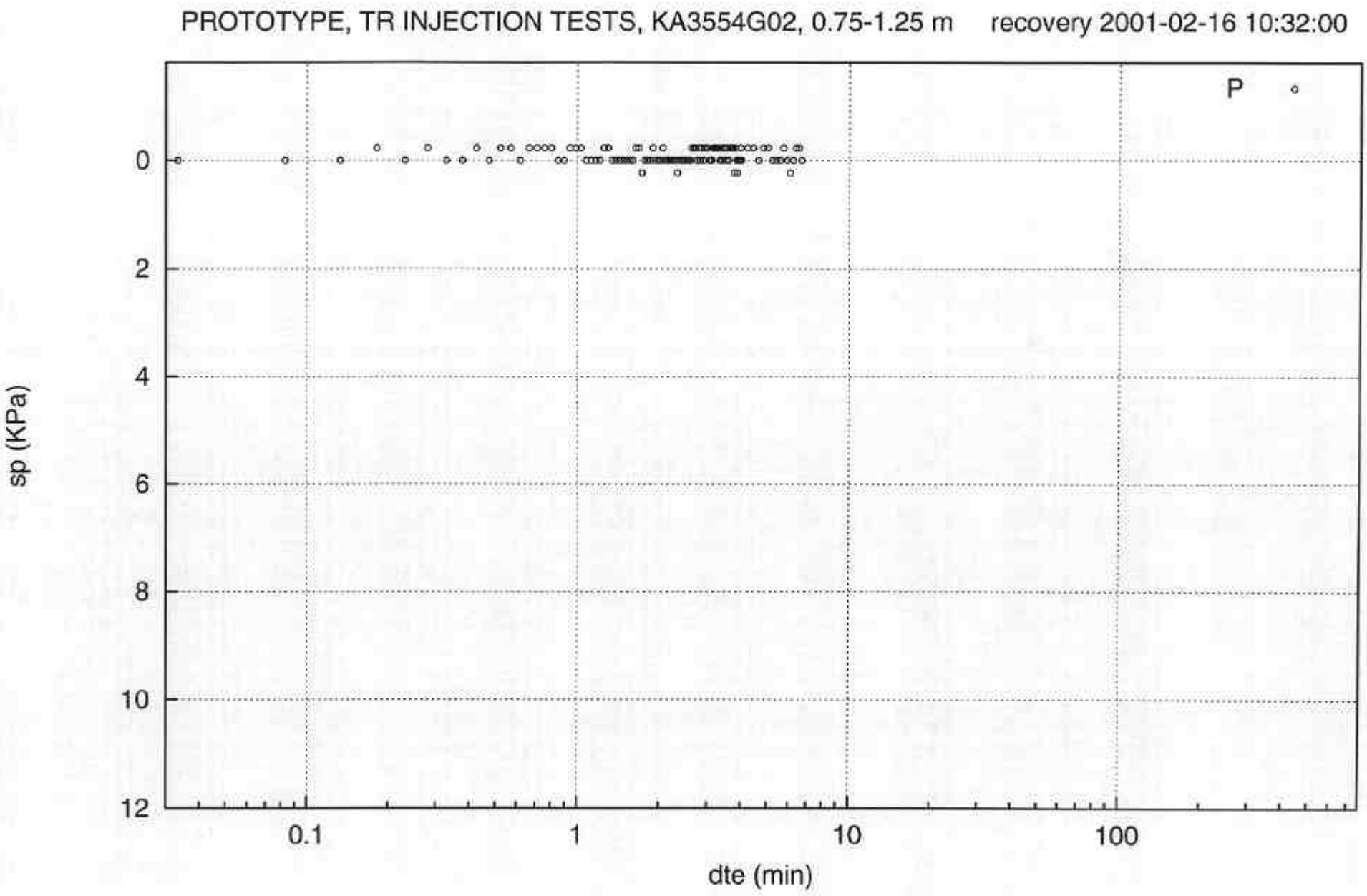

PROTOTYPE, TR INJECTION TESTS, KA3554G02, 0.25-0.75 m recovery 2001-02-16 09:36:00
P
sp (KPa)
0
1
2
3
4
5
6
0.1
1
10
100
dte (min)

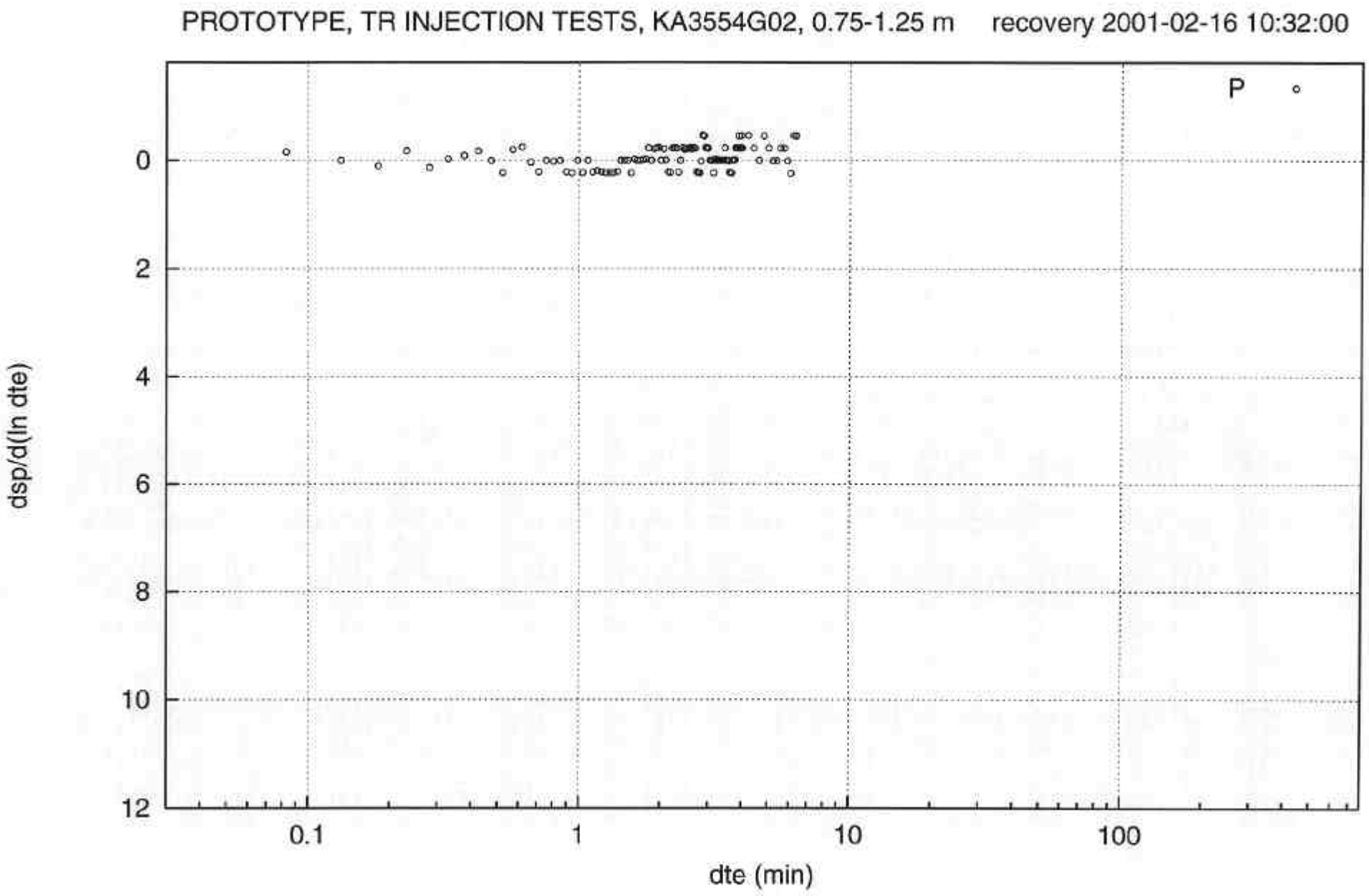

PROTOTYPE, TR INJECTION TESTS, KA3554G02, 0.25-0.75 m recovery 2001-02-16 09:36:00
P
100
10
1
sp (KPa)
0.1
1
10
100
dte (min)

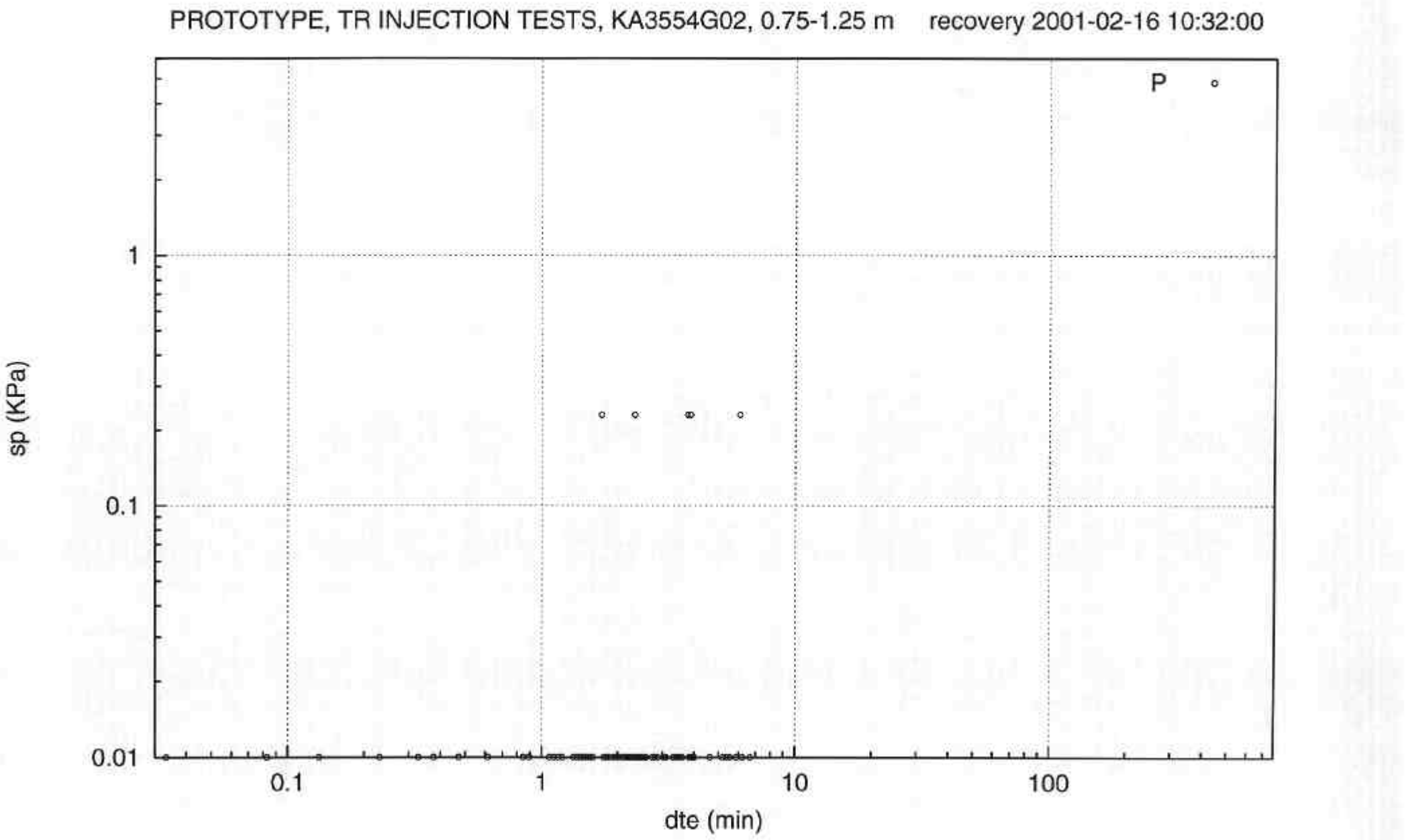

PROTOTYPE, TR INJECTION TESTS, KA3554G02, 0.25-0.75 m recovery 2001-02-16 09:36:00
P
dsp/d(ln dte)
0
1
2
3
4
5
6
0.1
1
10
100
dte (min)

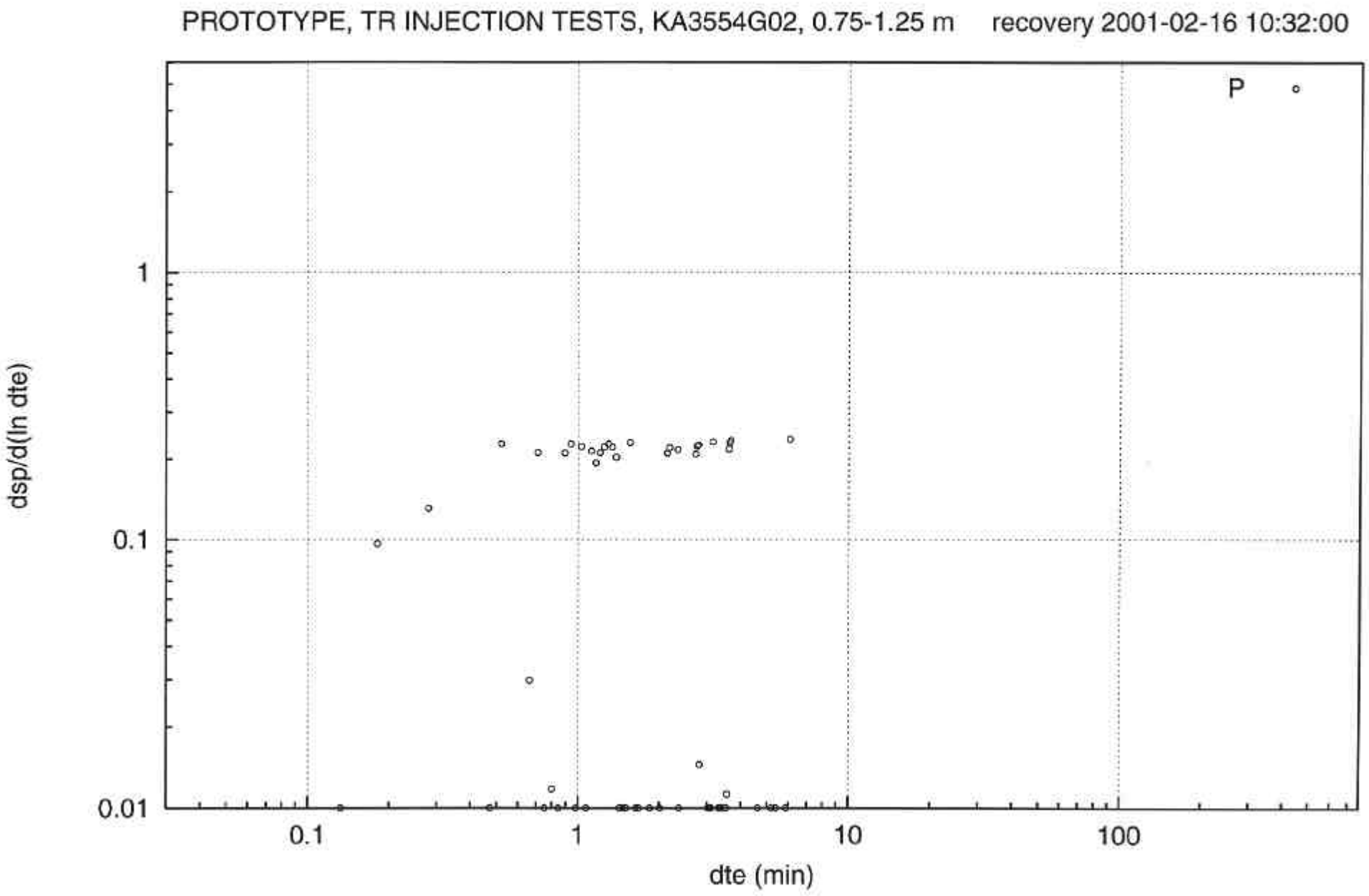

PROTOTYPE, TR INJECTION TESTS, KA3554G02, 0.25-0.75 m recovery 2001-02-16 09:36:00
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
dte (min)

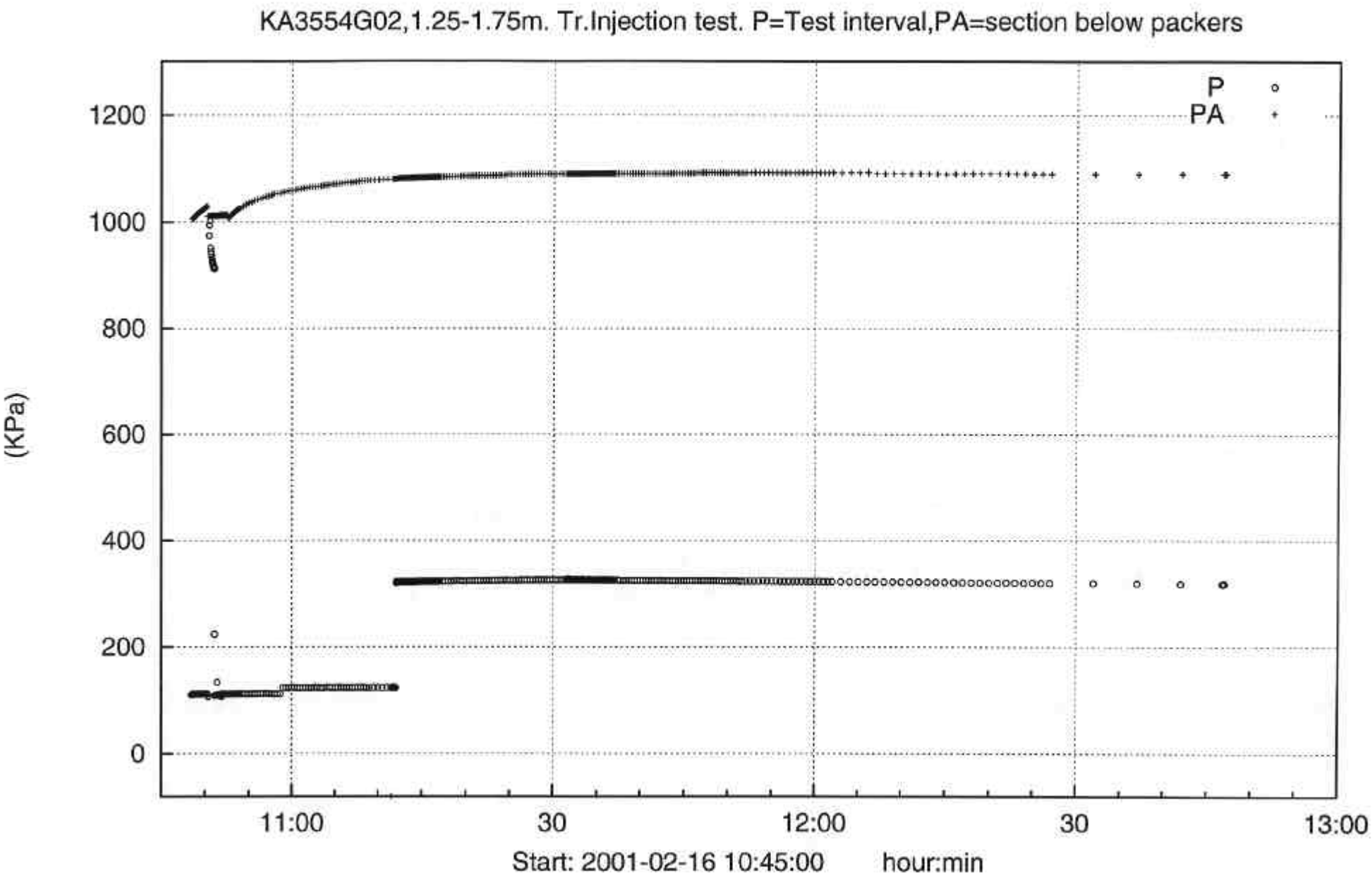

KA3554G02,0.75-1.25m. Tr.Injection test. P=Test interval,PA=section below packers
P
PA
1200
1000
800
600
400
200
0
(KPa)
09:50
10:00
10
20
30
40
Start: 2001-02-16 09:50:00
hour:min

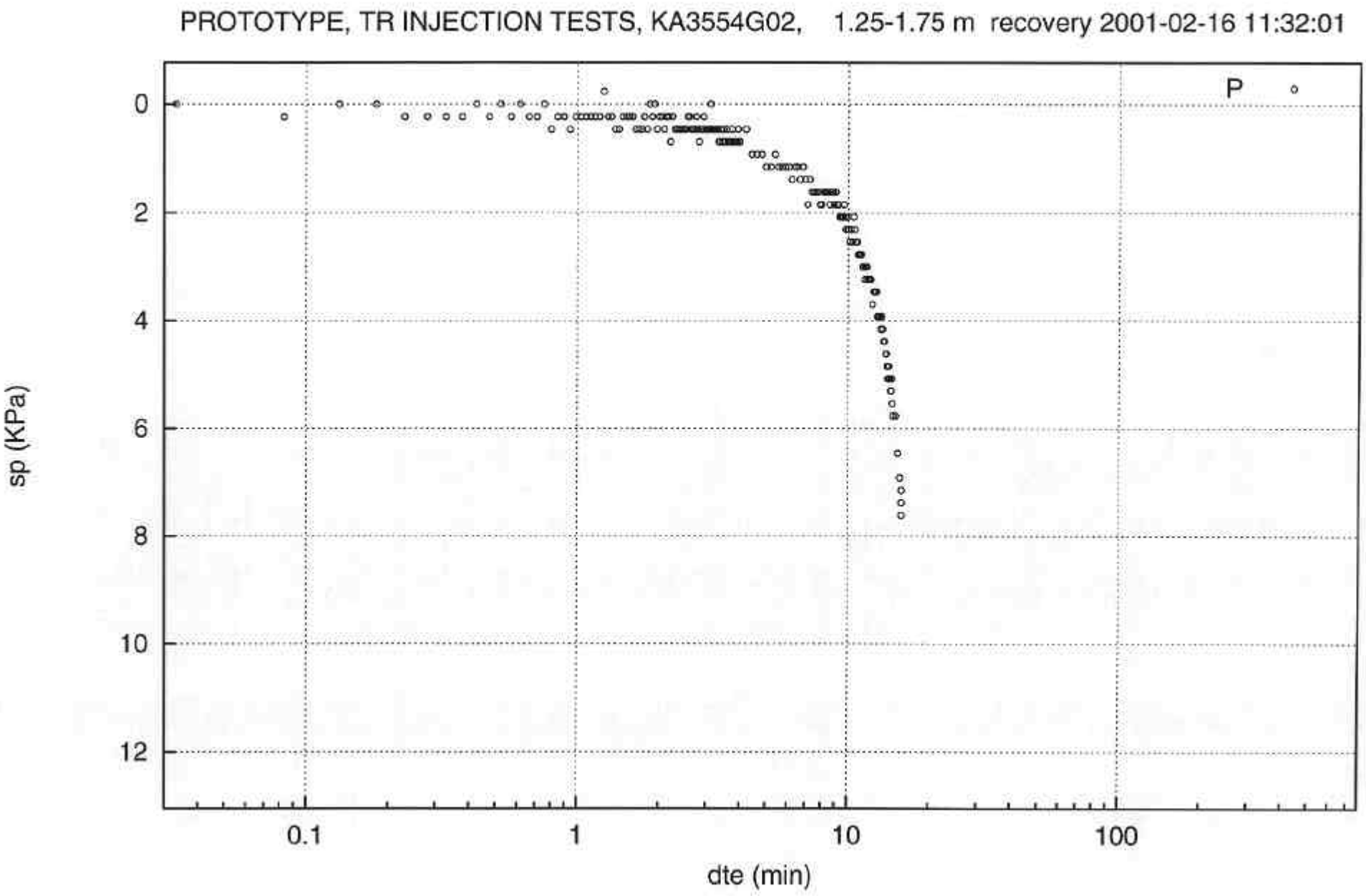

PROTOTYPE, TR INJECTION TESTS, KA3554G02, 0.75-1.25 m recovery 2001-02-16 10:32:00
P
sp (KPa)
0
2
4
6
8
10
12
0.1
1
10
100
dte (min)

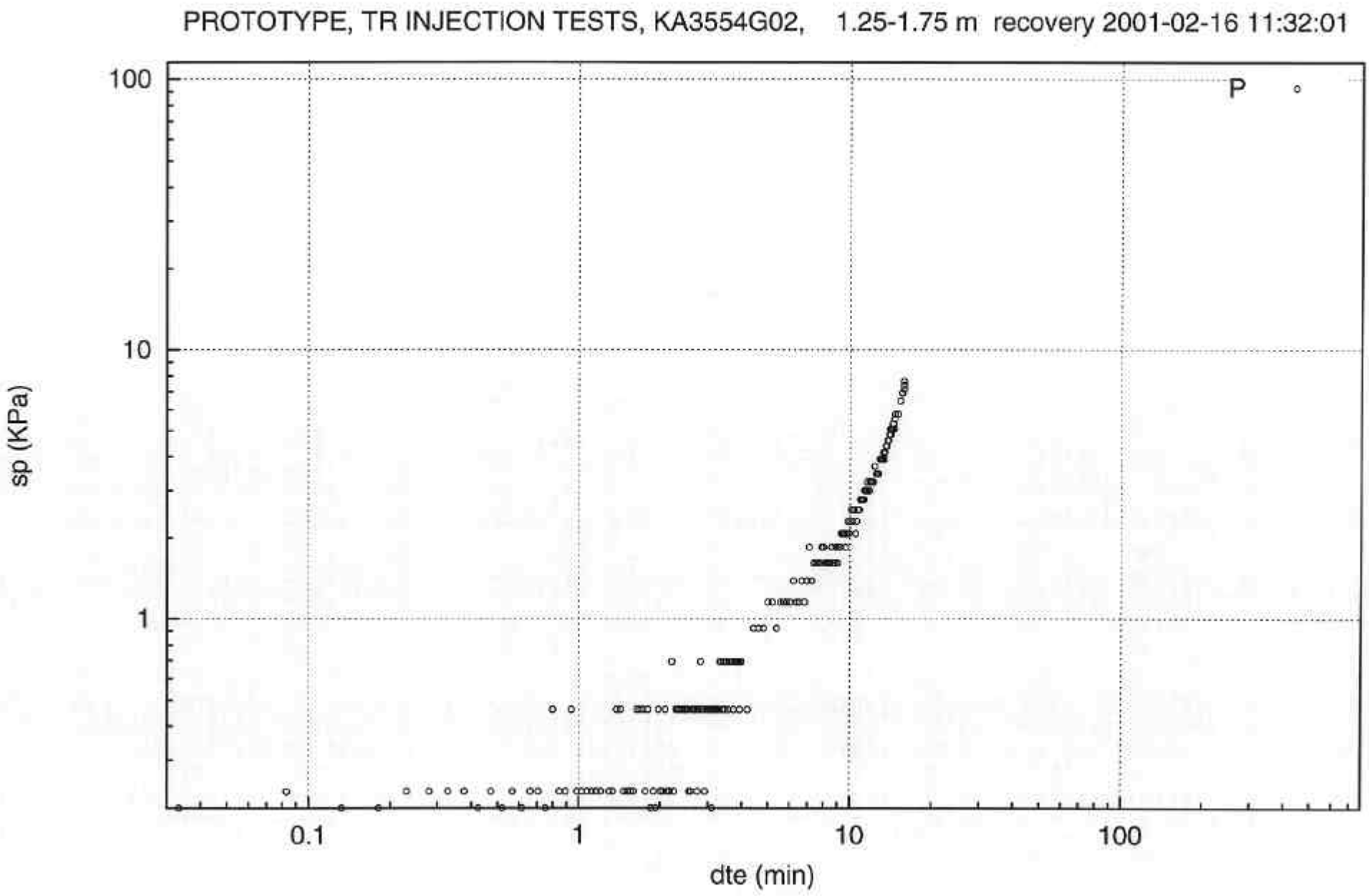

PROTOTYPE, TR INJECTION TESTS, KA3554G02, 0.75-1.25 m recovery 2001-02-16 10:32:00
P
dsp/d(ln dte)
0
2
4
6
8
10
12
0.1
1
10
100
dte (min)

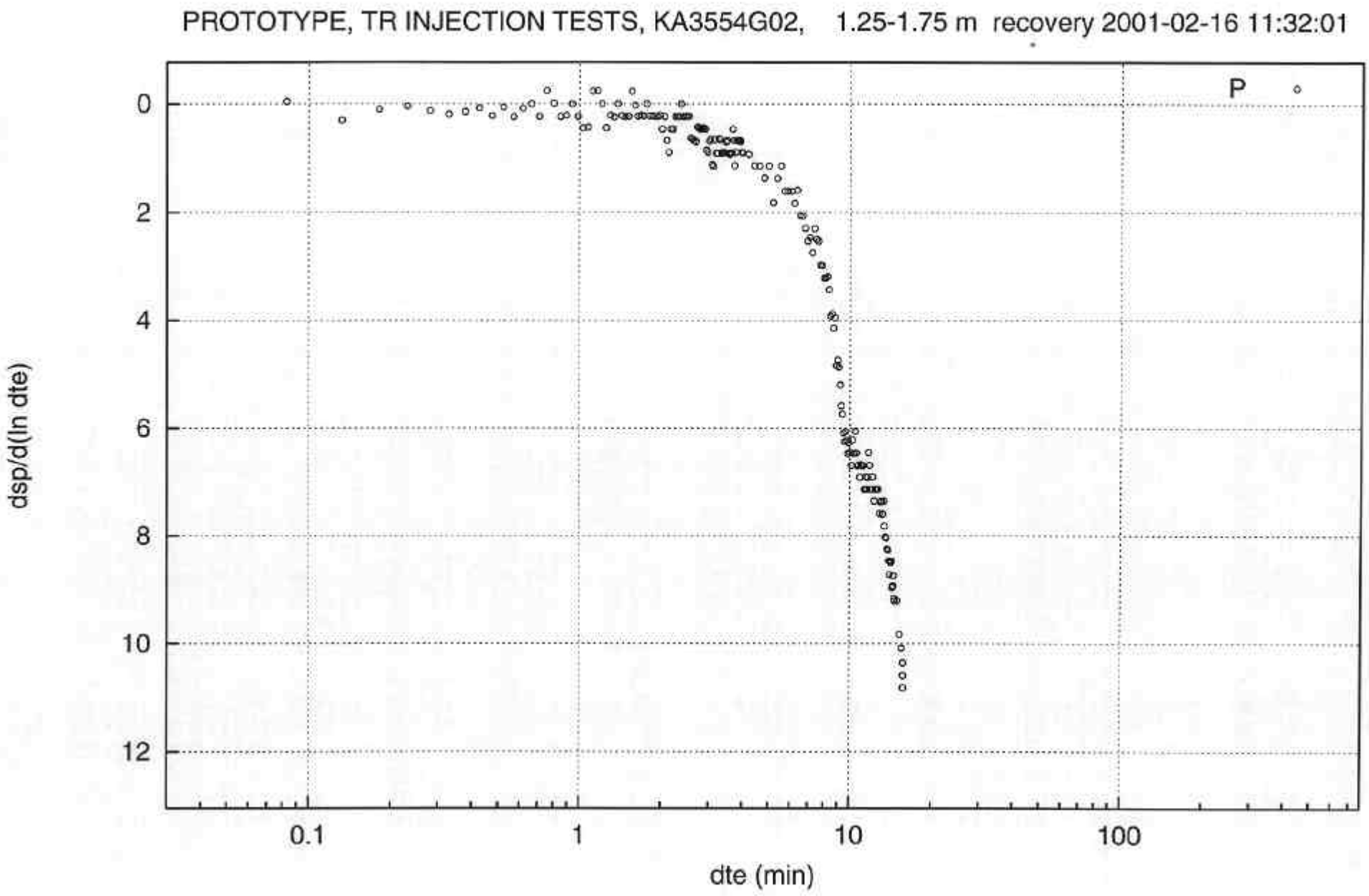

PROTOTYPE, TR INJECTION TESTS, KA3554G02, 0.75-1.25 m recovery 2001-02-16 10:32:00
P
sp (KPa)
1
0.1
0.01
0.1
1
10
100
dte (min)

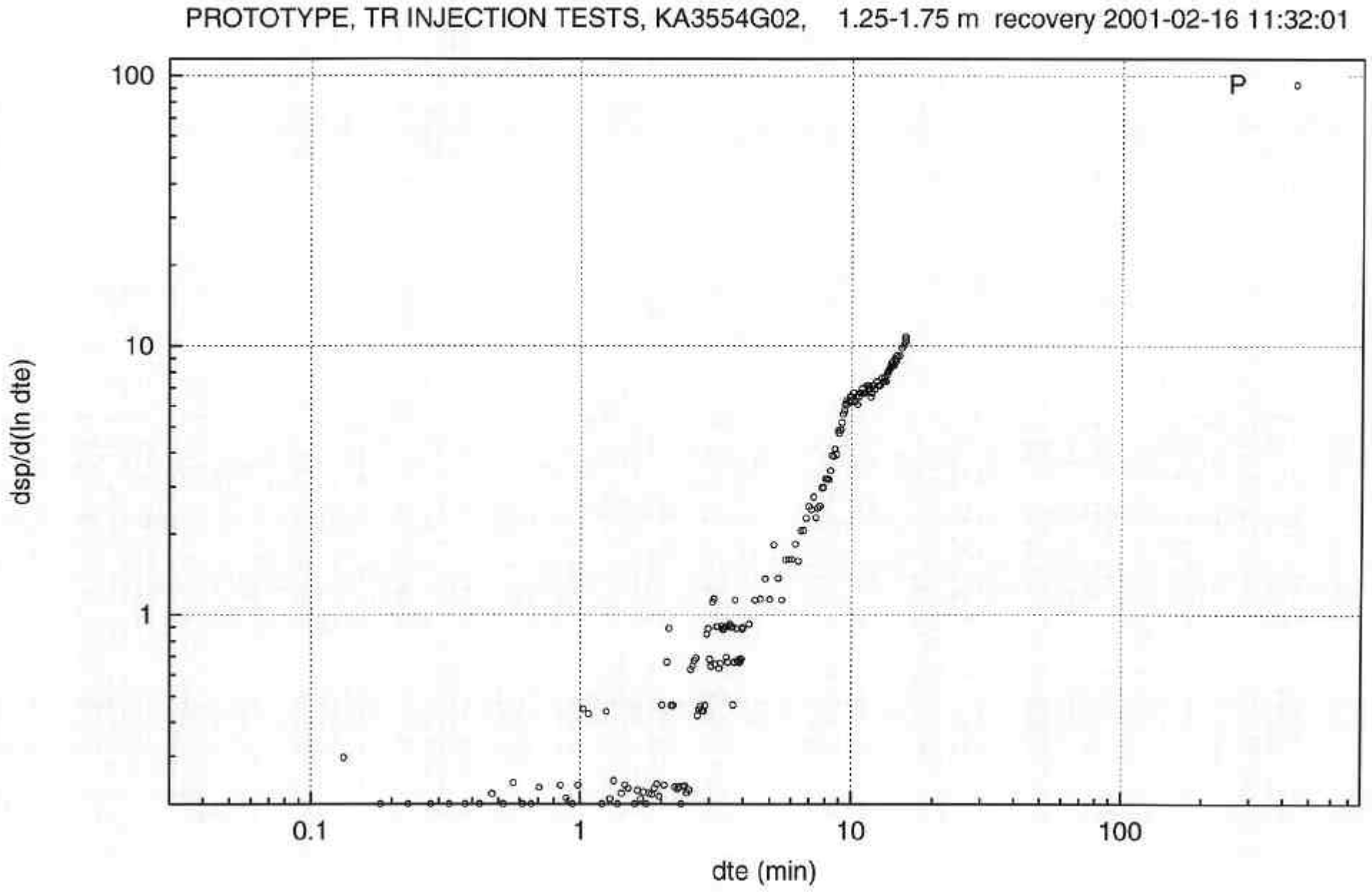

PROTOTYPE, TR INJECTION TESTS, KA3554G02, 0.75-1.25 m recovery 2001-02-16 10:32:00
P
dsp/d(ln dte)
1
0.1
0.01
0.1
1
10
100
dte (min)


KA3554G02,1.25-1.75m. Tr.Injection test. P=Test interval,PA=section below packers
P
PA
1200
1000
800
600
400
200
0
(KPa)
11:00
30
12:00
30
13:00
Start: 2001-02-16 10:45:00
hour:min

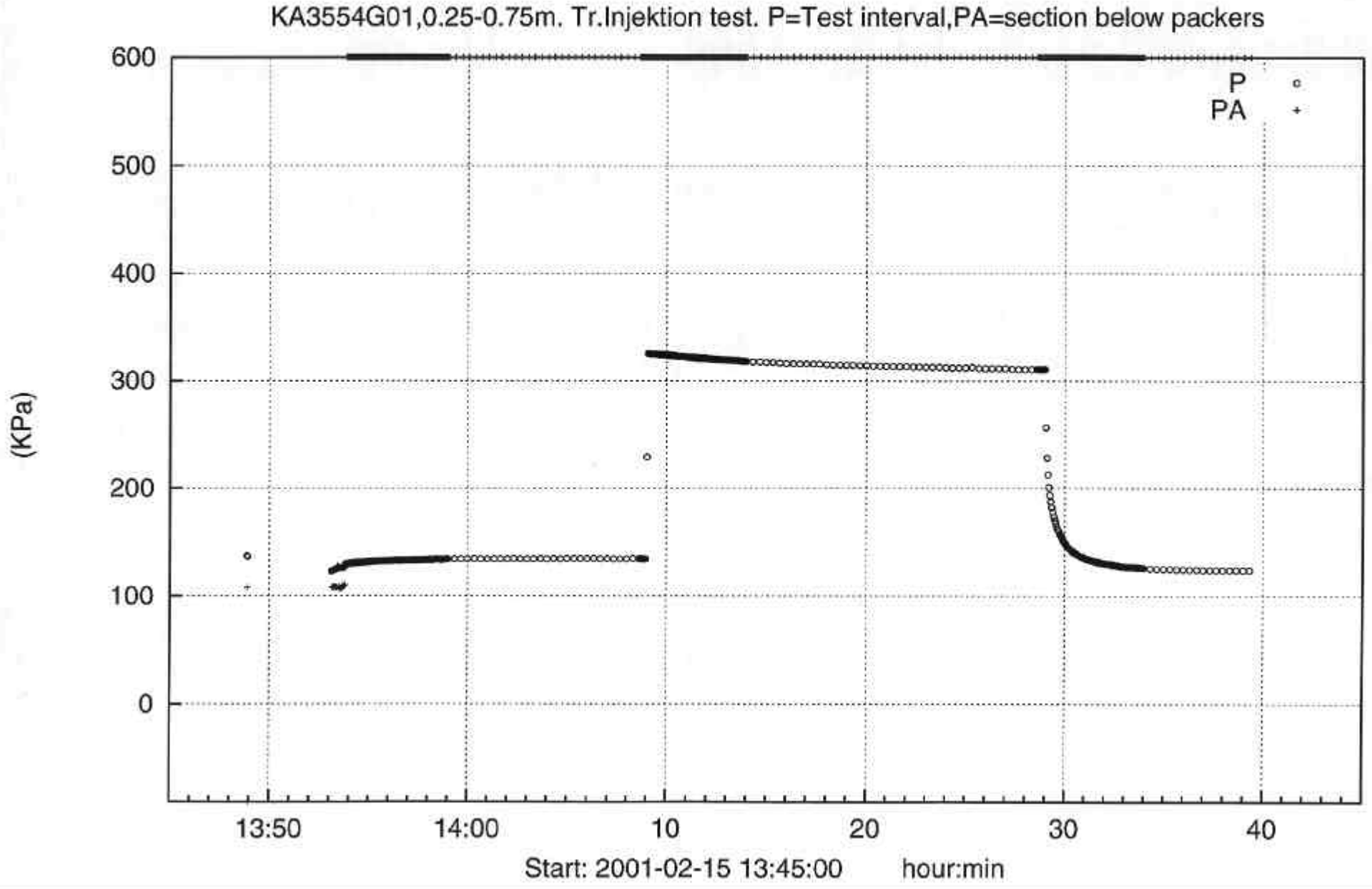

PROTOTYPE, TR INJECTION TESTS, KA3554G02, 1.25-1.75 m recovery 2001-02-16 11:32:01
P
sp (KPa)
0
2
4
6
8
10
12
0.1
1
10
100
dte (min)

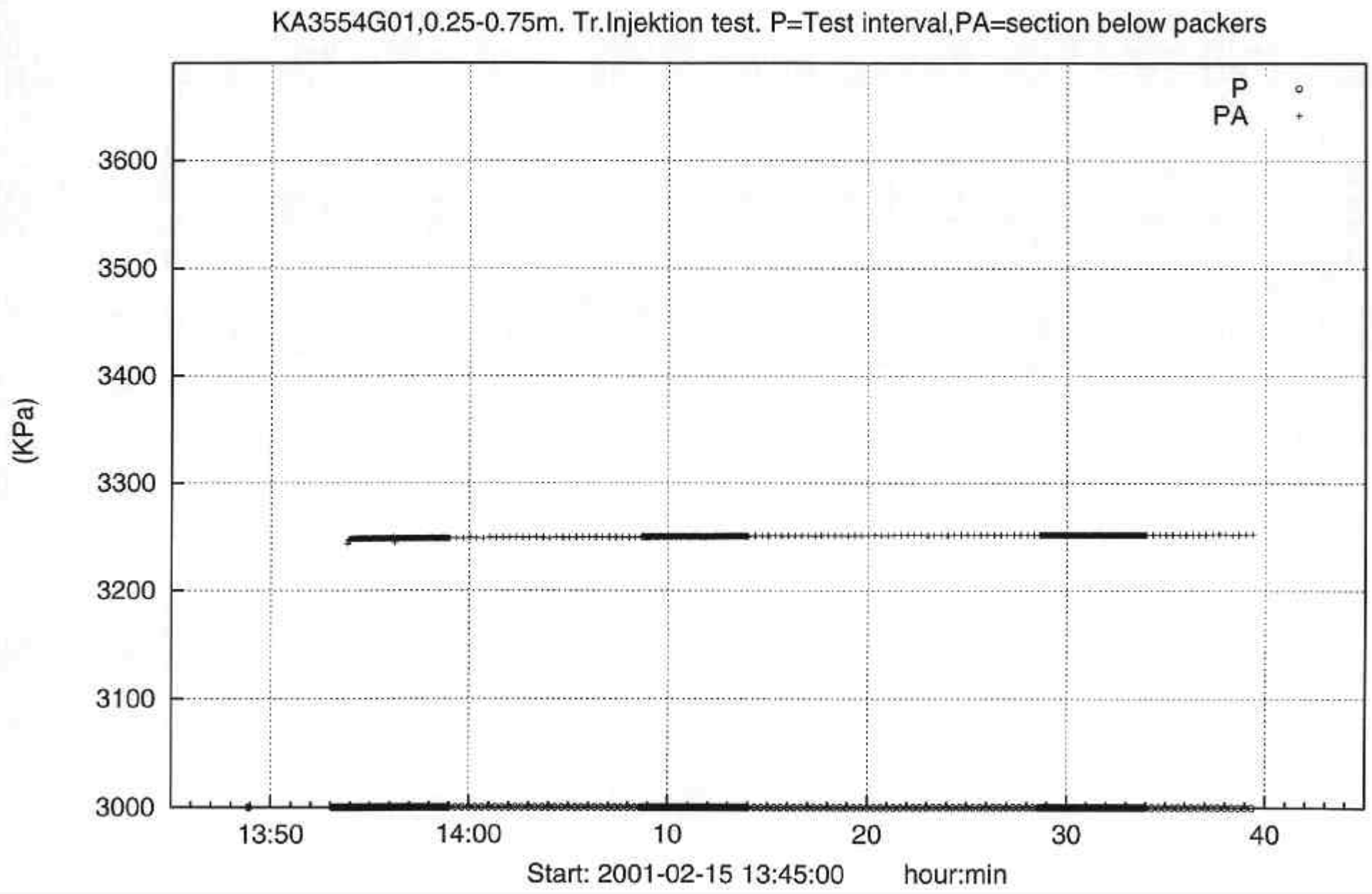

PROTOTYPE, TR INJECTION TESTS, KA3554G02, 1.25-1.75 m recovery 2001-02-16 11:32:01
P
100
10
1
sp (KPa)
0.1
1
10
100
dte (min)

