




<b>LONQUIST &amp; CO. LLC</b> PETROLEUM ENGINEERS ENERGY ADVISORS		<b>Step Rate Test Procedure</b>			<b>Project No.: 2375</b>	
		<b>Milestone Environmental Services LLC</b>			<b>Date:</b> April 25, 2022 <b>Page:</b> 1 of 6	
<b>Well:</b> Beaza SWD No. 1		<b>State:</b> NM	<b>County:</b> Lea	<b>API:</b> 30-025-49600	<b>District:</b> 1 (Hobbs)	
<p><b>INTRODUCTION:</b></p> <p>Milestone Environmental Services LLC ("Milestone") has requested Lonquist &amp; Co, LLC ("LCO") prepare procedures for a Step Rate Test ("SRT") on Beaza SWD No. 1. This test is being performed to support an application for injection pressure increase at the subject well. This procedure will follow the draft guidance document for the Application Process for Injection Pressure Increases provided by the Oil Conservation Division of the New Mexico Energy, Minerals and Natural Resources Department ("OCD").</p> <p>The general scope of the work is as follows:</p> <ul style="list-style-type: none"> <li>• If required by the District, a bradenhead test and mechanical integrity test (MIT) will be performed. The well must pass both tests before a SRT can be performed.</li> <li>• Prior to testing, shut in the well long enough, but not less than 48 hours to ensure that the bottom hole pressure is at or near the shut-in formation pressure.</li> <li>• Procure a minimum of nine (11) 500-bbl frac tanks</li> <li>• Fill tanks with clean brine water from a client facility or third-party source</li> <li>• MIRU pumps and iron</li> <li>• MIRU WL unit and Perform gauge ring run</li> <li>• TIH with BHP gauge to the mid-perf depth</li> <li>• If wellbore is not full, fill with brine at 0.5 BPM</li> <li>• Allow pressure to stabilize</li> <li>• Step up rates as detailed in the Rate Schedule table</li> <li>• Shut in well completely and record pressure fall-off</li> <li>• Conclude test and RDMO pumps and WL unit</li> </ul> <p><b>OBJECTIVES</b></p> <p>Perform a step-rate test that:</p> <ol style="list-style-type: none"> <li>1. Adheres precisely to the flow rates and durations included in the Rate Schedule below</li> <li>2. Confirms well behavior witnessed in previous step rate test</li> <li>3. Record fall-off pressure for an extended duration</li> </ol>						
PREPARED BY	DATE	REVIEWED BY	DATE	APPROVED BY	DATE	Client Signature
JAM	04/21/2022	NLB	04/22/2022	WHG	04/25/2022	

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<b>REGULATORY INFORMATION:</b>  <p>The Beaza SWD No. 1 is regulated by the New Mexico OCD. The operator must submit Division Form C-103 to the OCD District office with the description of the procedure for the SRT prior to the test. Once the operator has an approved Sundry Notice, the operator shall notify the appropriate OCD District office at least 72 hours prior to the scheduled SRT so that OCD personnel may be present to witness the test. A bradenhead test (if required by the District) and mechanical integrity test (MIT) will be performed before the SRT. If the subject well fails either test, then the SRT will be suspended until the mechanical integrity issue(s) has been remediated. The mechanical integrity testing may be modified at the discretion of the District Supervisor.</p> <p>The completed SRT results are to be submitted to the Engineering Bureau in Santa Fe and should include the following information:</p> <ul style="list-style-type: none"> <li>• Administrative application checklist (available on OCD website under Unnumbered Forms on Form webpage).</li> <li>• Cover letter with contact information, general description of test and pressure increase being proposed.</li> <li>• Complete data summary including injection rates, duration of each step, pressure measurements (surface and bottom hole) and the ISIP.</li> <li>• SRT-specific information: location of pressure gauges (depth); initial bottomhole pressure; injection fluid type and specific gravity.</li> <li>• Graph summary of pressure versus injection rate with interpretation.</li> <li>• Current well completion diagram.</li> <li>• Copy of the order authorizing the injection into the well.</li> </ul> <p>If a pressure increase is granted, it shall be limited for use in the well with the same tubing, size, length, and type of interior coating as present for the SRT. If these components are changed, the operator must ask the Engineering Bureau to recalculate the surface pressure limit, which may require another SRT.</p>						
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**STEP-RATE TEST DETAILED PROCEDURE:**

1. Once the operator has an approved Sundry Notice, notify appropriate OCD District office at least 72 hours prior to the scheduled SRT so that OCD personnel may be present to witness the test.
2. If required by the District, a bradenhead test and mechanical integrity test (MIT) will be performed. The well must pass both tests before an SRT can begin.
3. Prior to testing, shut in the well long enough, but not less than 48 hours to ensure that the bottom hole pressure is at or near the shut-in formation pressure
  - a. Pressure should be recorded for the duration of the shut in to confirm stabilization
4. Set a minimum of eleven (11) 500-bbl frac tanks (Enough to complete the planned test with contingency brine)
  - a. Fill with a minimum of 5,500 bbls of clean brine water from a client facility or third-party source
5. RU pumps and iron
  - a. MIRU kill trucks/frac pumps and lay iron
  - b. Pumps, iron and flow control should be sized so that steps in rate will not create pressure or rate transients, other than those caused by the intended steps
6. If not already present, install flow meter(s) and surface pressure gauge capable of digitally recording injection rates and pressures
  - a. Recording frequency of one second or less is ideal
  - b. Pressure gauges and flow meters should have continuous readout for observation throughout test
  - c. Ensure pressure gauges are recently calibrated and able to accommodate the full range of expected rates and pressures
7. MIRU WL
8. Perform gauge ring run
9. PU BHP gauge and RIH to the mid-perf depth, ensure the gauge is calibrated
10. Ensure the wellbore is full of brine before initiating the test
  - a. If necessary, fill hole with brine at a constant rate of 0.5 BPM
  - b. Once the well is full, stop pumping and allow the pressure to stabilize
11. Begin test at an injection rate of 0.5 BPM for 30 minutes
  - a. **Surface injection pressure, bottomhole pressure, and injection rate must be digitally recorded for the duration of the test**
12. Step up rates per the table included below
  - a. Surface pressure should not exceed 80% of the maximum pressure rating of the wellhead at any time
  - b. Changes in flow rate must occur over as short of intervals as possible
  - c. Injection rates should be controlled with a constant flow regulator
  - d. All injection flow rates, including hole conditioning treatments prior to the test, must be documented on service company forms
  - e. Haul additional brine as needed
  - f. A minimum of three fluid samples should be caught throughout the test, at the beginning, middle and end
    - i. The density of the samples will be read by an in-house method
    - ii. Fluid density will be reported to the OCD with SRT results

