

# **WASKADA UNIT NO. 2**

## **WATERFLOOD PROGRESS REPORT**

**January 1, through December 31, 2011**

### **PennWest Exploration**

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## INTRODUCTION

The WASKADA UNIT NO.2 pressure maintenance project commenced water injection into the Lower Amaranth designed and in accordance with Manitoba Energy and Mines Approval No. PM 58.

PRESSURE MAINTENANCE: Governed by Board Order No. PM 58

### Unit Information:

UNITIZED ZONE: Lower Amaranth

Original Unit, Jan.1, 1984 Board Order; Voluntary

First Enlargement, Sept. 1, 1985 Board Order; Voluntary

Second Enlargement, Oct. 1, 1986 Board Order; Voluntary

POOL: Waskada Lower Amaranth A (03 29A)

This report documents the performance of the Waskada Lower Amaranth pressure maintenance project for the period of January 1 to December 31, 2011.

Unit # 2 is part of main Waskada. The Waskada field is situated on the northeast rim of the Williston Basin in southern Manitoba. It comprises a large portion of Township 1 and 2, Ranges 25 and 26 (W1PM).

The Waskada Fields produce light density crude (approximately 36° API), predominantly from the Lower Amaranth formation. The interlaminated, shallow marine to subtidal succession of sandstones, silstones, and shale progressively onlaps the Mississippian unconformity surface from basin center, up dip to the north and eastern basin limits in Saskatchewan and Manitoba. The fine grained reservoir rock has a complex reservoir characterization with 13 to 16 % porosity and permeability on the order of 0.5 to 15 md. The lower Amaranth, the oldest Mesozoic unit is a clastic red bed sequence lying directly on the Paleozoic erosional surface. It consists of a series of dolomitic siltstones and sandstones interbedded with argillaceous siltstones and shales. The section is usually subdivided into a lower sandy unit and an overlying shale unit. The lower sequence is the

oil production zone. The bulk of pay is founded in the laminated sandstone/siltstone facies.

The Lower Amaranth has been classified into four general lithological types:

1. Interbedded shale/siltstone/sandstone by grain size, color and texture
2. Siltstone – This lithology occurs in distinct intervals up to two or three meters in thickness. It is generally light green in color and dolomitic.
3. Laminated sandstone – This occurs in distinct sandy intervals with a wide range of grain sizes and primary sedimentary structures.
4. Massive sandstone – This lithology occurs in thin intervals and usually associated with the laminated sandstones facies. Beds are usually light grey to reddish grey in color and coarse to medium – grained.

## **UNIT HISTORY**

**Waskada Lower Amaranth Unit #1 (Unit History)**

<b>Abbreviated Well ID</b>	<b>Date Well Spudded</b>	<b>On Prod YYYY/MM</b>	<b>Org Operator Name</b>	<b>Ground Elevation (m)</b>	<b>TVD (m)</b>
00/14-22-001-26W1/0	10/28/1985	1985/11	Omega Hydcbns Ltd	460.4	959
00/16-22-001-26W1/0	8/7/1982		Omega Hydcbns Ltd	464.3	949
00/13-23-001-26W1/0	6/2/1983	1983/06	Omega Hydcbns Ltd	466.2	947
00/14-23-001-26W1/0	8/12/1982	1982/10	Omega Hydcbns Ltd	465.4	953
00/03-26-001-26W1/0	6/18/1982	1982/07	Omega Hydcbns Ltd	466	941
02/03-26-001-26W1/0	1/26/2011			463.2	907.4
00/04-26-001-26W1/0	7/17/1982	1982/10	Omega Hydcbns Ltd	465.2	947
00/05-26-001-26W1/0	6/14/1982	1982/07	Omega Hydcbns Ltd	464.6	955
00/06-26-001-26W1/0	2/23/1982	1982/06	Omega Hydcbns Ltd	465.8	948
02/06-26-001-26W1/0	2/3/2011			463	902.3
04/06-26-001-26W1/0	11/19/2011			463.4	
00/11-26-001-26W1/0	6/9/1982	1982/07	Omega Hydcbns Ltd	466.5	941
04/11-26-001-26W1/0				463.3	
05/11-26-001-26W1/0				463.4	
02/12-26-001-26W1/0	6/10/1983	1983/06	Omega Hydcbns Ltd	465.7	947