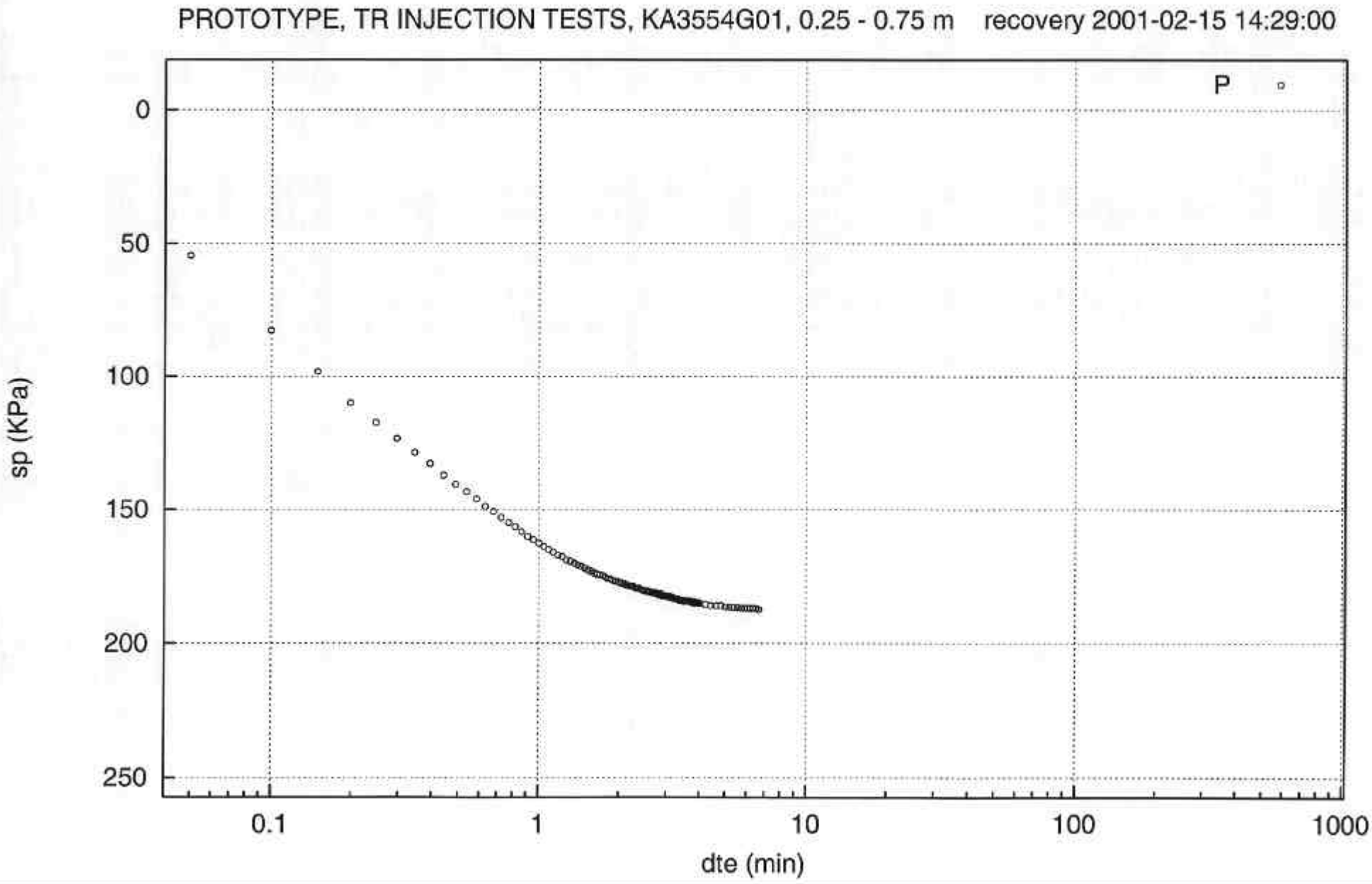

PROTOTYPE, TR INJECTION TESTS, KA3554G02, 1.25-1.75 m recovery 2001-02-16 11:32:01
P
dsp/d(ln dte)
0
2
4
6
8
10
12
0.1
1
10
100
dte (min)

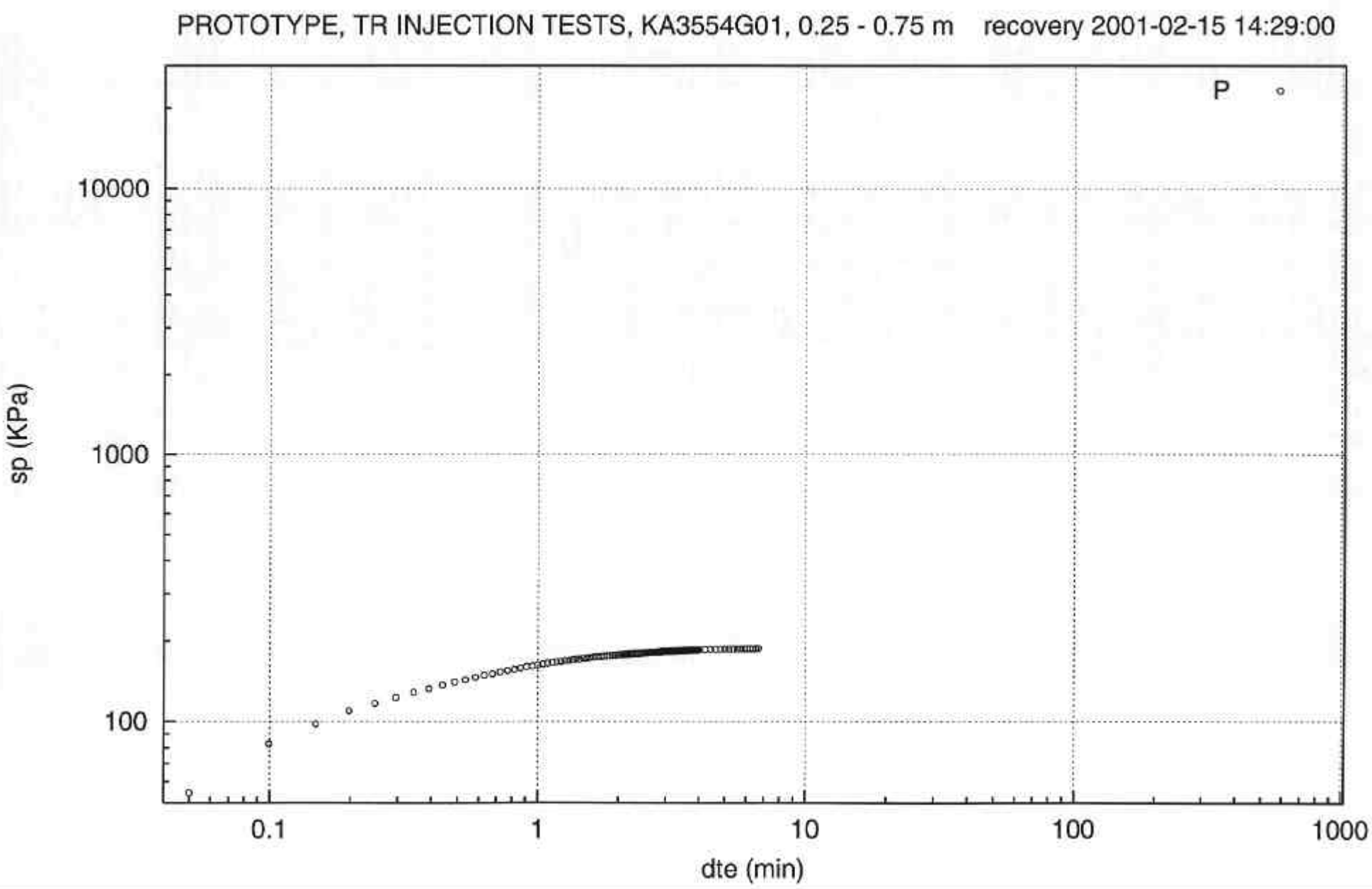

PROTOTYPE, TR INJECTION TESTS, KA3554G02, 1.25-1.75 m recovery 2001-02-16 11:32:01
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
dte (min)

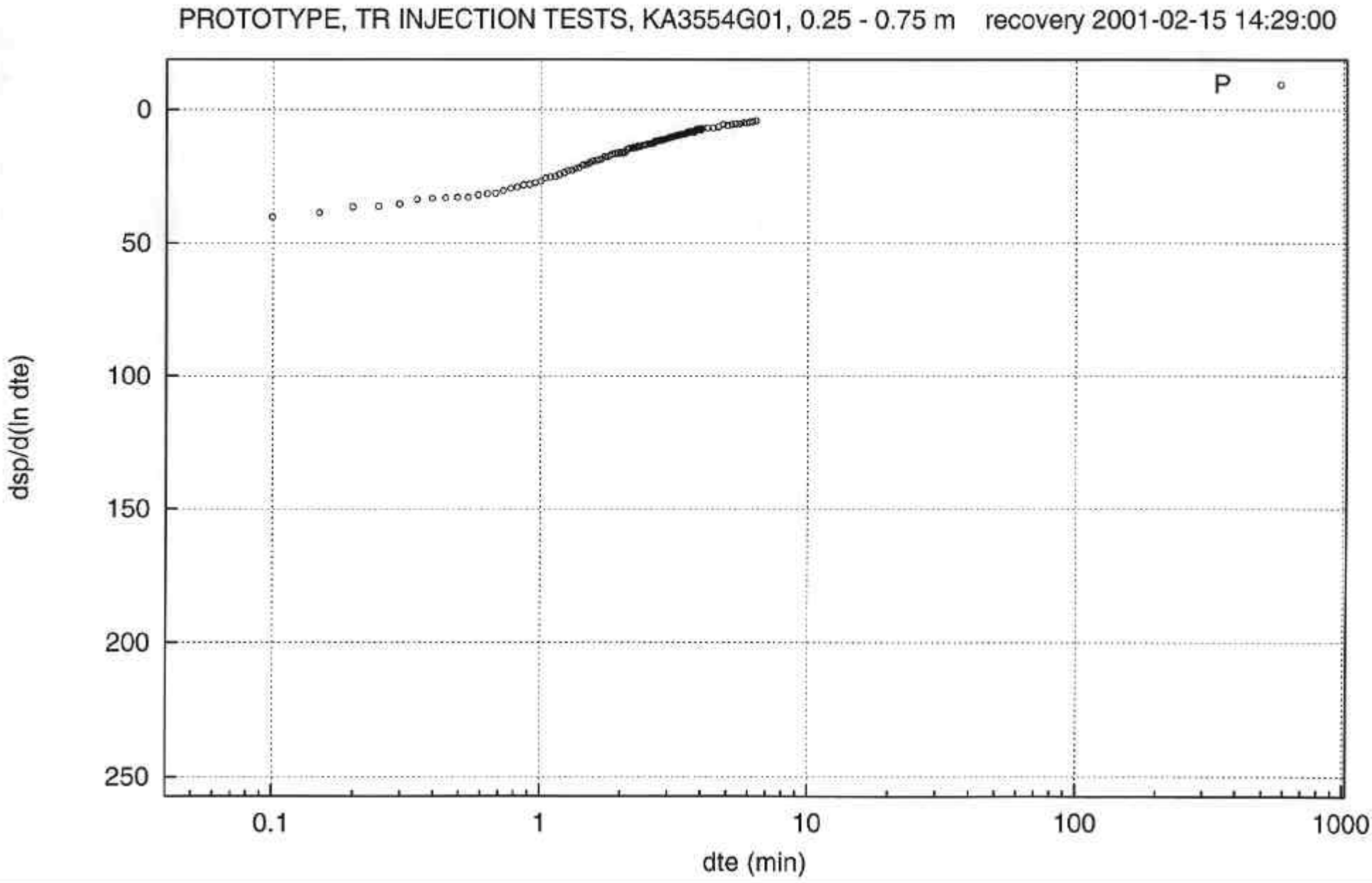
APPENDIX 10: Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3554G01. February 2001

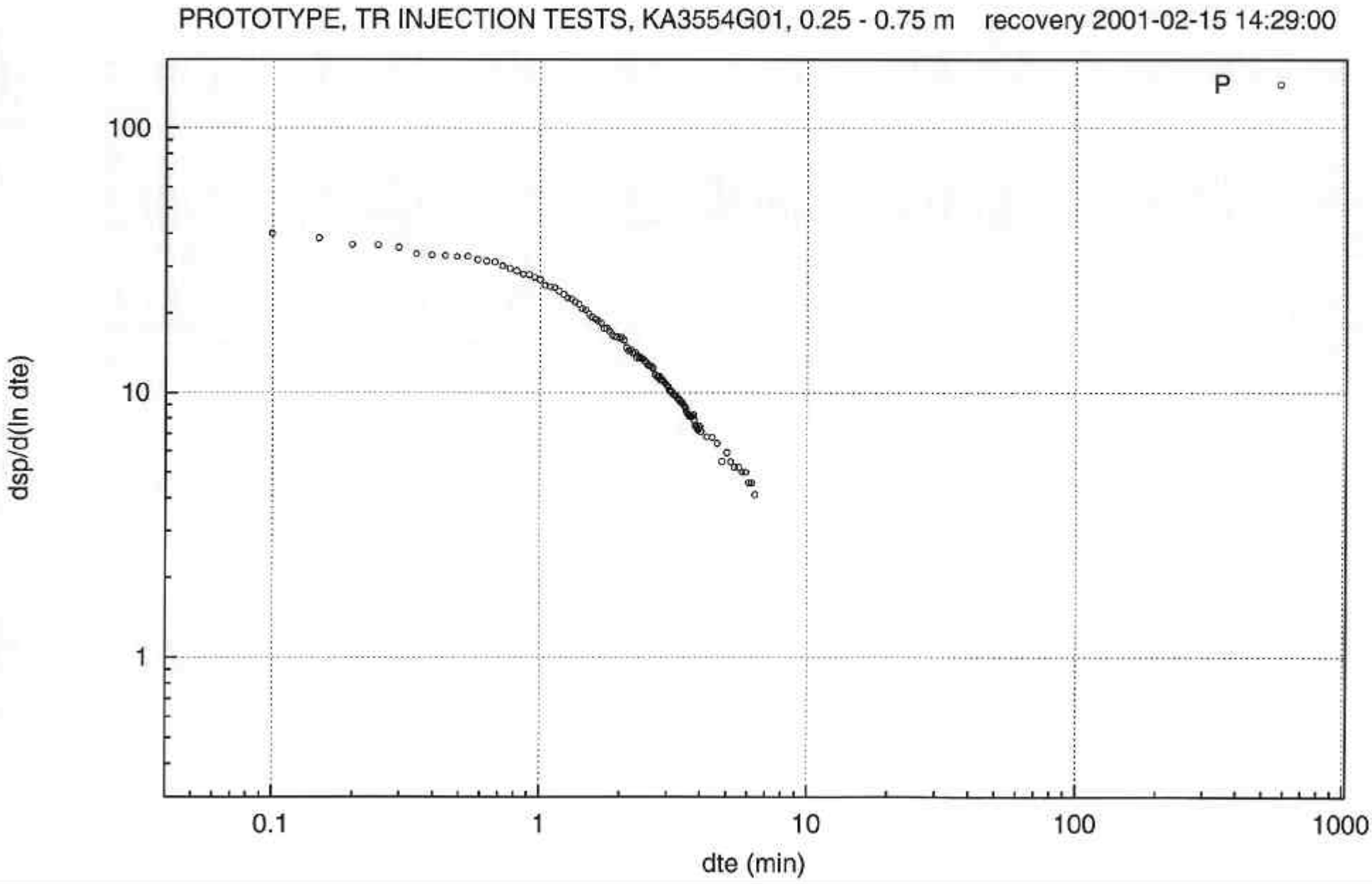

KA3554G01,0.25-0.75m. Tr.Injektion test. P=Test interval,PA=section below packers
600
500
400
300
200
100
0
(KPa)
P
PA
13:50
14:00
10
20
30
40
Start: 2001-02-15 13:45:00
hour:min


KA3554G01,0.25-0.75m. Tr.Injektion test. P=Test interval,PA=section below packers
P
PA
3600
3500
3400
3300
3200
3100
3000
(KPa)
13:50
14:00
10
20
30
40
Start: 2001-02-15 13:45:00
hour:min

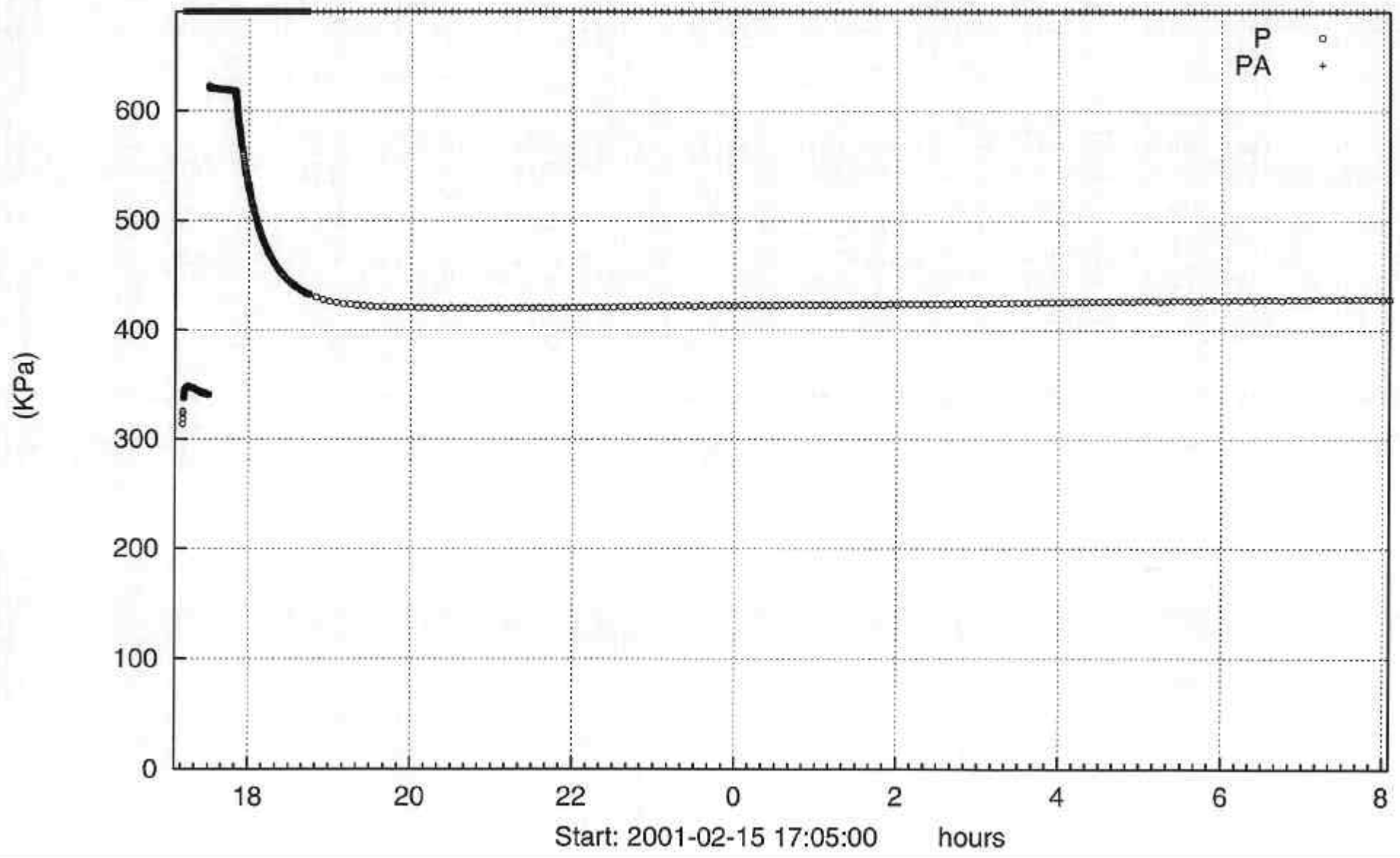

PROTOTYPE, TR INJECTION TESTS, KA3554G01, 0.25 - 0.75 m recovery 2001-02-15 14:29:00
P
0
50
100
150
200
250
sp (KPa)
0.1
1
10
100
1000
dte (min)

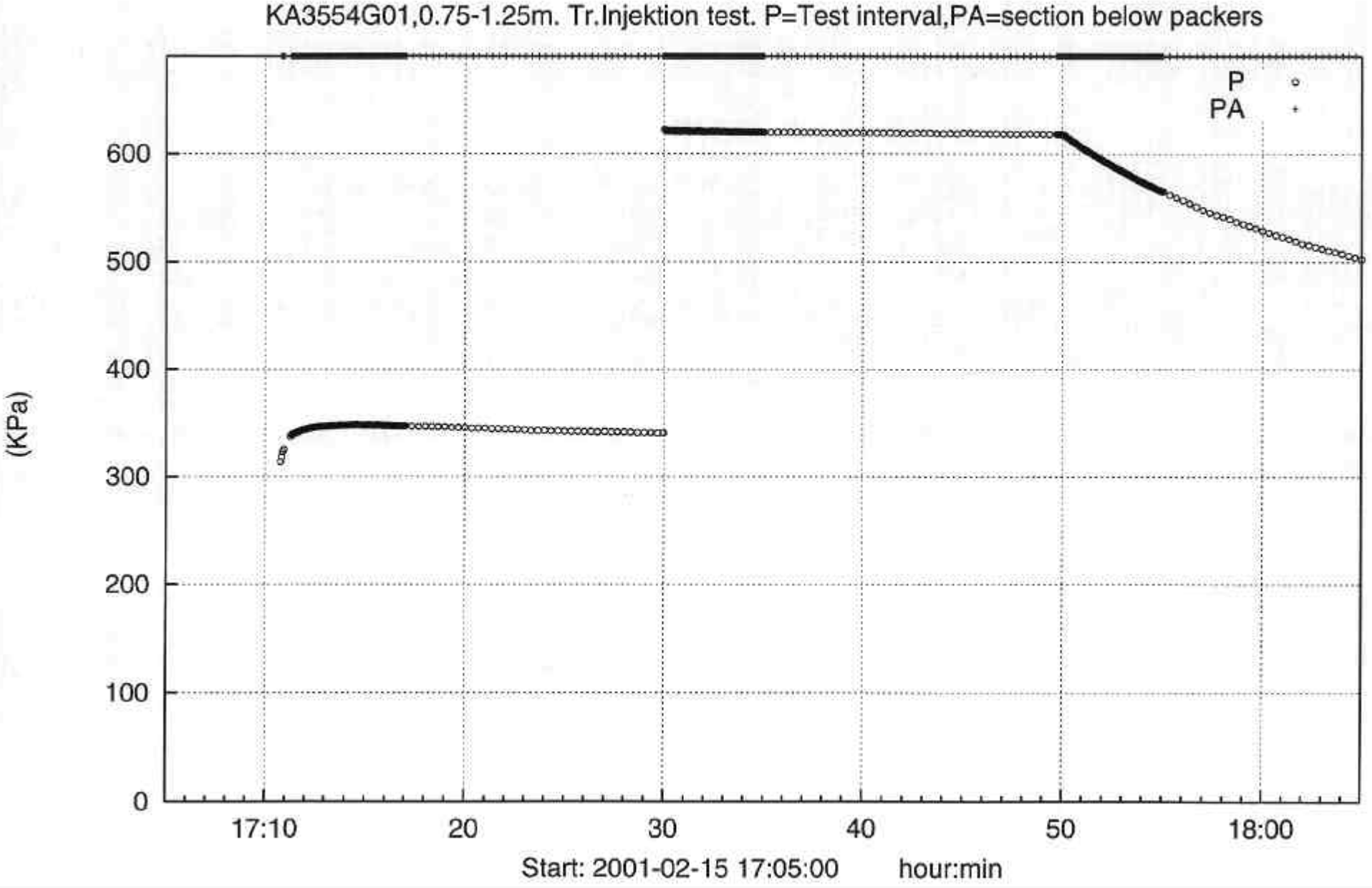

PROTOTYPE, TR INJECTION TESTS, KA3554G01, 0.25 - 0.75 m recovery 2001-02-15 14:29:00
P
10000
1000
100
sp (KPa)
0.1
1
10
100
1000
dte (min)

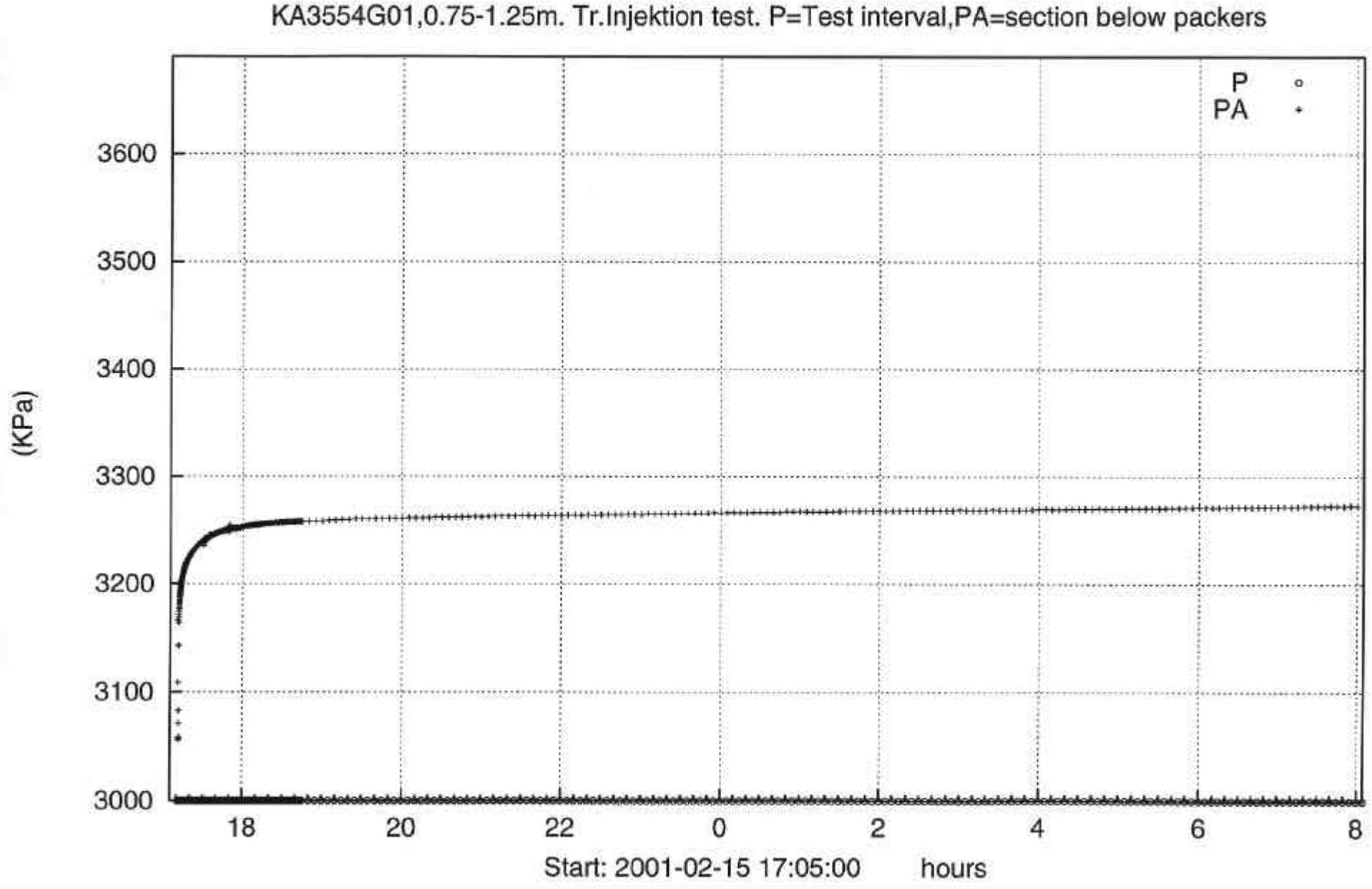

PROTOTYPE, TR INJECTION TESTS, KA3554G01, 0.25 - 0.75 m recovery 2001-02-15 14:29:00
P
0
50
100
150
200
250
dsp/d(ln dte)
0.1
1
10
100
1000
dte (min)

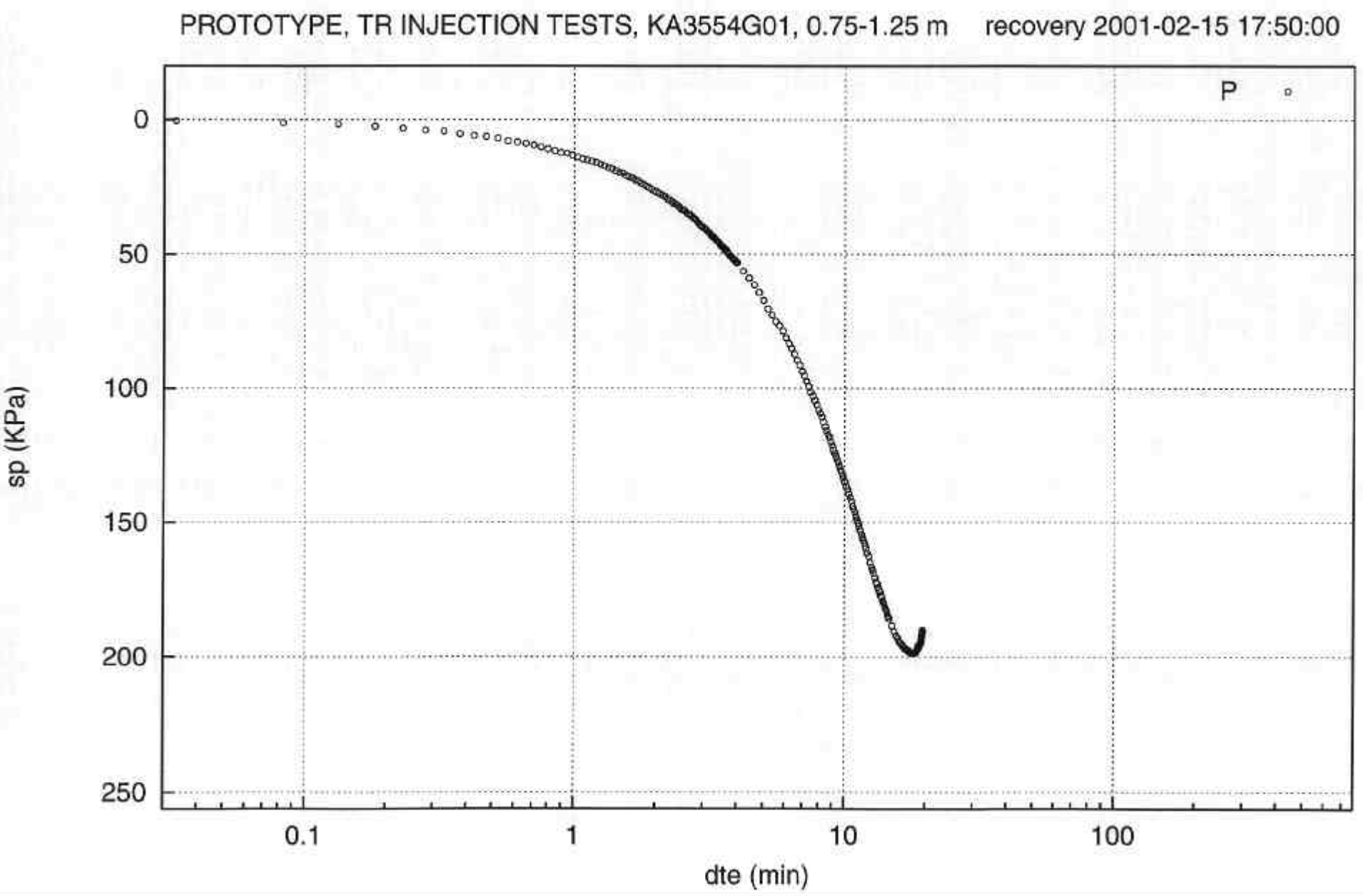

PROTOTYPE, TR INJECTION TESTS, KA3554G01, 0.25 - 0.75 m recovery 2001-02-15 14:29:00
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
1000
dte (min)

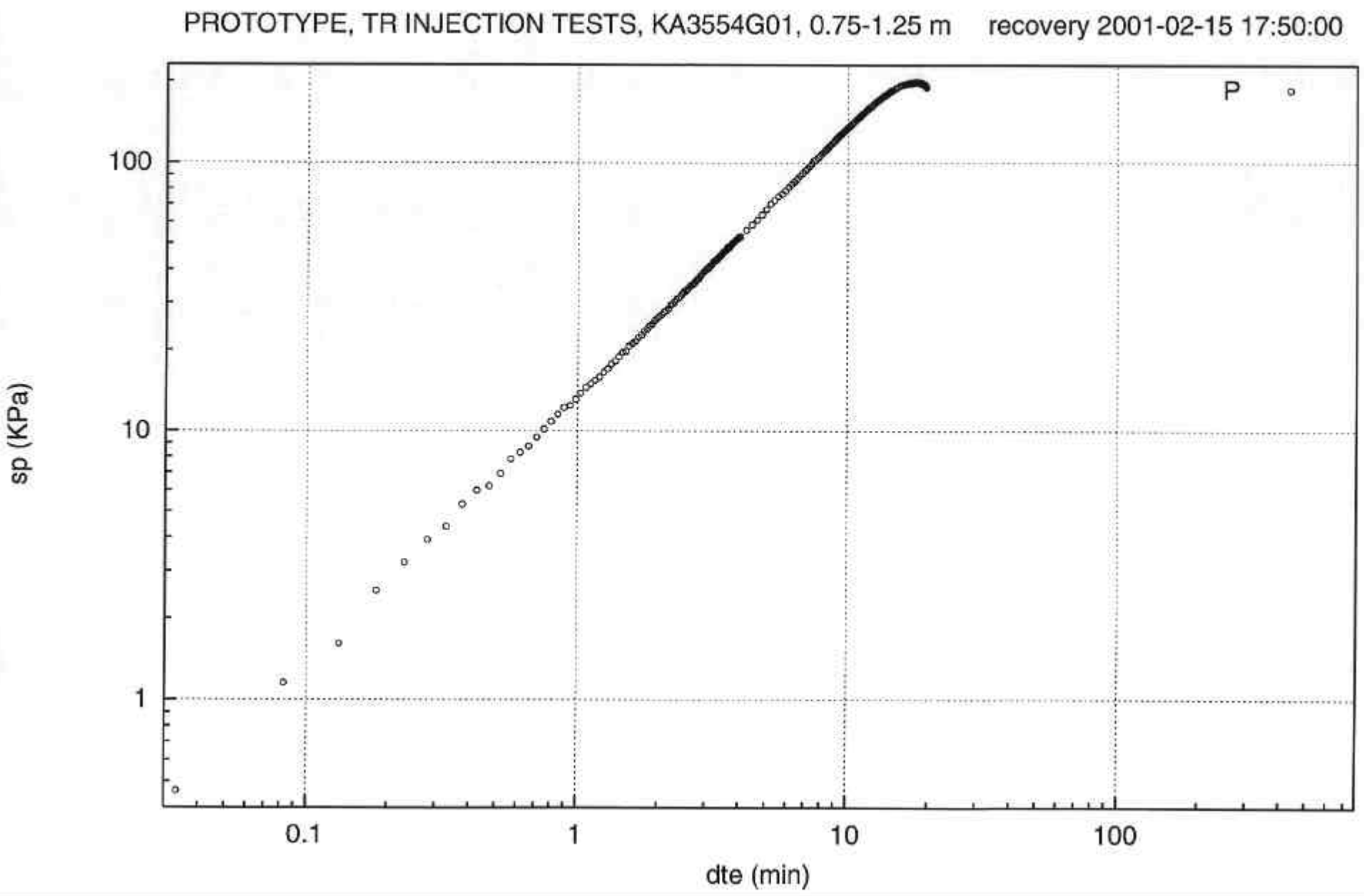
KA3554G01,0.75-1.25m. Tr.Injektion test. P=Test interval,PA=section below packers

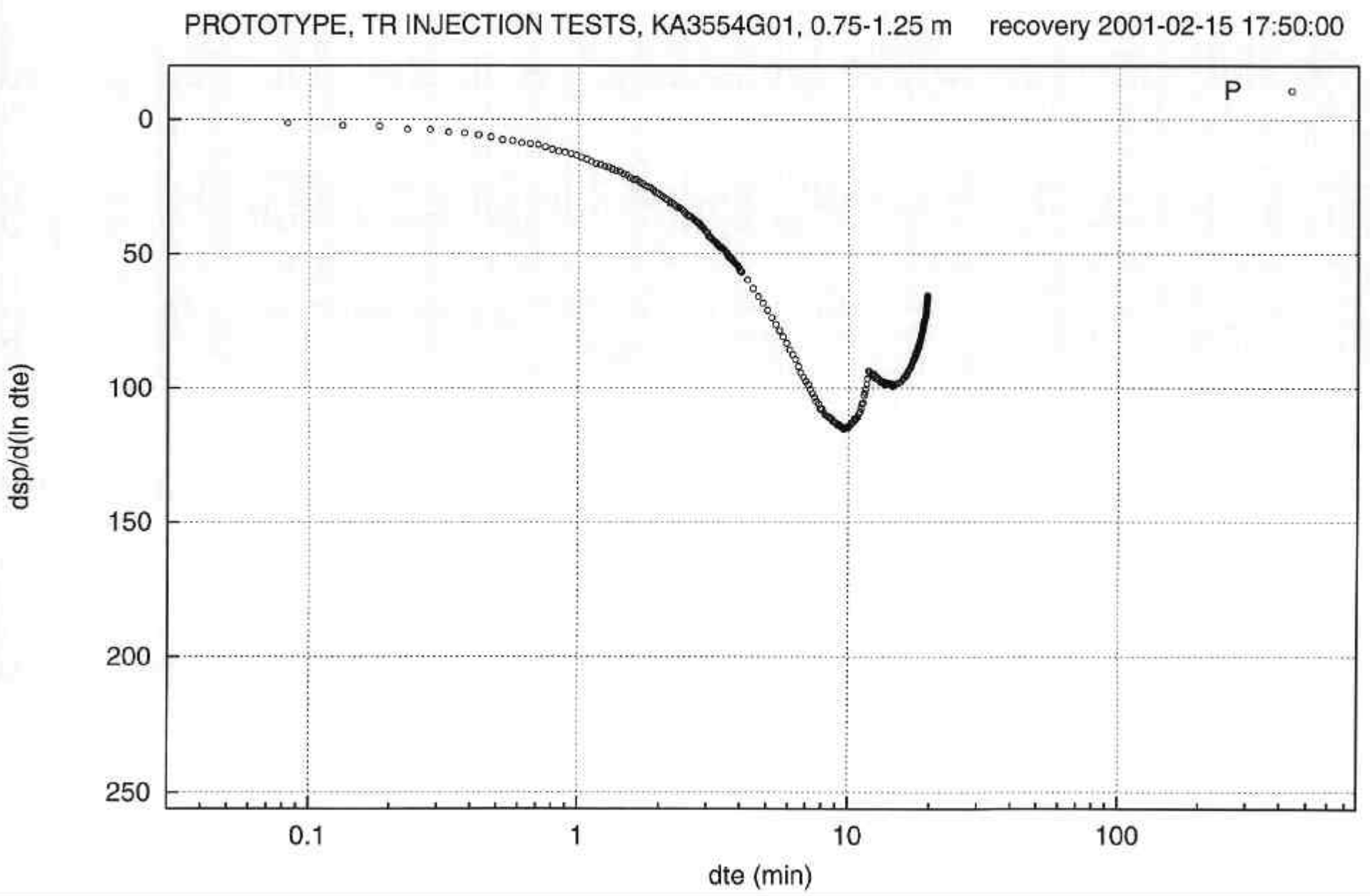


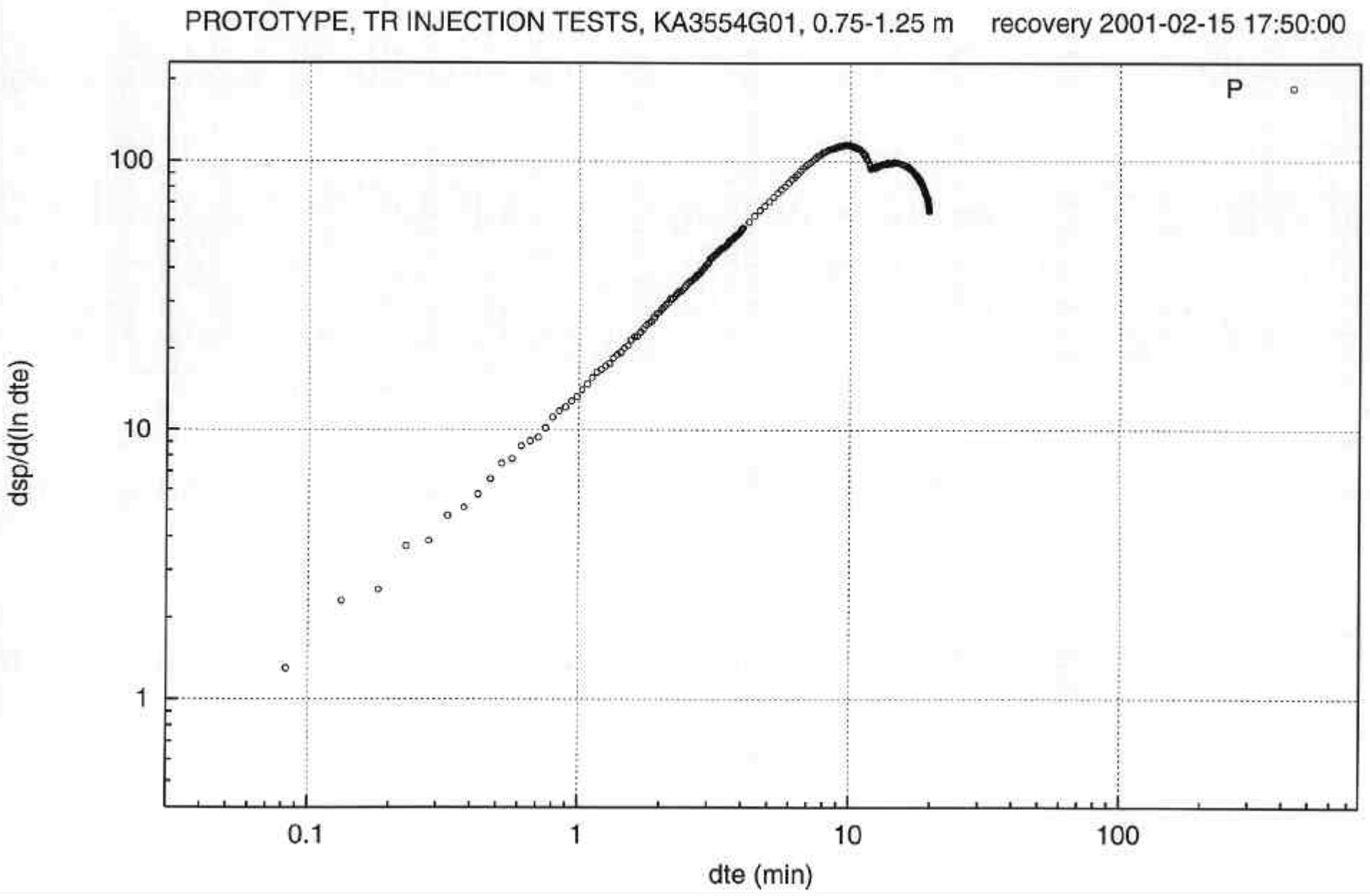

KA3554G01,0.75-1.25m. Tr.Injektion test. P=Test interval,PA=section below packers
P
PA
(KPa)
600
500
400
300
200
100
0
17:10
20
30
40
50
18:00
Start: 2001-02-15 17:05:00
hour:min


KA3554G01,0.75-1.25m. Tr.Injektion test. P=Test interval,PA=section below packers
P
PA
3600
3500
3400
3300
3200
3100
3000
(KPa)
18
20
22
0
2
4
6
8
Start: 2001-02-15 17:05:00
hours


PROTOTYPE, TR INJECTION TESTS, KA3554G01, 0.75-1.25 m recovery 2001-02-15 17:50:00
P
0
50
100
150
200
250
sp (KPa)
0.1
1
10
100
dte (min)