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<p>13. Upon completion of the final injection stage, the line valve must be closed to stop injection immediately. This will allow the pressure to bleed off into the formation.</p> <ul style="list-style-type: none"> <li>a. Ensure that pressure values are recorded at the highest obtainable frequency during shut-in</li> <li>b. Continue to capture falloff pressure data for an extended duration</li> <li>c. Monitor for fracture closure and/or original reservoir pressure</li> </ul> <p>14. Conclude test</p> <ul style="list-style-type: none"> <li>a. POOH with BHP gauge</li> <li>b. RDMO WL</li> </ul> <p>15. The completed SRT results are to be submitted to the Engineering Bureau in Santa Fe and should include the following information:</p> <ul style="list-style-type: none"> <li>a. Administrative application checklist (available on OCD website under Unnumbered Forms on Form webpage).</li> <li>b. Cover letter with contact information, general description of test and pressure increase being proposed.</li> <li>c. Complete data summary including injection rates, duration of each step, pressure measurements (surface and bottom hole) and the ISIP.</li> <li>d. SRT-specific information: location of pressure gauges (depth) initial bottomhole pressure; injection fluid type and specific gravity.</li> <li>e. Graph summary of pressure versus injection rate with interpretation.</li> <li>f. Current well completion diagram.</li> <li>g. Copy of the order authorizing the injection into the well.</li> </ul>						
<b>EQUIPMENT DESCRIPTION</b> <ul style="list-style-type: none"> <li>• Surface Pressure Gauge with continuous readout and digital data recording</li> <li>• Bottomhole Pressure Gauge with live surface readout and digital data recording</li> <li>• In-line Flow Meter with a rate range that includes 0.5 BPM to 14 BPM</li> </ul>						
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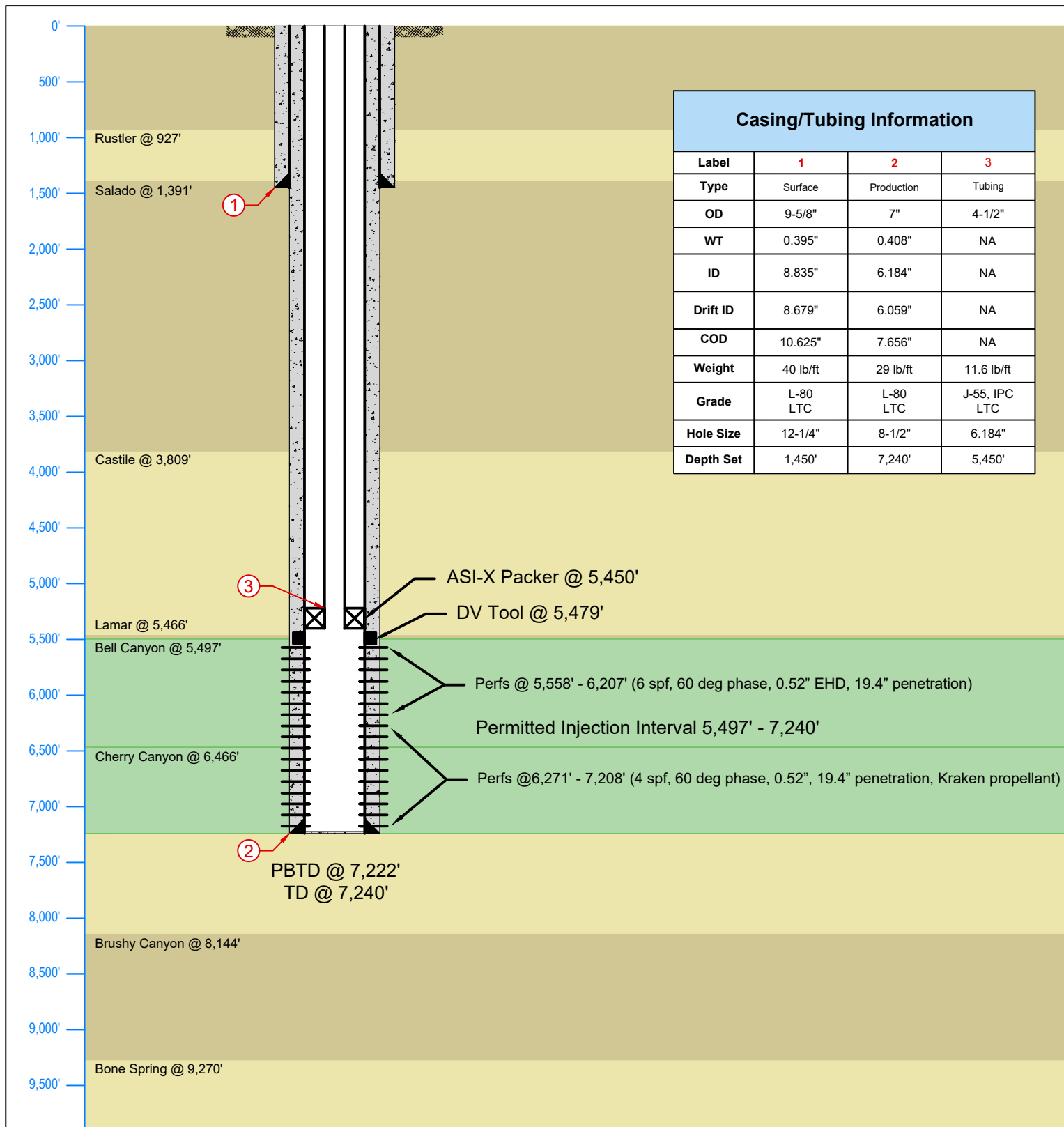
## RATE SCHEDULE

- Schedule is subject to change. Durations may increase to accommodate pressure stabilization and rates may change based on pressure behavior indicative of formation fracture.