Abbreviated Well ID	Date Well Spudded	On Prod YYYY/MM	Org Operator Name	Ground Elevation (m)	TVD (m)
00/13-26-001-26W1/0	12/14/1982	1983/03	Omega Hydcbns Ltd	464.7	950
00/14-26-001-26W1/0	6/26/1982	1982/07	Omega Hydcbns Ltd	465.9	954
02/14-26-001-26W1/0				463.6	
03/14-26-001-26W1/0				463.8	
04/14-26-001-26W1/0				463.8	
00/01-27-001-26W1/0	11/15/1982	1982/12	Omega Hydcbns Ltd	462	955
03/01-27-001-26W1/0	7/17/2010	2010/09		460.8	904.4
00/02-27-001-26W1/0	8/20/1982	1982/11	Omega Hydcbns Ltd	461.9	956
00/03-27-001-26W1/0	10/25/1982	1983/03	Omega Hydcbns Ltd	461.3	950
02/03-27-001-26W1/2	7/1/1983	1988/11	Omega Hydcbns Ltd	461.8	947
00/04-27-001-26W1/0	12/4/1982	1983/02	Omega Hydcbns Ltd	459.8	954
02/04-27-001-26W1/0	11/14/2010	2010/12		462.5	906.5
00/05-27-001-26W1/0	9/20/1982	1982/12	Omega Hydcbns Ltd	461.5	951.8
02/05-27-001-26W1/0	1/3/2010	2010/03		464.1	909.2
03/05-27-001-26W1/0	11/20/2010	2010/12		462.5	903.3
02/06-27-001-26W1/0	6/18/1983	1983/07	Omega Hydcbns Ltd	463.9	948
00/07-27-001-26W1/0	8/23/1982	1982/12	Omega Hydcbns Ltd	462.8	955
00/08-27-001-26W1/0	6/22/1982	1982/08	Omega Hydcbns Ltd	464.7	955
02/08-27-001-26W1/0	7/12/2010	2010/09		460.8	902.8
00/09-27-001-26W1/0	8/24/1982	1982/12	Omega Hydcbns Ltd	463.3	951
02/09-27-001-26W1/2	7/5/1983	1987/03	NCE Petrofund Corp	464.2	950
00/10-27-001-26W1/0	8/28/1982	1982/12	Omega Hydcbns Ltd	462.5	951
02/11-27-001-26W1/0	6/27/1983	1983/08	Omega Hydcbns Ltd	464.2	948
00/12-27-001-26W1/0	8/27/1982	1982/11	Omega Hydcbns Ltd	461.5	948
02/13-27-001-26W1/0	6/19/1983	1983/07	Omega Hydcbns Ltd	461.5	948
02/14-27-001-26W1/0	6/23/1983	1983/08	Omega Hydcbns Ltd	463.5	946
02/15-27-001-26W1/0	6/2/1983	1983/06	Omega Hydcbns Ltd	464.3	952
02/16-27-001-26W1/0	6/6/1983	1983/06	Omega Hydcbns Ltd	464.1	954
00/02-34-001-26W1/2	3/13/1983	1983/08	Omega Hydcbns Ltd	465	964

<b>Abbreviated Well ID</b>	<b>Date Well Spudded</b>	<b>On Prod YYYY/MM</b>	<b>Org Operator Name</b>	<b>Ground Elevation (m)</b>	<b>TVD (m)</b>
00/08-34-001-26W1/0	5/30/1982	1983/02	Omega Hydcbns Ltd	464.2	951
00/02-35-001-26W1/0	9/1/1981	1981/11	Omega Hydcbns Ltd	463.9	964
00/03-35-001-26W1/2	7/22/1983	1984/03	Omega Hydcbns Ltd	467.5	970
00/05-35-001-26W1/0	7/18/1983	1983/10	Omega Hydcbns Ltd	466	950
00/06-35-001-26W1/0	11/24/1982	1982/12	Omega Hydcbns Ltd	466.9	948
00/12-35-001-26W1/0	10/5/1983	1983/10	Omega Hydcbns Ltd	465.7	964

**Waskada Lower Amaranth Unit #1 (Production & Injection History)**

<b>Abbreviated Well ID</b>	<b>First Prod YYYY/MM</b>	<b>On Inject. YYYY/MM</b>	<b>Last Prod. YYYY/MM</b>	<b>Cumulative OIL Prod. (m3)</b>	<b>Cumulative WTR Prod. (m3)</b>	<b>First 12 mo. Ave WC%</b>	<b>Last Inject. YYYY/MM</b>
00/14-22-001-26W1/0	1985/11		1987/04	365	5808	93.1	
00/16-22-001-26W1/0		1983/12					1988/02
00/13-23-001-26W1/0	1983/06	1988/02	1988/02	1445	22332	86.4	1994/03
00/14-23-001-26W1/0	1982/10		1996/04	10112	14240	50.5	
00/03-26-001-26W1/0	1982/07		2011/11	12188	15666	14.7	
02/03-26-001-26W1/0							
00/04-26-001-26W1/0	1982/10		2011/11	22539	59185	46.1	
00/05-26-001-26W1/0	1982/07	1984/01	1984/01	4452	560	10.2	2011/05
00/06-26-001-26W1/0	1982/06		2011/11	16752	7974	10.6	
02/06-26-001-26W1/0							
04/06-26-001-26W1/0							
00/11-26-001-26W1/0	1982/07		1996/06	5291	9748	45.3	
04/11-26-001-26W1/0							
05/11-26-001-26W1/0							
02/12-26-001-26W1/0	1983/06		1996/05	10871	23414	28.6	
00/13-26-001-26W1/0	1983/03	1984/02	1984/01	456	3106	87.2	1987/03
00/14-26-001-26W1/0	1982/07		1989/10	1263	17092	86.9	
02/14-26-001-26W1/0							
03/14-26-001-26W1/0							
04/14-26-001-26W1/0							
00/01-27-001-26W1/0	1982/12		1988/08	3814	22881	74.6	
03/01-27-001-26W1/0	2010/09		2011/11	3693	8728	69.8	
00/02-27-001-26W1/0	1982/11		1991/12	2721	10453	70.5	
00/03-27-001-26W1/0	1983/03		1988/06	1812	14399	85.4	
02/03-27-001-26W1/2	1988/11		1989/02	0	1277	0	
00/04-27-001-26W1/0	1983/02		1988/05	3241	24522	73.4	