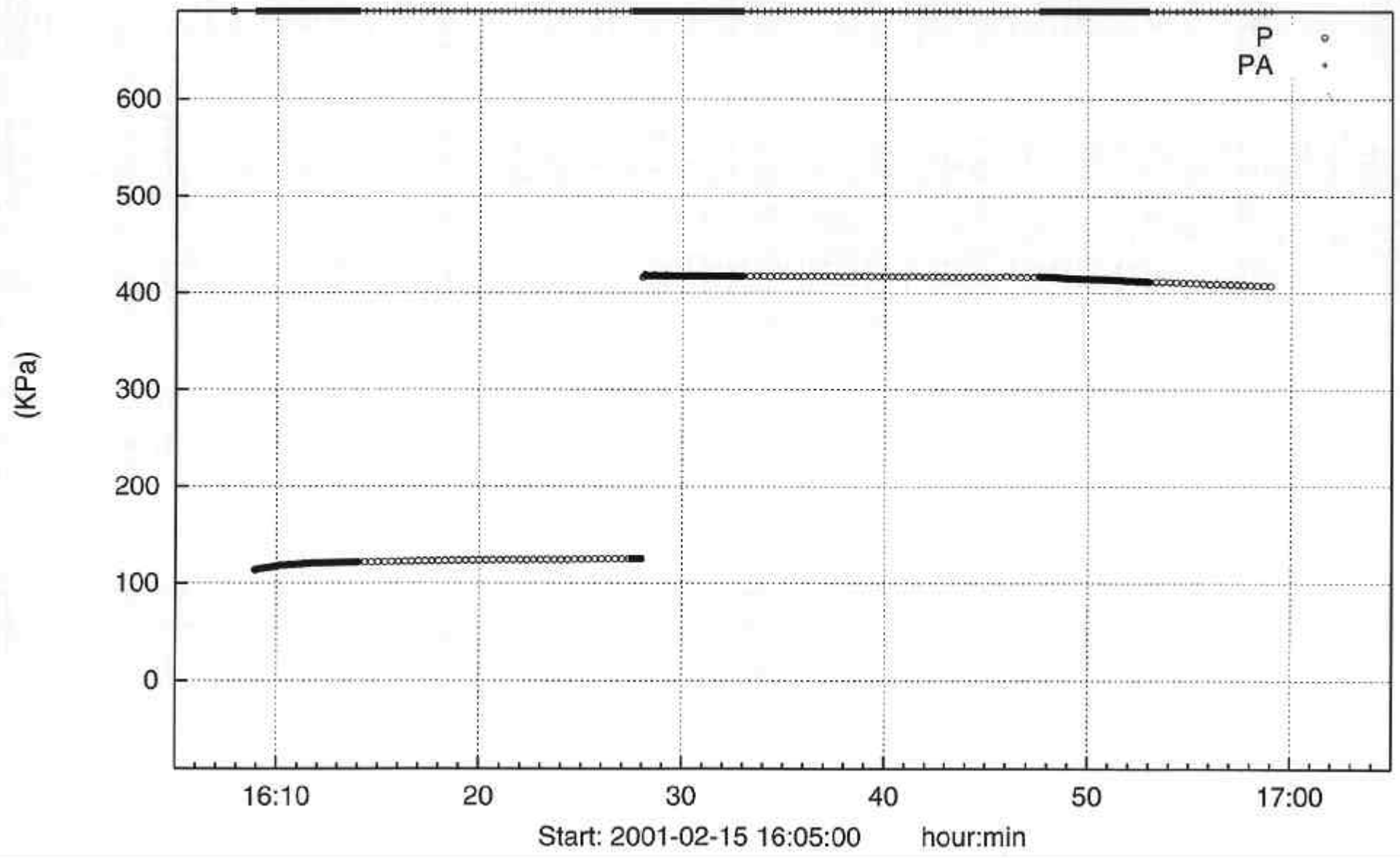

PROTOTYPE, TR INJECTION TESTS, KA3554G01, 0.75-1.25 m recovery 2001-02-15 17:50:00
P
sp (KPa)
100
10
1
0.1
1
10
100
dte (min)

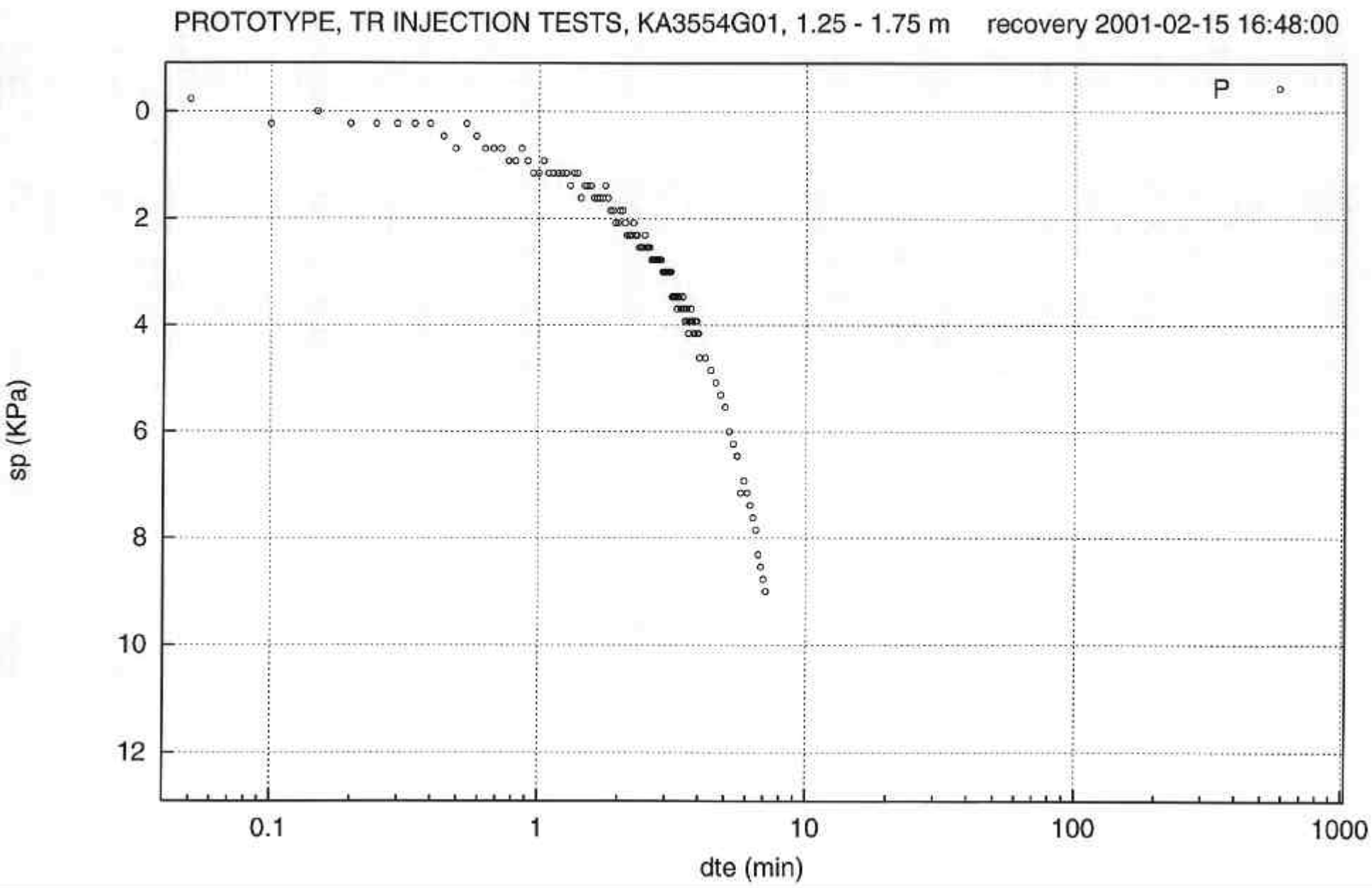

PROTOTYPE, TR INJECTION TESTS, KA3554G01, 0.75-1.25 m recovery 2001-02-15 17:50:00
P
0
50
100
150
200
250
dsp/d(ln dte)
0.1
1
10
100
dte (min)

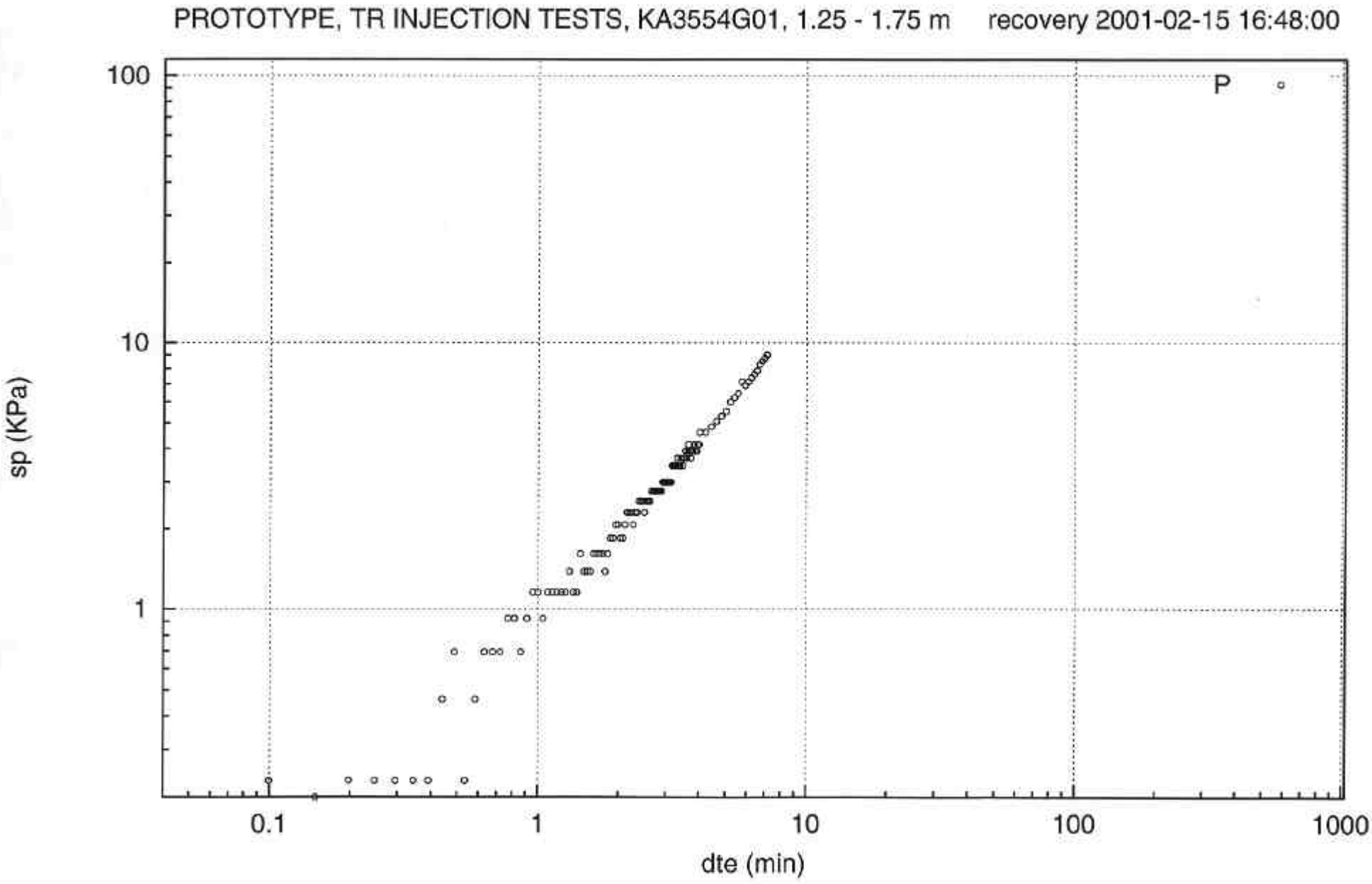

PROTOTYPE, TR INJECTION TESTS, KA3554G01, 0.75-1.25 m recovery 2001-02-15 17:50:00
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
dte (min)

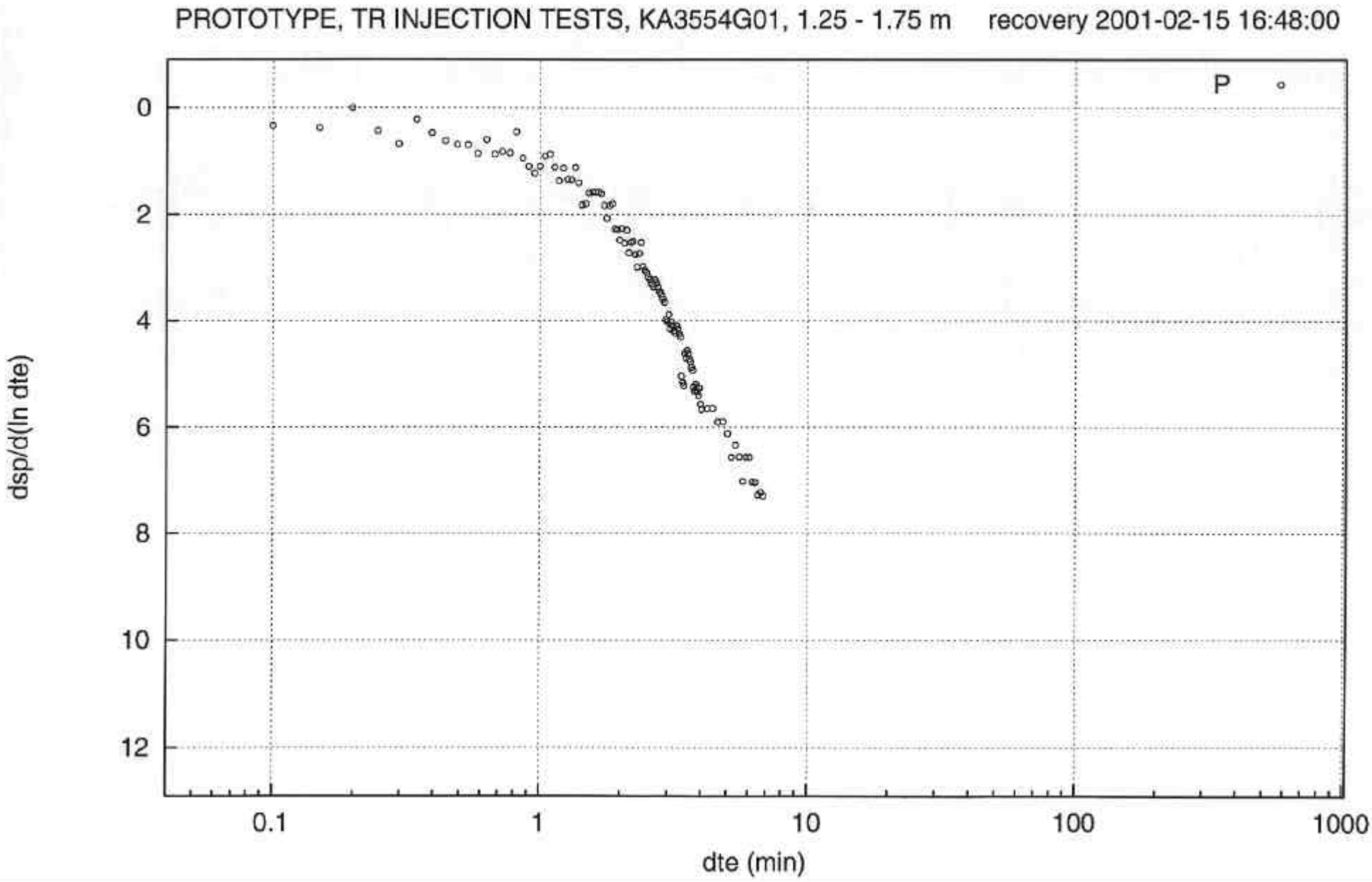
c

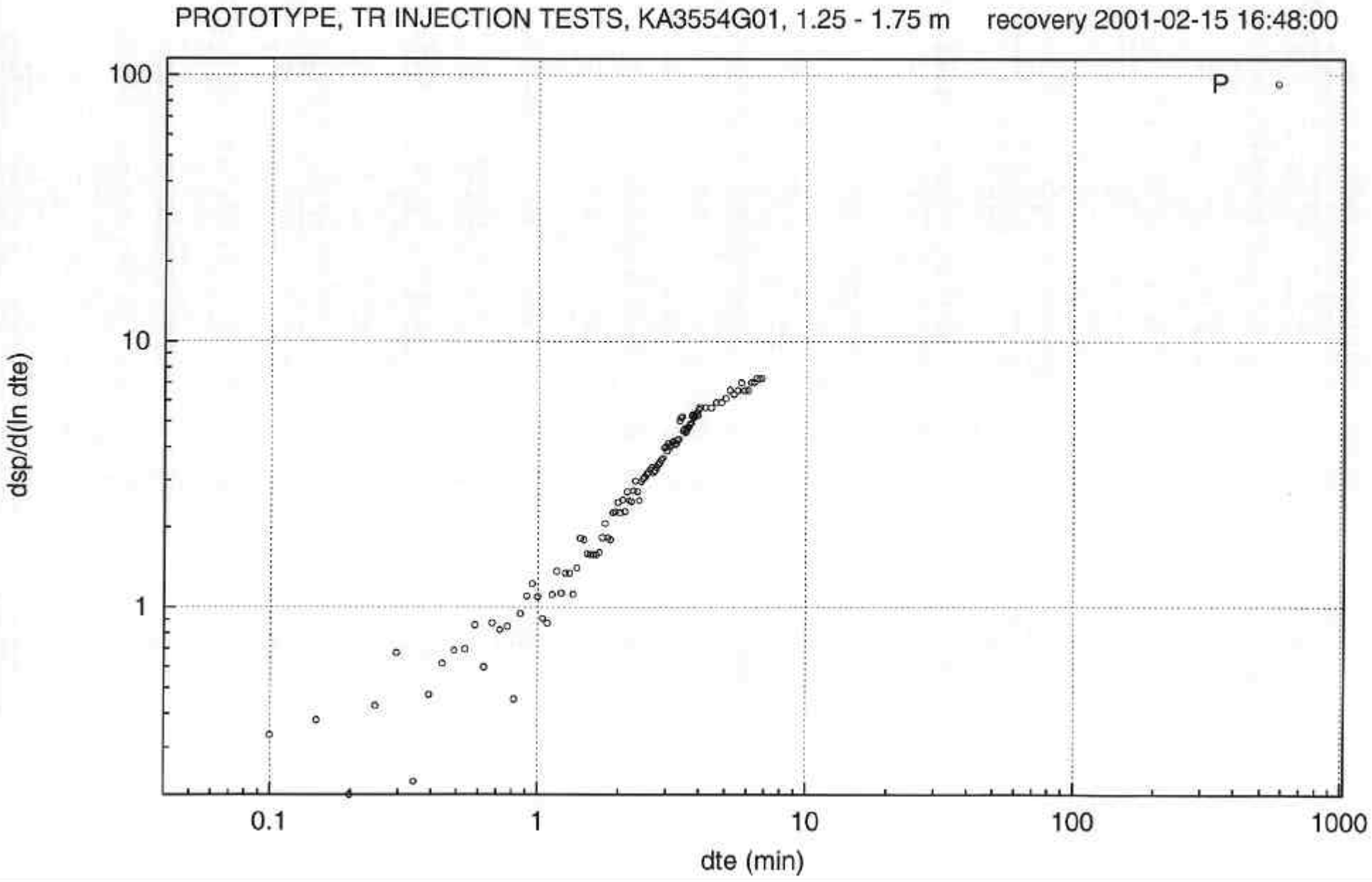
KA3554G01,1.25-1.75m. Tr.Injektion test. P=Test interval,PA=section below packers



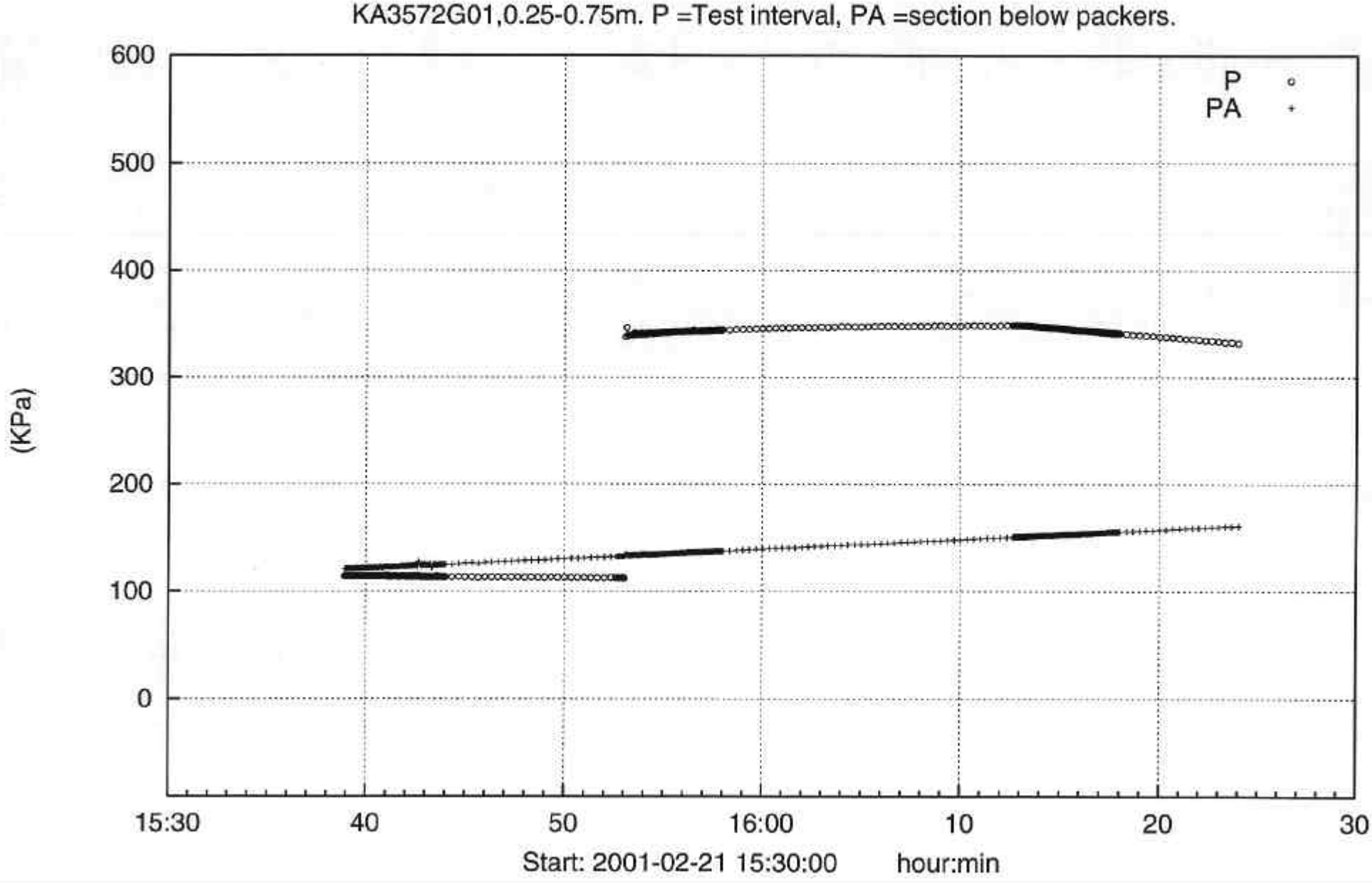

PROTOTYPE, TR INJECTION TESTS, KA3554G01, 1.25 - 1.75 m recovery 2001-02-15 16:48:00
P
sp (KPa)
0
2
4
6
8
10
12
0.1
1
10
100
1000
dte (min)

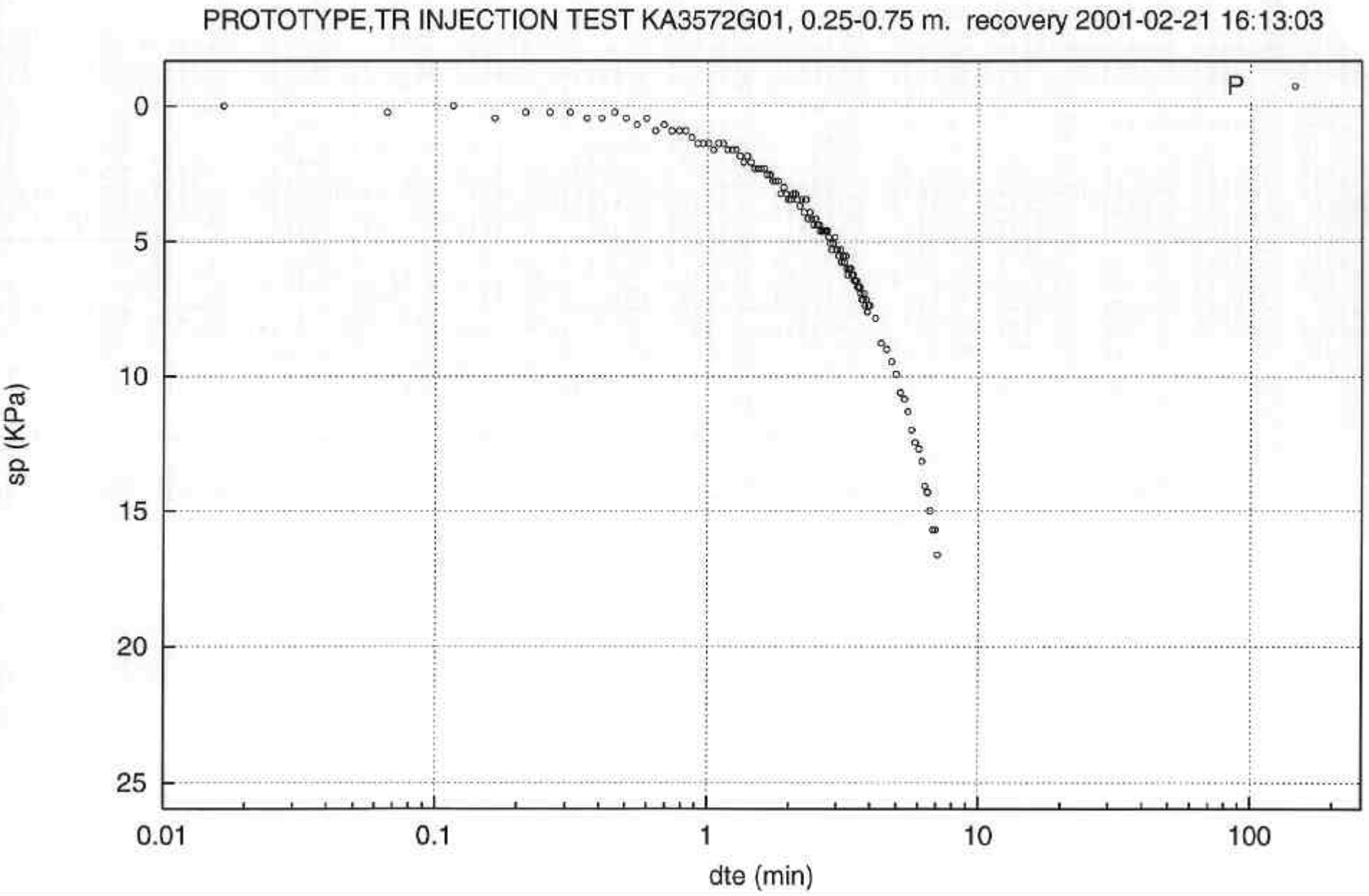

PROTOTYPE, TR INJECTION TESTS, KA3554G01, 1.25 - 1.75 m recovery 2001-02-15 16:48:00
P
100
10
1
sp (KPa)
0.1
1
10
100
1000
dte (min)

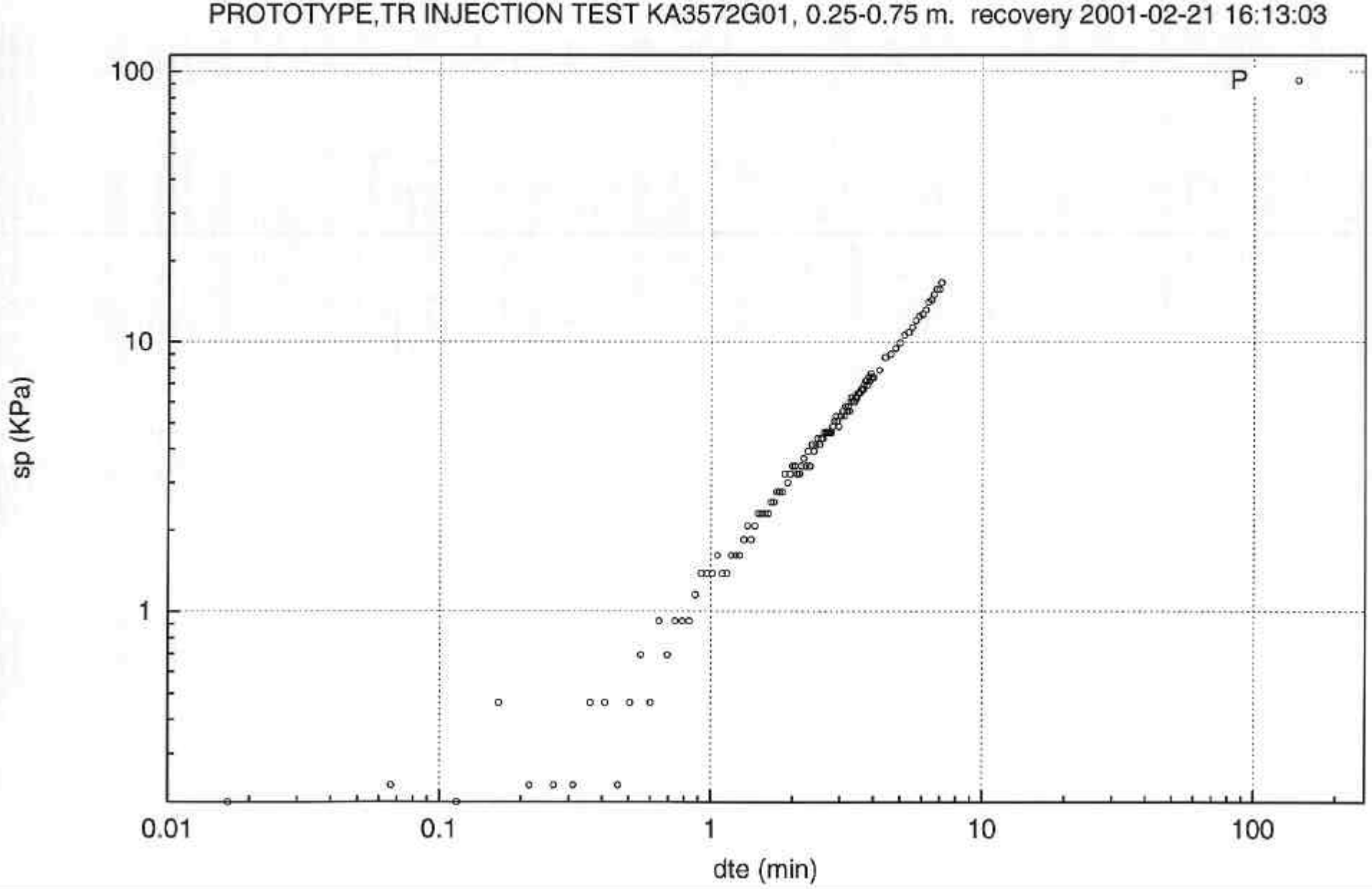

PROTOTYPE, TR INJECTION TESTS, KA3554G01, 1.25 - 1.75 m recovery 2001-02-15 16:48:00
P
dsp/d(ln dte)
0
2
4
6
8
10
12
0.1
1
10
100
1000
dte (min)

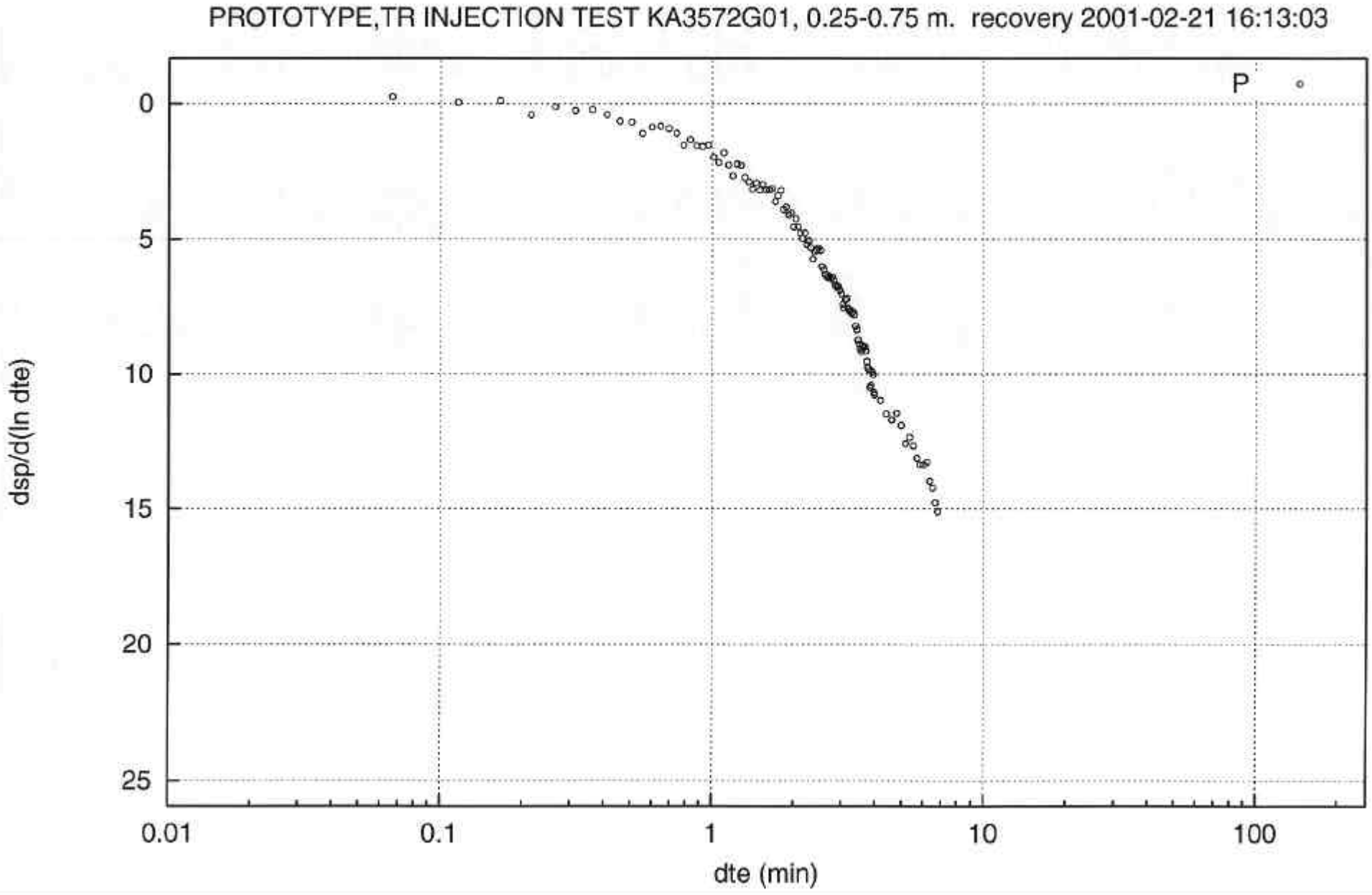

PROTOTYPE, TR INJECTION TESTS, KA3554G01, 1.25 - 1.75 m recovery 2001-02-15 16:48:00
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
1000
dte (min)

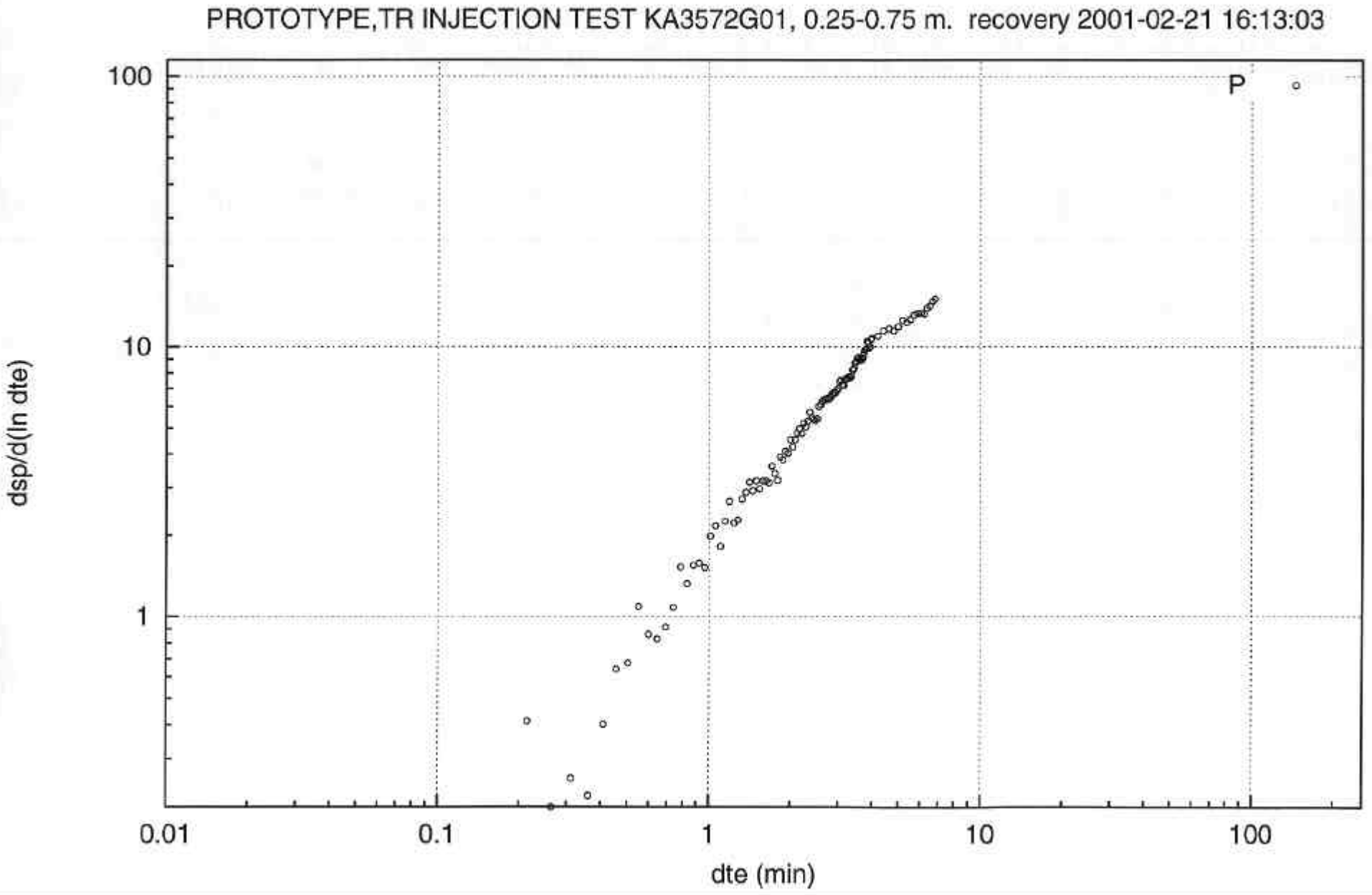
APPENDIX 11: Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3572G01. February 2001

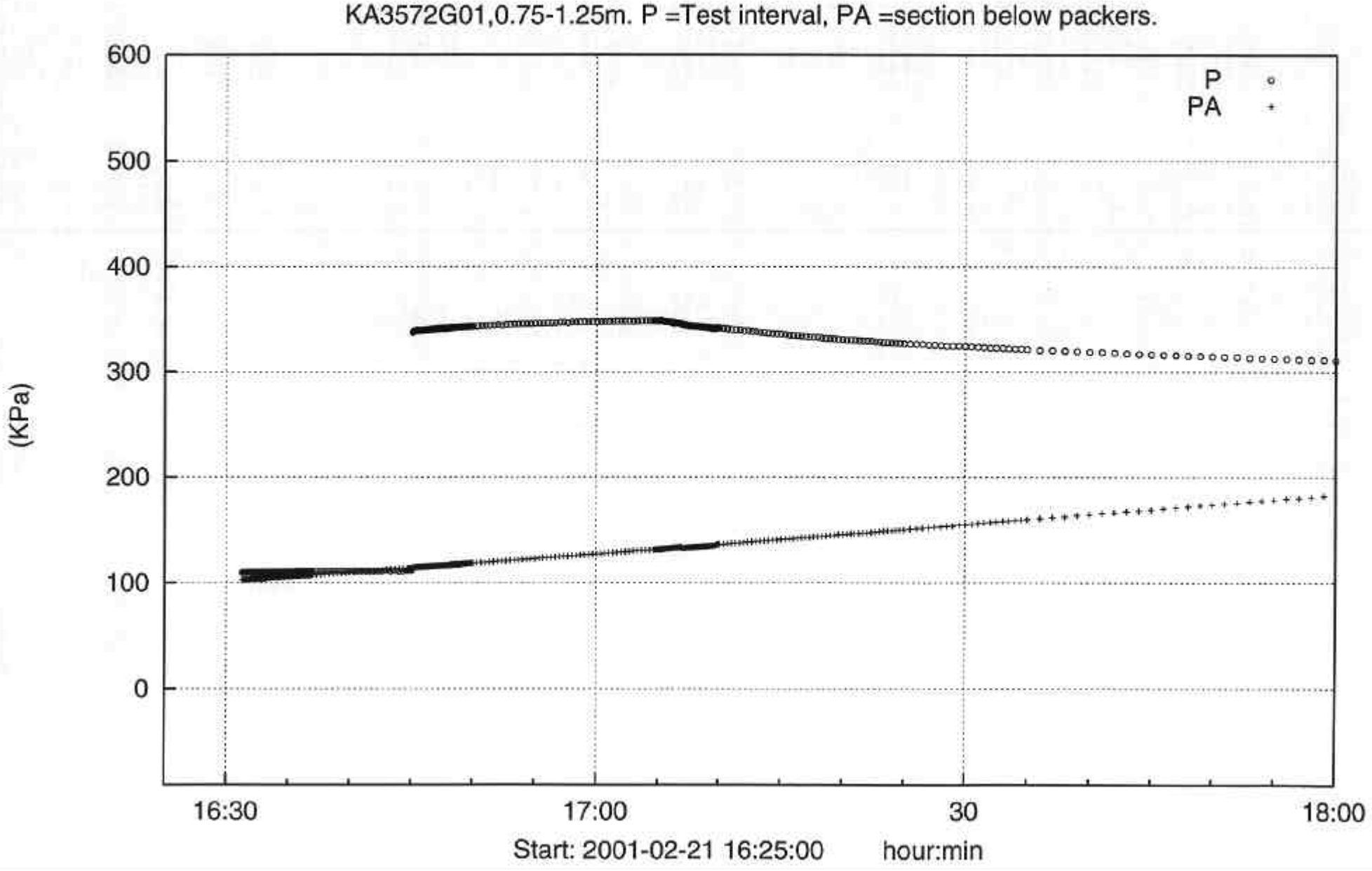

KA3572G01,0.25-0.75m. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
15:30
40
50
16:00
10
20
30
Start: 2001-02-21 15:30:00
hour:min