Step No.	Injection Rate			Duration (minutes)	Stage Volume (BBL)	Cumulative Volume (BBL)
	BPM	GPM	BPD			
1	0.5	21	720	60	30	30
2	0.75	31.5	1080	60	45	75
3	1	42	1440	60	60	135
4	1.5	63	2160	60	90	225
5	2	84	2880	60	120	345
6	3	126	4320	60	180	525
7	5	210	7200	60	300	825
8	8	336	11520	60	480	1305
9	11	462	15840	60	660	1965
10	14	588	20160	60	840	2805
11	11	462	15840	60	660	3465
12	8	336	11520	60	480	3945
13	5	210	7200	60	300	4245
14	3	126	4320	60	180	4425
15	2	84	2880	60	120	4545
16	1.5	63	2160	60	90	4635
17	1	42	1440	60	60	4695
18	0.75	31.5	1080	60	45	4740
19	0.5	21	720	60	30	4770

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Casing/Tubing Information			
Label	1	2	3
Type	Surface	Production	Tubing
OD	9-5/8"	7"	4-1/2"
WT	0.395"	0.408"	NA
ID	8.835"	6.184"	NA
Drift ID	8.679"	6.059"	NA
COD	10.625"	7.656"	NA
Weight	40 lb/ft	29 lb/ft	11.6 lb/ft
Grade	L-80 LTC	L-80 LTC	J-55, IPC LTC
Hole Size	12-1/4"	8-1/2"	6.184"
Depth Set	1,450'	7,240'	5,450'

<b>LONQUIST &amp; CO. LLC</b> <b>PETROLEUM ENGINEERS</b> <b>ENERGY ADVISORS</b>  Texas License F-9147 12912 Hill Country Blvd. Ste F-200 Austin, Texas 78738 Tel: 512.732.9812 Fax: 512.732.9816	Milestone Environmental		Beaza SWD No. 1	
	Country: USA		State/Province: New Mexico	County/Parish: Lea
	Location: 160' FEL & 2,480' FNL of Unit H, Section 25, Township 24S, Range 34E			District: 1 (Hobbs)
	API No: 30-025-49600		Field:	Well Type/Status: Disposal / New Drill
	State ID No:		Project No: 1761	Date: 03/16/2022
	Drawn: WHG		Reviewed: RH	Approved: RSC
	Rev No: 3		Notes:	

# Beaza SWD No. 1 Step Rate Test Evaluation Milestone Environmental Services LLC

April 2022



**LONQUIST & CO. LLC**

PETROLEUM  
ENGINEERS

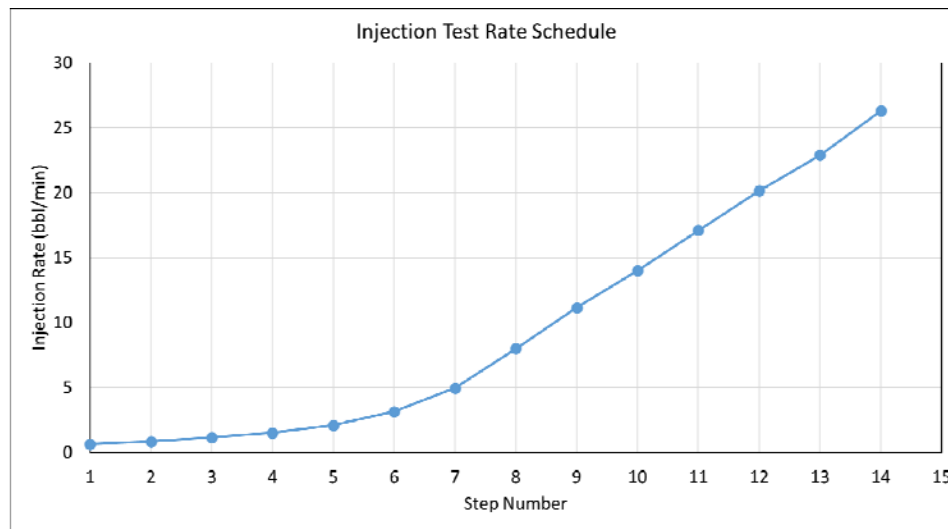
ENERGY  
ADVISORS

PRIVILEGED AND CONFIDENTIAL INFORMATION



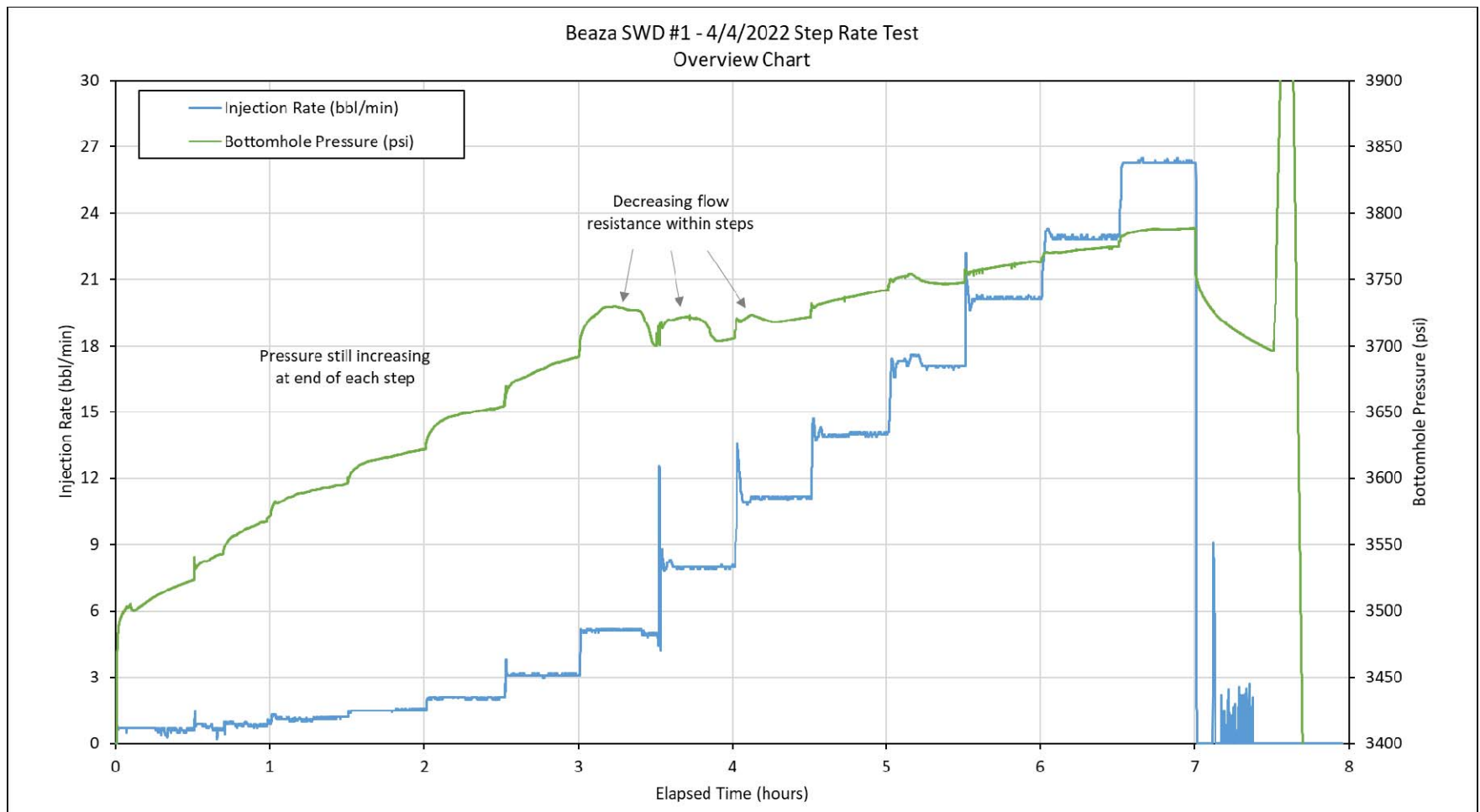
# Step Rate Test Overview

- Step Rate Test was performed 4/4/2022 on the Beaza SWD No. 1 in Lea County, NM
- Current Injection Permit:
  - Slurry Injection into Bell Canyon & Cherry Canyon
  - MASIP = 1,099 psi (0.2 psi/ft at 5,497 ft)
  - Max Rate = 10,000 bbl/day
  - Requires SRT within first 12 months of injection