<b>Abbreviated Well ID</b>	<b>First Prod YYYY/MM</b>	<b>On Inject. YYYY/MM</b>	<b>Last Prod. YYYY/MM</b>	<b>Cumulative OIL Prod. (m3)</b>	<b>Cumulative WTR Prod. (m3)</b>	<b>First 12 mo. Ave WC%</b>	<b>Last Inject. YYYY/MM</b>
02/04-27-001-26W1/0	2010/12		2011/11	1775	11933	87.1	
00/05-27-001-26W1/0	1982/12	1984/01	1984/01	1918	3490	64.2	1987/03
02/05-27-001-26W1/0	2010/03		2011/11	2403	9438	78.6	
03/05-27-001-26W1/0	2010/12		2011/11	1297	10072	88.6	
02/06-27-001-26W1/0	1983/07		1993/03	9371	22335	65.1	
00/07-27-001-26W1/0	1982/12	1984/02	1984/01	2288	3673	60.4	1999/03
00/08-27-001-26W1/0	1982/08		1992/04	9204	34447	52.3	
02/08-27-001-26W1/0	2010/09		2011/11	3636	8930	73.1	
00/09-27-001-26W1/0	1982/12		1990/01	1822	6785	70.3	
02/09-27-001-26W1/2	1987/03		1992/04	528	2827	80.3	
00/10-27-001-26W1/0	1982/12		1995/12	4358	11774	63.6	
02/11-27-001-26W1/0	1983/08		1989/04	1755	28320	86.9	
00/12-27-001-26W1/0	1982/11		1993/05	8116	27664	57.9	
02/13-27-001-26W1/0	1983/07	1984/02	1984/01	1431	1348	48.5	1986/12
02/14-27-001-26W1/0	1983/08		1995/12	23444	50261	60.5	
02/15-27-001-26W1/0	1983/06	1984/01	1984/01	1833	381	17.2	1987/12
02/16-27-001-26W1/0	1983/06		1990/05	3332	26565	78.2	
00/02-34-001-26W1/2	1983/08		1990/03	1073	7923	82.3	
00/08-34-001-26W1/0	1983/02		1990/02	1500	14810	84	
00/02-35-001-26W1/0	1981/11		1989/02	1237	1020	33.9	
00/03-35-001-26W1/2	1984/03		1989/10	439	9279	95.4	
00/05-35-001-26W1/0	1983/10	1985/10	1985/09	628	6047	88.5	1992/10
00/06-35-001-26W1/0	1982/12		1991/04	3515	13752	44.3	
00/12-35-001-26W1/0	1983/10		1989/11	697	7887	82.7	



## **DISCUSSION:**

### **Production Performance**

Production Response versus Injection: Since injection began, late 1983, injection rates fluctuated to some degree amongst the injectors; it is difficult to link any production responses to any specific injector. Water breakthrough in certain producers could not be directly correlated with over injection in associated injectors. Some wells showed no change in oil rate when injection was ceased in 1998-99.

### **Voidage Replacement Ratio Calculation**

What could be described as very limited success, the waterflood was not maintained properly and injection rate dropped year after year in most cases. The cumulative VRR in the pool is about 0.81 (under injected) and the current monthly VRR is zero. Almost all of the injectors are shut in currently. PennWest has no plan to re-activate the old injectors.

To understand the past performance of the Lower Amaranth waterflood, we are doing some reservoir engineering work to come up with potential solutions. One of our plans is to do a pilot program in section 2:

The objective of the pilot is to:

1. To see can we inject continuously into the Lower Amaranth Formation with:-
  - i. Particle size less than 1 micron
  - ii. Total Suspended Solid (TSS) less than 10 ppm
  - iii. Oil less than 10 ppm
2. Inject below the frac pressure
3. Test the simulation model that we have built.

### **2011 Waskada Lower Amaranth Waterflood Pilot Location**

The pilot producer will be 102/12-01-02-26W1/00 (a horizontal well) and the injectors will be two vertical wells; 100/12-01-02-26W1 and 100/11-01-02-26 (need to be converted to injectors)

### **Corrosion and Scale Prevention Program**

We currently inject ScalCor down all the new horizontal wells. Plus, PennWest will be installing cathodic protection on the wells. Also, the new gathering system is Fiberglass and as such is not susceptible to corrosion.