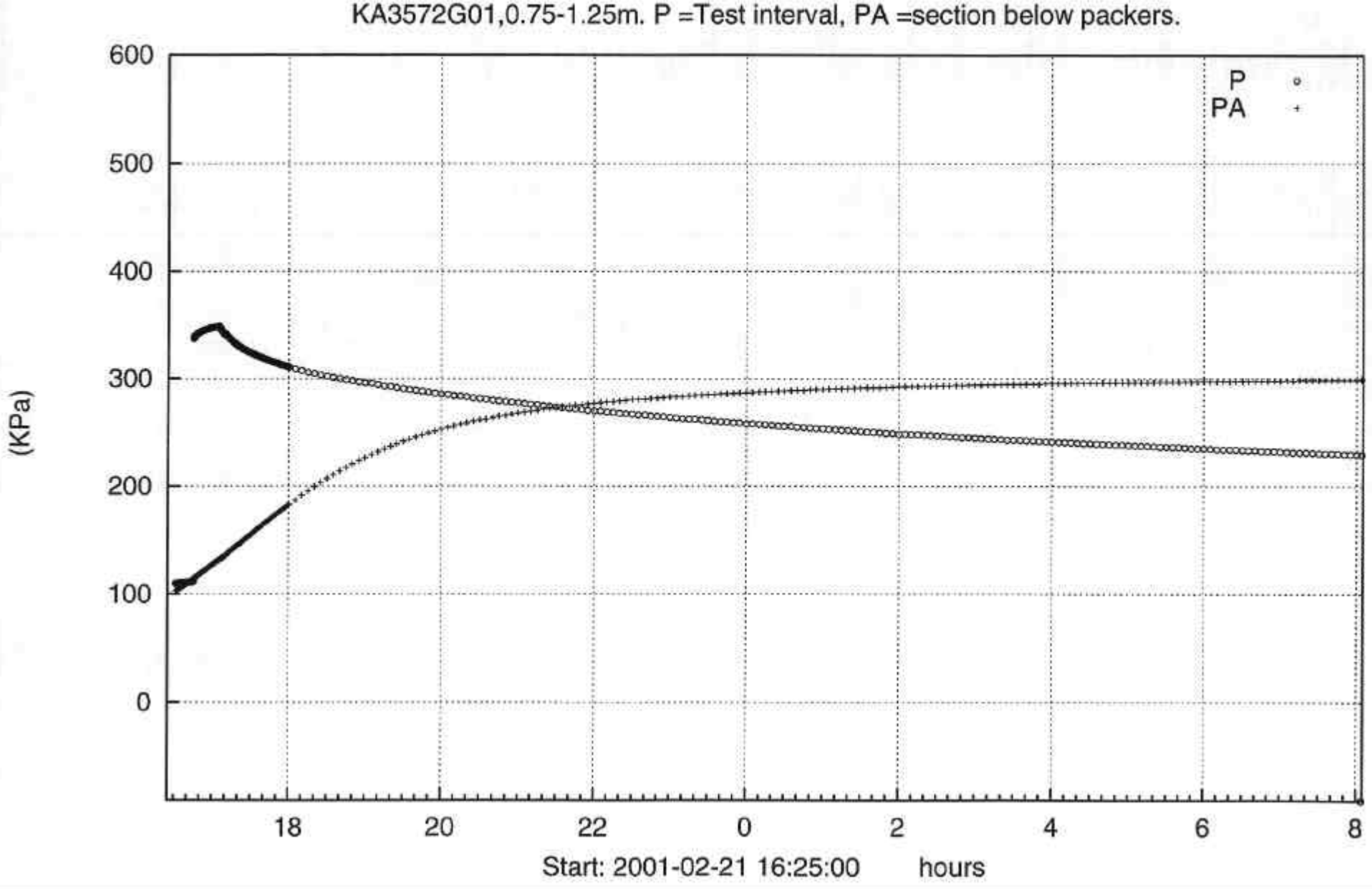

PROTOTYPE,TR INJECTION TEST KA3572G01, 0.25-0.75 m. recovery 2001-02-21 16:13:03
P
sp (KPa)
0
5
10
15
20
25
0.01
0.1
1
10
100
dte (min)

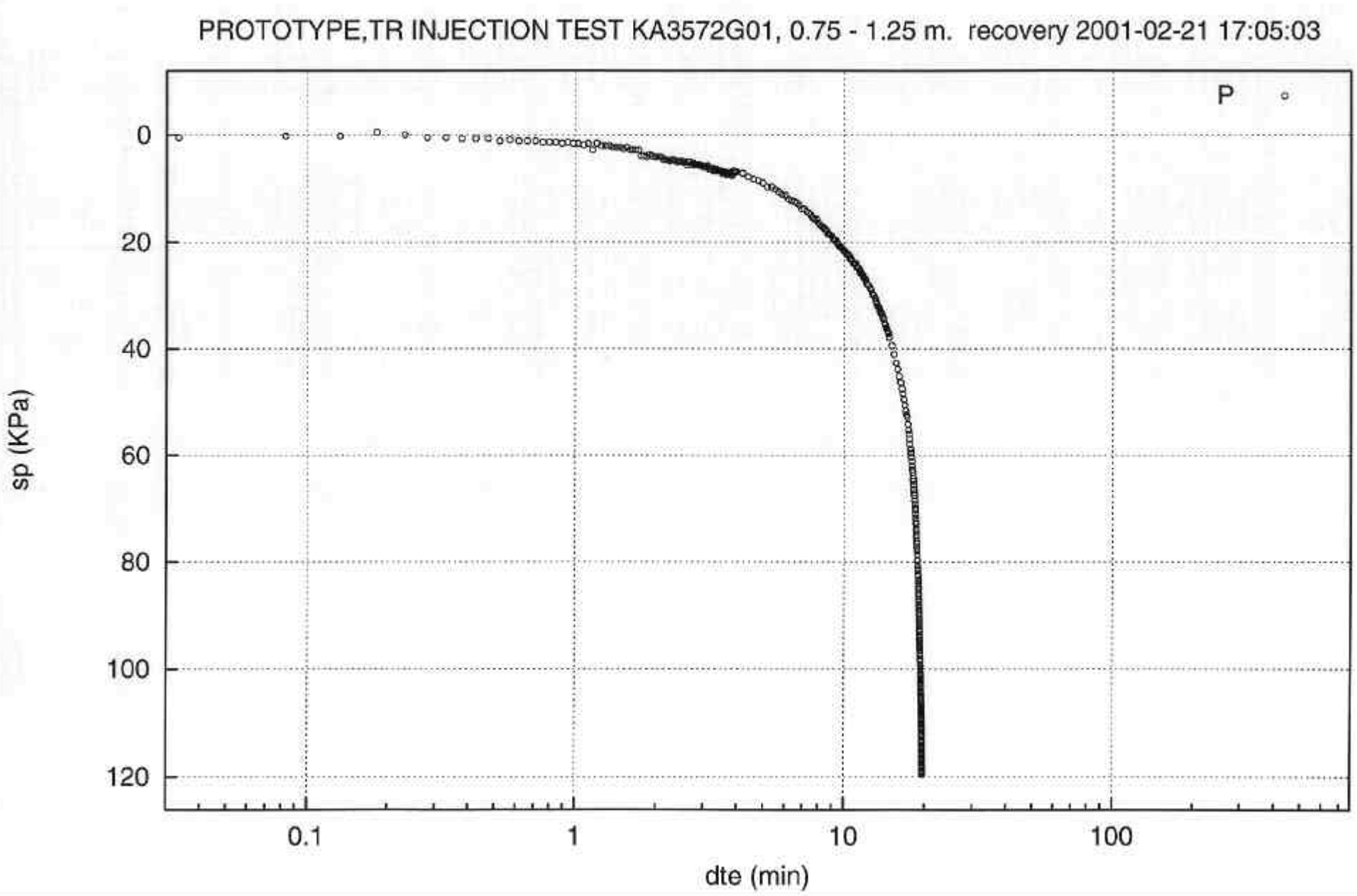

PROTOTYPE,TR INJECTION TEST KA3572G01, 0.25-0.75 m. recovery 2001-02-21 16:13:03
P
100
10
1
sp (KPa)
0.01
0.1
1
10
100
dte (min)

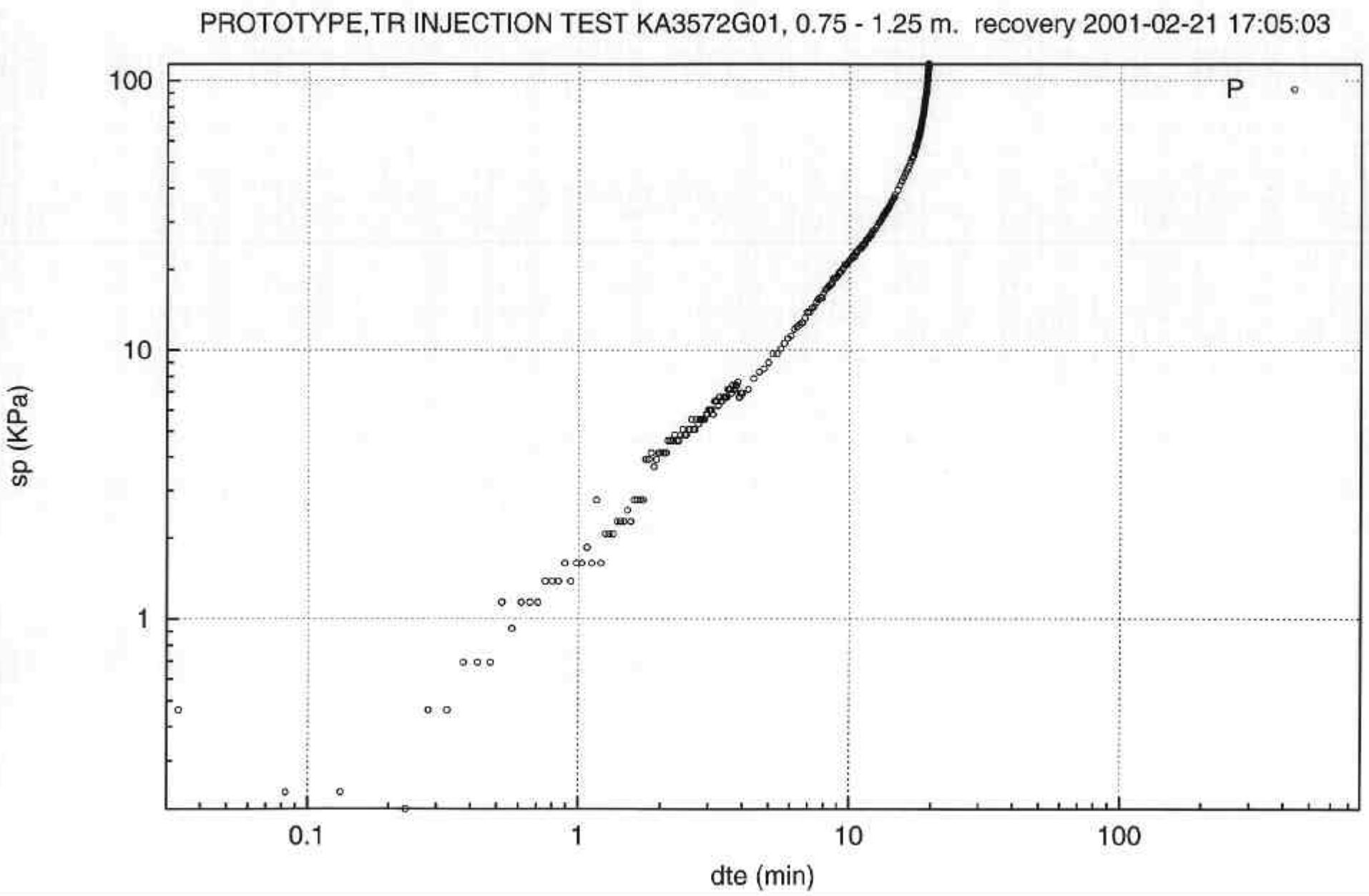

PROTOTYPE,TR INJECTION TEST KA3572G01, 0.25-0.75 m. recovery 2001-02-21 16:13:03
P
dsp/d(ln dte)
0
5
10
15
20
25
0.01
0.1
1
10
100
dte (min)

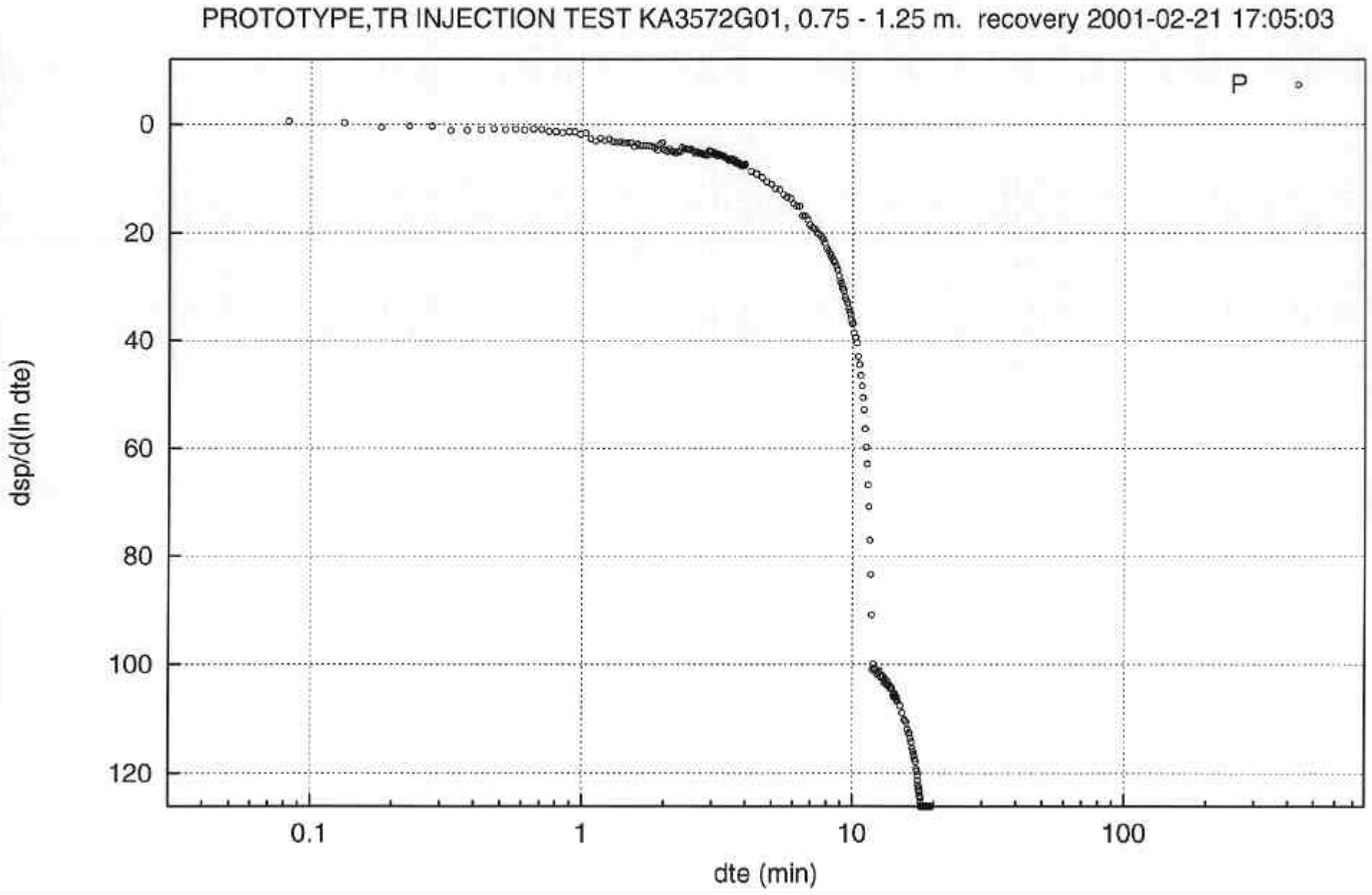

PROTOTYPE,TR INJECTION TEST KA3572G01, 0.25-0.75 m. recovery 2001-02-21 16:13:03
P
100
10
1
dsp/d(ln dte)
0.01
0.1
1
10
100
dte (min)

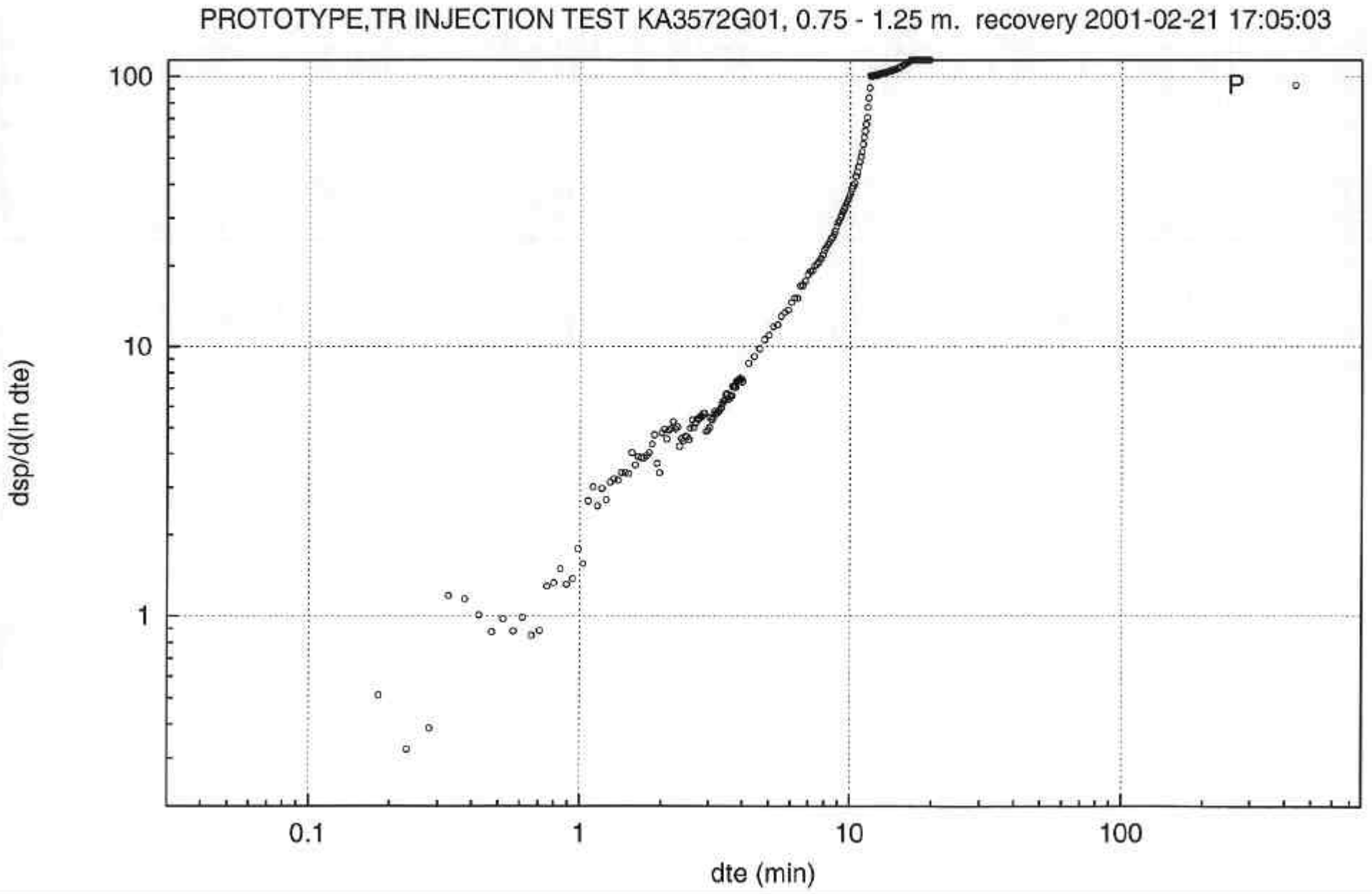

KA3572G01,0.75-1.25m. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
16:30
17:00
30
18:00
Start: 2001-02-21 16:25:00
hour:min

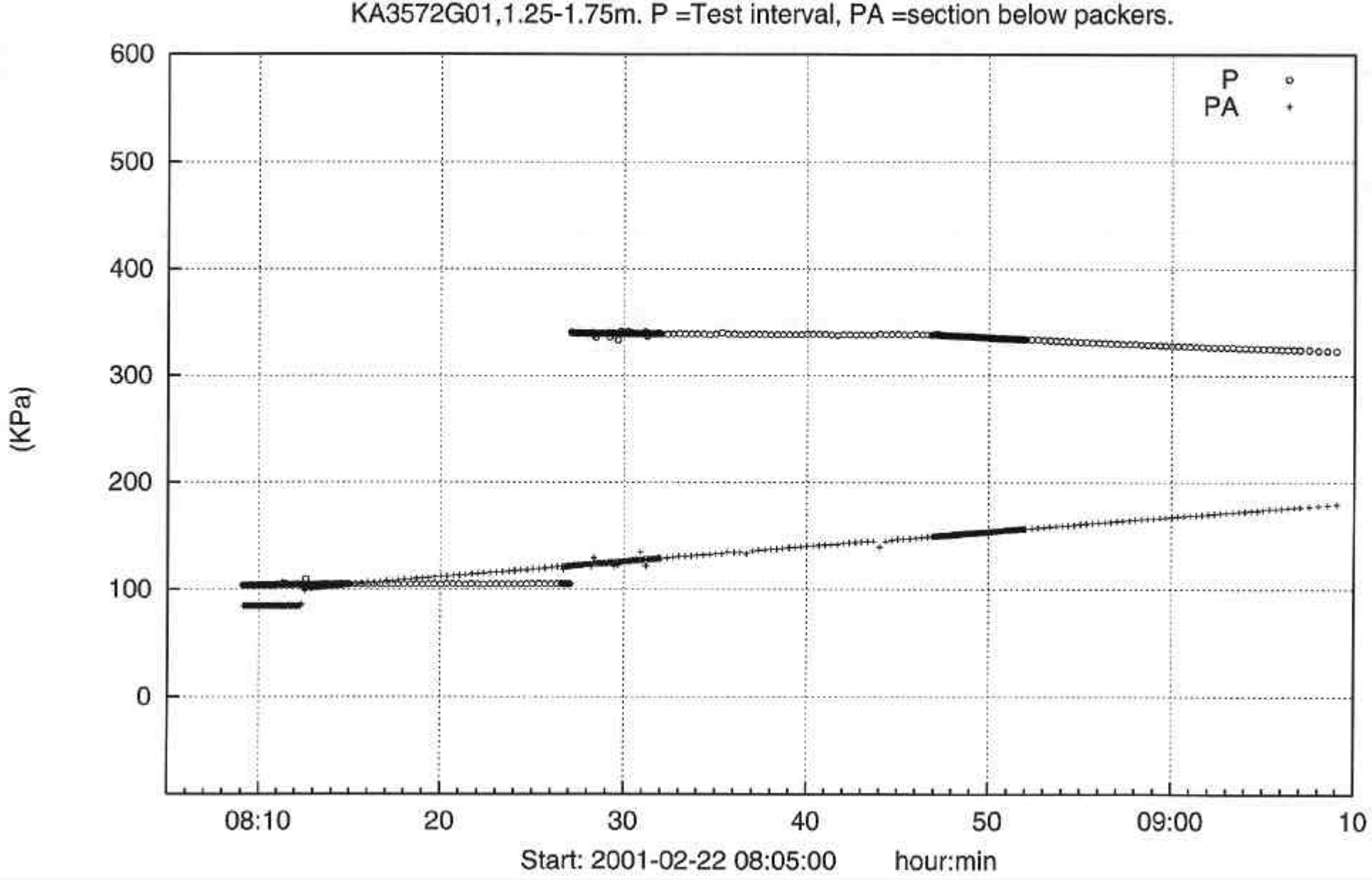

KA3572G01,0.75-1.25m. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
18
20
22
0
2
4
6
8
Start: 2001-02-21 16:25:00
hours

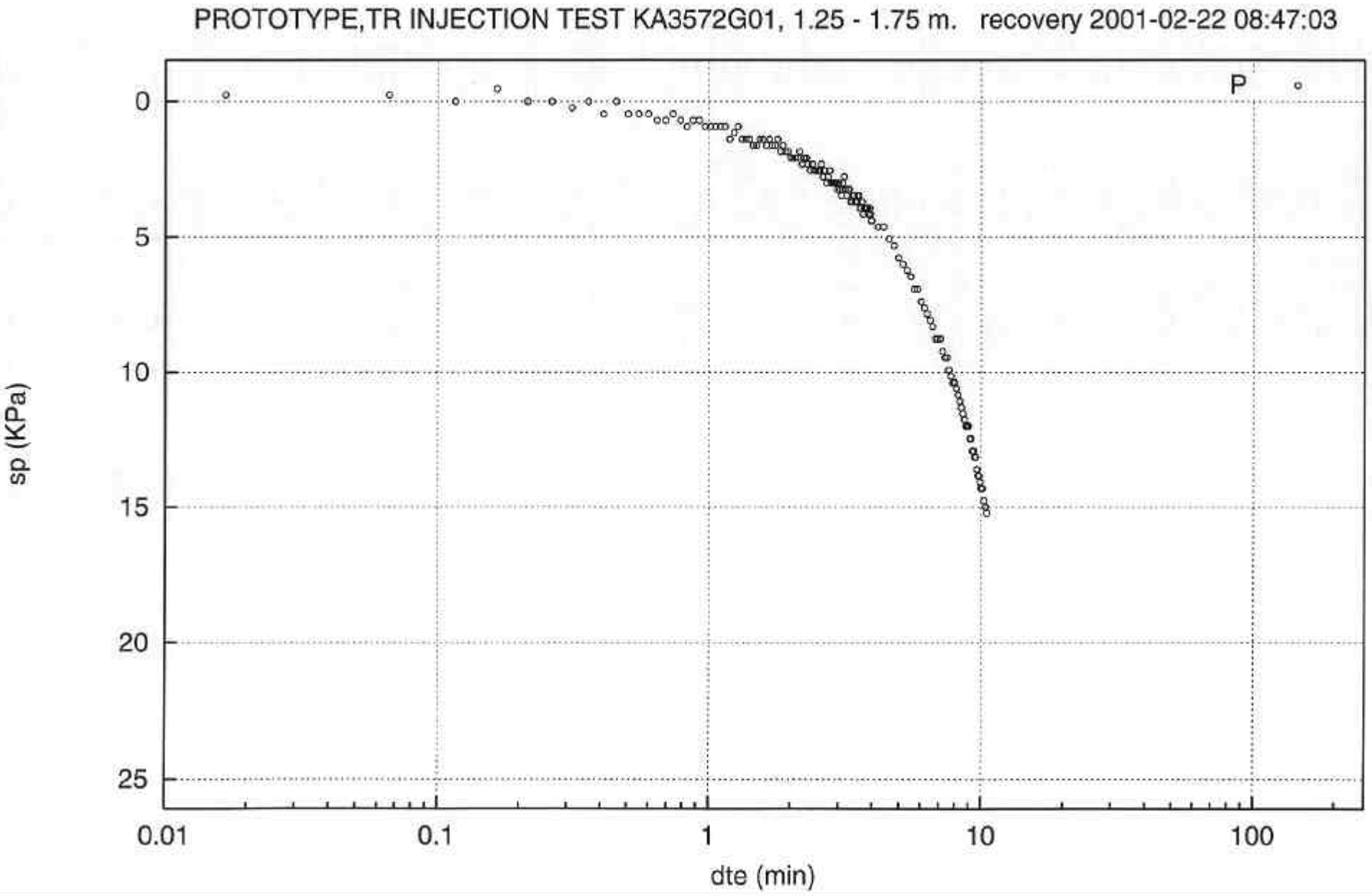

PROTOTYPE,TR INJECTION TEST KA3572G01, 0.75 - 1.25 m. recovery 2001-02-21 17:05:03
P
sp (KPa)
0
20
40
60
80
100
120
0.1
1
10
100
dte (min)

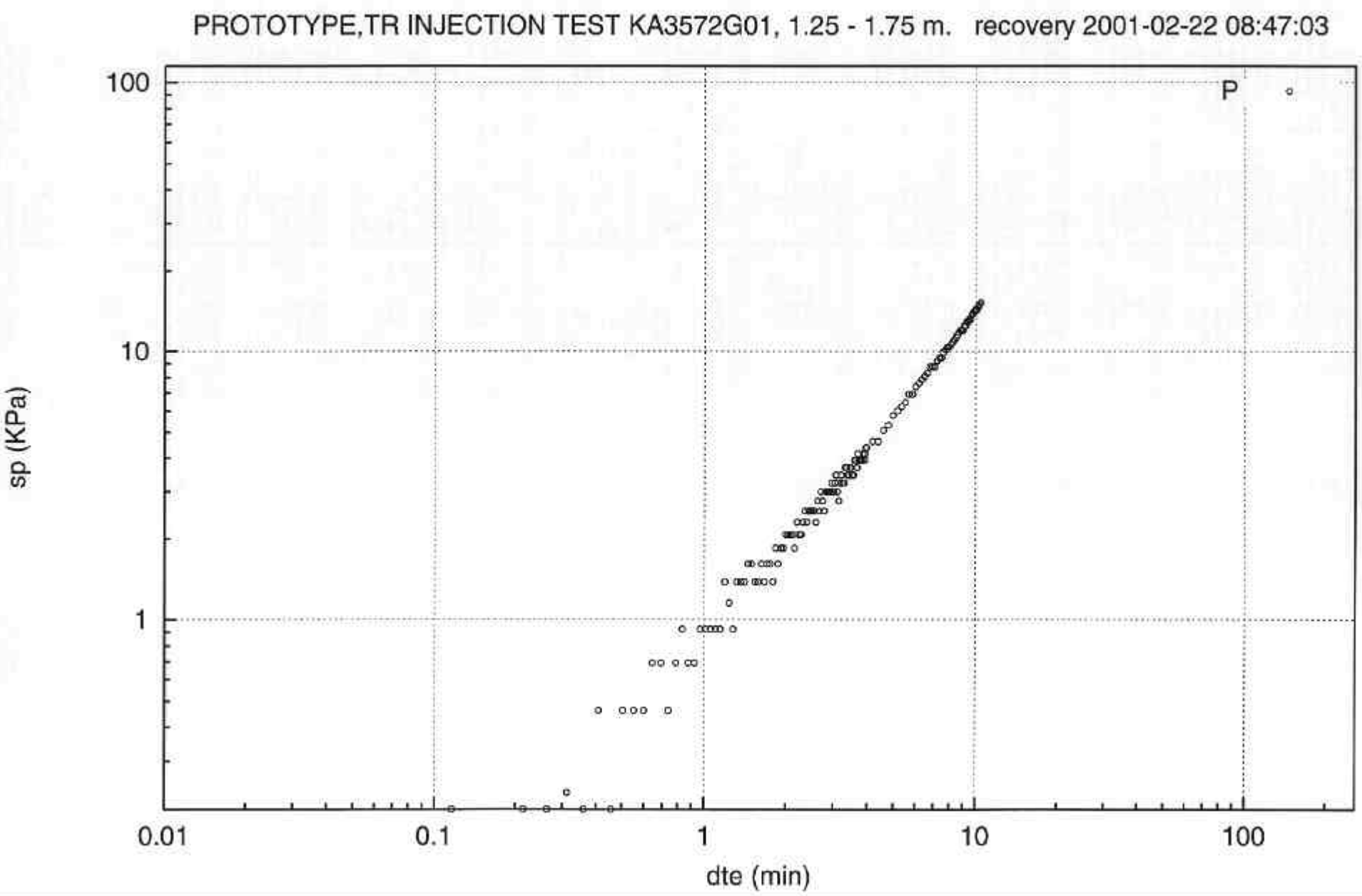

PROTOTYPE,TR INJECTION TEST KA3572G01, 0.75 - 1.25 m. recovery 2001-02-21 17:05:03
P
100
10
1
sp (KPa)
0.1
1
10
100
dte (min)

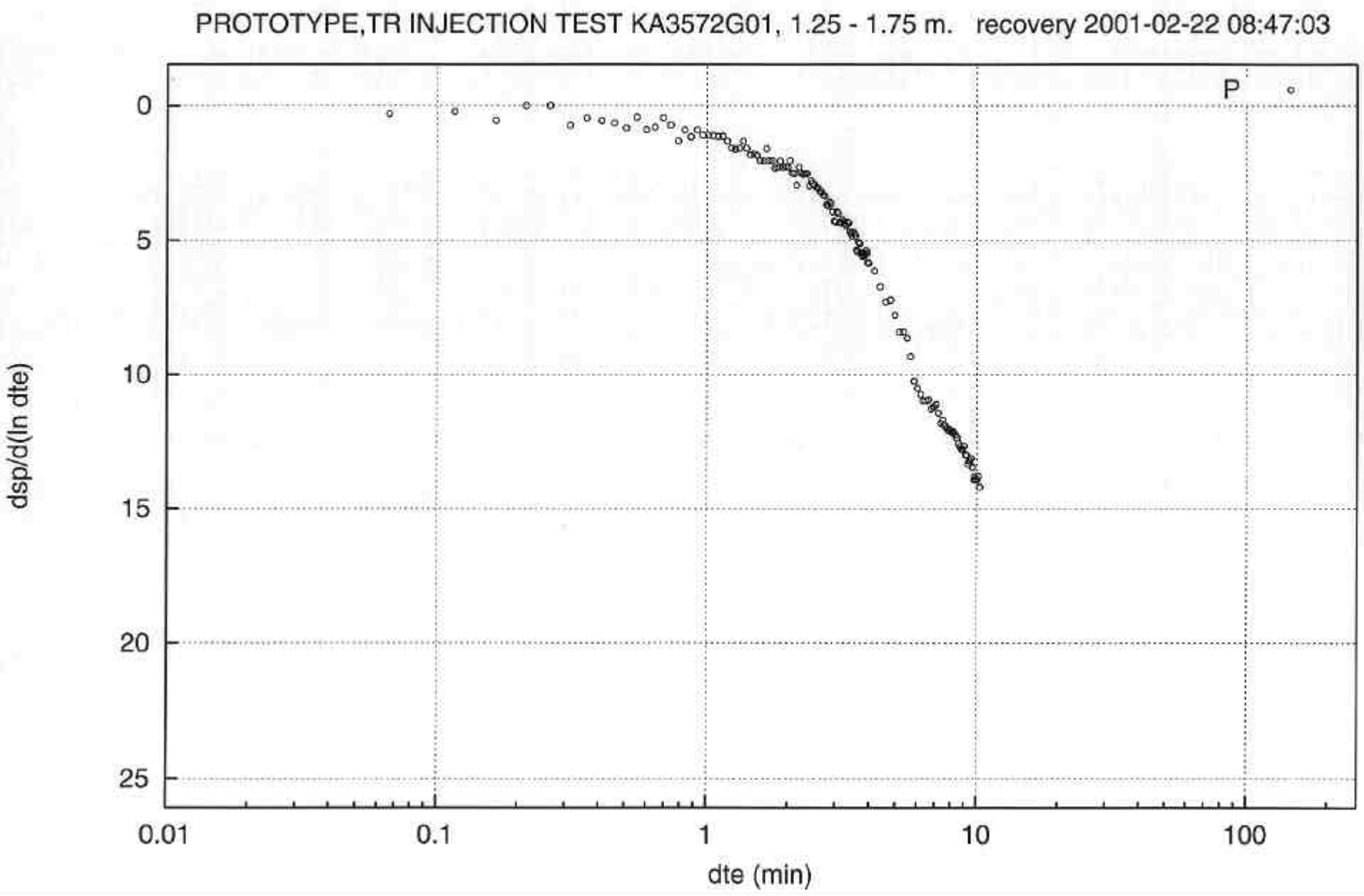

PROTOTYPE,TR INJECTION TEST KA3572G01, 0.75 - 1.25 m. recovery 2001-02-21 17:05:03
P
dsp/d(ln dte)
0
20
40
60
80
100
120
0.1
1
10
100
dte (min)

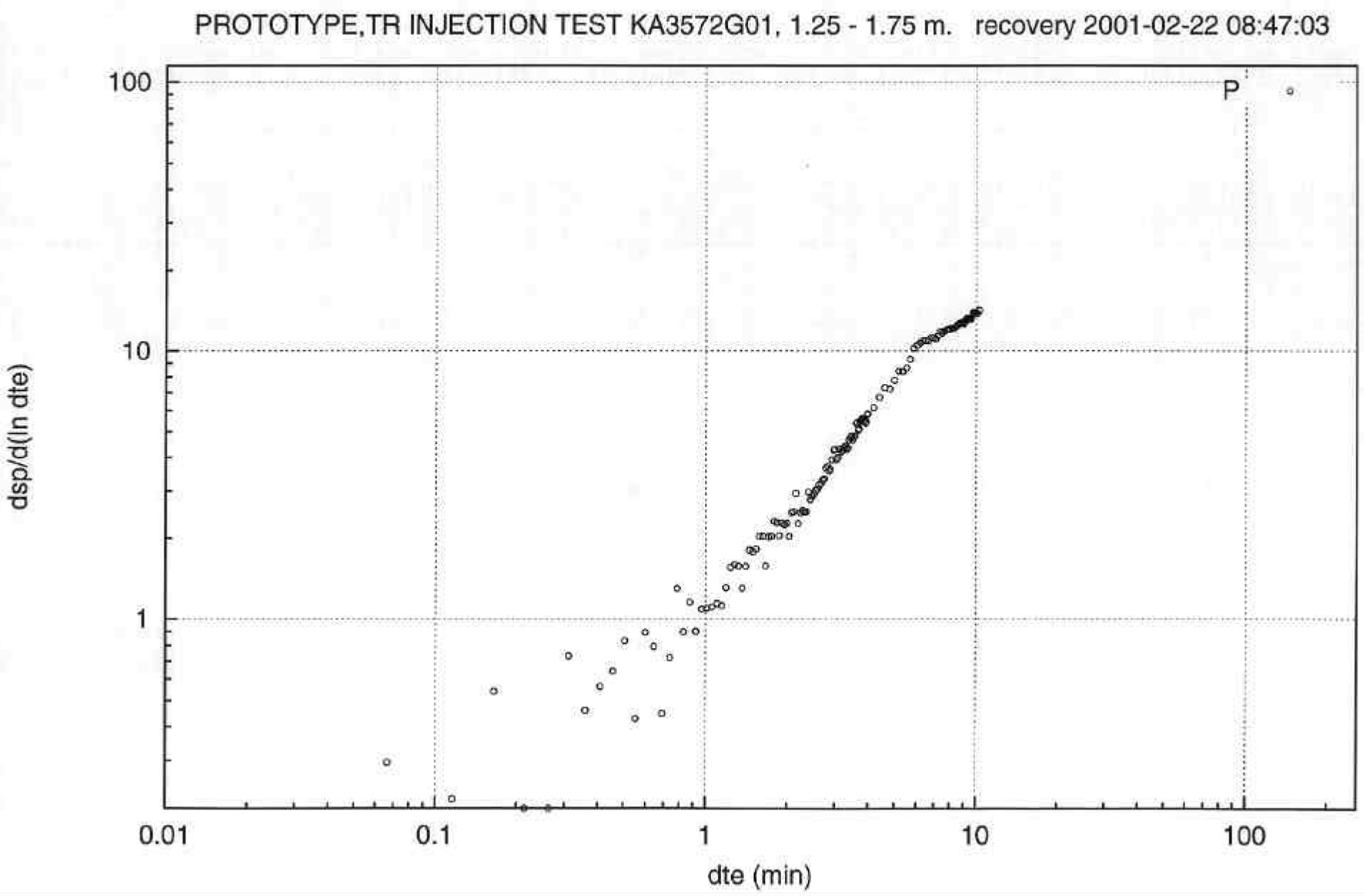

PROTOTYPE,TR INJECTION TEST KA3572G01, 0.75 - 1.25 m. recovery 2001-02-21 17:05:03
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
dte (min)


KA3572G01,1.25-1.75m. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
08:10
20
30
40
50
09:00
10
Start: 2001-02-22 08:05:00
hour:min

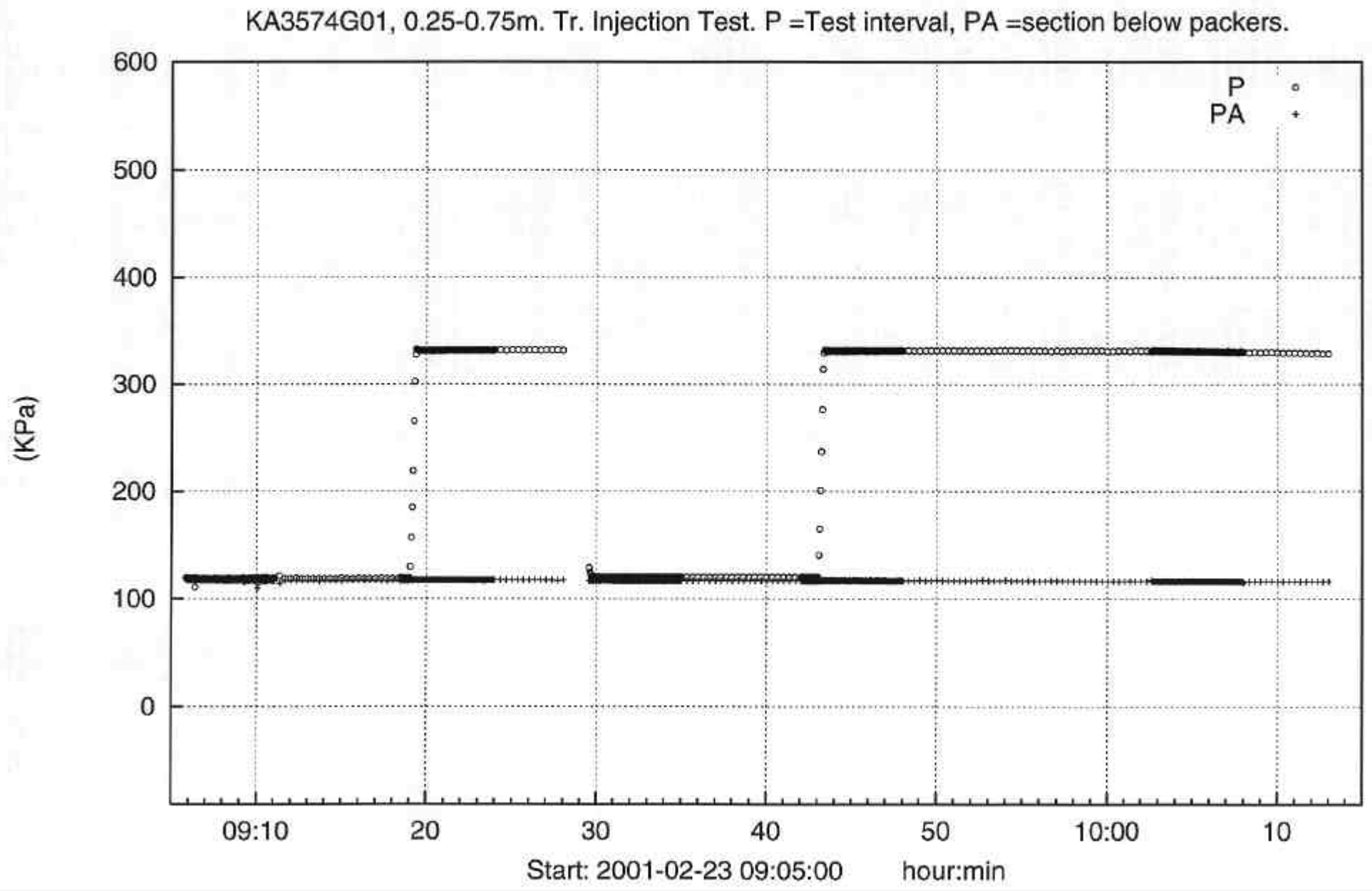

PROTOTYPE,TR INJECTION TEST KA3572G01, 1.25 - 1.75 m. recovery 2001-02-22 08:47:03
P
sp (KPa)
0
5
10
15
20
25
0.01
0.1
1
10
100
dte (min)

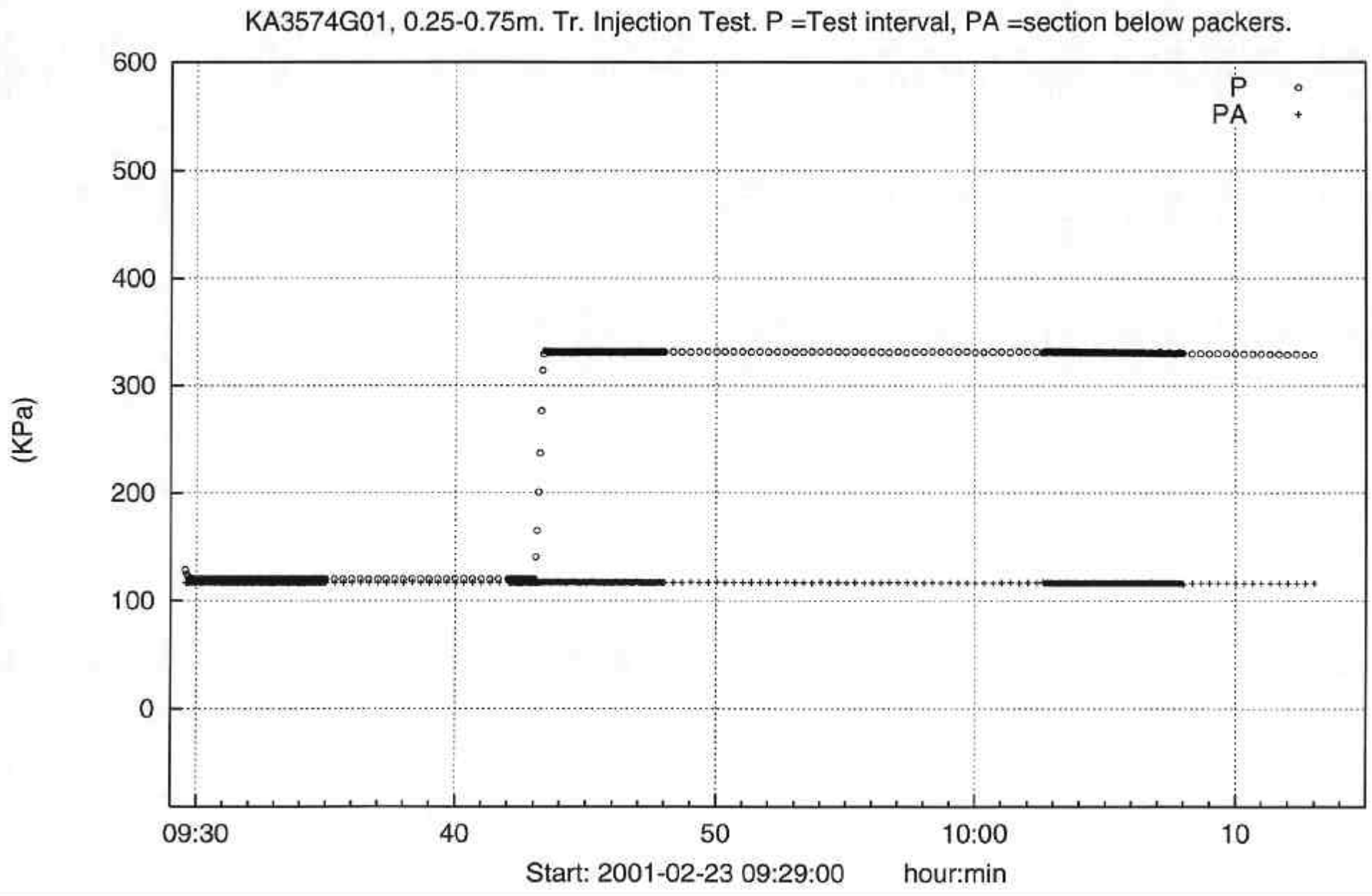

PROTOTYPE,TR INJECTION TEST KA3572G01, 1.25 - 1.75 m. recovery 2001-02-22 08:47:03
P
100
10
1
sp (KPa)
0.01
0.1
1
10
100
dte (min)