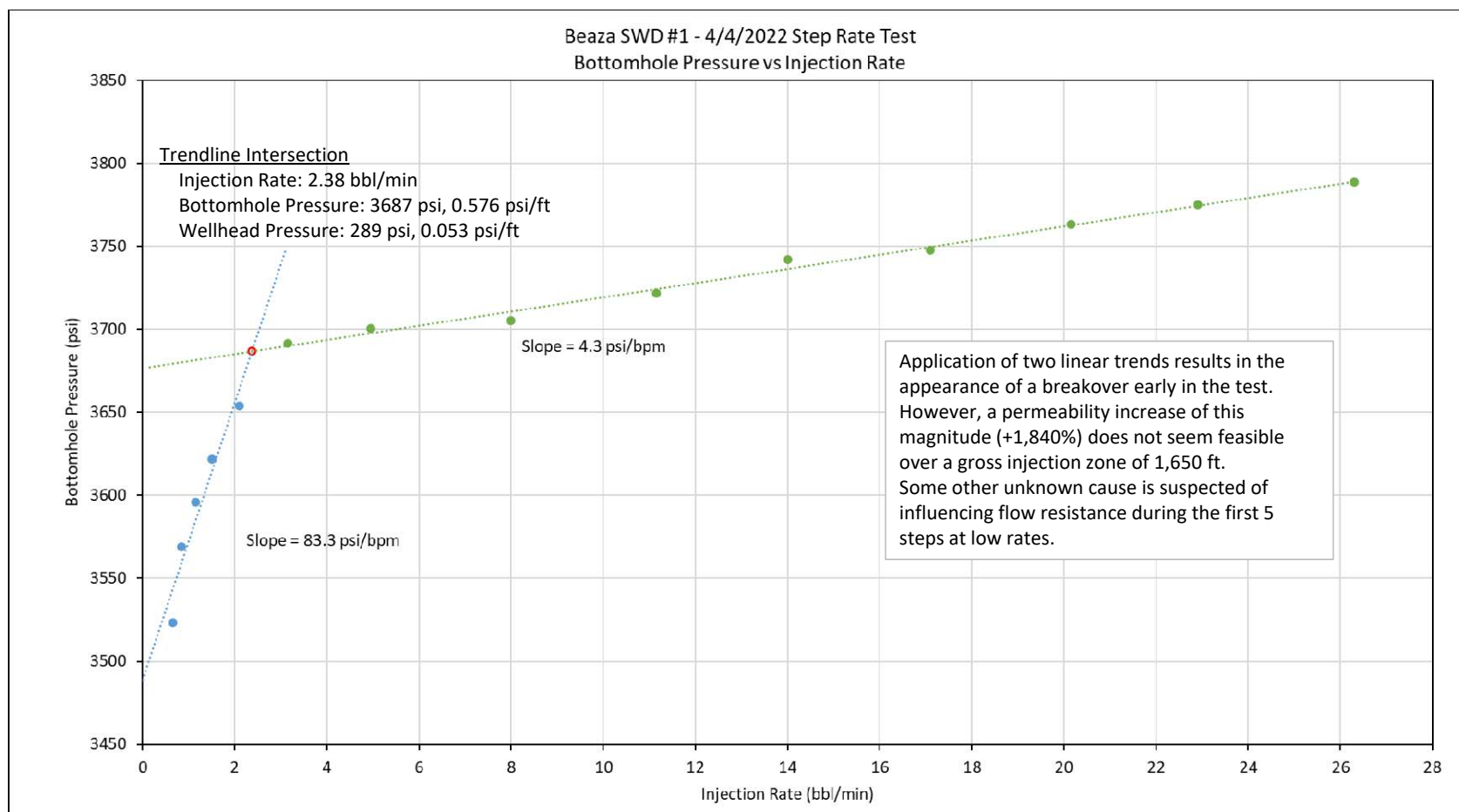


Step No.	Injection Rate	
	bbl/min	bbl/day
1	0.7	936
2	0.8	1,210
3	1.2	1,656
4	1.5	2,160
5	2.1	3,024
6	3.2	4,536
7	5.0	7,128
8	8.0	11,520
9	11.2	16,056
10	14.0	20,160
11	17.1	24,624
12	20.2	29,016
13	22.9	32,976
14	26.3	37,872