## **SUMMARY AND RECOMMENDATIONS**

### **Producers**

#### **Current Producing Wells**

1. 00/03-26-001-26W1/0
2. 00/04-26-001-26W1/0
3. 00/06-26-001-26W1/0
4. 03/01-27-001-26W1/0
5. 02/04-27-001-26W1/0
6. 02/05-27-001-26W1/0
7. 03/05-27-001-26W1/0
8. 02/08-27-001-26W1/0

#### **Current Suspended Wells**

None

#### **Abandoned Wells**

1. 00/14-22-001-26W1/0 (since 1987/05)
2. 00/14-23-001-26W1/0 (since 1996/05)
3. 00/11-26-001-26W1/0 (since 1996/07)
4. 02/12-26-001-26W1/0 (since 1996/06)
5. 00/14-26-001-26W1/0 (since 1989/11)

6. 00/01-27-001-26W1/0 (since 1988/09)
7. 00/02-27-001-26W1/0 (since 1992/01)
8. 00/03-27-001-26W1/0 (since 1988/07)
9. 00/04-27-001-26W1/0 (since 1988/06)
10. 02/06-27-001-26W1/0 (since 1993/04)
11. 00/08-27-001-26W1/0 (since 1992/05)
12. 00/09-27-001-26W1/0 (since 1990/02)
13. 02/09-27-001-26W1/2 (since 1992/05)
14. 00/10-27-001-26W1/0 (since 1996/01)
15. 02/11-27-001-26W1/0 (since 1989/05)
16. 00/12-27-001-26W1/0 (since 1993/06)
17. 02/14-27-001-26W1/0 (since 1996/01)
18. 02/16-27-001-26W1/0 (since 1990/06)
19. 00/02-34-001-26W1/2 (since 1990/04)
20. 00/08-34-001-26W1/0 (since 1990/03)
21. 00/02-35-001-26W1/0 (since 1989/03)
22. 00/03-35-001-26W1/2 (since 1989/11)
23. 00/06-35-001-26W1/0 (since 1991/05)
24. 00/12-35-001-26W1/0 (since 1989/12)

## **Injectors**

### **Current Injecting Wells**

None

### **Current Suspended Wells**

1. 00/05-26-001-26W1/0 (since 2011/05)

### **Abandoned Wells**

1. 00/16-22-001-26W1/0 (since 1988/03)
2. 00/13-23-001-26W1/0 (since 1994/04)
3. 00/13-26-001-26W1/0 (since 1987/04)
4. 00/05-27-001-26W1/0 (since 1987/04)
5. 00/07-27-001-26W1/0 (since 1999/04)
6. 02/13-27-001-26W1/0 (since 1987/01)
7. 02/15-27-001-26W1/0 (since 1988/01)
8. 00/05-35-001-26W1/0 (since 1992/11)

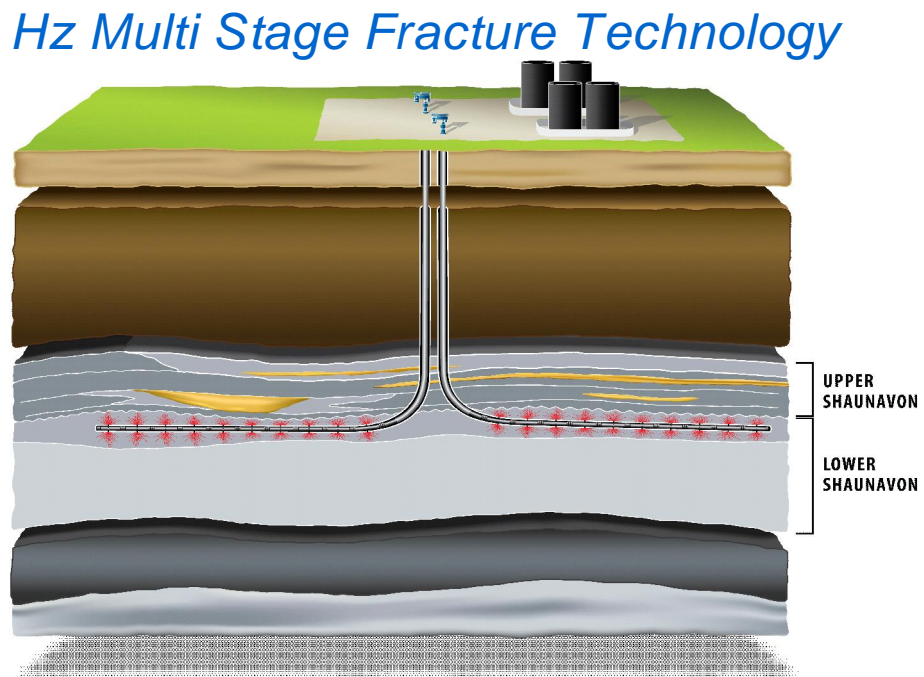
The behavior of a Waskada Unit 2 producers are indicated by examining the oil rate versus time plots (see Appendix B). Waskada Unit 2 exhibited relatively high initial oil productivity (most of the wells that were drilled in the past are verticals), rapidly declining to flat/low decline rates, with almost no discernible water flood response. This behavior can be explained by drop in the reservoir pressure from initial (approximately 8700 kPag) to above in some wells or below in others bubble point pressure (about 4200 kPag) followed by solution gas breakout which adversely affected the relative permeability to oil. (See Table # 2)

It is believed that fracture stimulation treatments, performed on these wells prior to initiation of water injection, “broke” through into the higher productivity Mississippian zone and that majority of injected water to date has entered this zone. This is one of the major explanations for lack of waterflood response to date and the continued decline in oil productivities.