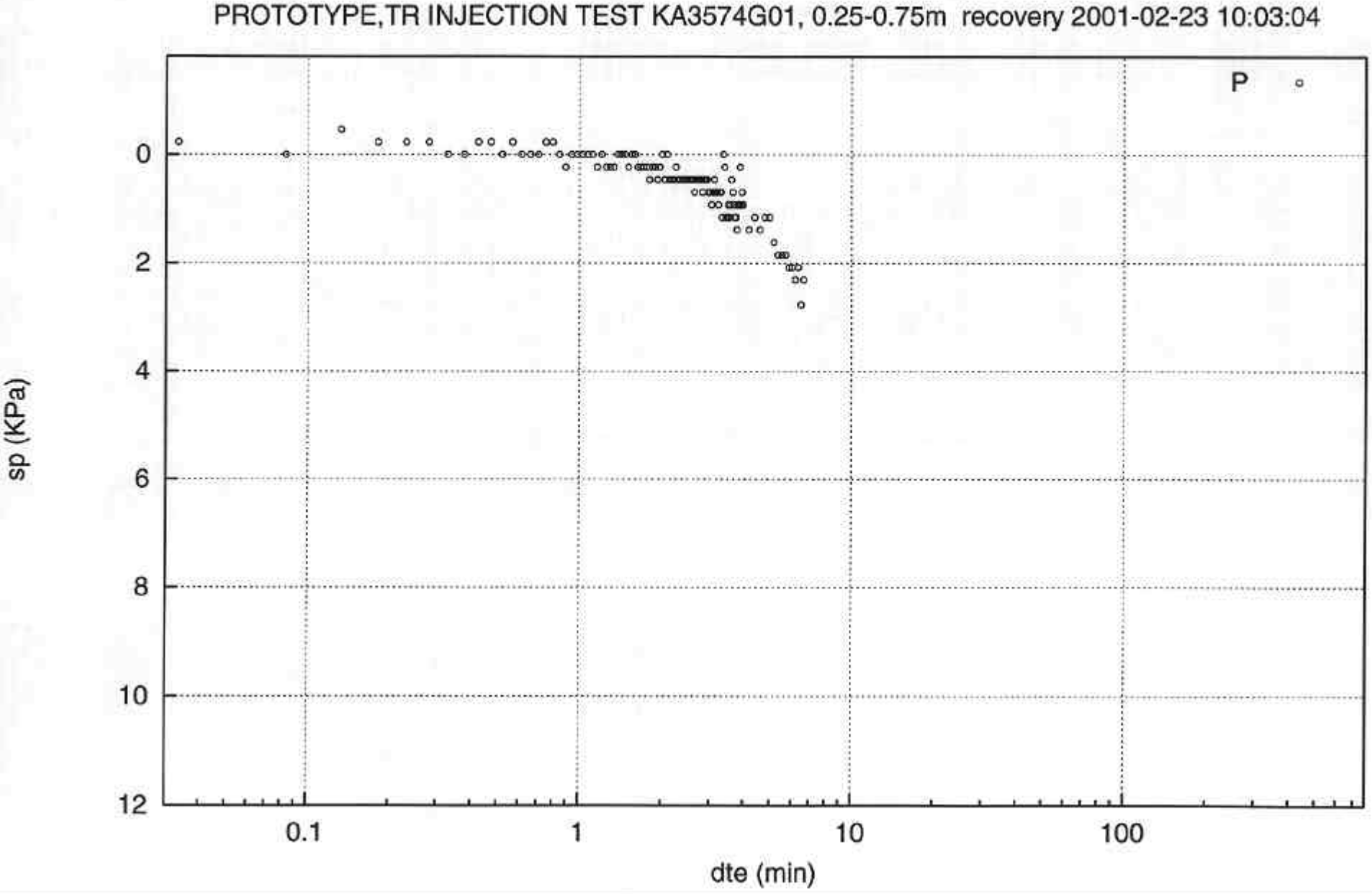

PROTOTYPE,TR INJECTION TEST KA3572G01, 1.25 - 1.75 m. recovery 2001-02-22 08:47:03
P
dsp/d(ln dte)
0
5
10
15
20
25
0.01
0.1
1
10
100
dte (min)

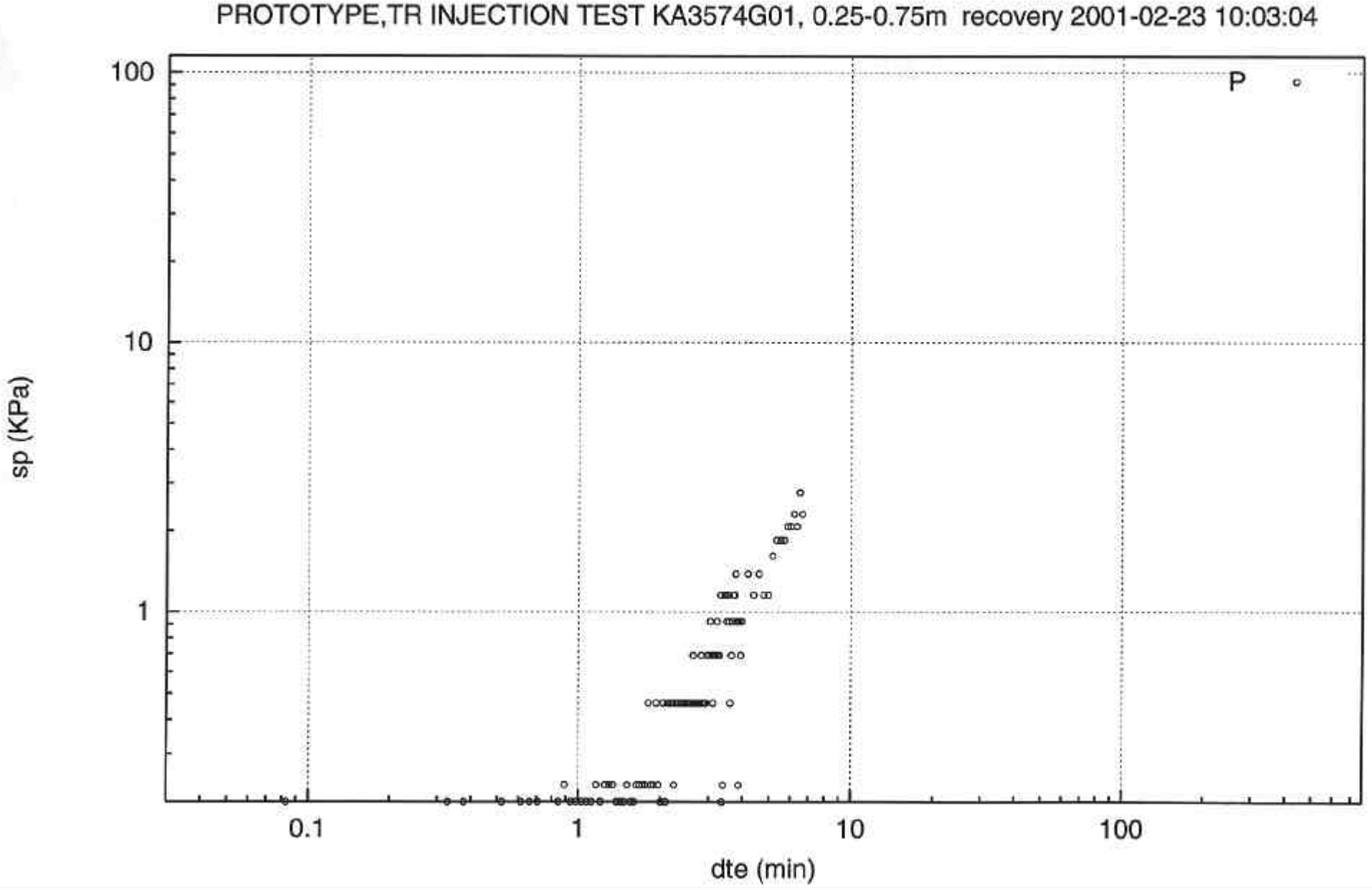

PROTOTYPE,TR INJECTION TEST KA3572G01, 1.25 - 1.75 m. recovery 2001-02-22 08:47:03
P
100
10
1
dsp/d(ln dte)
0.01
0.1
1
10
100
dte (min)

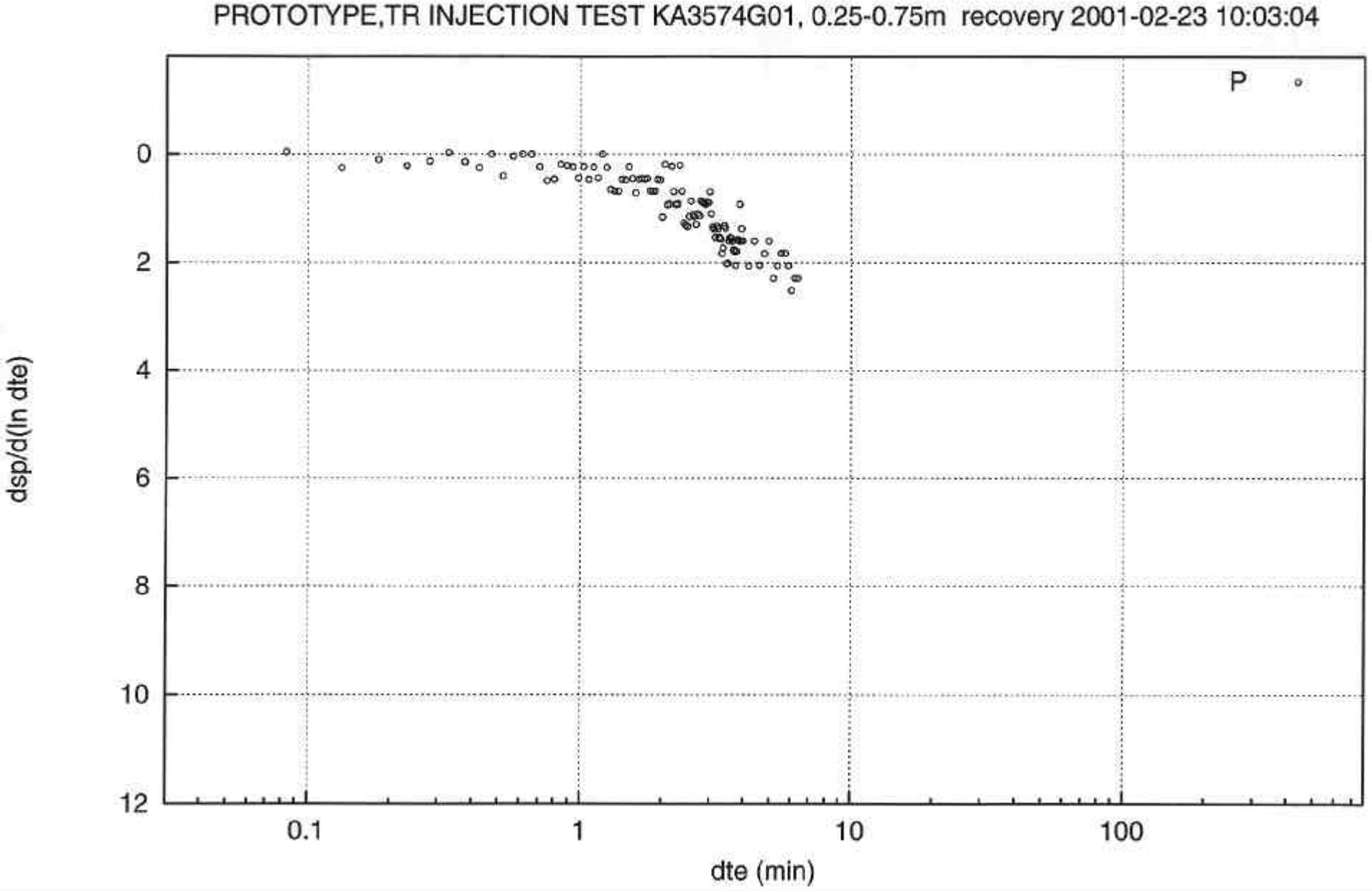
APPENDIX 12: Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3574G01 February 2001

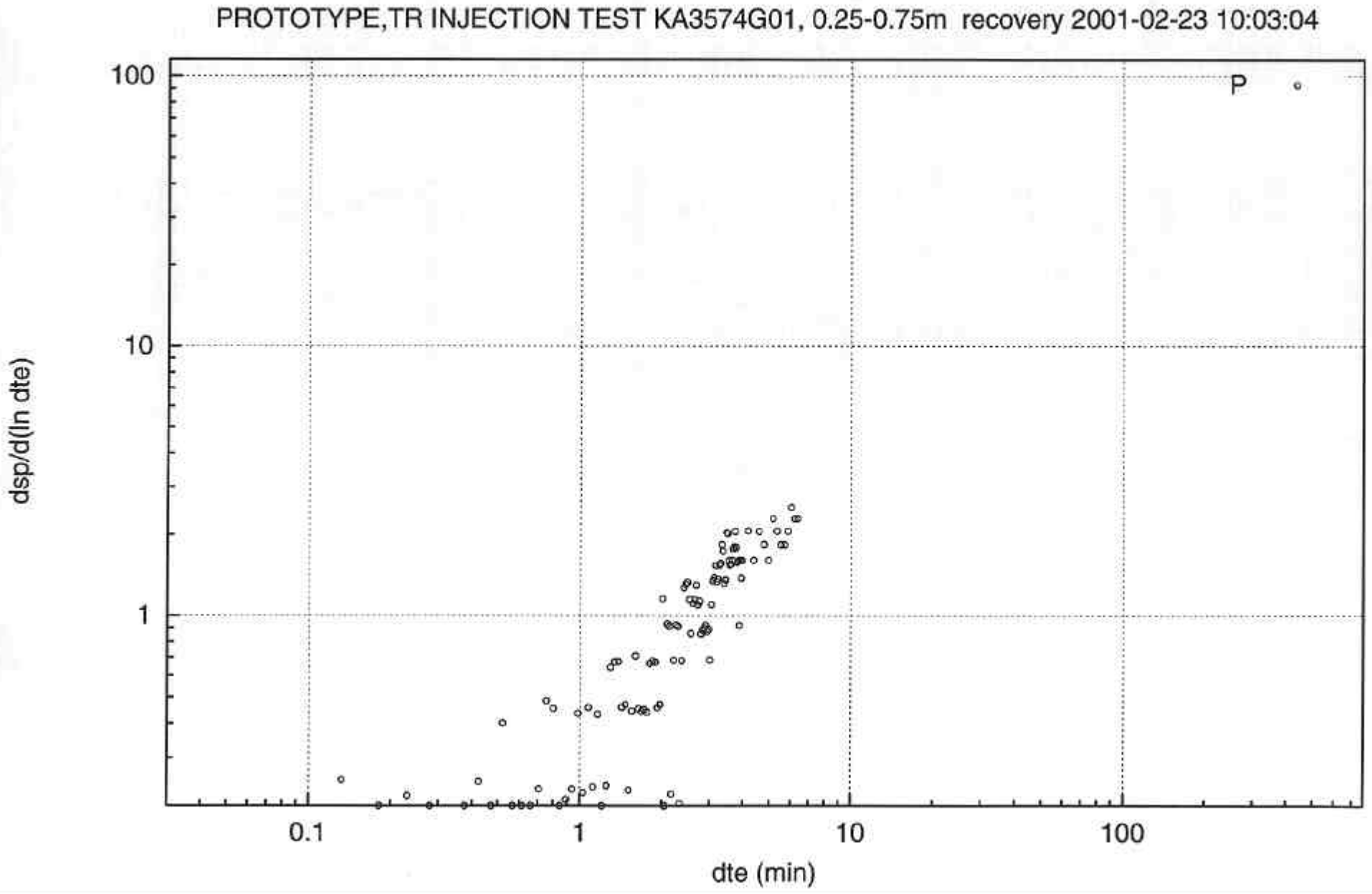

KA3574G01, 0.25-0.75m. Tr. Injection Test. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
09:10
20
30
40
50
10:00
10
Start: 2001-02-23 09:05:00
hour:min

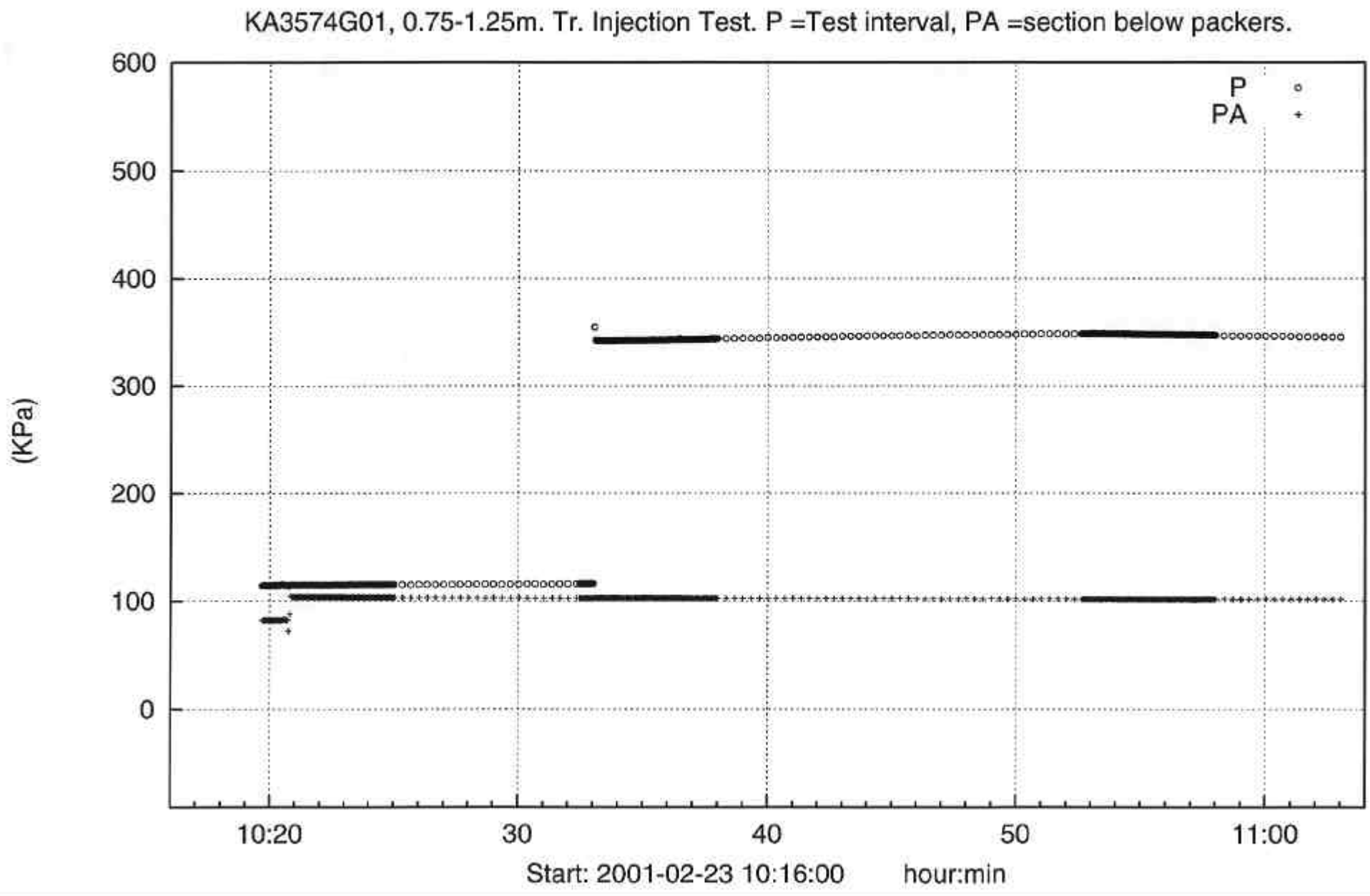

KA3574G01, 0.25-0.75m. Tr. Injection Test. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
09:30
40
50
10:00
10
Start: 2001-02-23 09:29:00
hour:min

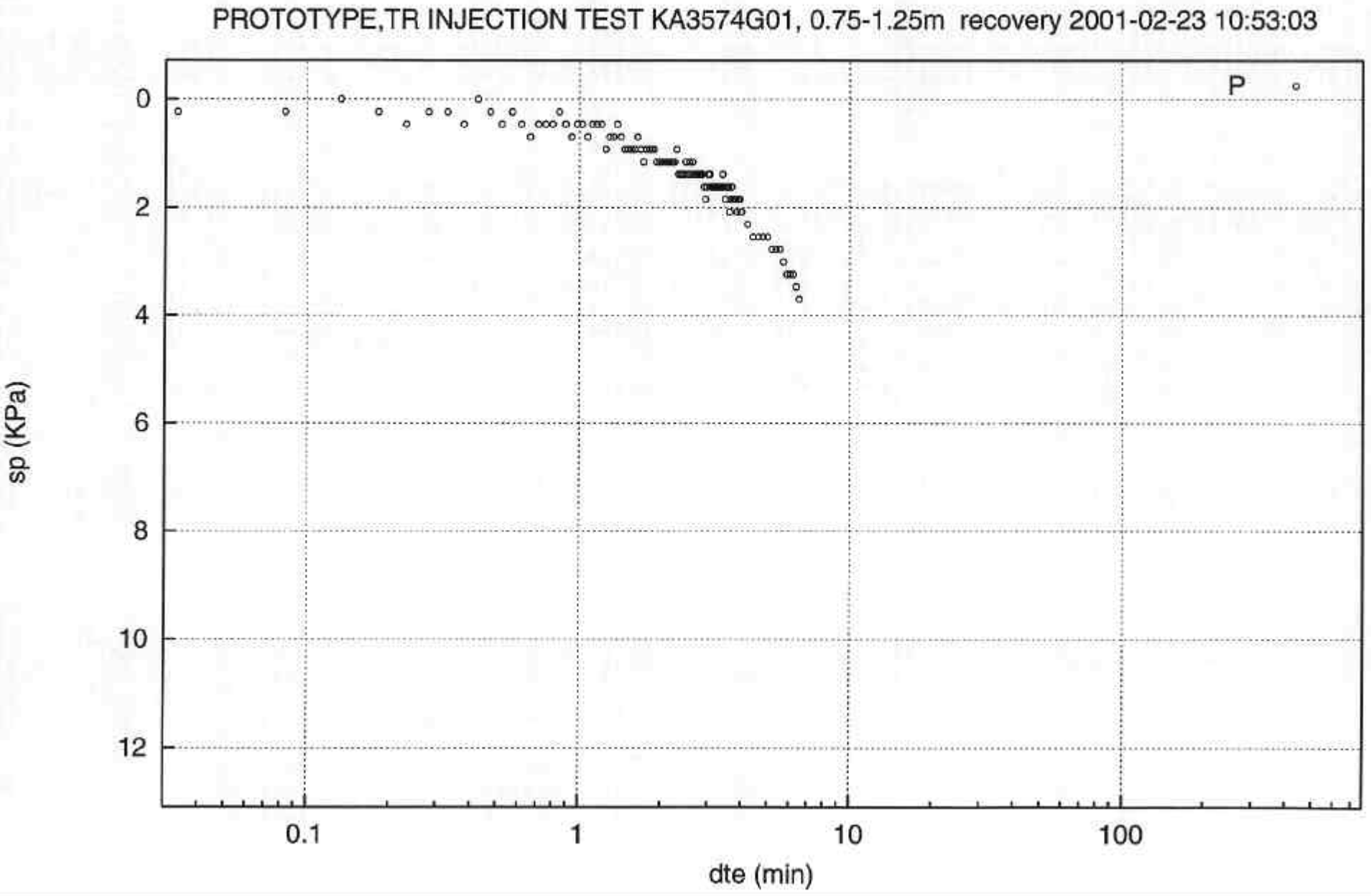

PROTOTYPE,TR INJECTION TEST KA3574G01, 0.25-0.75m recovery 2001-02-23 10:03:04
P
sp (KPa)
0
2
4
6
8
10
12
0.1
1
10
100
dte (min)

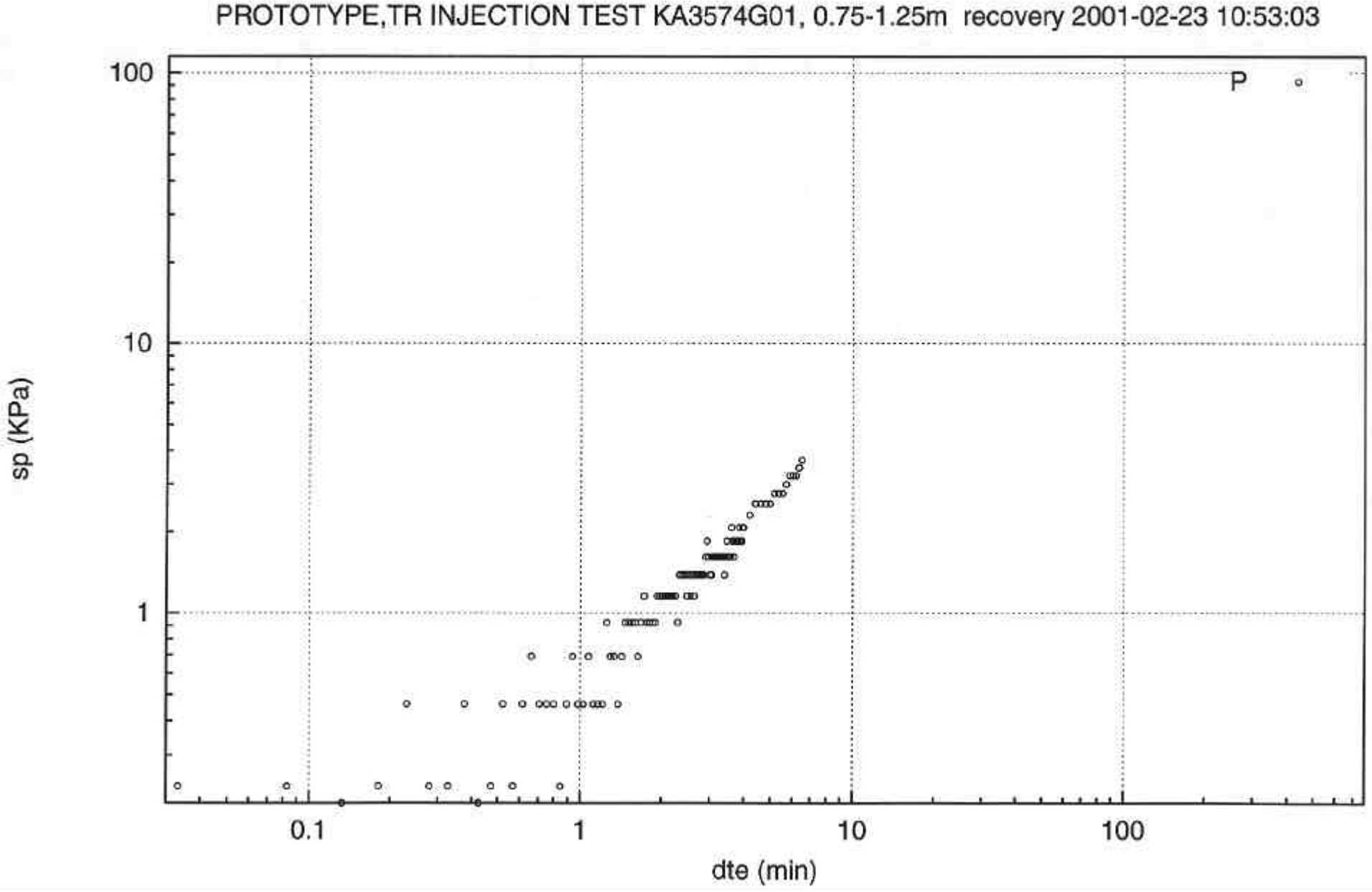

PROTOTYPE,TR INJECTION TEST KA3574G01, 0.25-0.75m recovery 2001-02-23 10:03:04
P
100
10
1
sp (KPa)
0.1
1
10
100
dte (min)

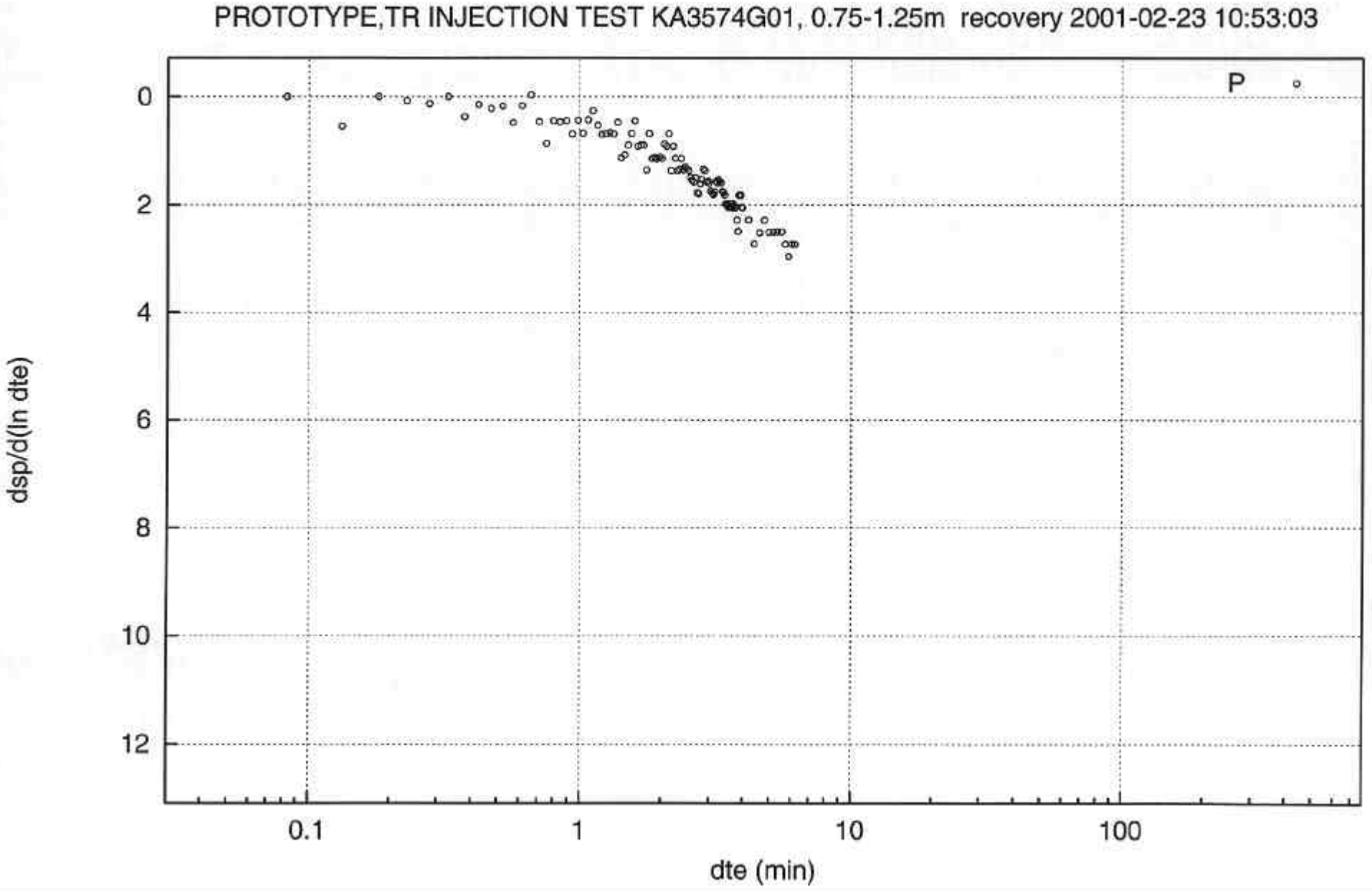

PROTOTYPE,TR INJECTION TEST KA3574G01, 0.25-0.75m recovery 2001-02-23 10:03:04
P
dsp/d(ln dte)
0
2
4
6
8
10
12
0.1
1
10
100
dte (min)

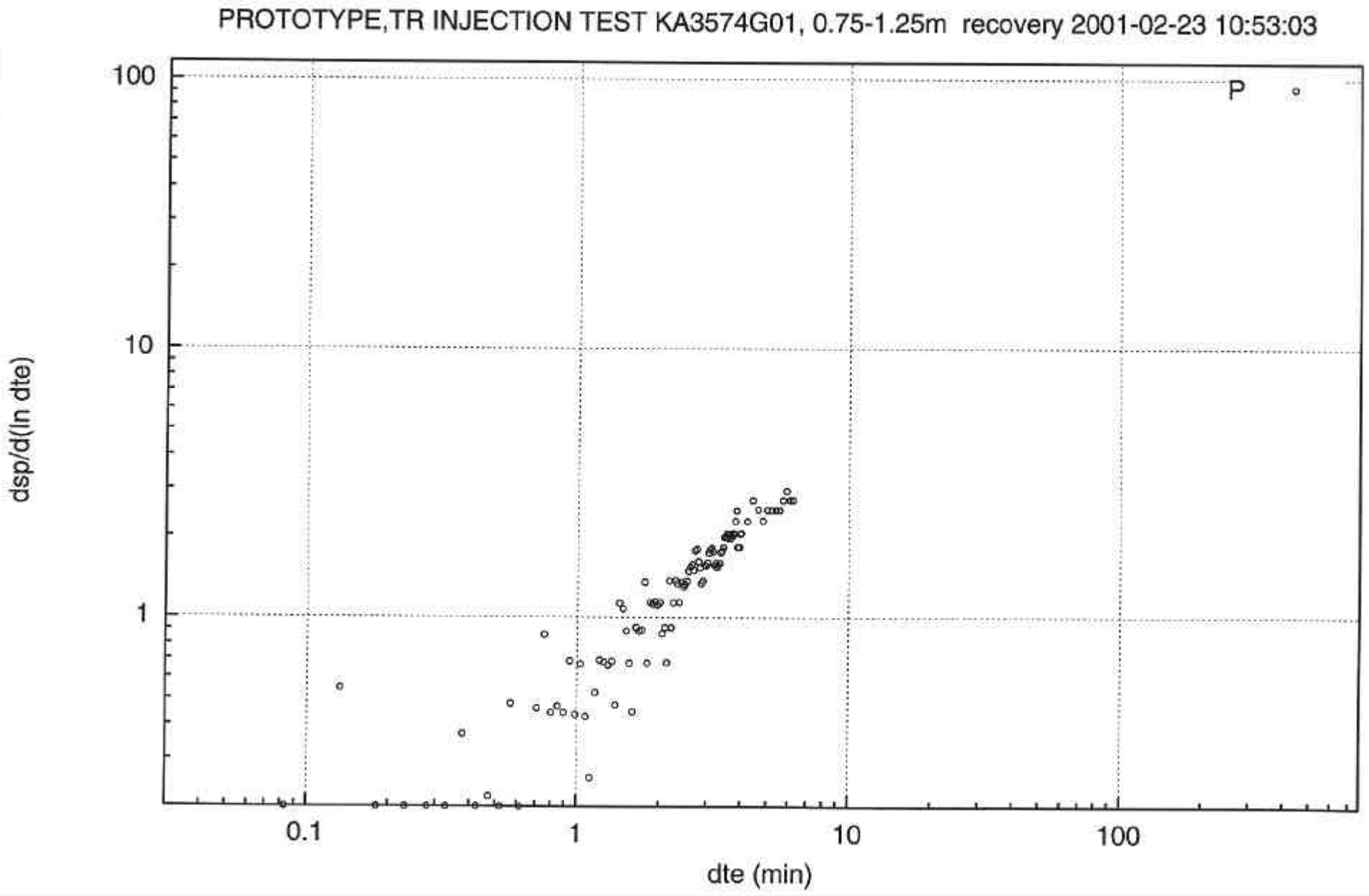

PROTOTYPE,TR INJECTION TEST KA3574G01, 0.25-0.75m recovery 2001-02-23 10:03:04
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
dte (min)

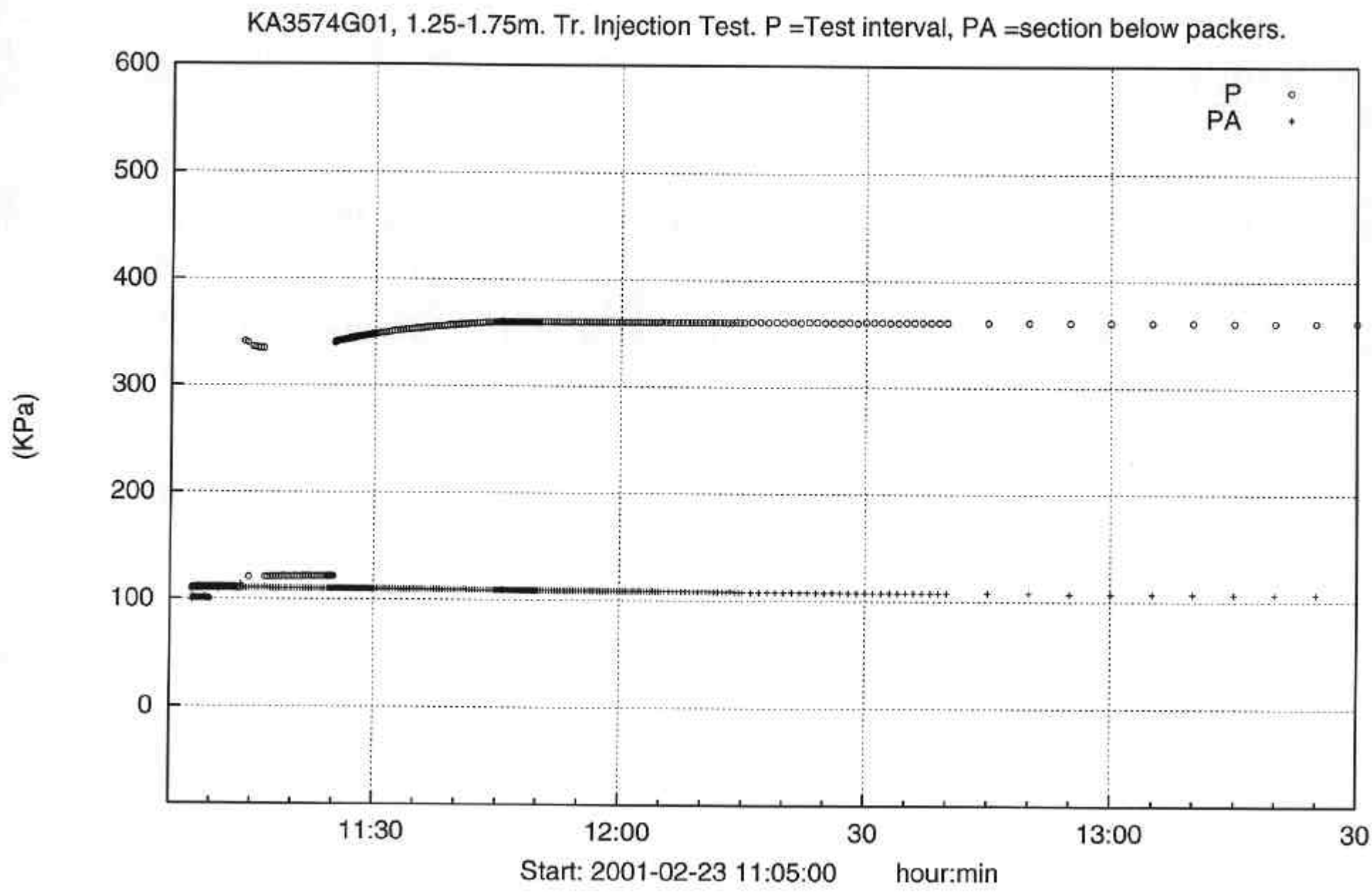

KA3574G01, 0.75-1.25m. Tr. Injection Test. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
10:20
30
40
50
11:00
Start: 2001-02-23 10:16:00
hour:min

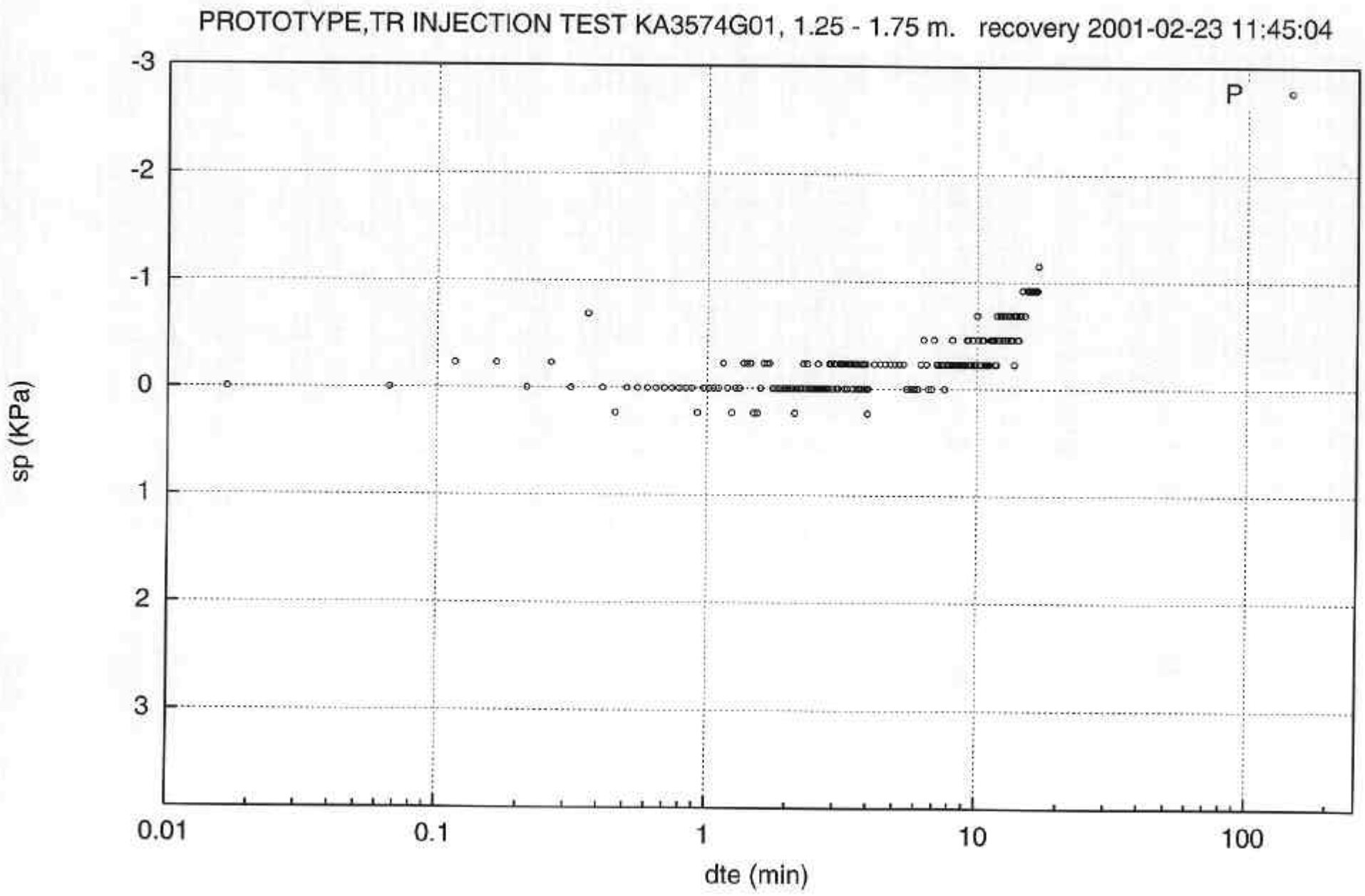

PROTOTYPE,TR INJECTION TEST KA3574G01, 0.75-1.25m recovery 2001-02-23 10:53:03
P
sp (KPa)
0
2
4
6
8
10
12
0.1
1
10
100
dte (min)