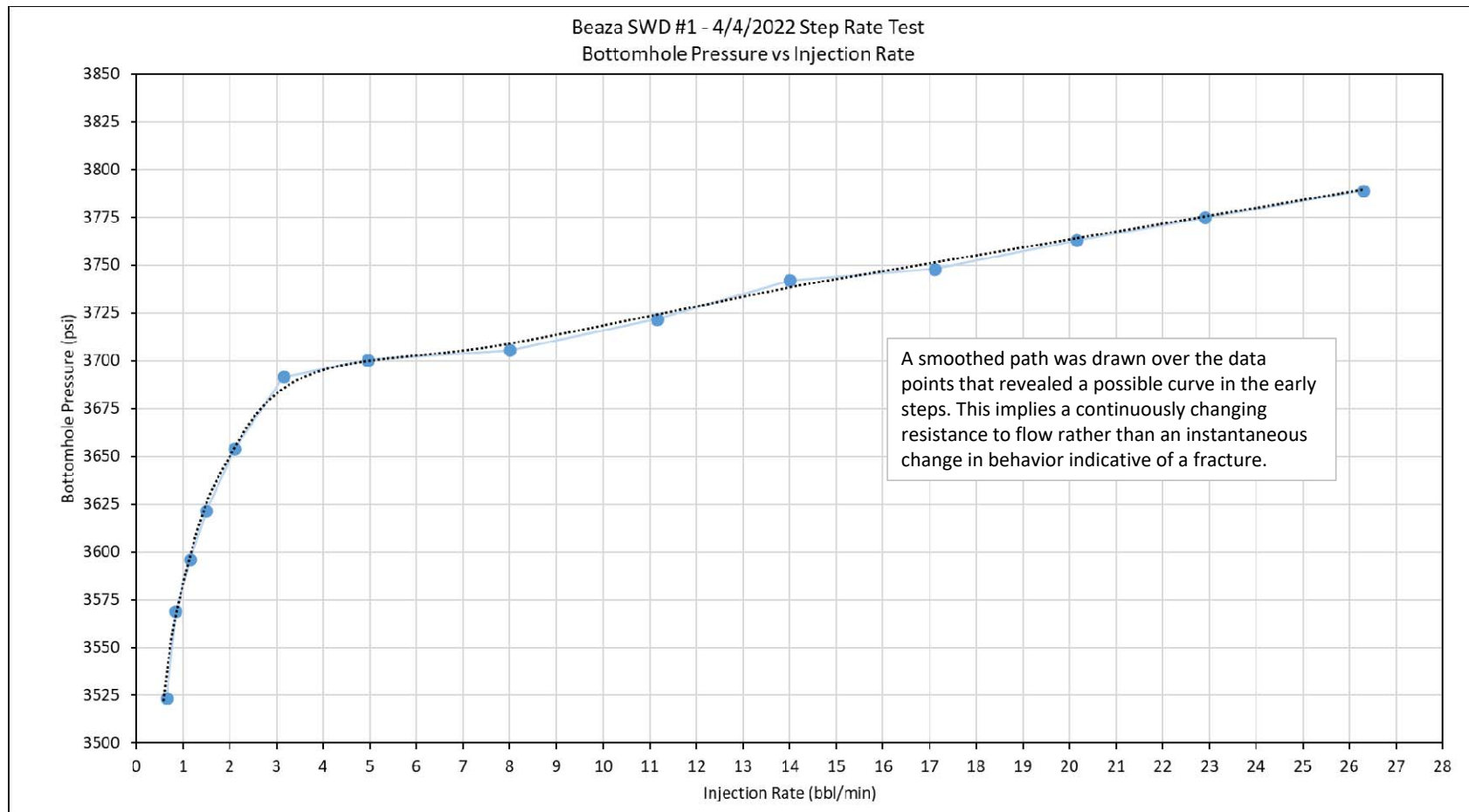
# Step Rate Test Overview



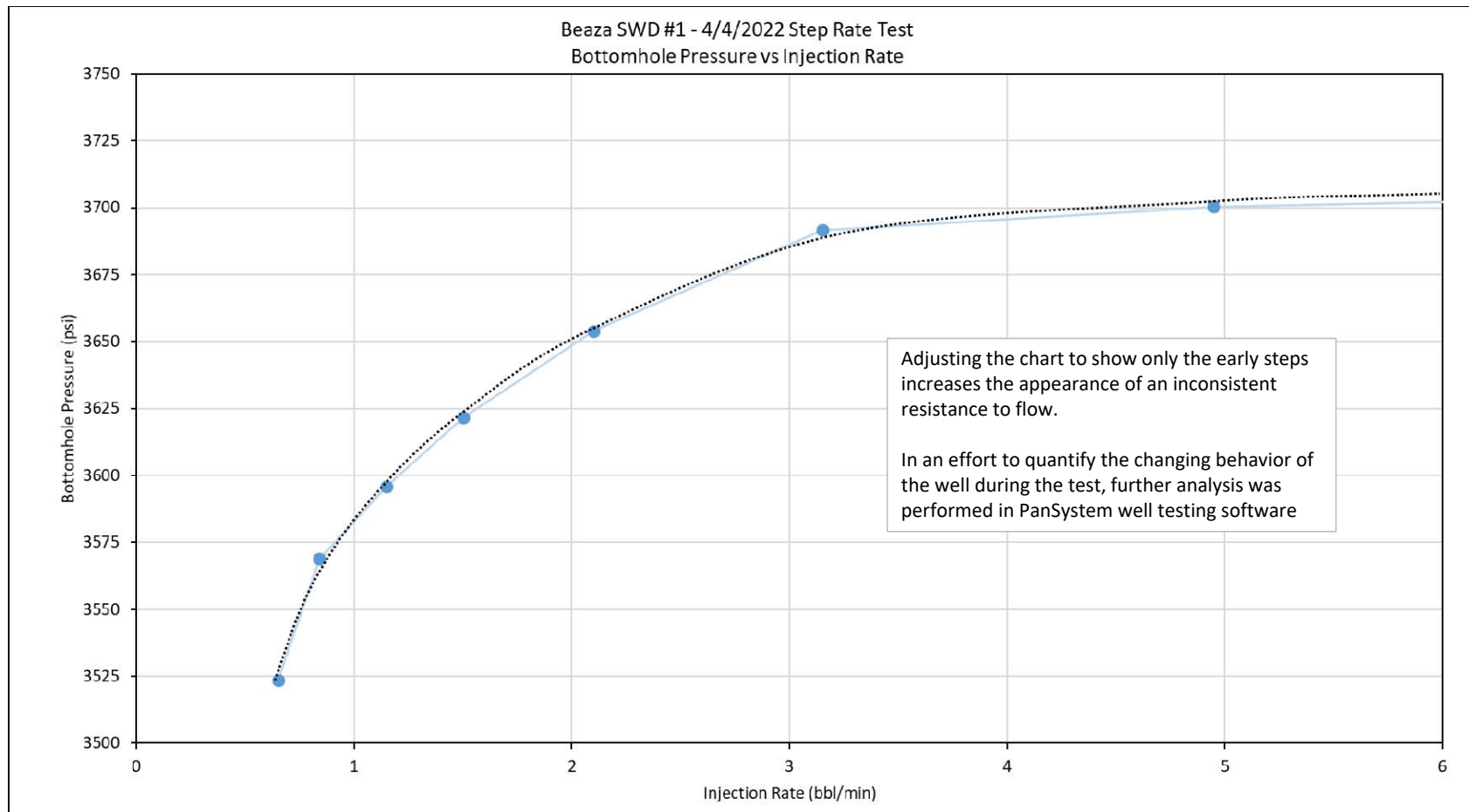
# Bottomhole Pressure vs Rate