The Waskada Lower Amaranth is becoming a non-conventional tight oil resource play that utilizes horizontal multi-stage frac drilling technology (small multi-stage frac stimulations on newly drilled wells will remain “in zone” within the Lower Amaranth) to re-develop the thick low perm oil zones adjacent to the conventional Amaranth zone that was discovered in the 1980’s. PennWest drilled five horizontal wells, to increase the Recovery Factor (RF), in year 2010, 102/05-27-001-26W1, 103/01-27-001-26W1, 102/04-27-001-26W1, 103/05-27-001-26W1 and 102/08-27-001-26W1. PennWest

drilled two more horizontal well in 2011 in this unit. PennWest's follow up plan is to convert some of the recent horizontal producing wells to injection wells to increase the sweep efficiency and ultimately increase the recoverable oil in place.

The following is the HZ Multi Stage Fracture Technology that we are using in our new development.



## **TABLES**

## Waskada Unit #2

**Table 1: Rates History**

Date	Oil		Water		Inj Water	
Year	m3/year	m3/day	m3/year	m3/day	m3/year	m3/day
1981	146	0.40	78	0.21	0	0.00
1982	9,220	25.26	4,445	12.18	0	0.00
1983	36,384	99.68	63,552	174.12	1,239	3.39
1984	24,120	66.08	79,843	218.75	153,606	420.84
1985	22,559	61.80	85,328	233.77	126,181	345.70
1986	20,364	55.79	87,504	239.74	160,776	440.48
1987	14,682	40.23	56,168	153.88	61,485	168.45
1988	9,025	24.73	32,921	90.19	12,461	34.14
1989	5,778	15.83	24,659	67.56	3,834	10.51
1990	5,145	14.10	13,878	38.02	14,370	39.37
1991	3,887	10.65	12,754	34.94	15,978	43.78
1992	3,270	8.96	12,727	34.87	15,440	42.30
1993	2,365	6.48	12,922	35.40	8,431	23.10
1994	1,970	5.40	9,267	25.39	5,612	15.38
1995	2,064	5.65	9,530	26.11	5,405	14.81
1996	1,647	4.51	3,642	9.98	5,289	14.49
1997	1,084	2.97	2,867	7.85	469	1.28
1998	1,327	3.63	2,463	6.75	0	0.00
1999	1,379	3.78	2,187	5.99	639	1.75
2000	1,300	3.56	1,779	4.87	1,818	4.98
2001	1,198	3.28	2,168	5.94	1,816	4.97
2002	1,213	3.32	1,781	4.88	2,044	5.60
2003	711	1.95	1,068	2.93	1,921	5.26
2004	554	1.52	1,214	3.33	1,437	3.94
2005	421	1.15	999	2.74	1,383	3.79
2006	360	0.98	906	2.48	2,275	6.23
2007	527	1.44	1,190	3.26	3,093	8.47
2008	648	1.78	1,062	2.91	2,396	6.56
2009	473	1.29	912	2.50	1,378	3.77
2010	4704	16.33	13796	54.07	1,905	5.22
2011	10088	34.35	38736	139.35	154.1	0.422