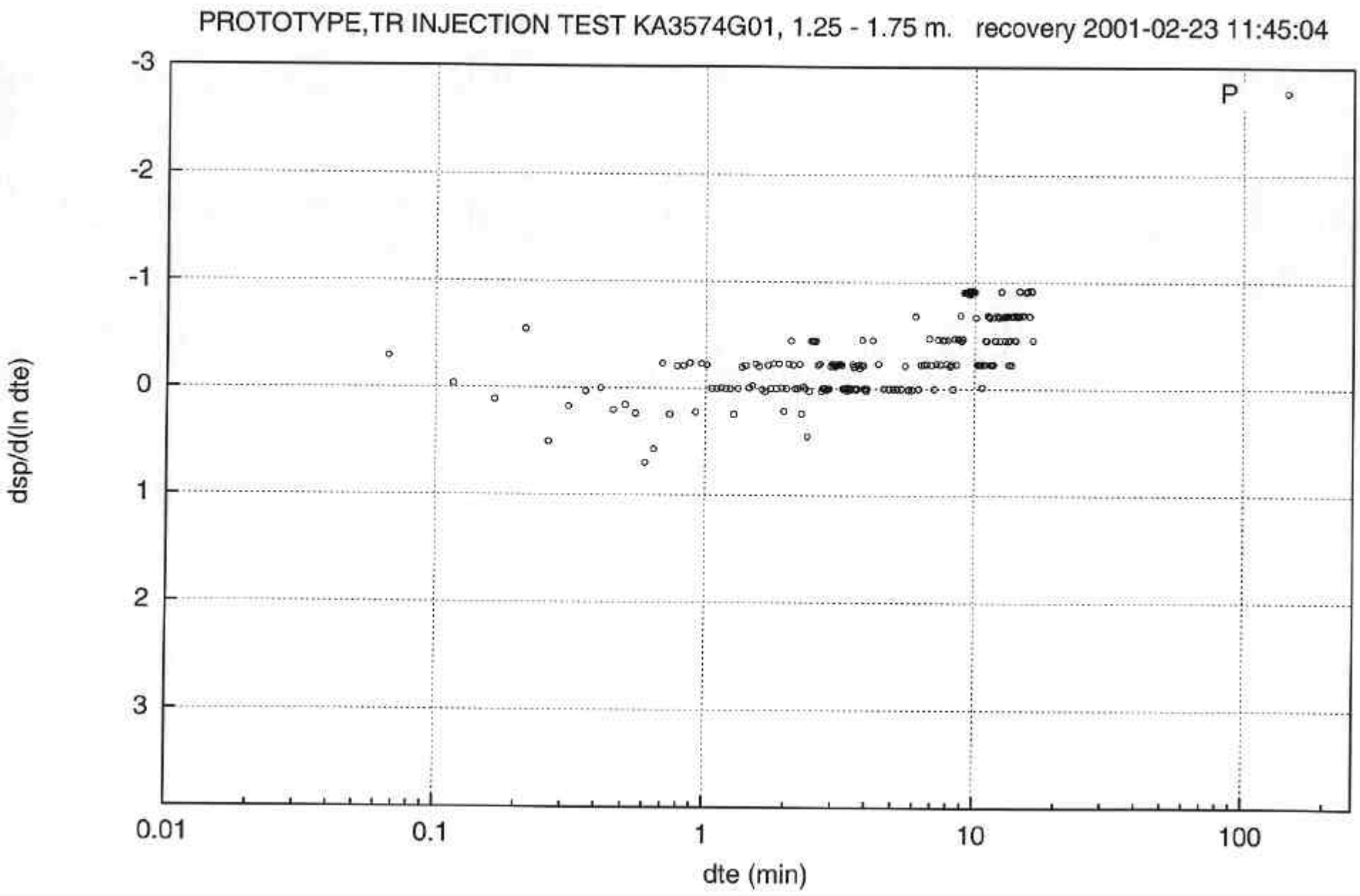

PROTOTYPE,TR INJECTION TEST KA3574G01, 0.75-1.25m recovery 2001-02-23 10:53:03
P
100
10
1
sp (KPa)
0.1
1
10
100
dte (min)

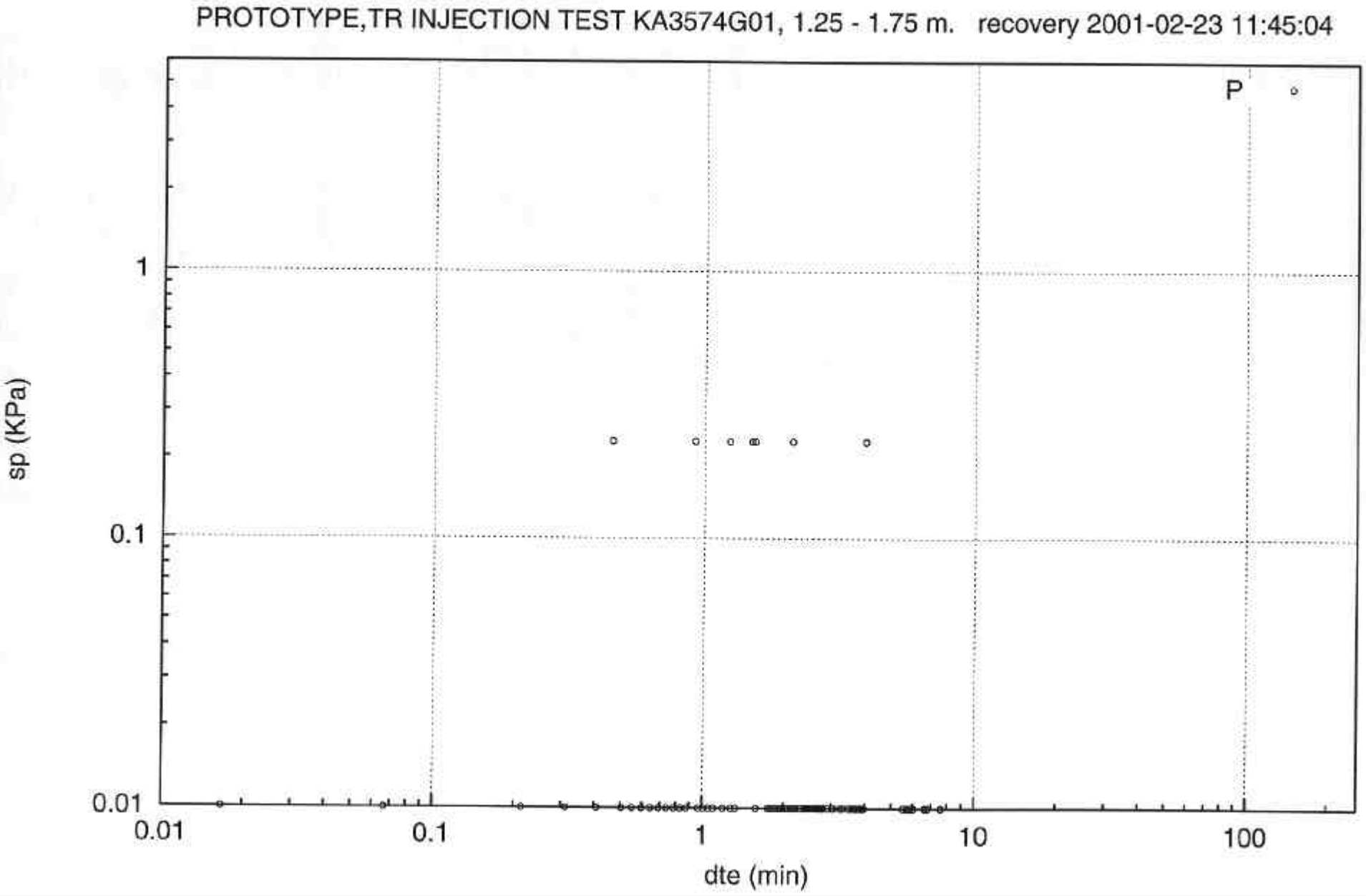

PROTOTYPE,TR INJECTION TEST KA3574G01, 0.75-1.25m recovery 2001-02-23 10:53:03
P
dsp/d(ln dte)
0
2
4
6
8
10
12
0.1
1
10
100
dte (min)

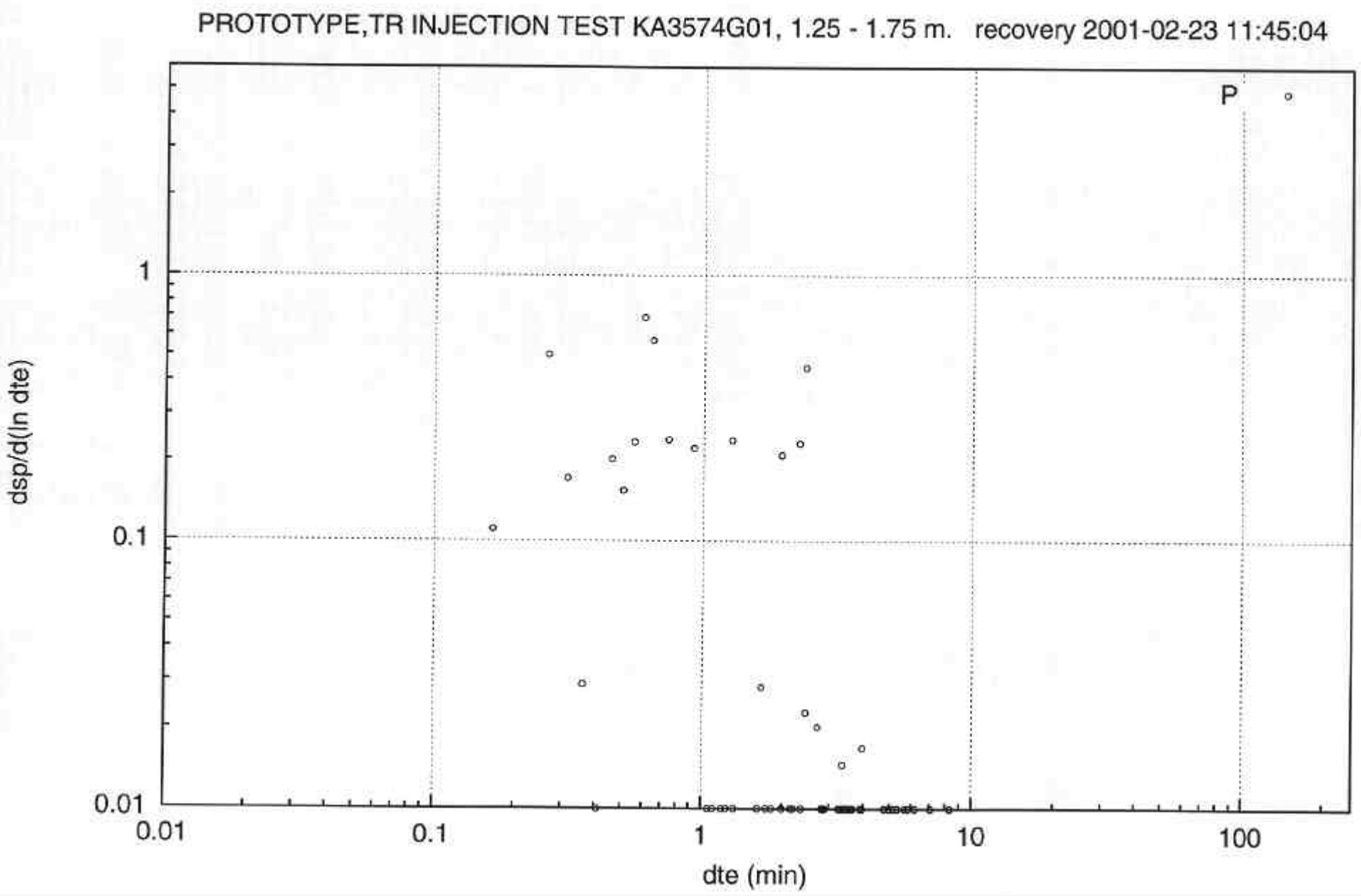

PROTOTYPE,TR INJECTION TEST KA3574G01, 0.75-1.25m recovery 2001-02-23 10:53:03
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
dte (min)


KA3574G01, 1.25-1.75m. Tr. Injection Test. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
11:30
12:00
30
13:00
30
Start: 2001-02-23 11:05:00
hour:min

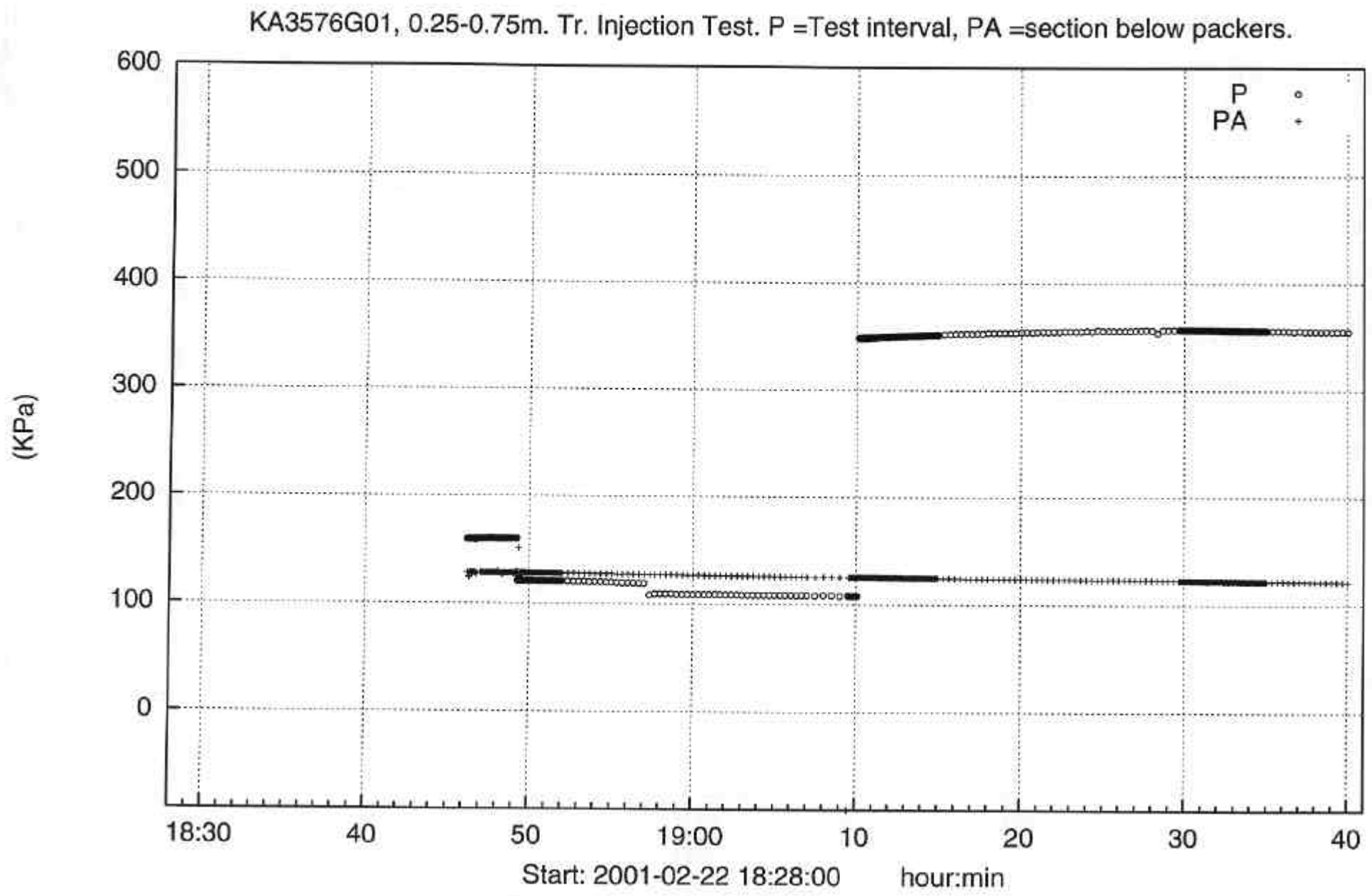

PROTOTYPE,TR INJECTION TEST KA3574G01, 1.25 - 1.75 m. recovery 2001-02-23 11:45:04
P
sp (KPa)
-3
-2
-1
0
1
2
3
0.01
0.1
1
10
100
dte (min)

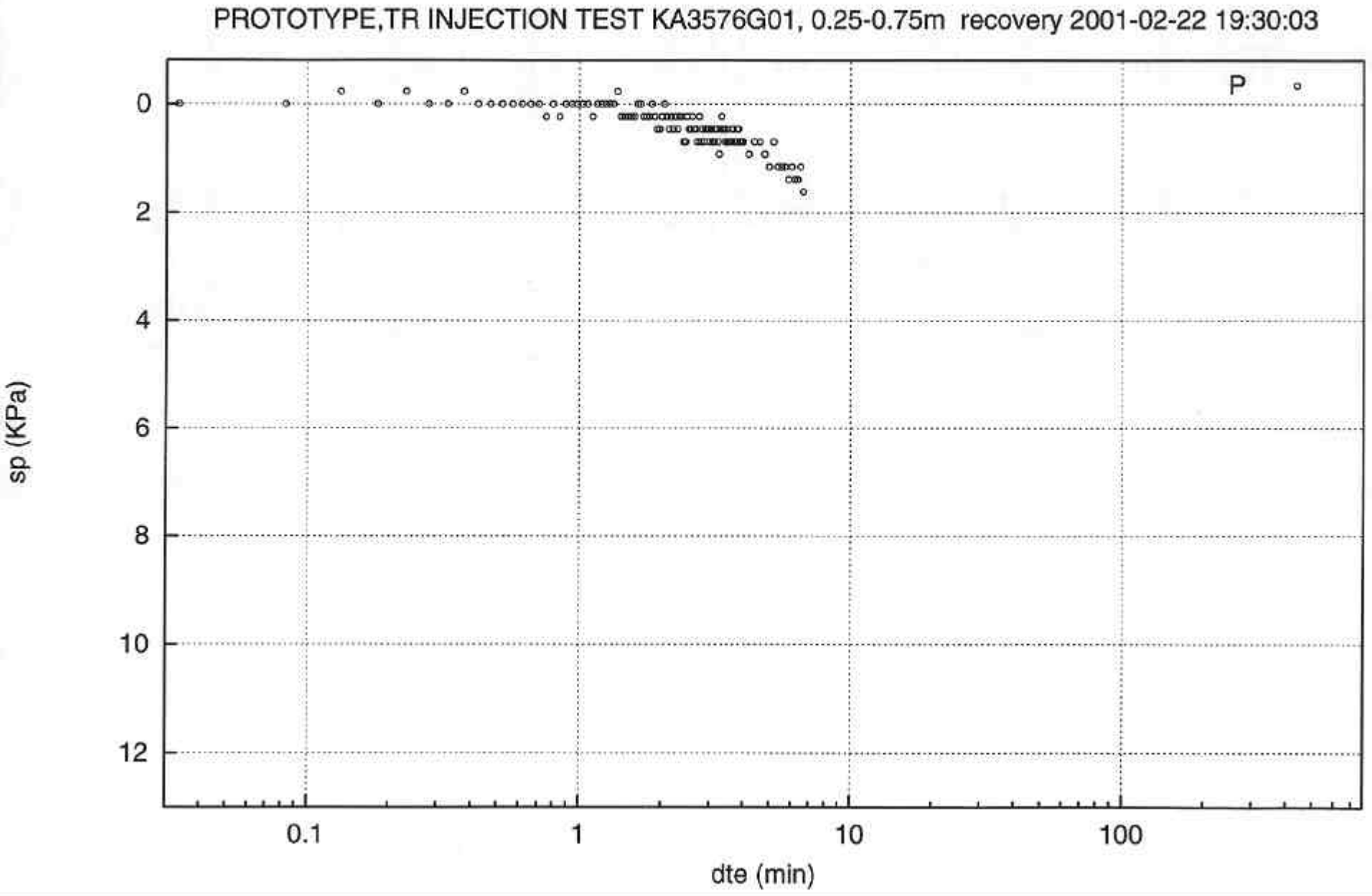

PROTOTYPE,TR INJECTION TEST KA3574G01, 1.25 - 1.75 m. recovery 2001-02-23 11:45:04
P
dsp/d(ln dte)
-3
-2
-1
0
1
2
3
0.01
0.1
1
10
100
dte (min)

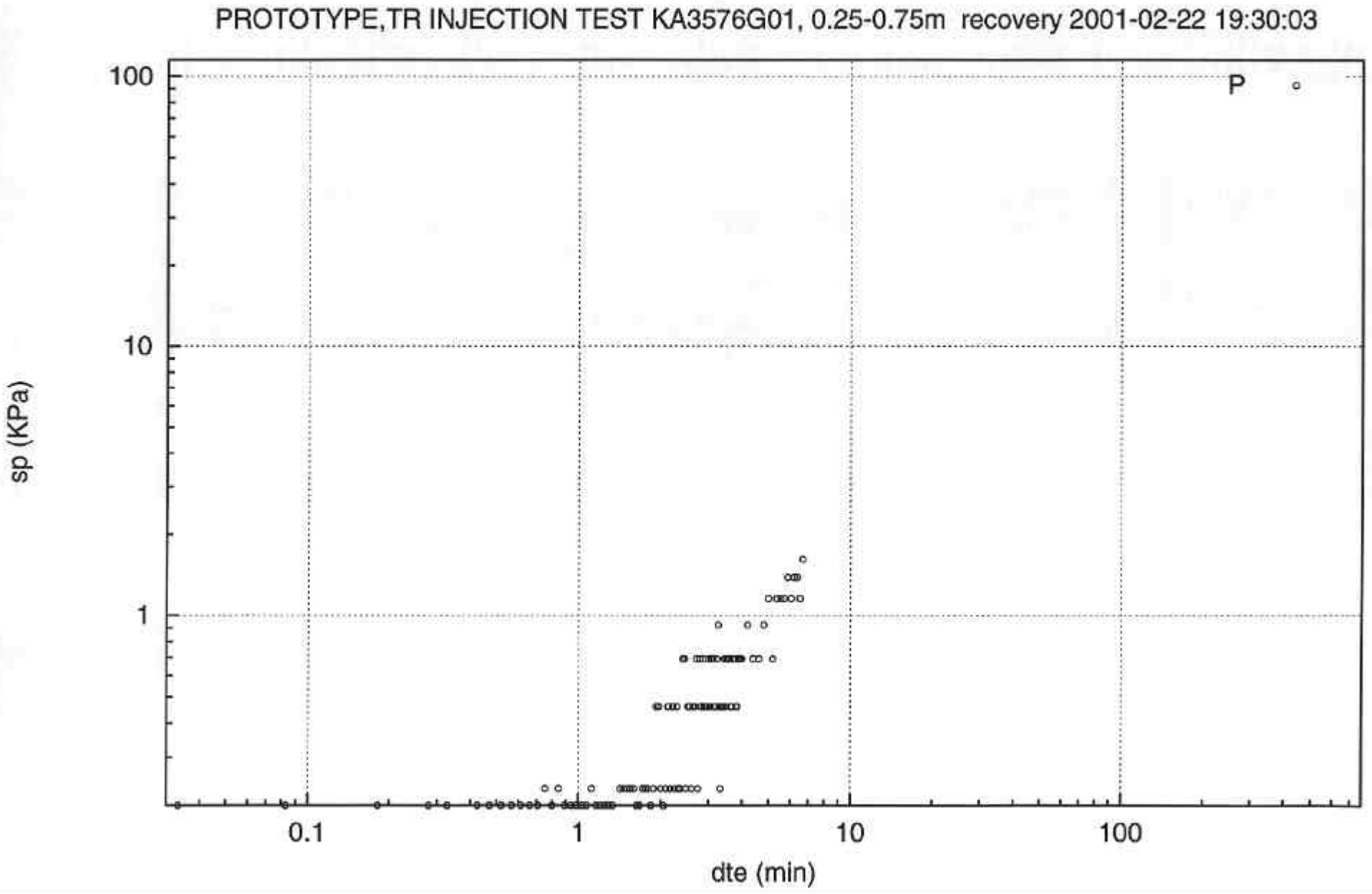

PROTOTYPE,TR INJECTION TEST KA3574G01, 1.25 - 1.75 m. recovery 2001-02-23 11:45:04
P
sp (KPa)
1
0.1
0.01
0.01
0.1
1
10
100
dte (min)

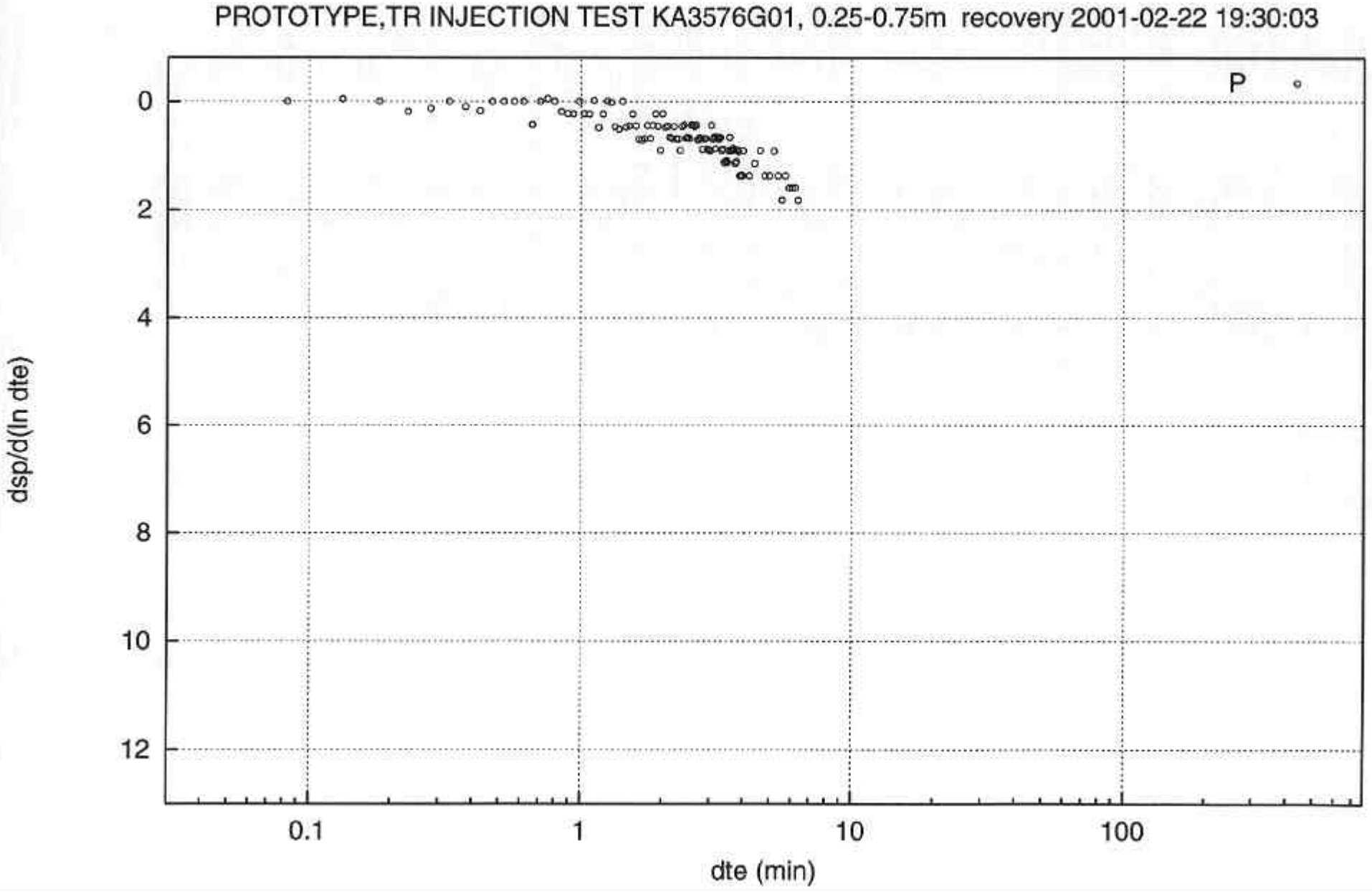

PROTOTYPE,TR INJECTION TEST KA3574G01, 1.25 - 1.75 m. recovery 2001-02-23 11:45:04
P
dsp/d(ln dte)
1
0.1
0.01
0.01
0.1
1
10
100
dte (min)

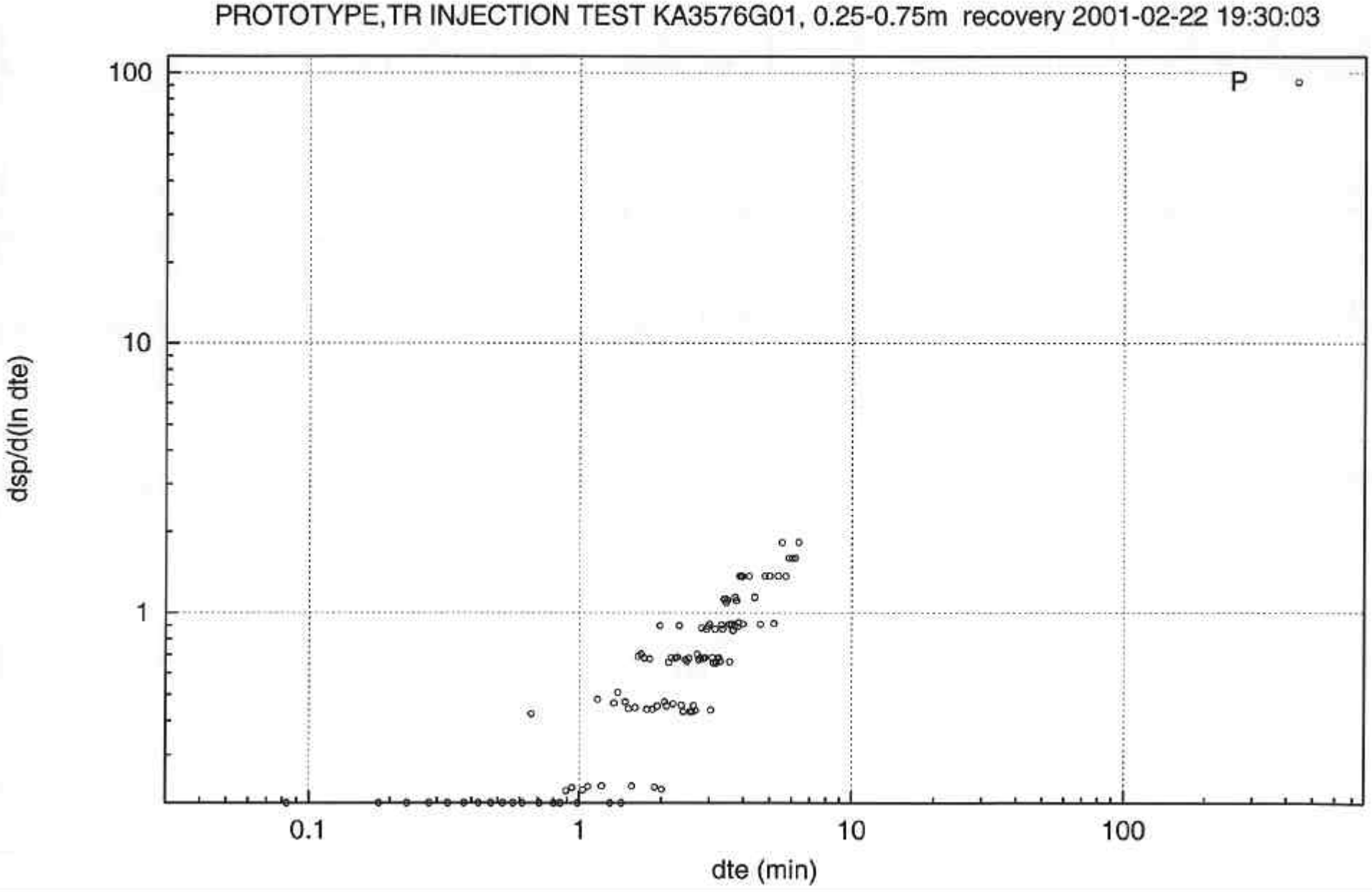
APPENDIX 13: Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3576G01. February 2001

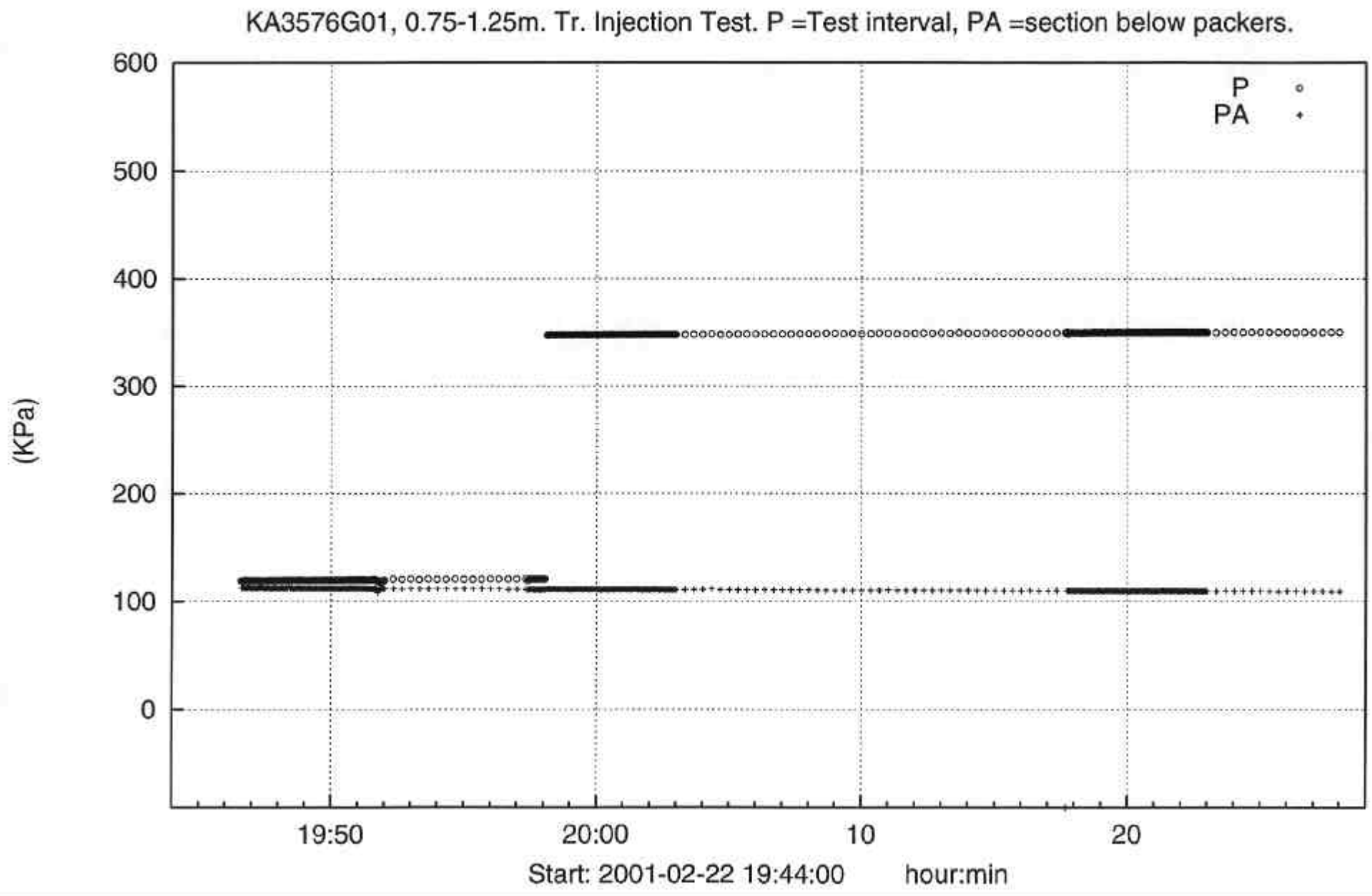

KA3576G01, 0.25-0.75m. Tr. Injection Test. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
18:30
40
50
19:00
10
20
30
40
Start: 2001-02-22 18:28:00
hour:min

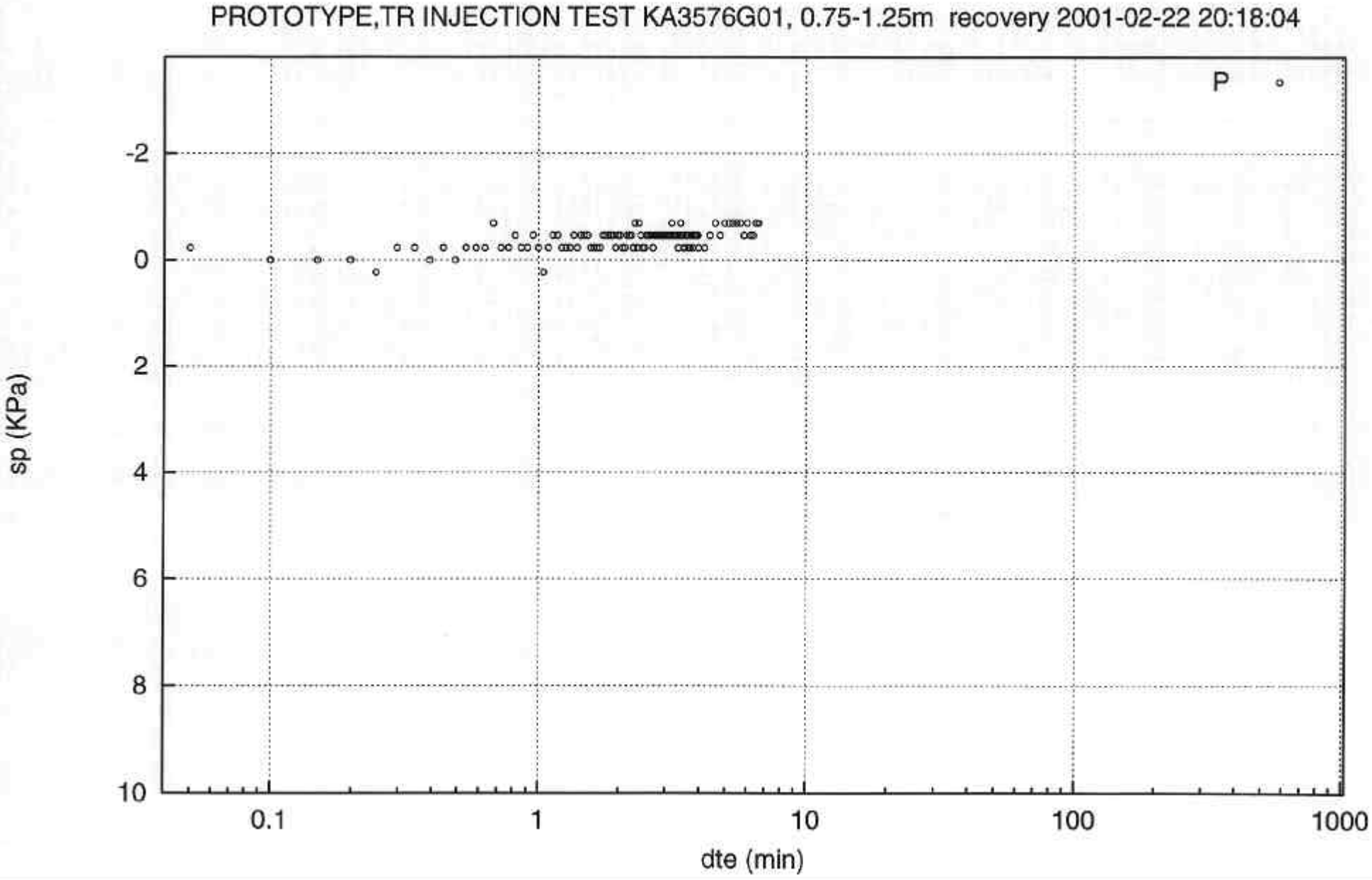

PROTOTYPE,TR INJECTION TEST KA3576G01, 0.25-0.75m recovery 2001-02-22 19:30:03
P
sp (KPa)
0
2
4
6
8
10
12
0.1
1
10
100
dte (min)

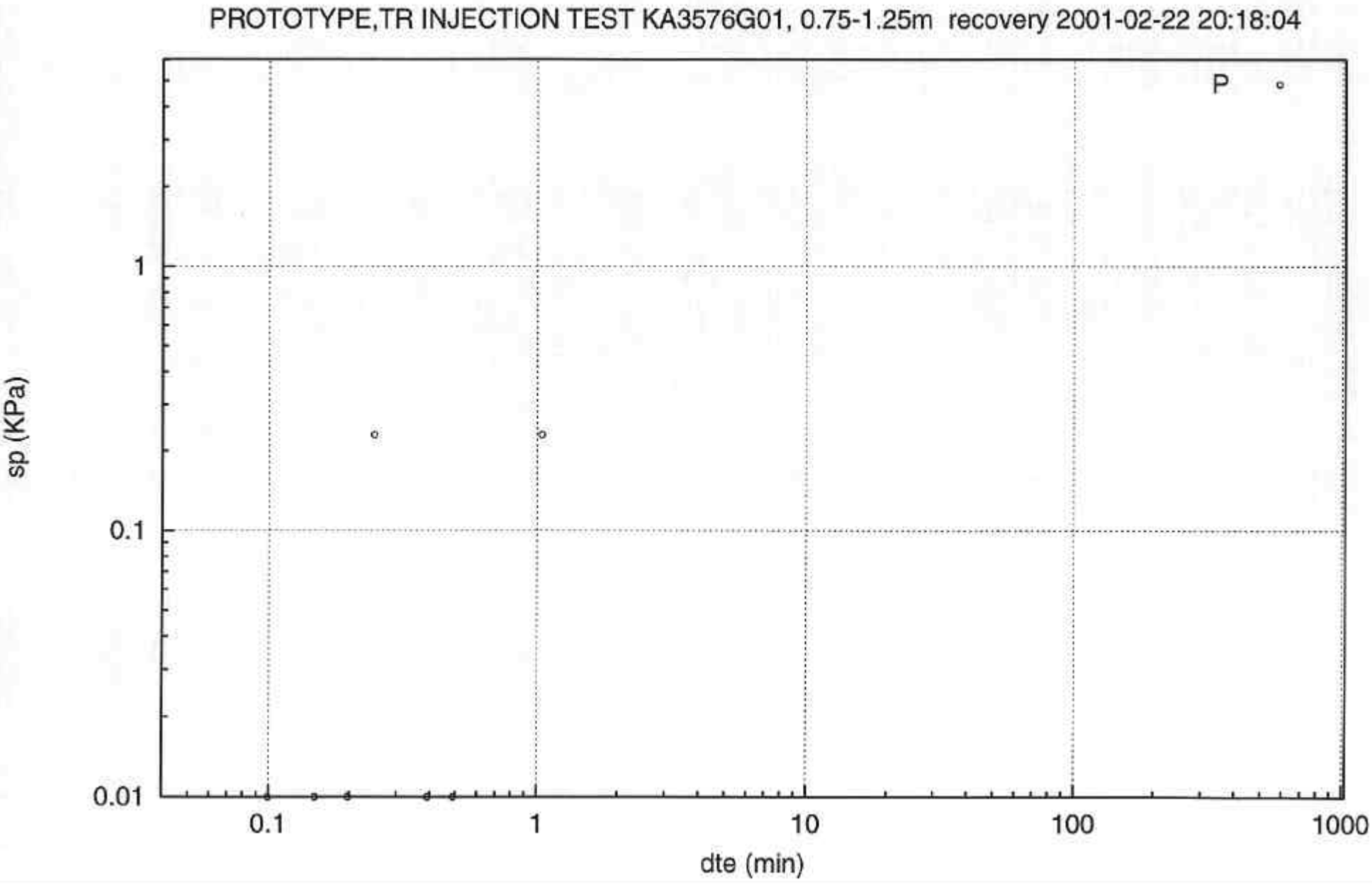

PROTOTYPE,TR INJECTION TEST KA3576G01, 0.25-0.75m recovery 2001-02-22 19:30:03
P
100
10
1
sp (KPa)
0.1
1
10
100
dte (min)