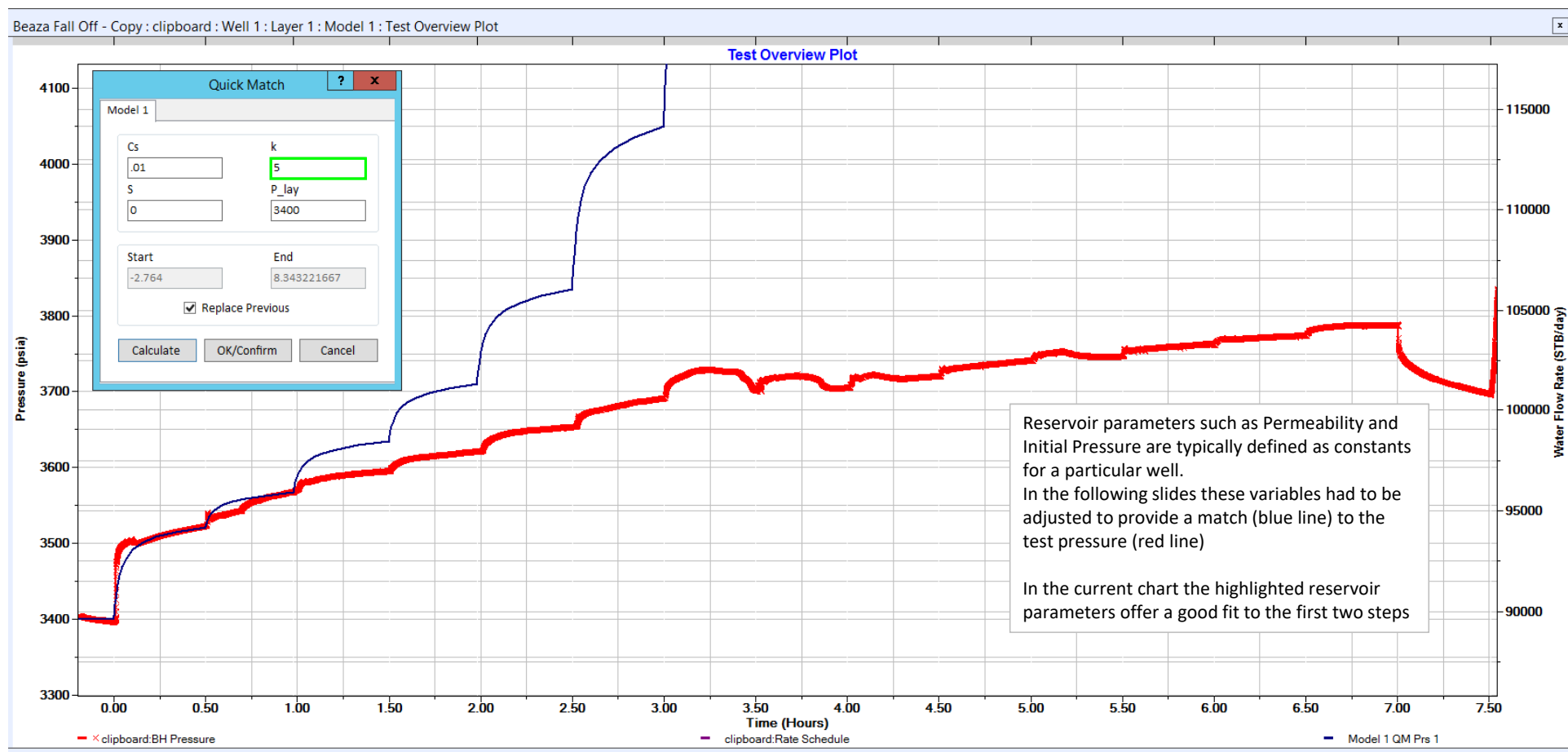
# Bottomhole Pressure vs Rate



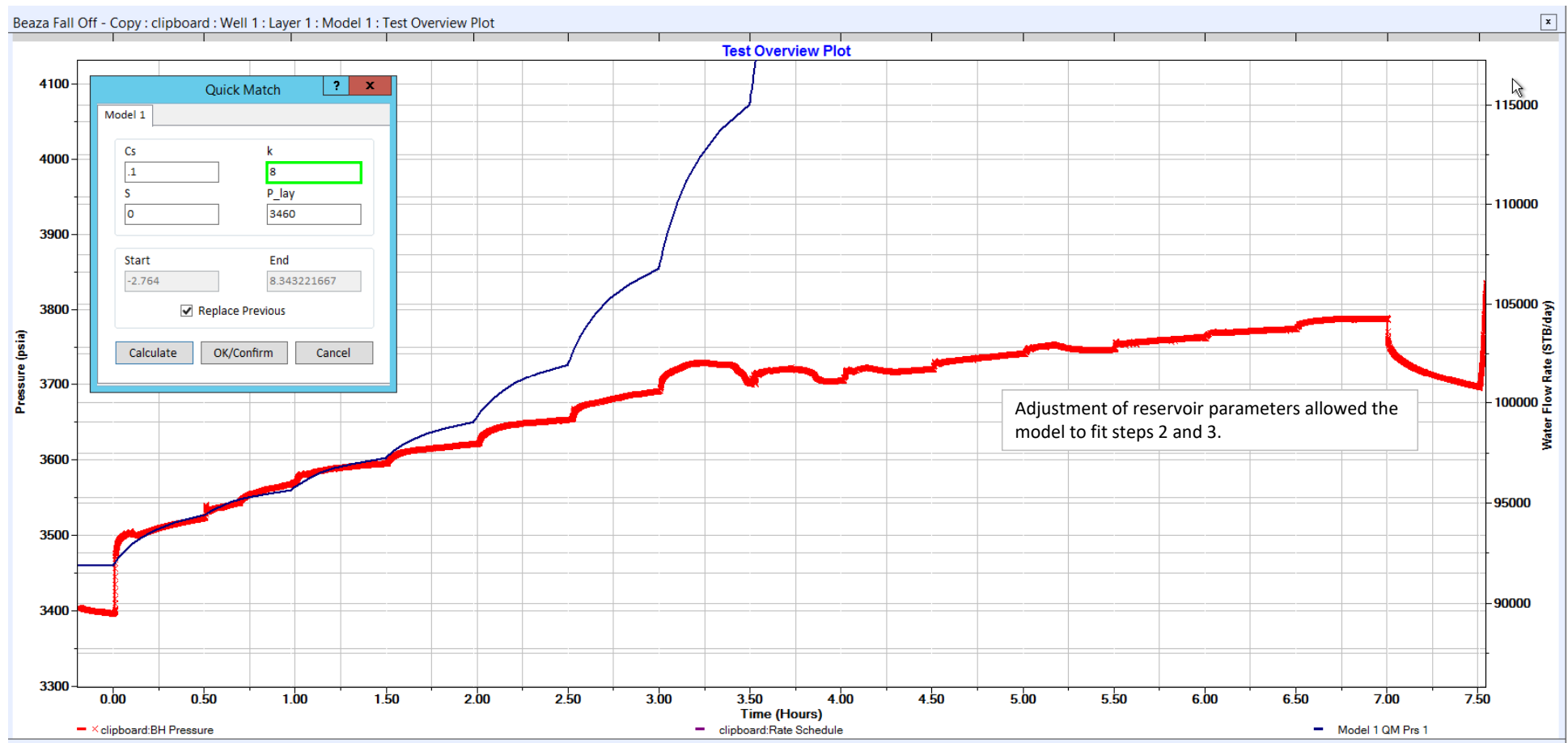
# Bottomhole Pressure vs Rate – Zoomed in