## Waskada Unit #2

**Table 2: Pressure Survey**

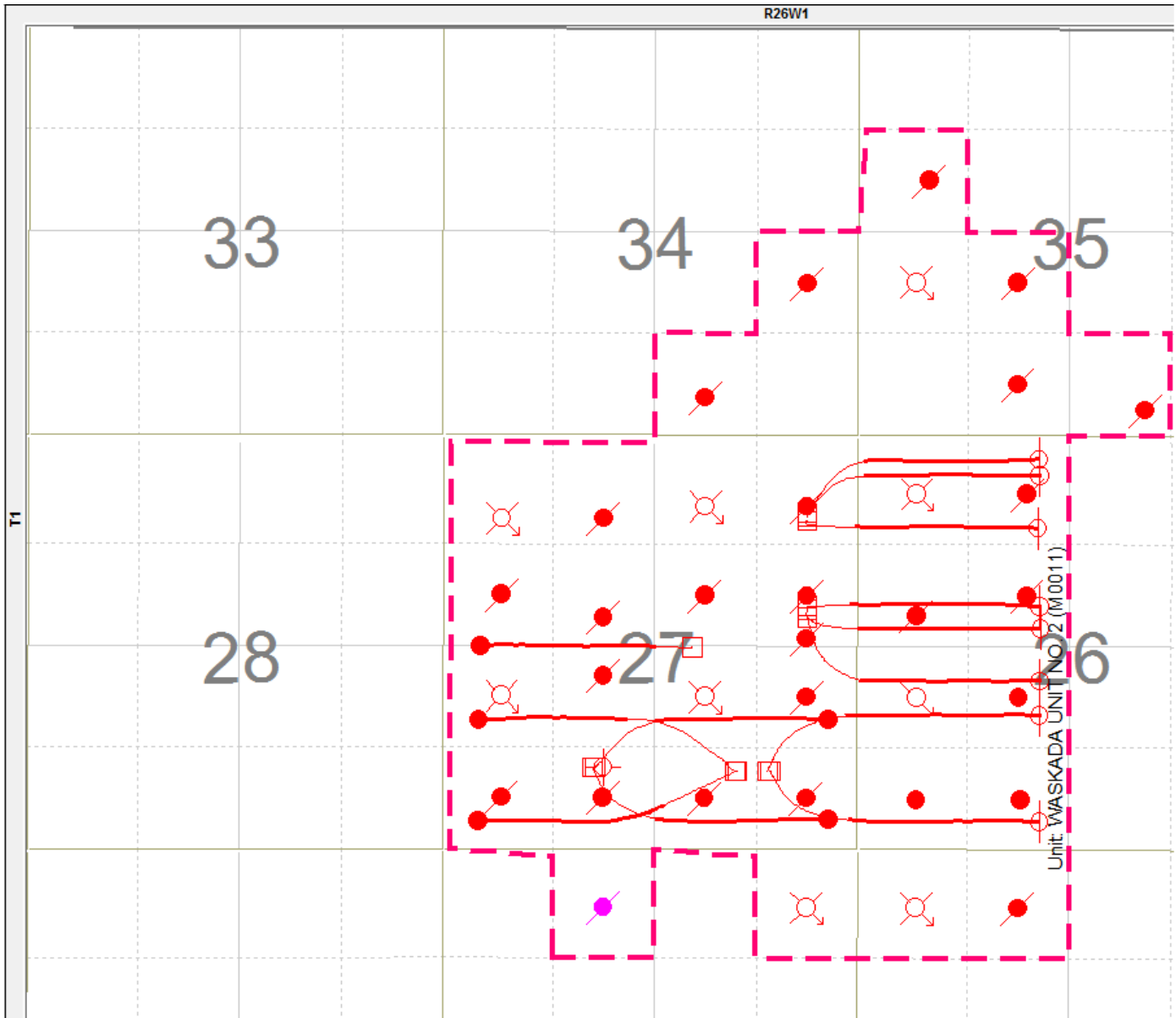
Location	Shut In Date	Date of Survey	Type of Survey	Pressure @ Datum Depth (kPa)
02/12-24-001-26W1/0	17-Oct-10	24-Oct-10	BHP Build Up	1016
03/13-24-001-26W1/0	17-Oct-10	24-Oct-10	BHP Build Up	3179
00/15-24-001-26W1/0	Dec-89	(18 days)	Static Gradient	10482
00/06-25-001-26W1/0	(8 days)	11-Dec-06	Acoustic Build Up	4186
00/09-25-001-26W1/0		2008	BHP, Assuming WC from Last Prod'n	4881
02/09-25-001-26W1/0	17-Oct-10	24-Oct-10	BHP Build Up	1743
00/15-25-001-26W1/0	Jan-90	(68 days)	Static Gradient	11144
00/16-25-001-26W1/0		2008	BHP, Assuming WC from Last Prod'n	5765
00/08-26-001-26W1/0		2008	BHP, Assuming WC from Last Prod'n	6267
102/05-27-001-26W1/0		Sept 2011	Results of the test are attached to the report	

Recent pressure test was performed on 102/05-27-001-26W1/00 on September 2011 and the results of the test are attached to the report