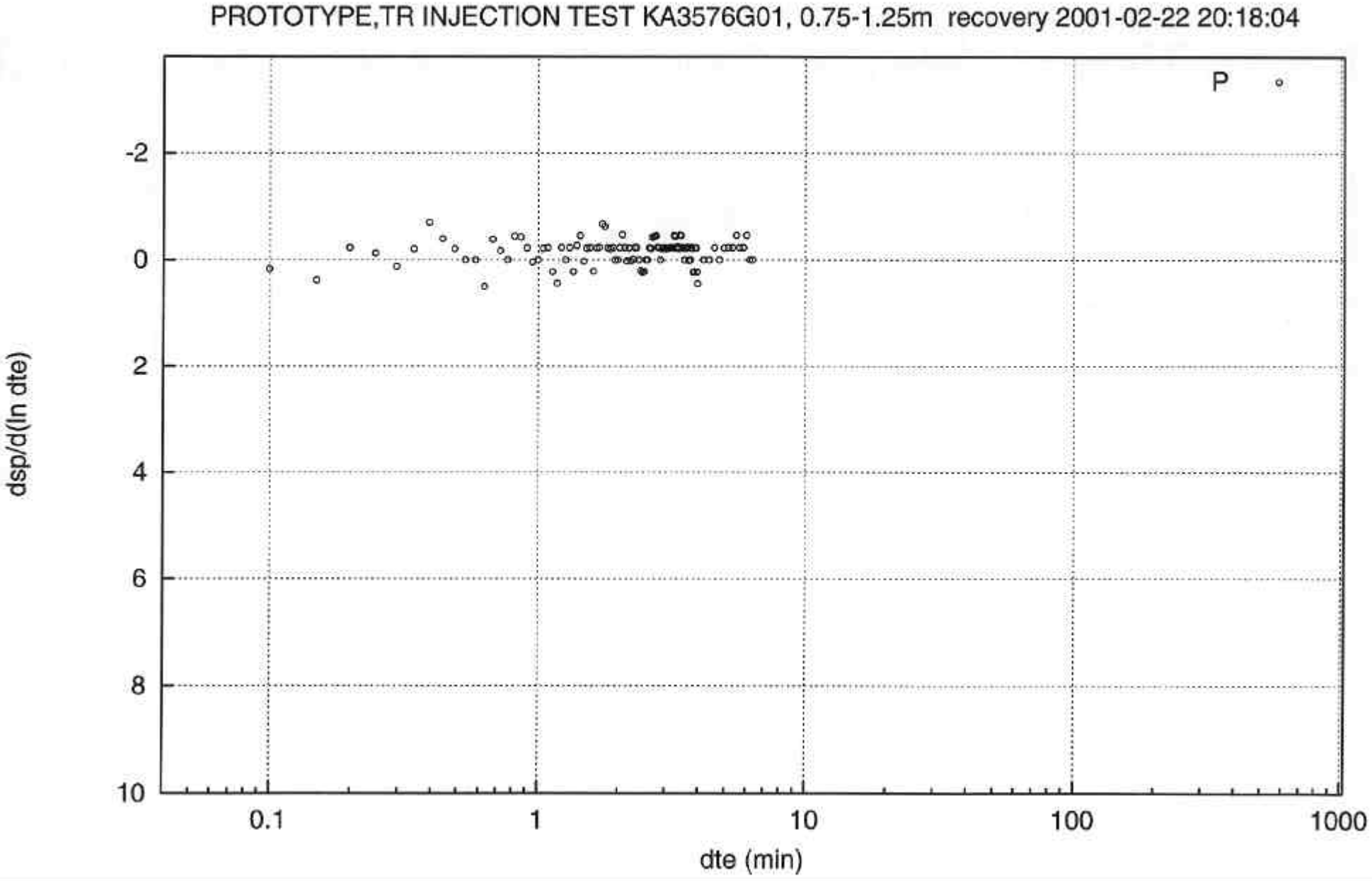

PROTOTYPE,TR INJECTION TEST KA3576G01, 0.25-0.75m recovery 2001-02-22 19:30:03
P
dsp/d(ln dte)
0
2
4
6
8
10
12
0.1
1
10
100
dte (min)

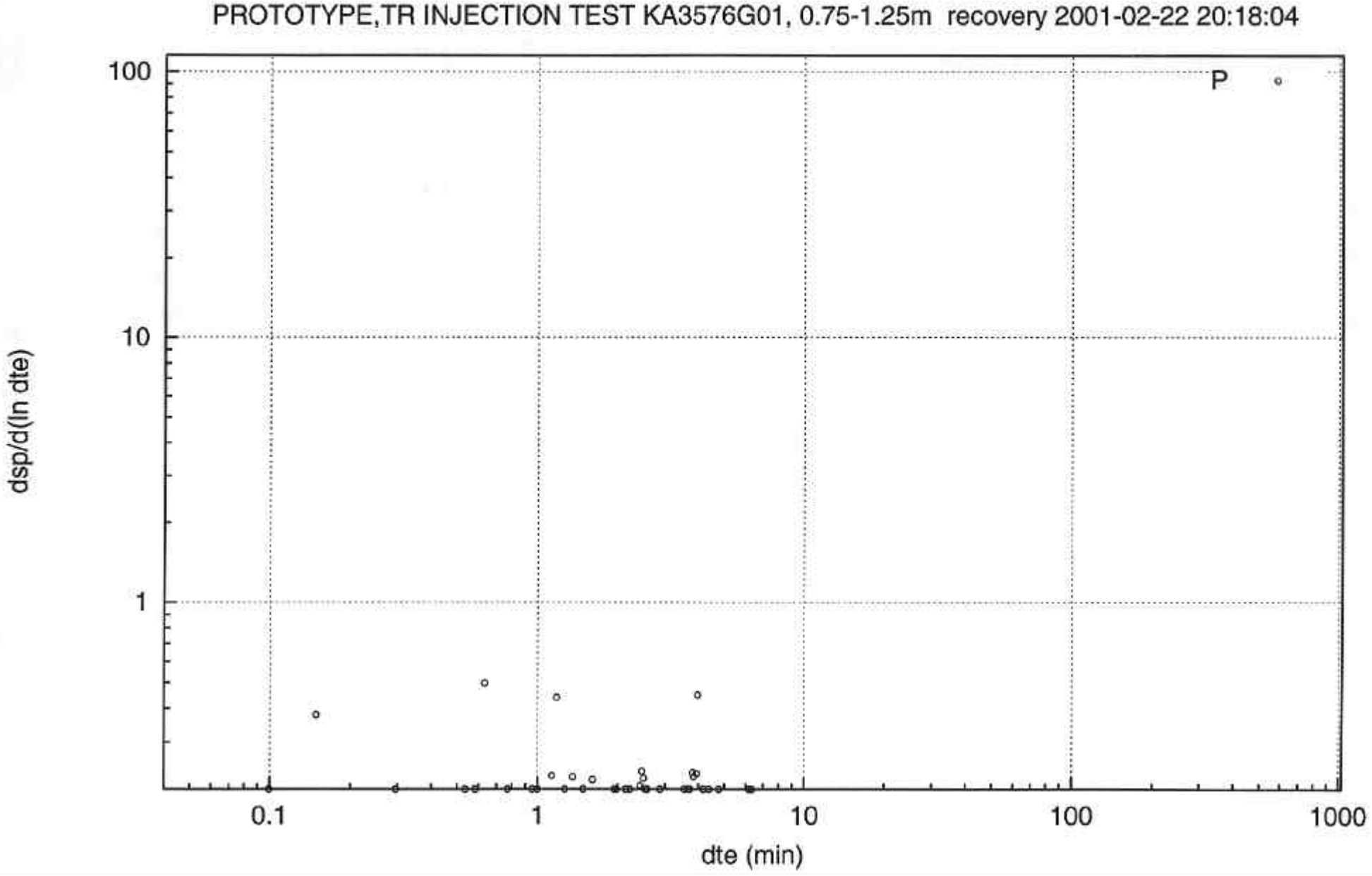

PROTOTYPE,TR INJECTION TEST KA3576G01, 0.25-0.75m recovery 2001-02-22 19:30:03
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
dte (min)

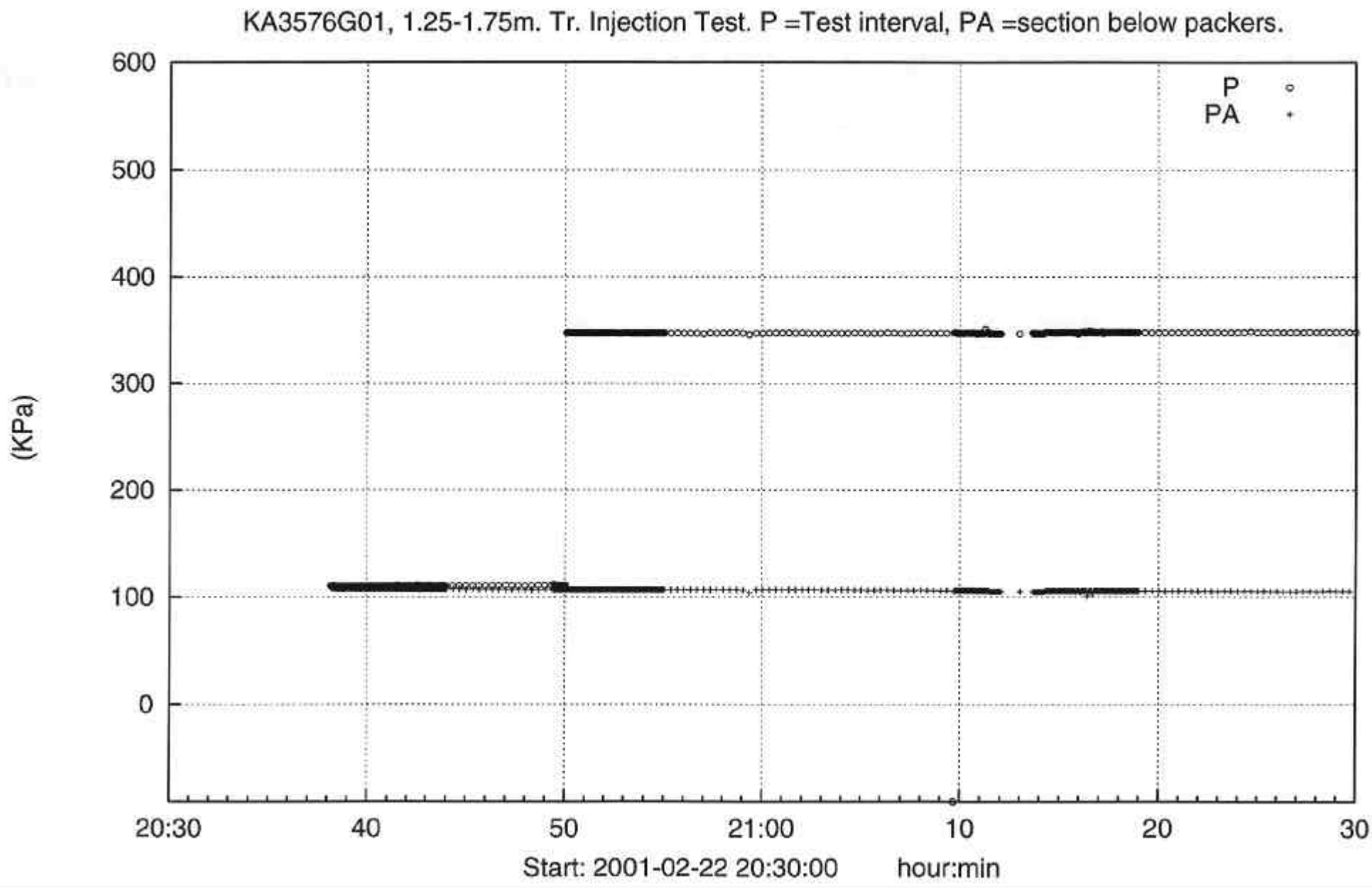

KA3576G01, 0.75-1.25m. Tr. Injection Test. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
19:50
20:00
10
20
Start: 2001-02-22 19:44:00
hour:min

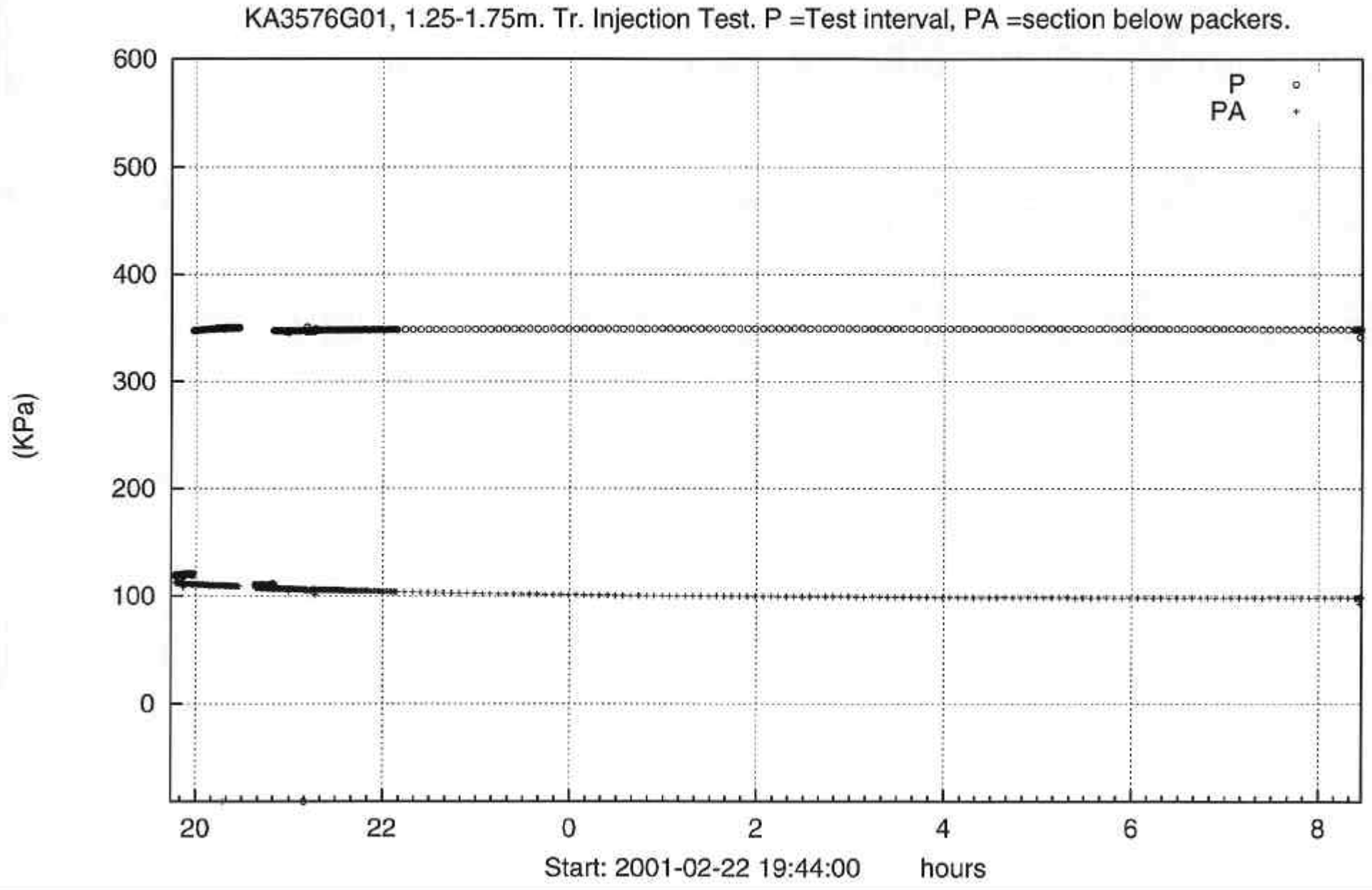

PROTOTYPE,TR INJECTION TEST KA3576G01, 0.75-1.25m recovery 2001-02-22 20:18:04
P
sp (KPa)
-2
0
2
4
6
8
10
0.1
1
10
100
1000
dte (min)

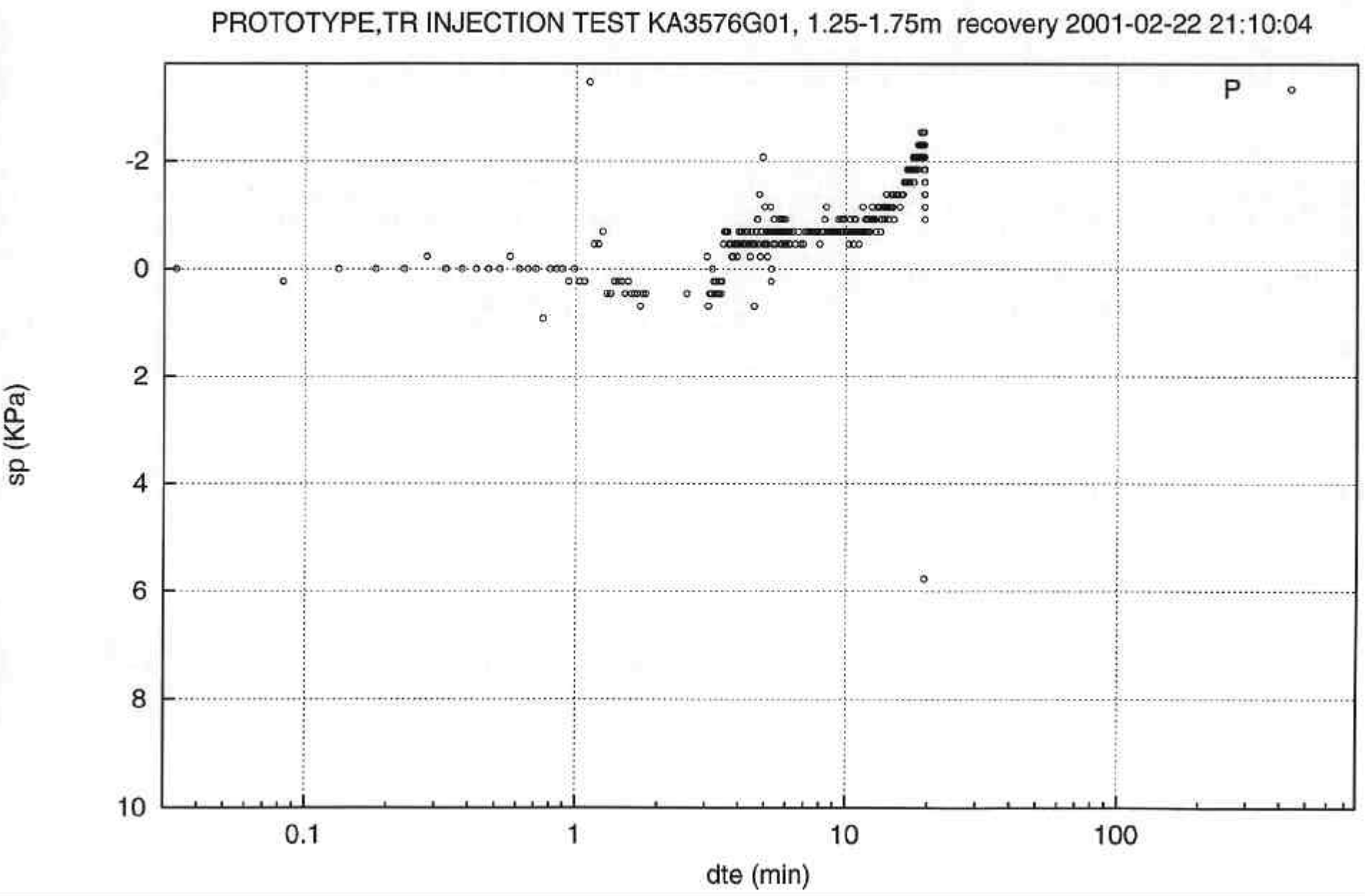

PROTOTYPE,TR INJECTION TEST KA3576G01, 0.75-1.25m recovery 2001-02-22 20:18:04
P
sp (KPa)
1
0.1
0.01
0.1
1
10
100
1000
dte (min)

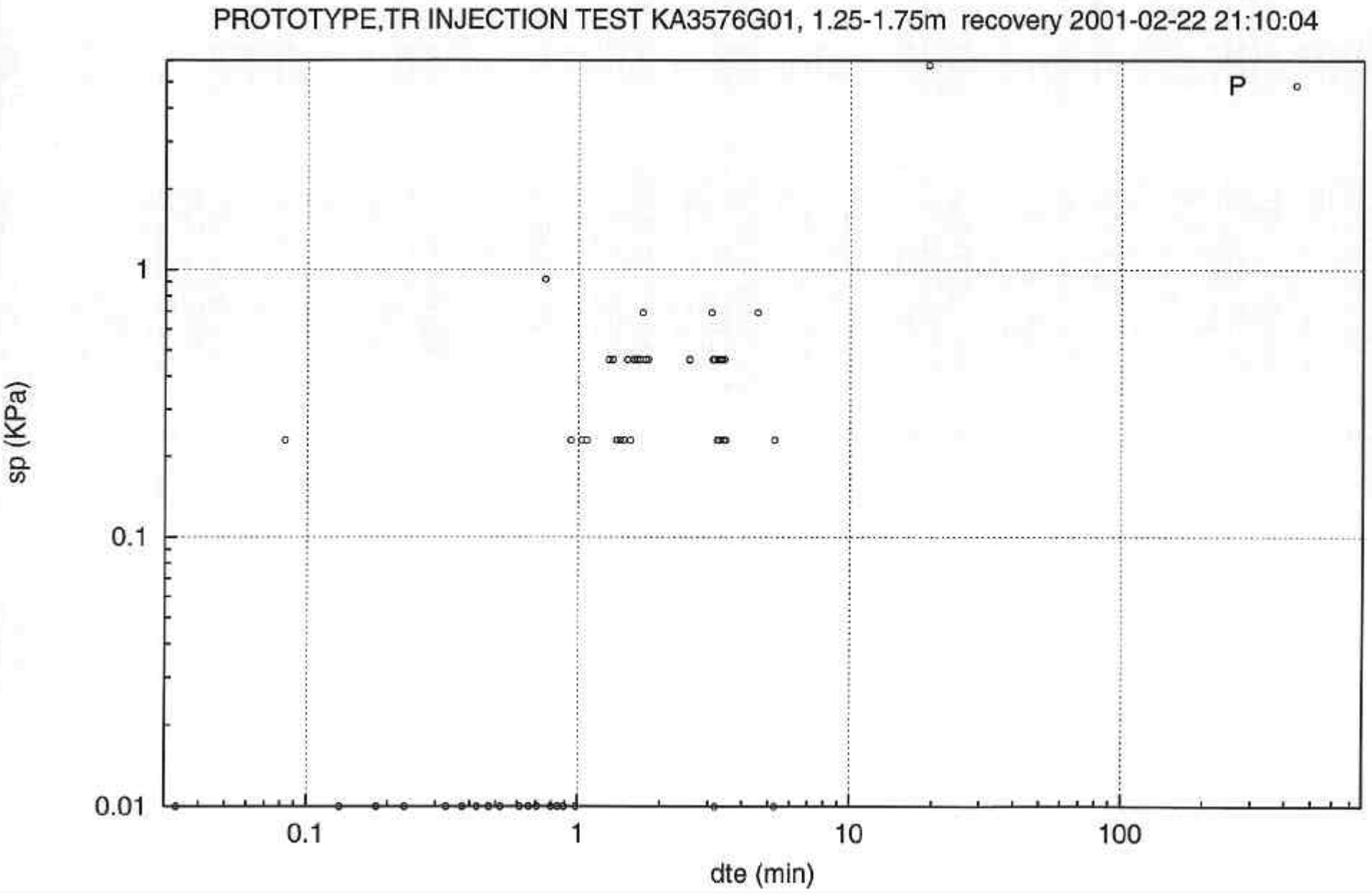

PROTOTYPE,TR INJECTION TEST KA3576G01, 0.75-1.25m recovery 2001-02-22 20:18:04
P
dsp/d(ln dte)
-2
0
2
4
6
8
10
0.1
1
10
100
1000
dte (min)

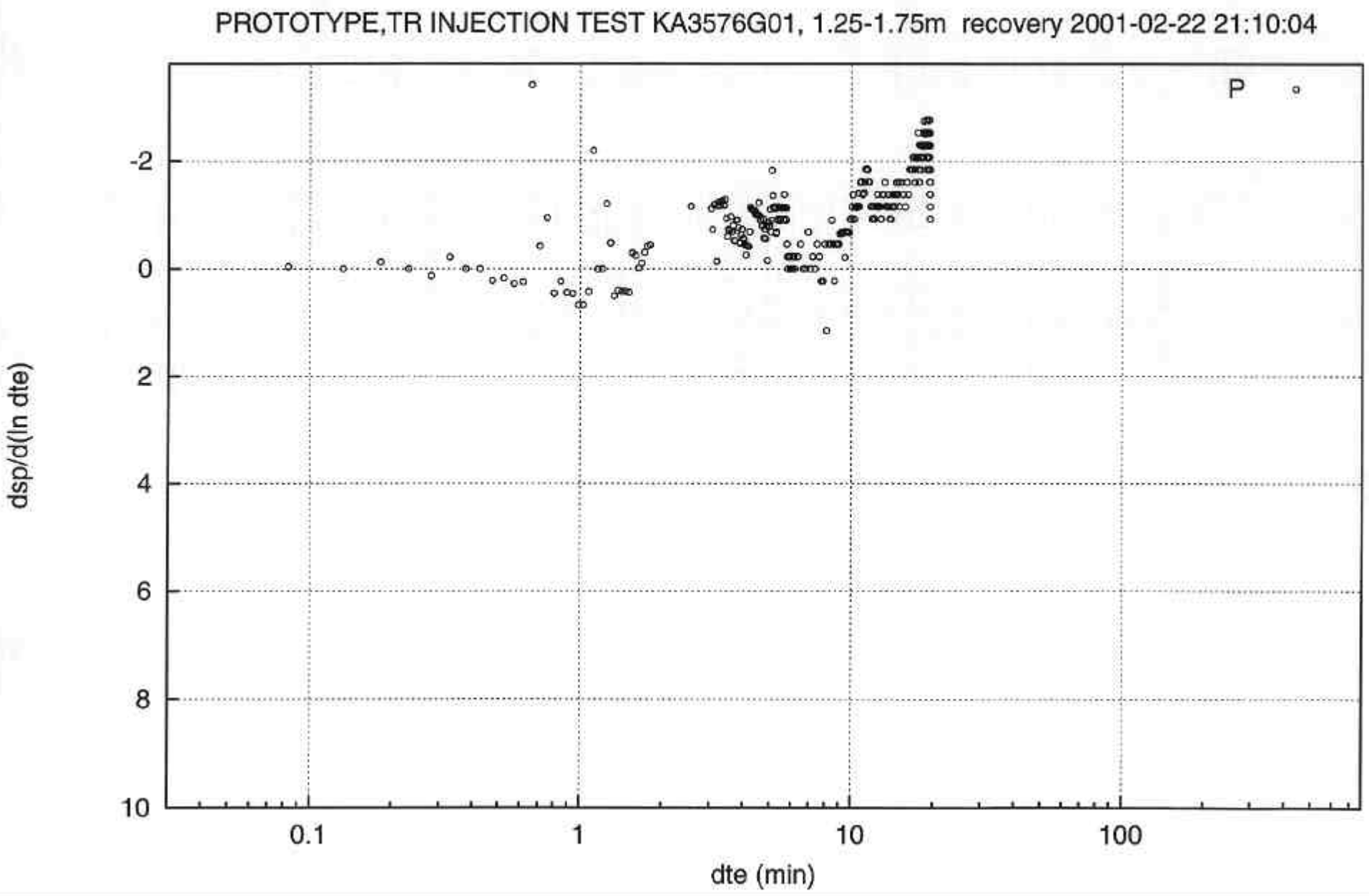

PROTOTYPE,TR INJECTION TEST KA3576G01, 0.75-1.25m recovery 2001-02-22 20:18:04
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
1000
dte (min)


KA3576G01, 1.25-1.75m. Tr. Injection Test. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
20:30
40
50
21:00
10
20
30
Start: 2001-02-22 20:30:00
hour:min

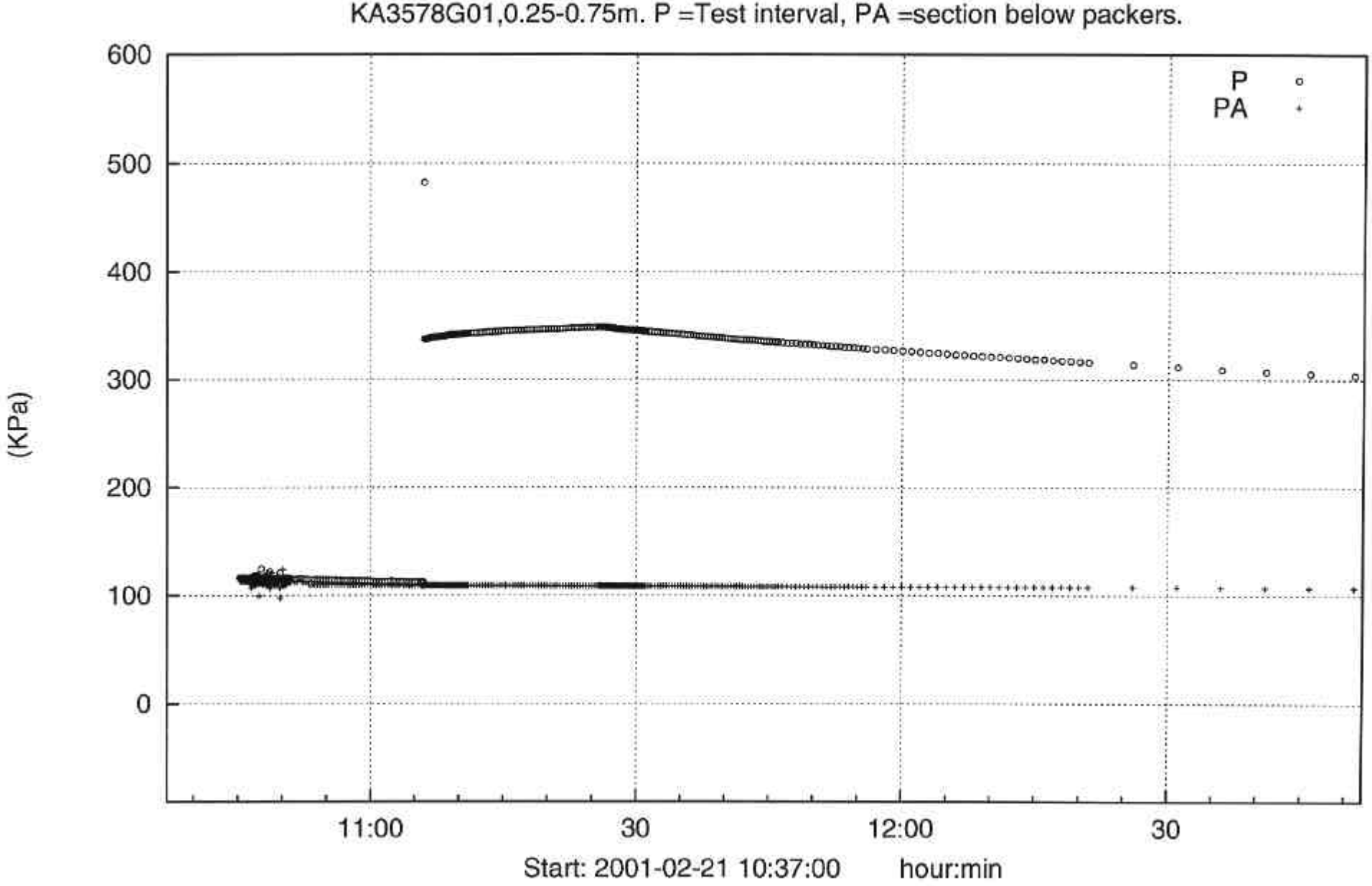

KA3576G01, 1.25-1.75m. Tr. Injection Test. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
20
22
0
2
4
6
8
Start: 2001-02-22 19:44:00
hours

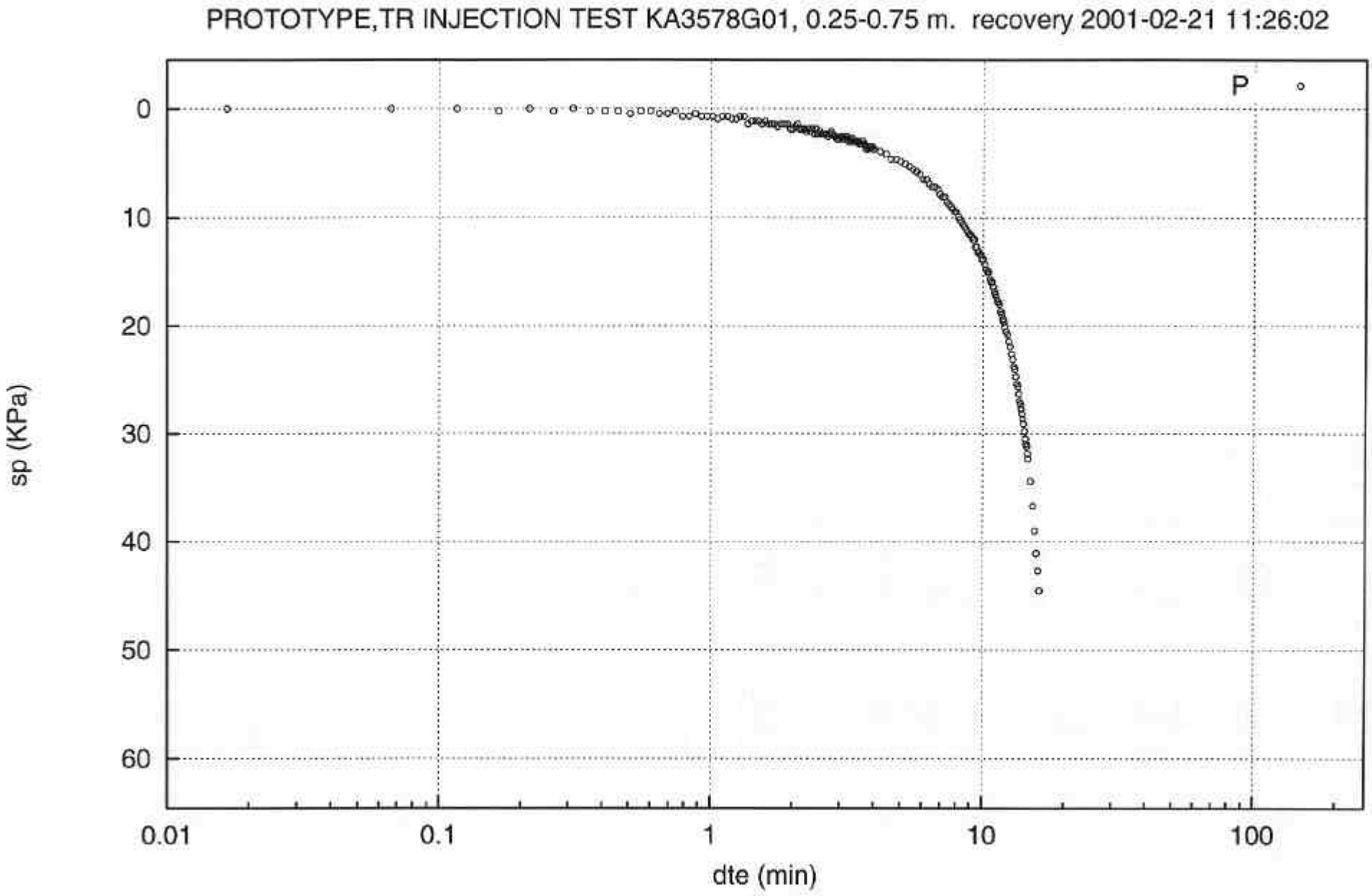

PROTOTYPE,TR INJECTION TEST KA3576G01, 1.25-1.75m recovery 2001-02-22 21:10:04
P
sp (KPa)
-2
0
2
4
6
8
10
0.1
1
10
100
dte (min)

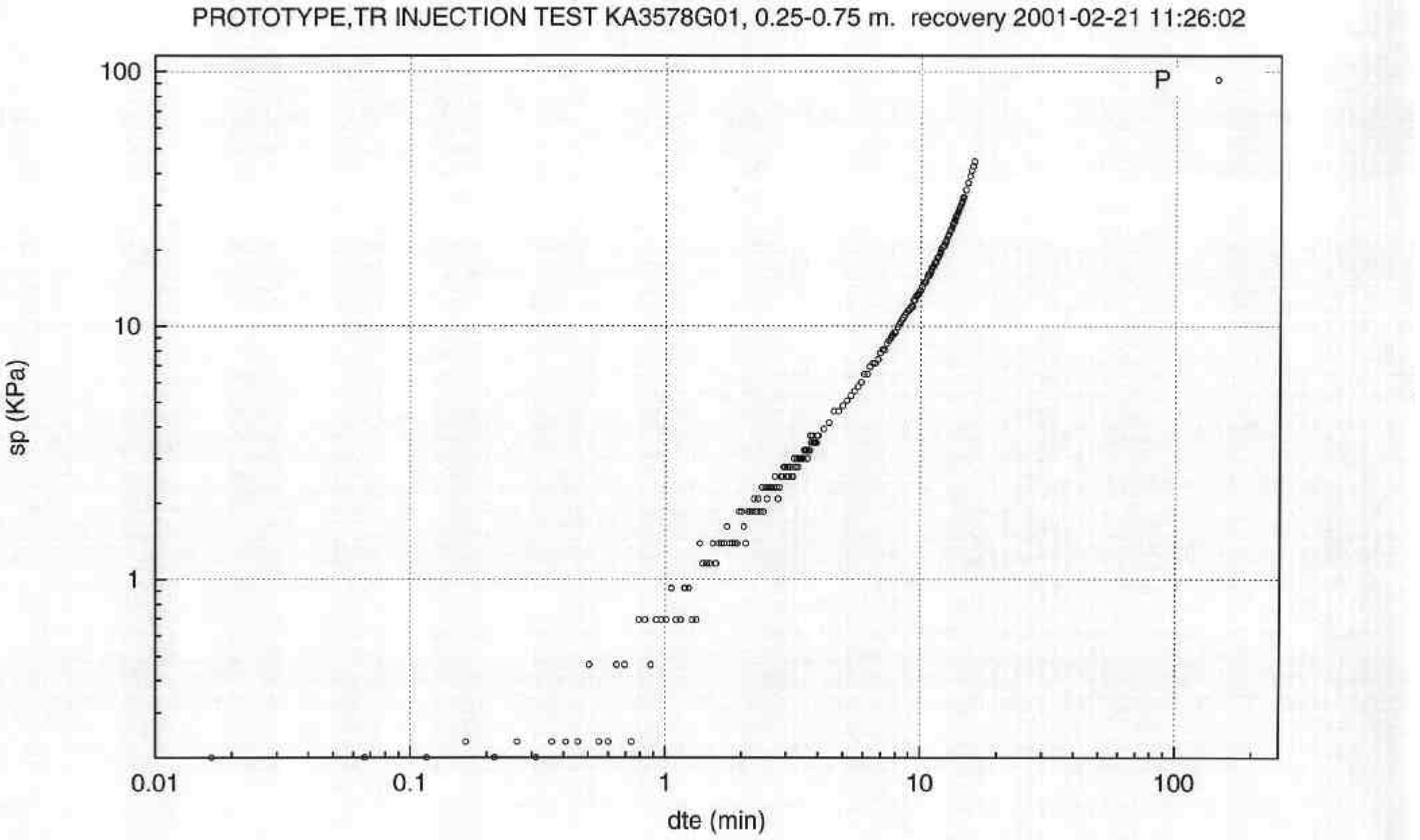

PROTOTYPE,TR INJECTION TEST KA3576G01, 1.25-1.75m recovery 2001-02-22 21:10:04
P
sp (KPa)
1
0.1
0.01
0.1
1
10
100
dte (min)

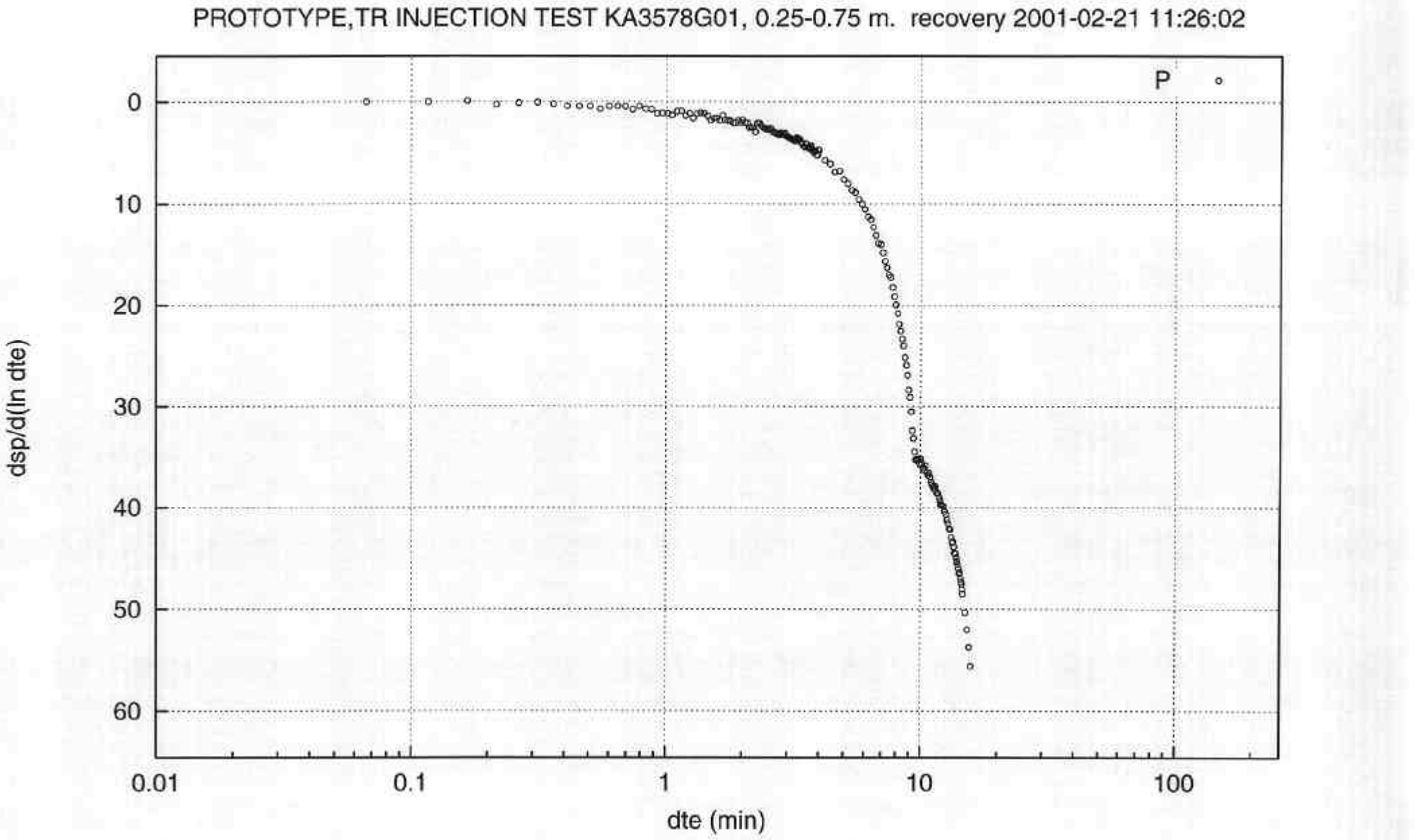

PROTOTYPE,TR INJECTION TEST KA3576G01, 1.25-1.75m recovery 2001-02-22 21:10:04
P
dsp/d(ln dte)
-2
0
2
4
6
8
10
0.1
1
10
100
dte (min)