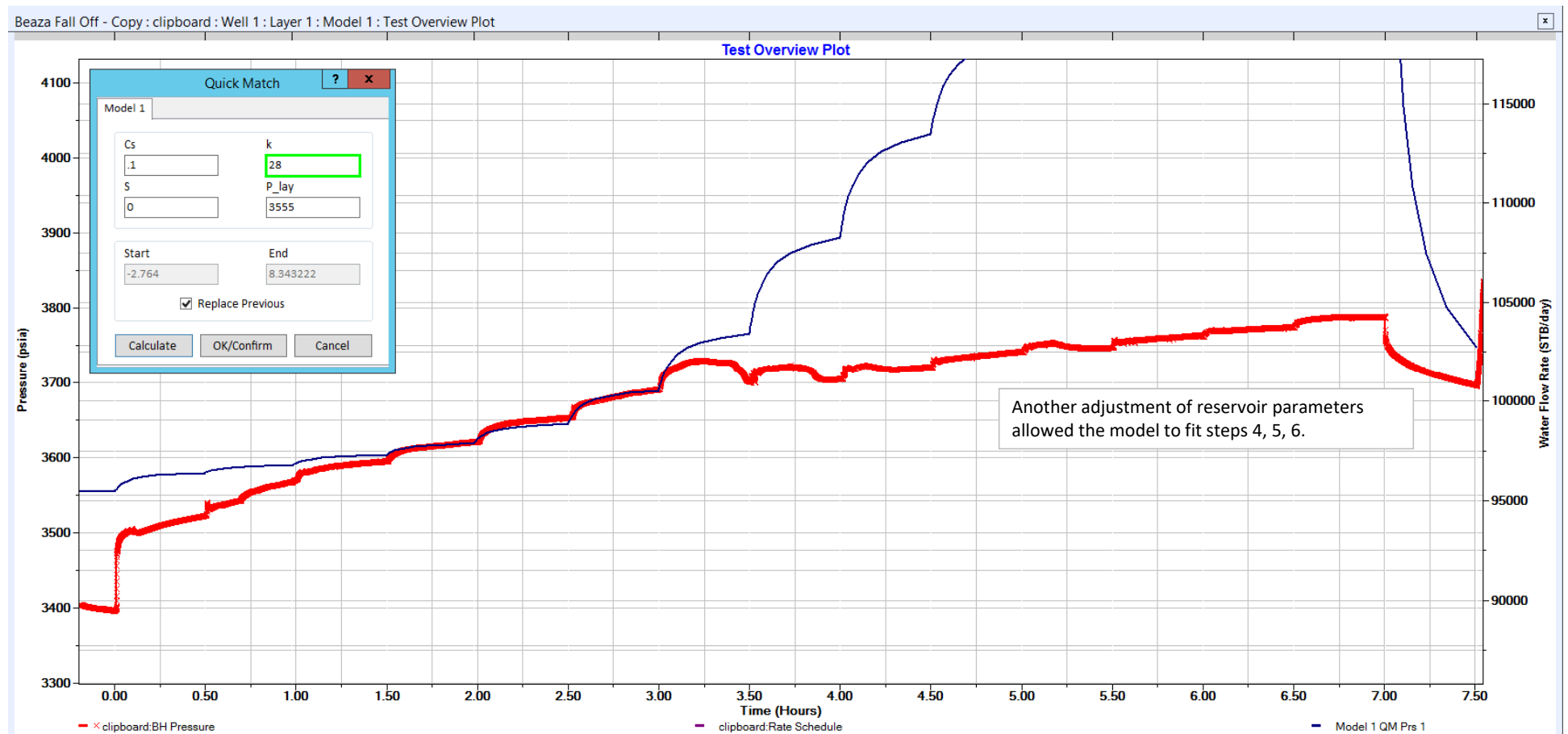
# PanSystem Analysis – Simulation fit to First Step