## **APPENDIX A**



## Appendix A – Area Map

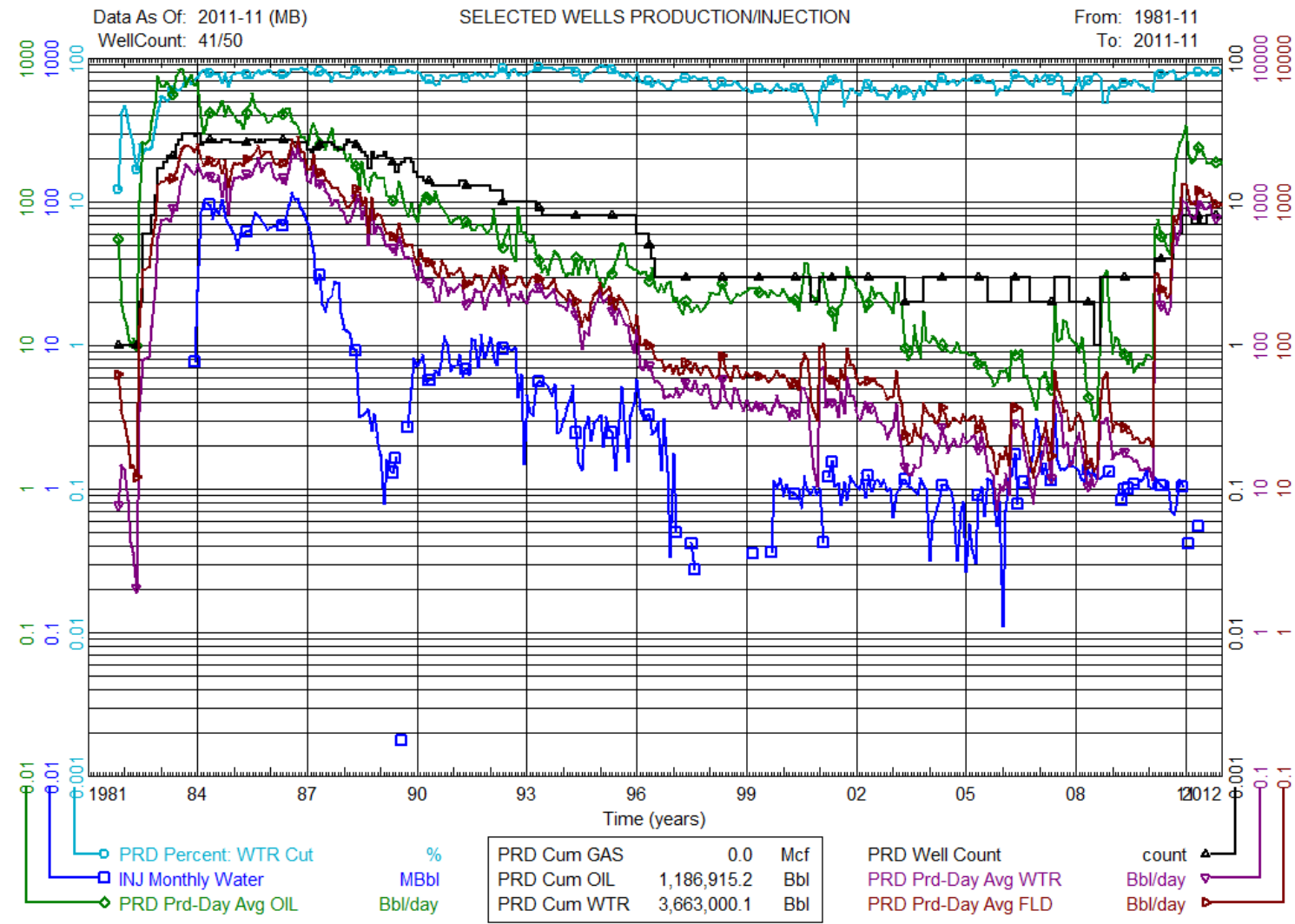


WELL SYMBOLS									
• OIL	⚡ AO	⚡ PTN	⚡ D&A	⚡ WI					
○ LCT	⚡ AAI	⚡ STN	⚡ CMM	⚡ DRL					
⚡ RDR	⚡ WD	⚡ AWS	⚡ AWD	⚡ SWI					
⚡ SO	⚡ WSC	⚡ J&A	□ SL						

<b>PennWest</b> Exploration		
Waskada Unit #2		
	By : Scale = 1:19881	Date : 2011/04/14 Project : Waskada