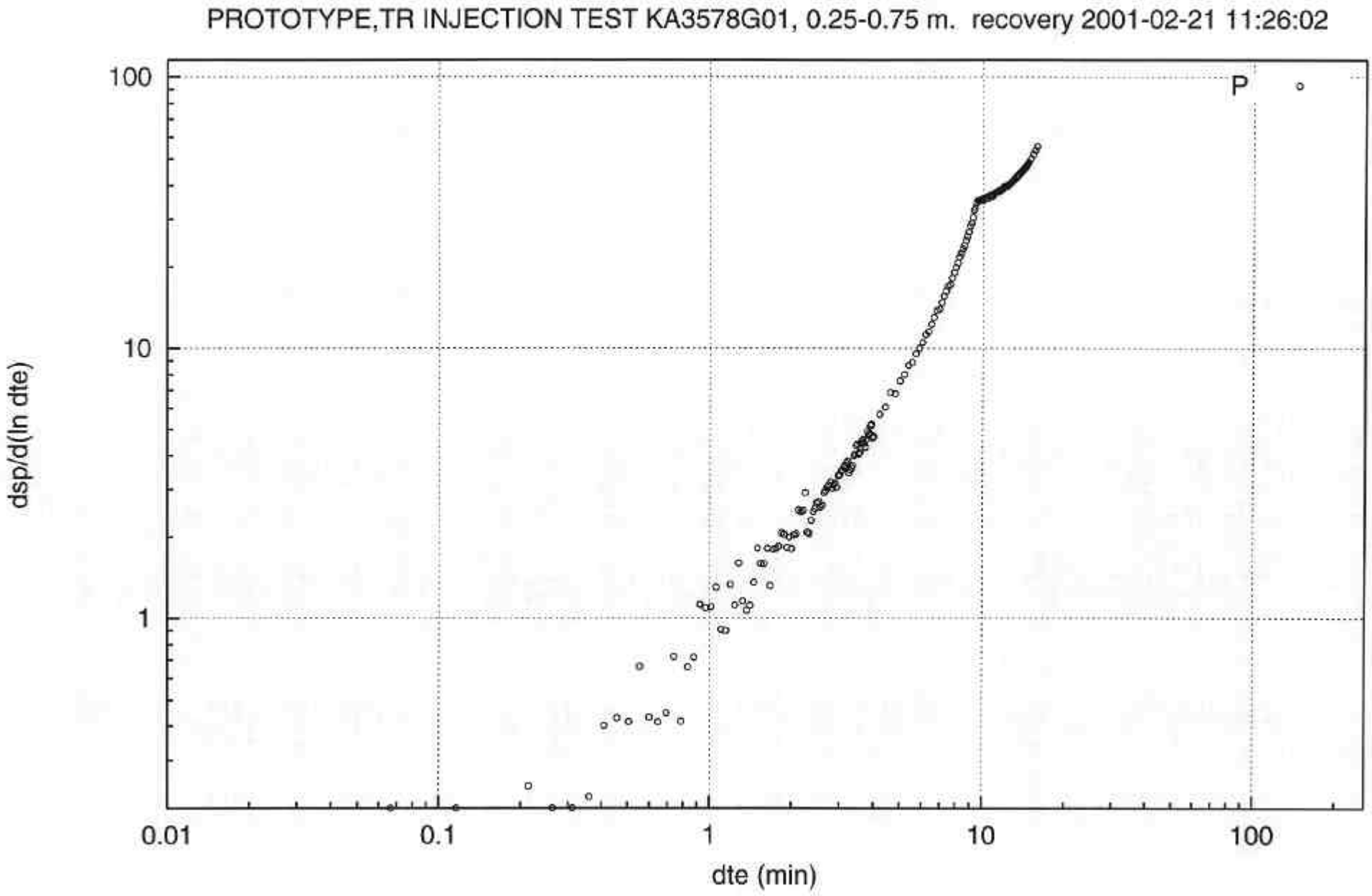
APPENDIX 14: Diagrams from transient injection tests in three test intervals between 0.25 m and 1.75 m in borehole KA3578G01. February 2001

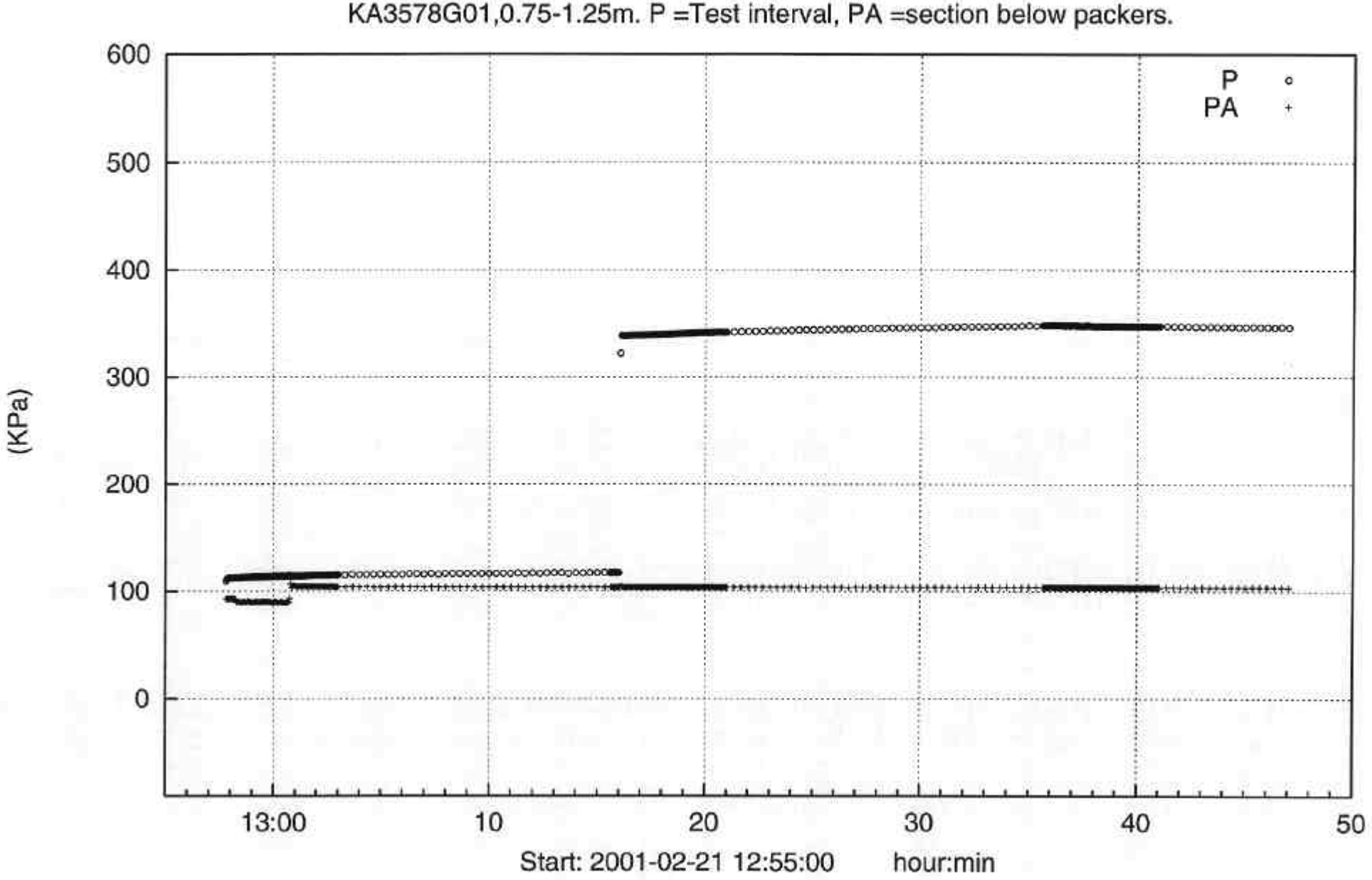

KA3578G01,0.25-0.75m. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
11:00
30
12:00
30
Start: 2001-02-21 10:37:00
hour:min

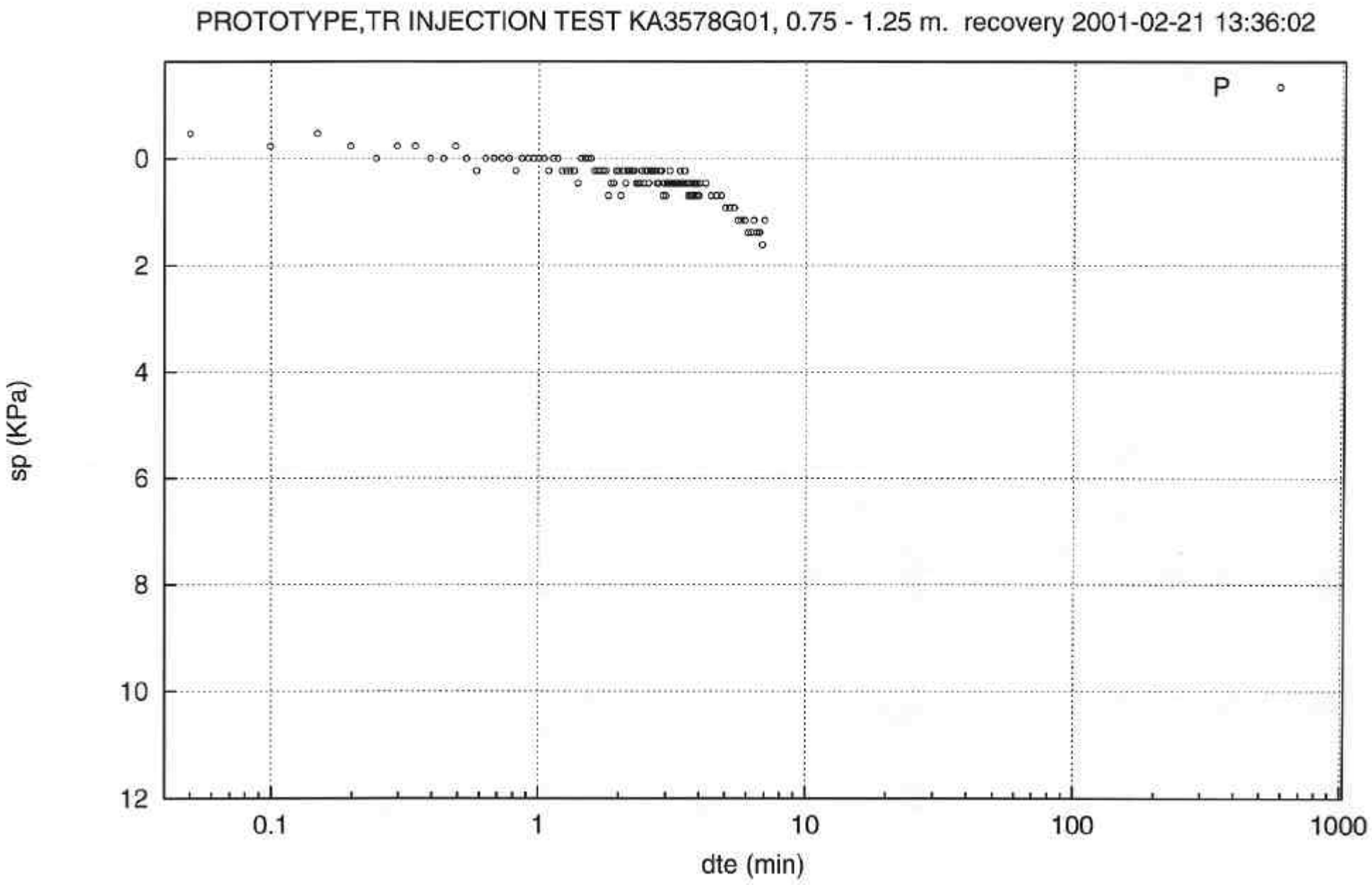

PROTOTYPE,TR INJECTION TEST KA3578G01, 0.25-0.75 m. recovery 2001-02-21 11:26:02
P
sp (KPa)
0
10
20
30
40
50
60
0.01
0.1
1
10
100
dte (min)

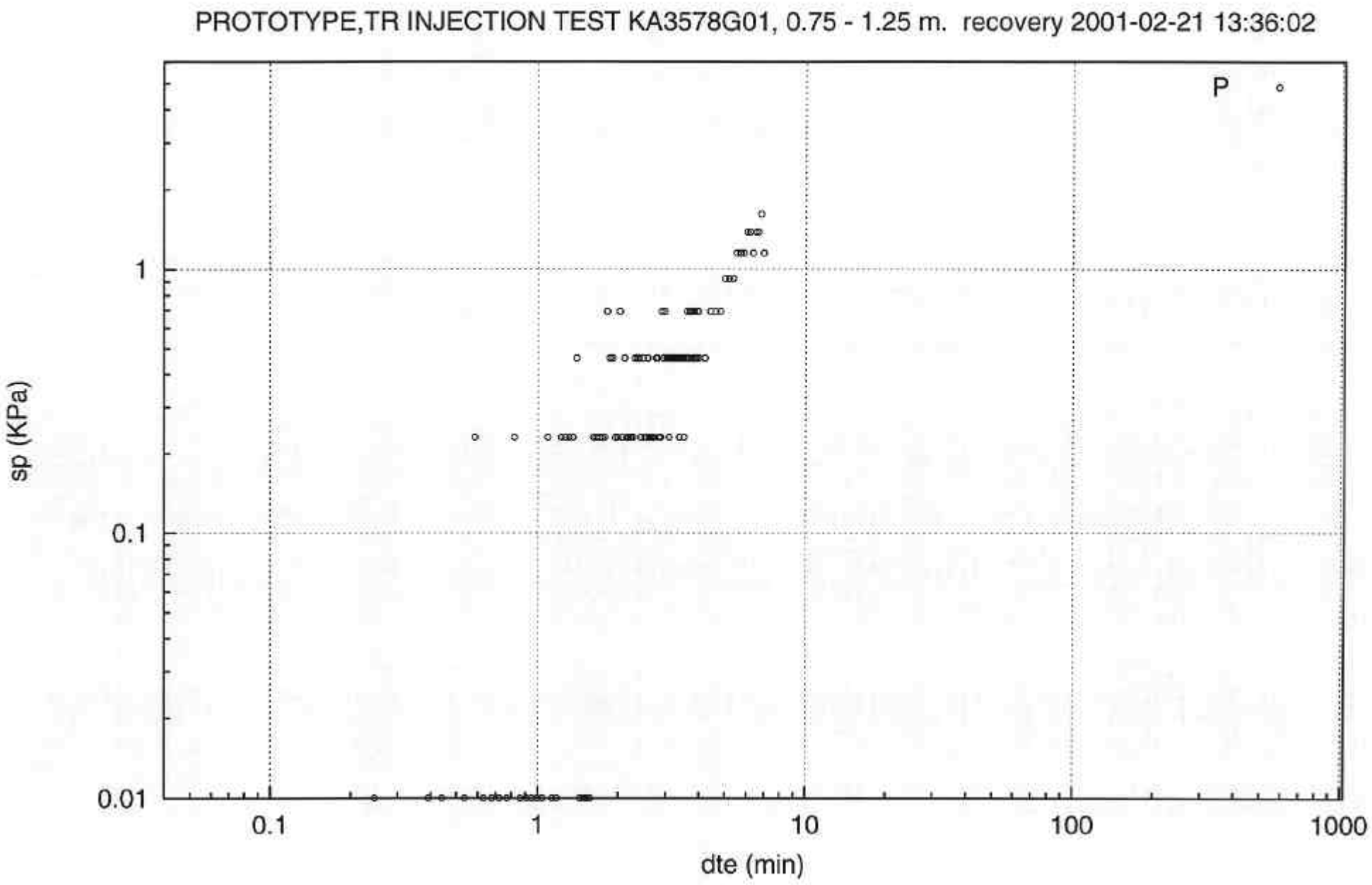

PROTOTYPE,TR INJECTION TEST KA3578G01, 0.25-0.75 m. recovery 2001-02-21 11:26:02
P
100
10
1
sp (KPa)
0.01
0.1
1
10
100
dte (min)

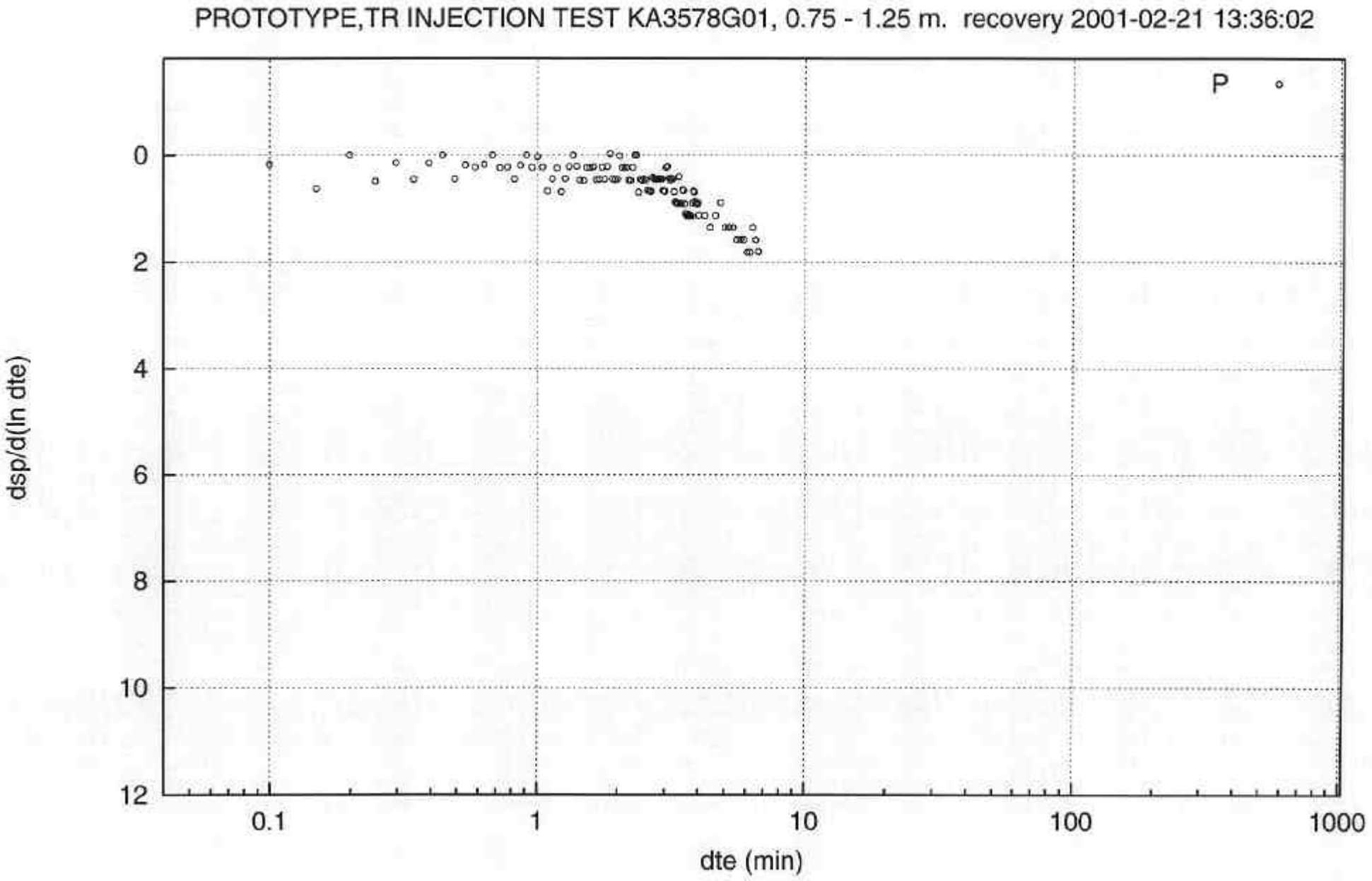

PROTOTYPE,TR INJECTION TEST KA3578G01, 0.25-0.75 m. recovery 2001-02-21 11:26:02
P
0
10
20
30
40
50
60
dsp/d(ln dte)
0.01
0.1
1
10
100
dte (min)

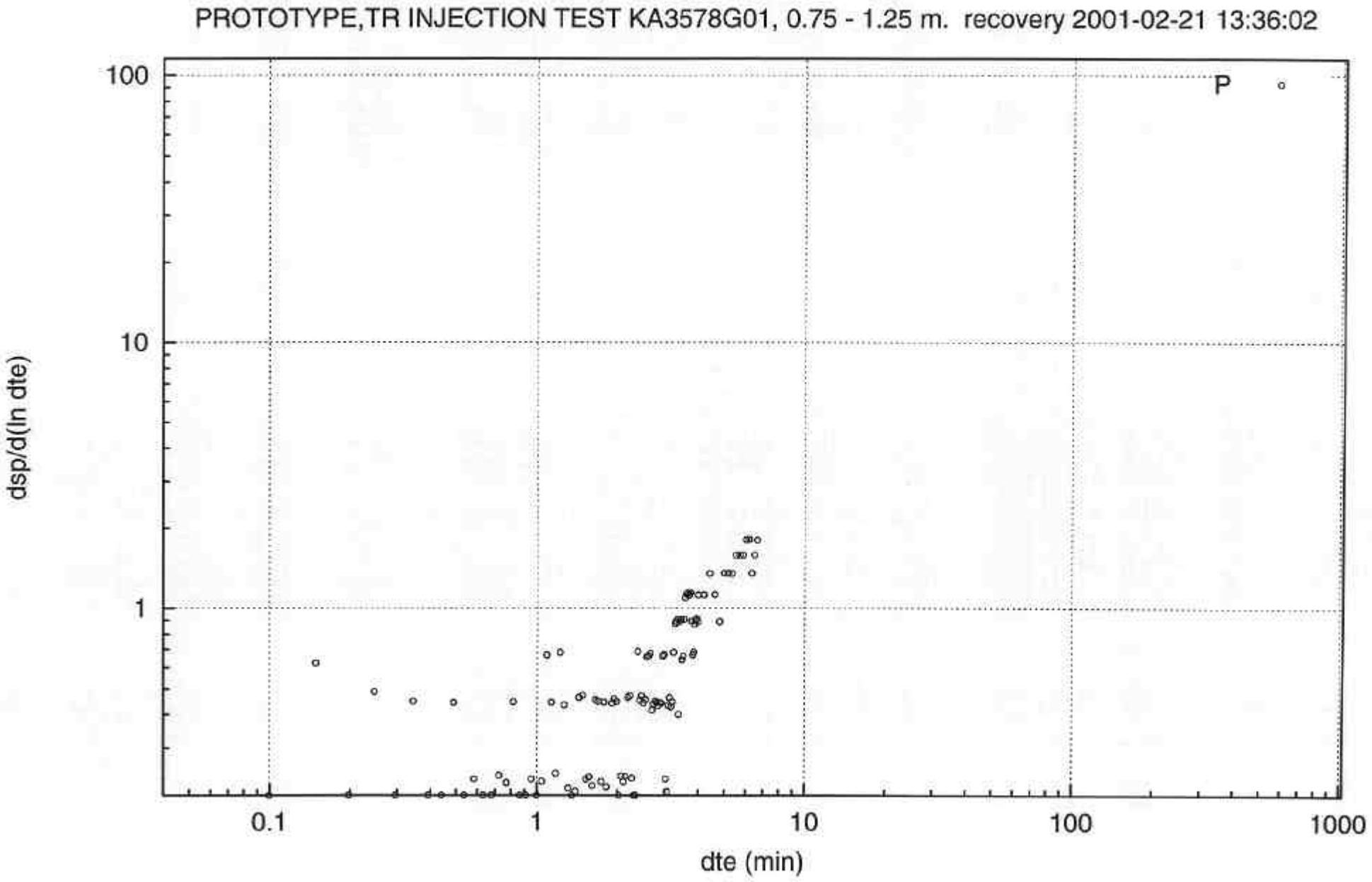

PROTOTYPE,TR INJECTION TEST KA3578G01, 0.25-0.75 m. recovery 2001-02-21 11:26:02
P
100
10
1
dsp/d(ln dte)
0.01
0.1
1
10
100
dte (min)

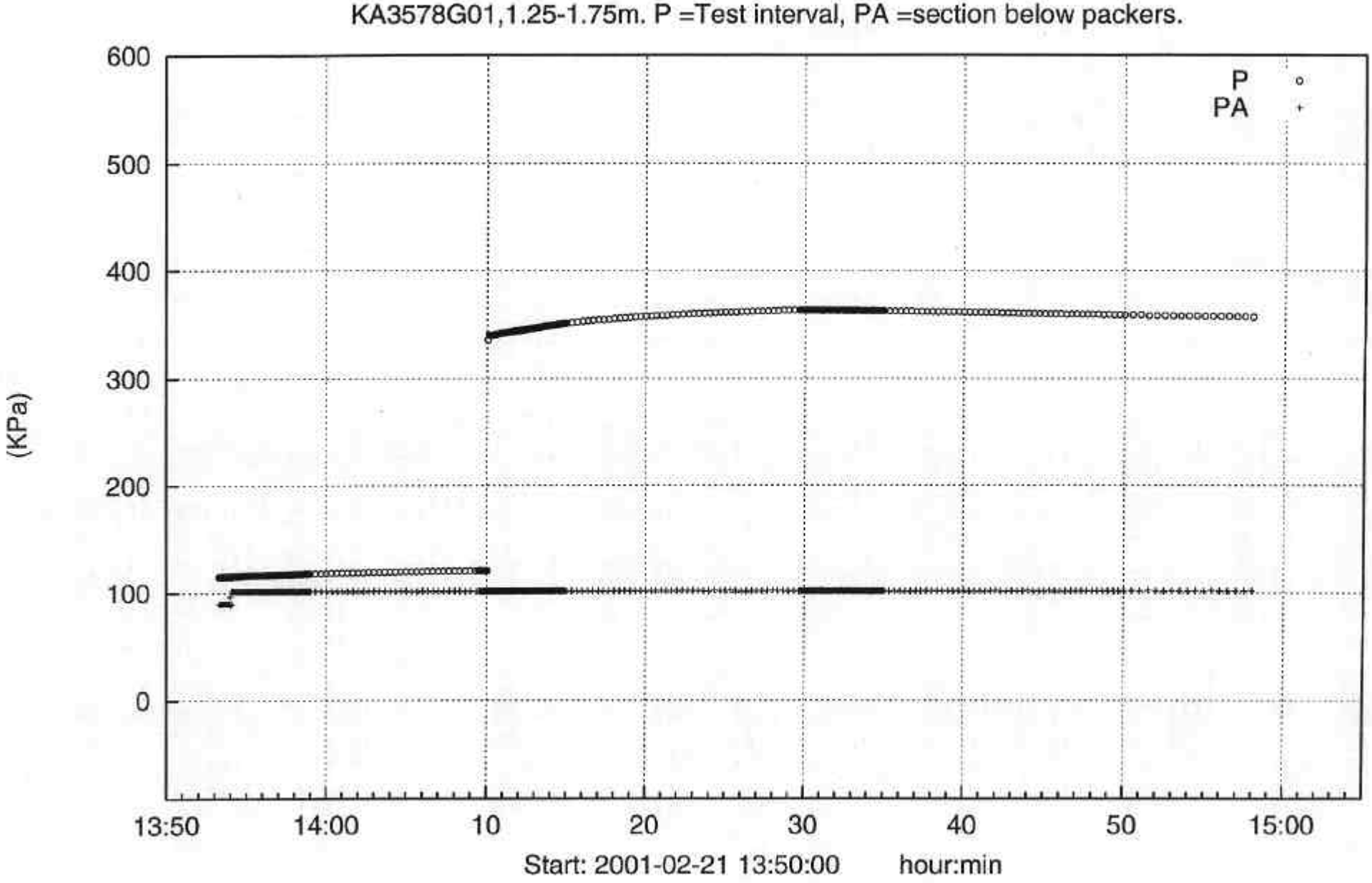

KA3578G01,0.75-1.25m. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
13:00
10
20
30
40
50
Start: 2001-02-21 12:55:00
hour:min

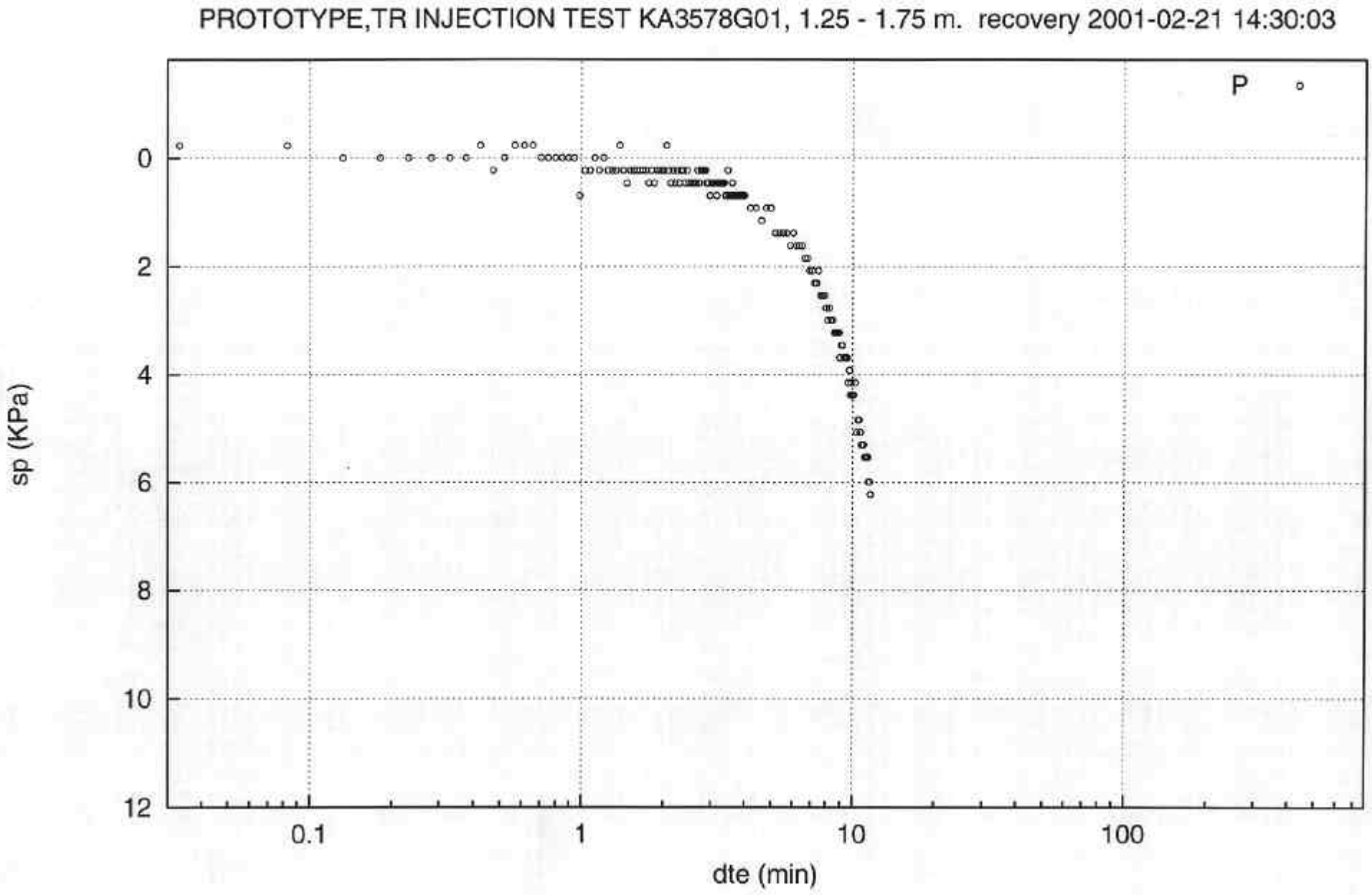

PROTOTYPE,TR INJECTION TEST KA3578G01, 0.75 - 1.25 m. recovery 2001-02-21 13:36:02
P
sp (KPa)
0
2
4
6
8
10
12
0.1
1
10
100
1000
dte (min)

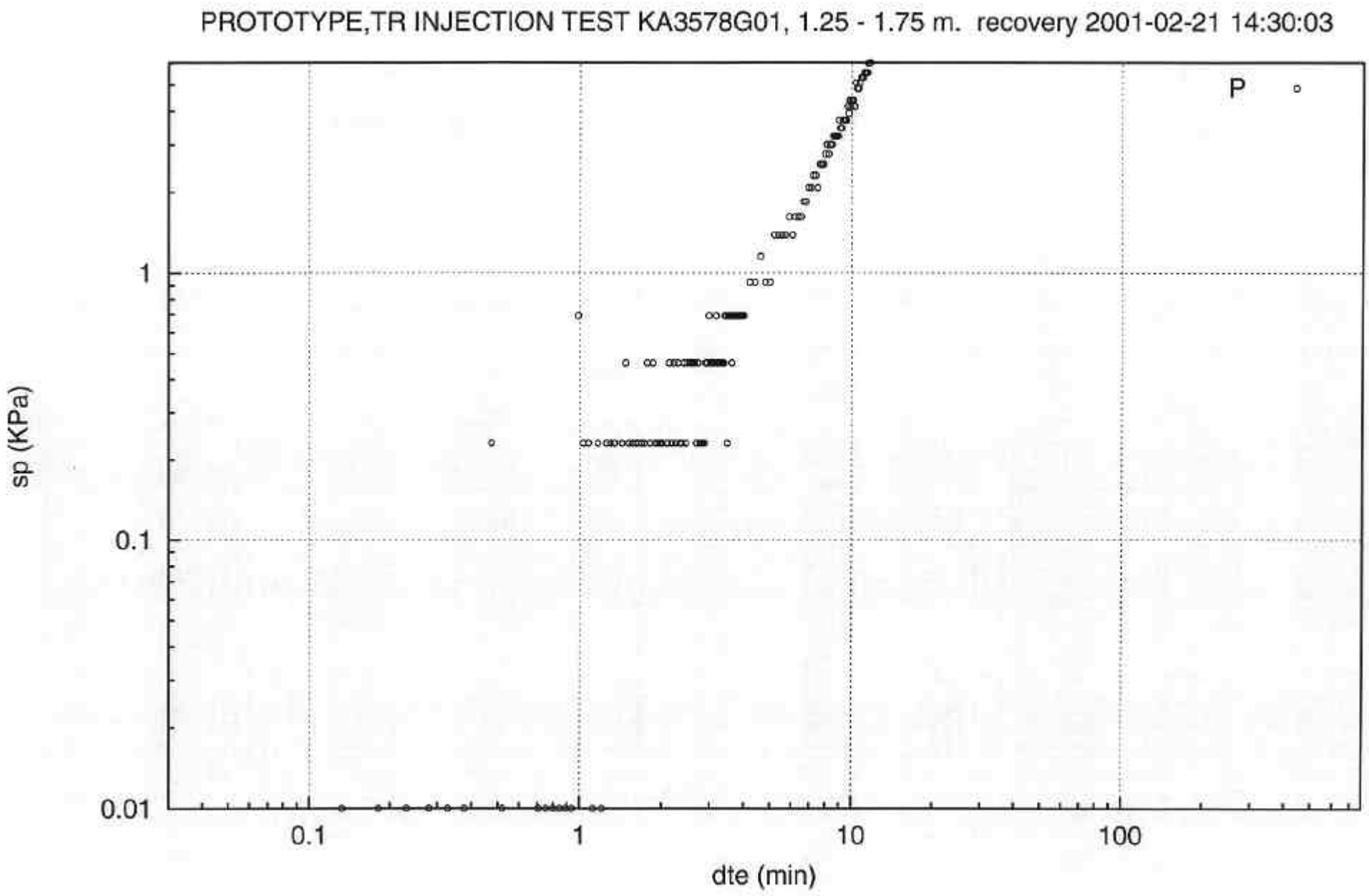

PROTOTYPE,TR INJECTION TEST KA3578G01, 0.75 - 1.25 m. recovery 2001-02-21 13:36:02
P
sp (KPa)
1
0.1
0.01
0.1
1
10
100
1000
dte (min)

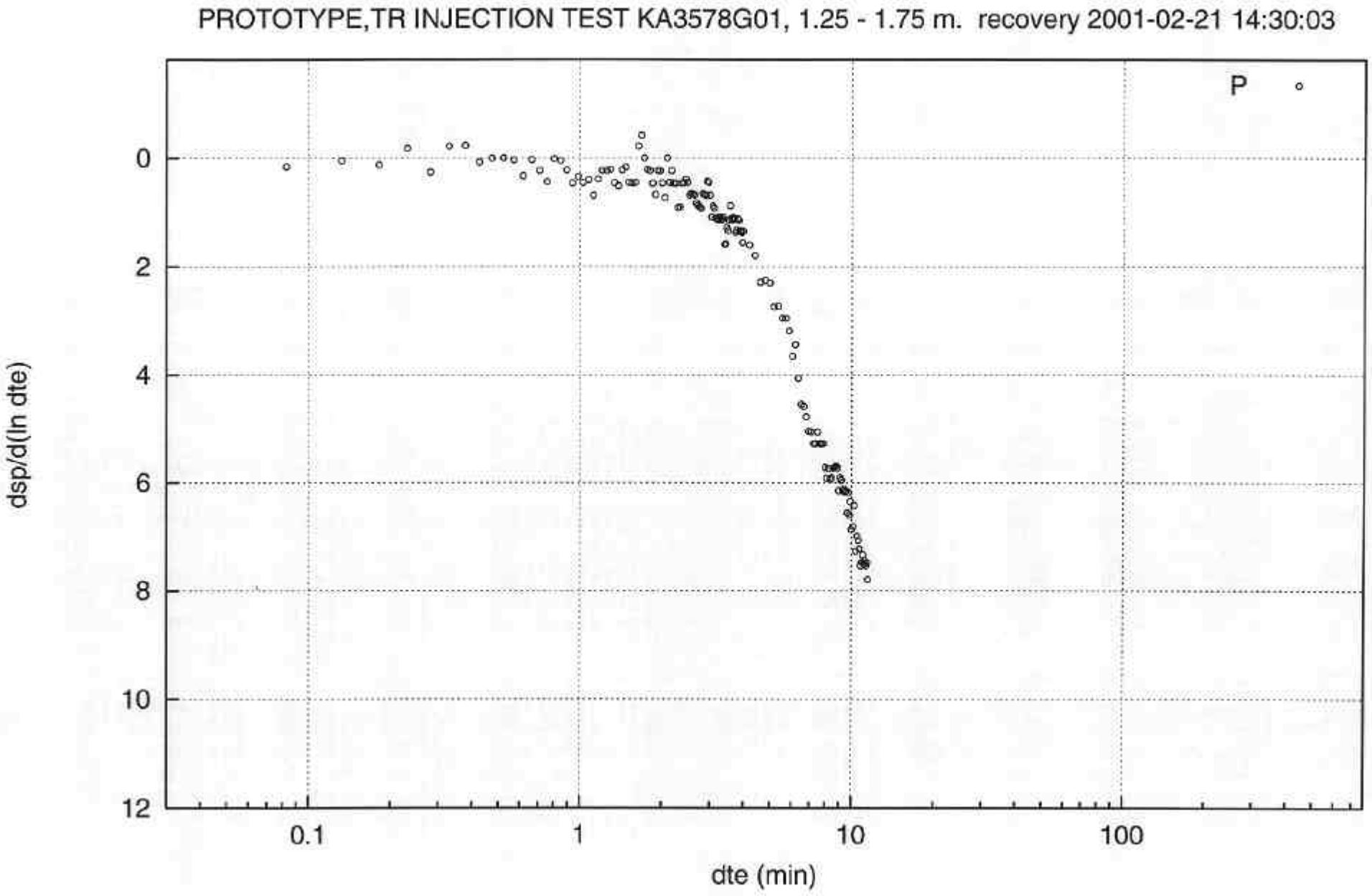

PROTOTYPE,TR INJECTION TEST KA3578G01, 0.75 - 1.25 m. recovery 2001-02-21 13:36:02
P
dsp/d(ln dte)
0
2
4
6
8
10
12
0.1
1
10
100
1000
dte (min)

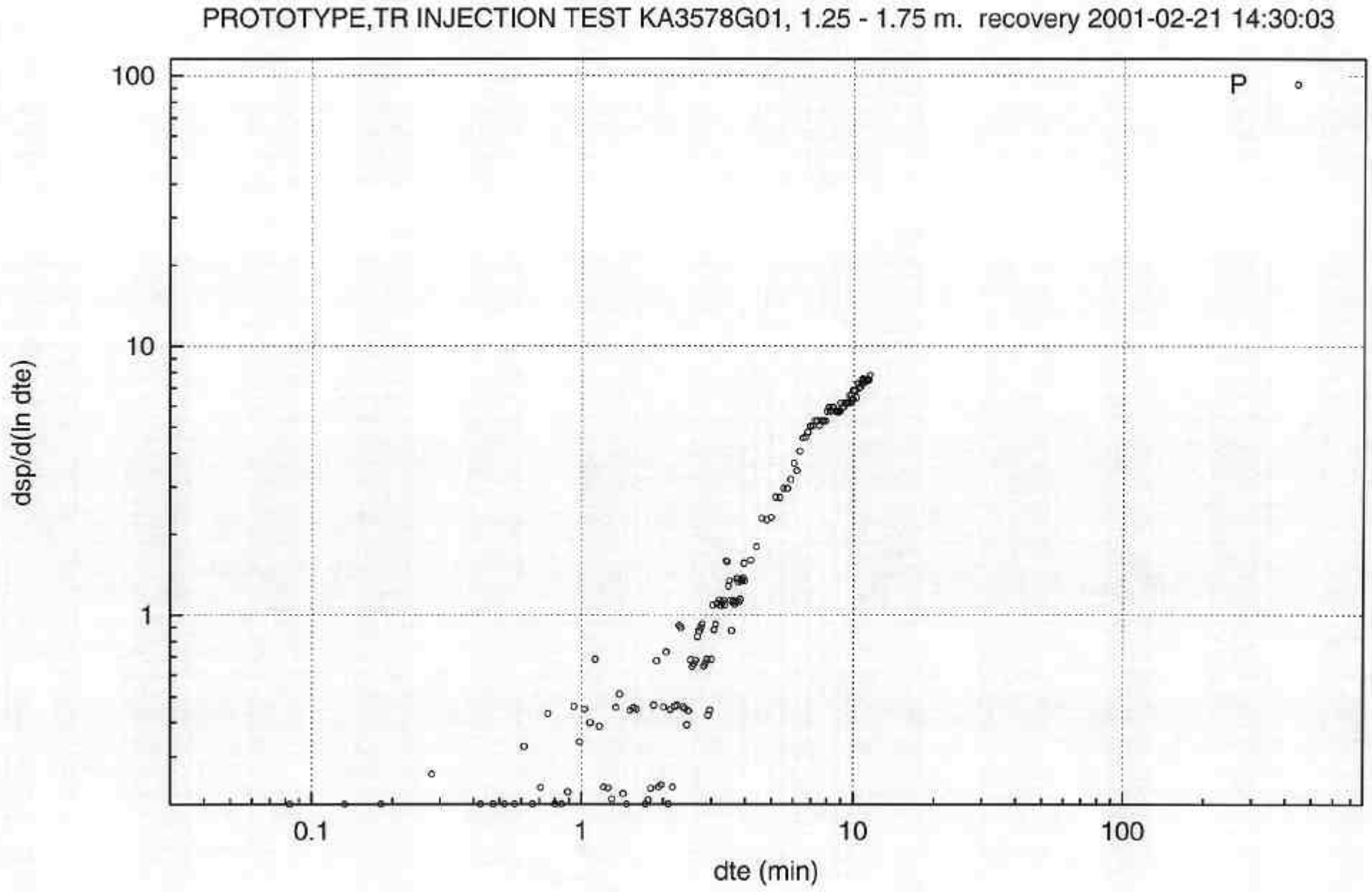

PROTOTYPE,TR INJECTION TEST KA3578G01, 0.75 - 1.25 m. recovery 2001-02-21 13:36:02
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
1000
dte (min)


KA3578G01,1.25-1.75m. P =Test interval, PA =section below packers.
600
500
400
300
200
100
0
(KPa)
P
PA
13:50
14:00
10
20
30
40
50
15:00
Start: 2001-02-21 13:50:00
hour:min


PROTOTYPE,TR INJECTION TEST KA3578G01, 1.25 - 1.75 m. recovery 2001-02-21 14:30:03
P
sp (KPa)
0
2
4
6
8
10
12
0.1
1
10
100
dte (min)


PROTOTYPE,TR INJECTION TEST KA3578G01, 1.25 - 1.75 m. recovery 2001-02-21 14:30:03
P
sp (KPa)
1
0.1
0.01
0.1
1
10
100
dte (min)


PROTOTYPE,TR INJECTION TEST KA3578G01, 1.25 - 1.75 m. recovery 2001-02-21 14:30:03
P
dsp/d(ln dte)
0
2
4
6
8
10
12
0.1
1
10
100
dte (min)


PROTOTYPE,TR INJECTION TEST KA3578G01, 1.25 - 1.75 m. recovery 2001-02-21 14:30:03
P
100
10
1
dsp/d(ln dte)
0.1
1
10
100
dte (min)