# PanSystem Analysis – Simulation Fit to Early Steps

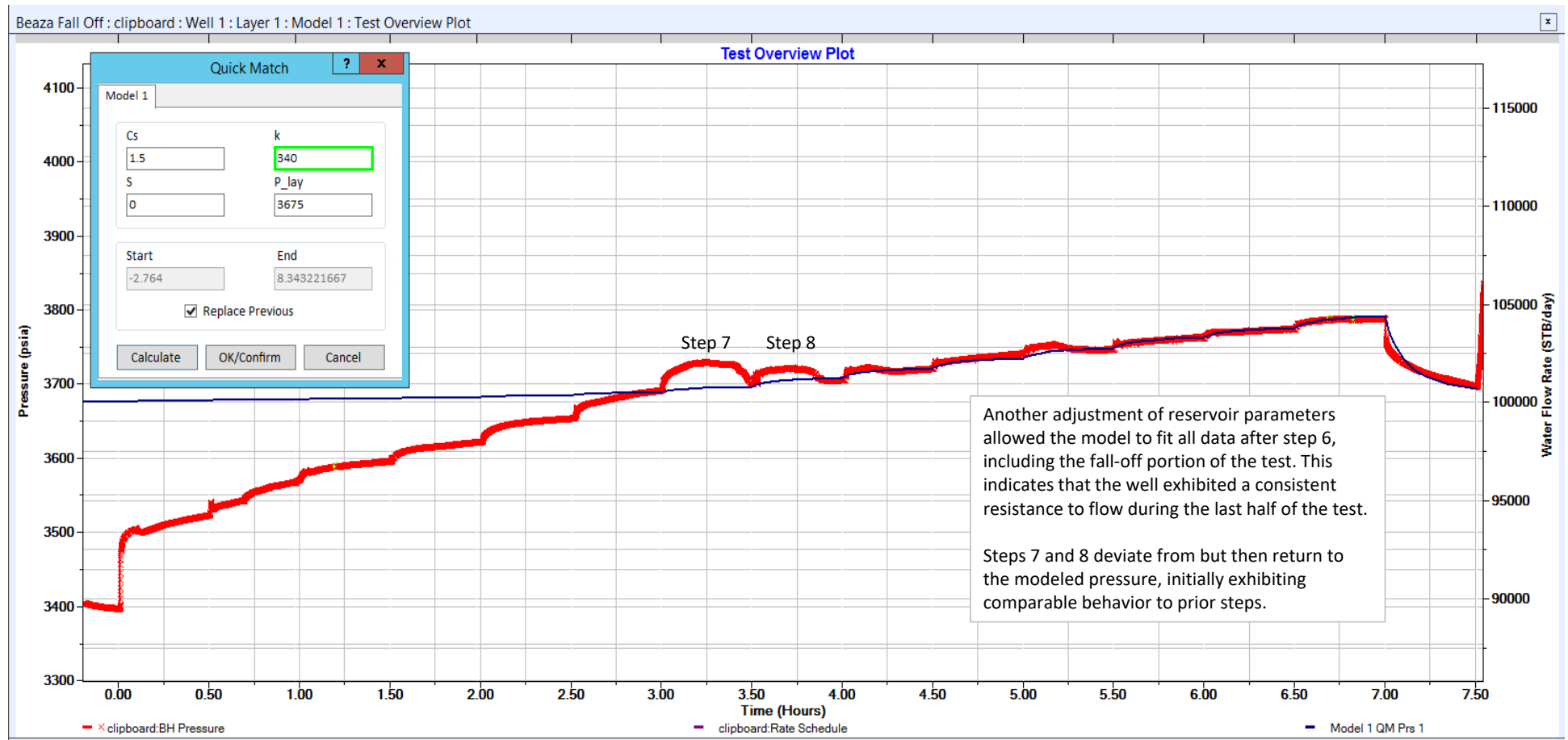


# PanSystem Analysis – Simulation Fit to Middle Steps

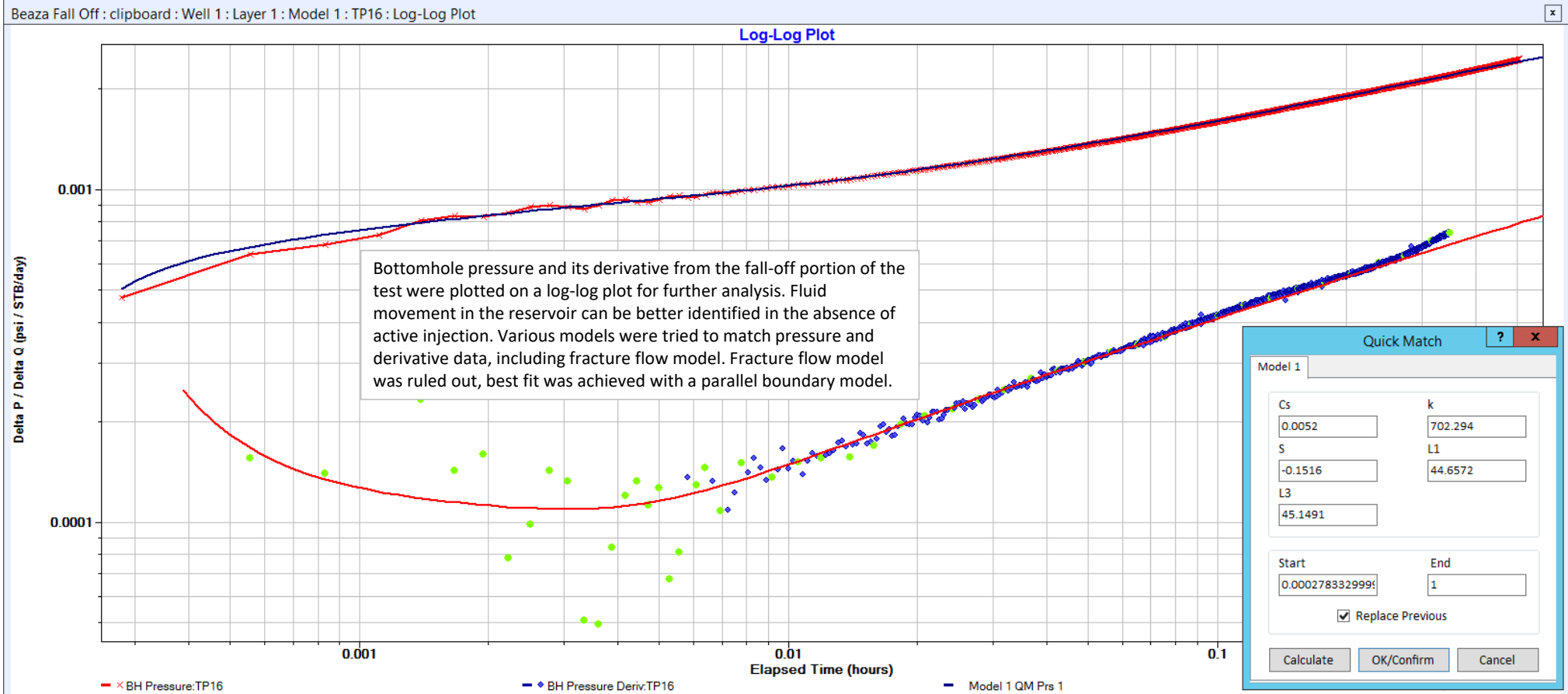




# PanSystem Analysis – Simulation Fit to Late Steps



# PanSystem Analysis – Log-Log Plot of Fall-Off Data



# Summary

- Continually changing resistance to flow during the first part of the test is likely caused by anomalous fluid dynamics within the large perforated interval including:
  - 786' of perforations across a 1,650' interval
  - Lack of fluid movement deeper in the well
  - Lack of fluid movement in zones of lower permeability
  - Inconsistent fluid density within the wellbore
- Consistent resistance to flow during the second half of the test.
- No evidence of fracture closure during the fall-off portion of the test.
- Max flow rate and pressures during test
  - Injection Rate: 26.3 bpm
  - Bottomhole Pressure: 3,789 psi, 0.59 psi/ft
  - Wellhead Pressure: 2,077 psi, 0.38 psi/ft

## Path Forward

- An additional test will be run to confirm well behavior
  - Proposed rate schedule starts at low rates, steps up to 14 bbl/min, and steps back down to ensure all perforations are accepting fluid during the second half of the test
  - 45 to 60 minute steps are suggested to achieve pressure stabilization at each injection rate
  - Record fall-off pressures for an extended duration

Step No.	Injection Rate	
	bbl/min	bbl/day
1	0.5	720
2	0.75	1,080
3	1	1,440
4	1.5	2,160
5	2	2,880
6	3	4,320
7	5	7,200
8	8	11,520
9	11	15,840
10	14	20,160
11	11	15,840
12	8	11,520
13	5	7,200
14	3	4,320
15	2	2,880
16	1.5	2,160
17	1	1,440
18	0.75	1,080
19	0.5	720