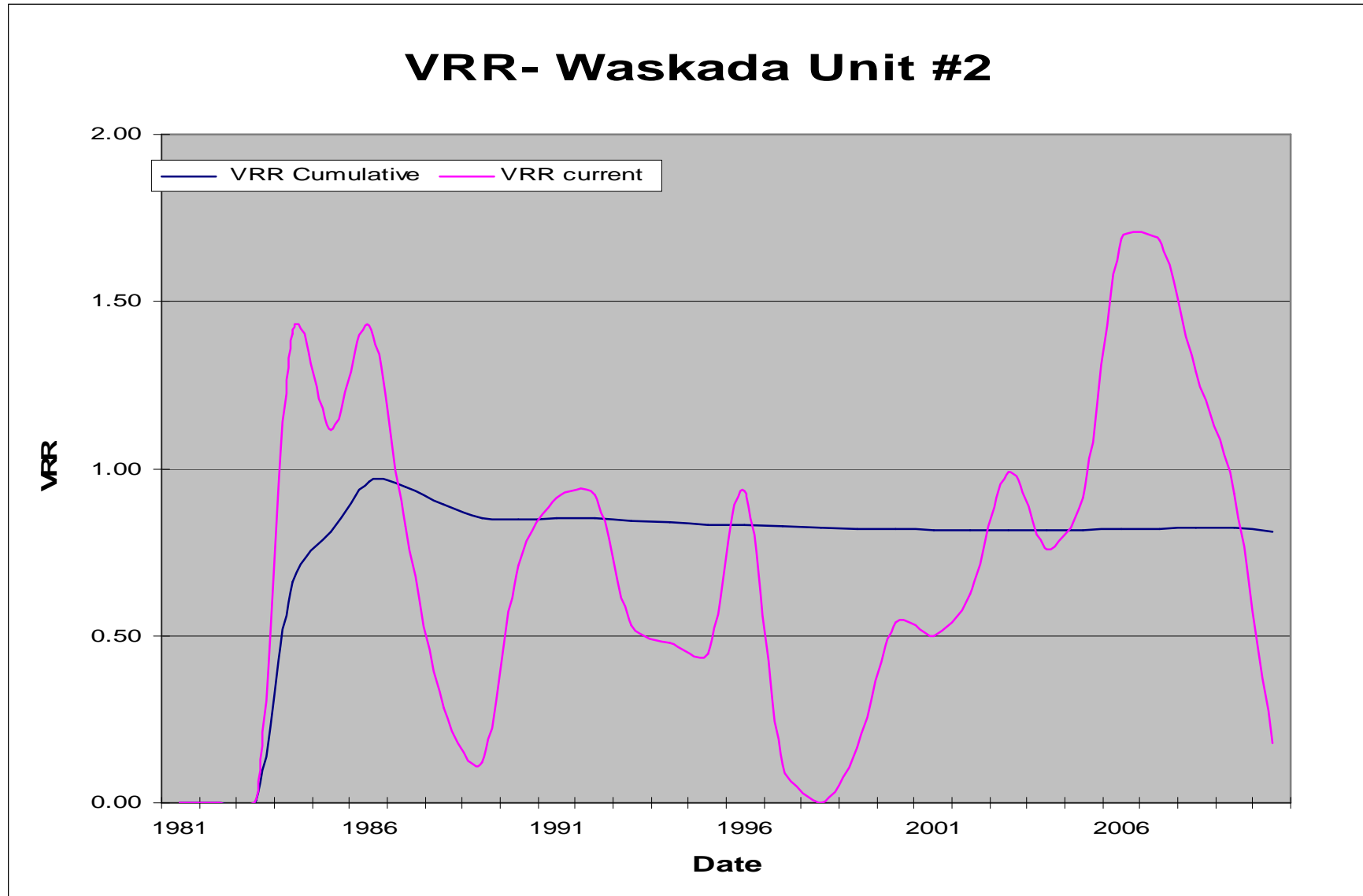
## **APPENDIX B**

## Appendix B – Production and Injection History plot



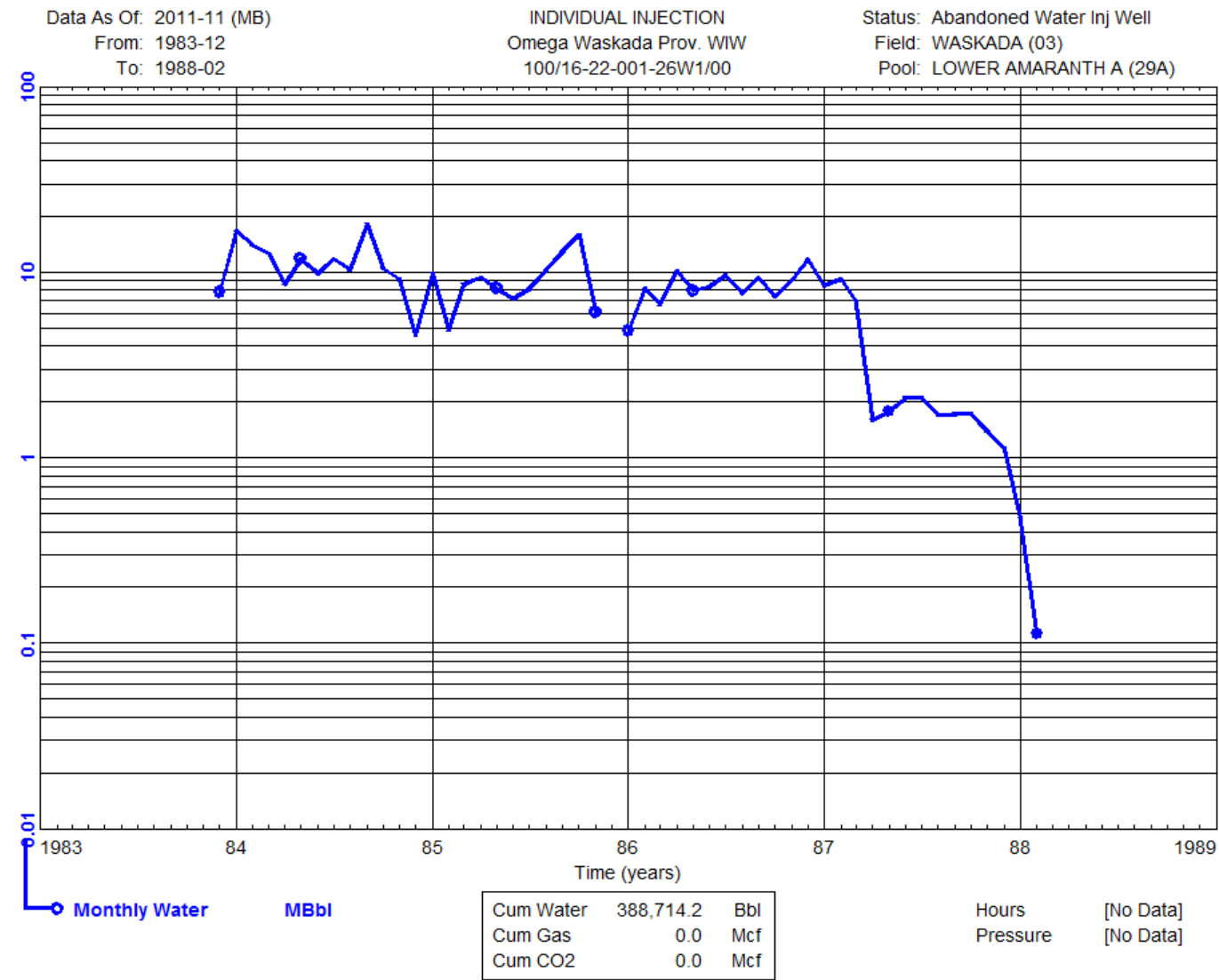
## **APPENDIX C**

**Appendix C – Voidage Replacement Ratio VRR**



## **APPENDIX D**

## Appendix D – Production and Injection Profiles (Individual wells)



Data As Of: 2011-11 (MB)

From: 1988-02

To: 1994-03

INDIVIDUAL INJECTION

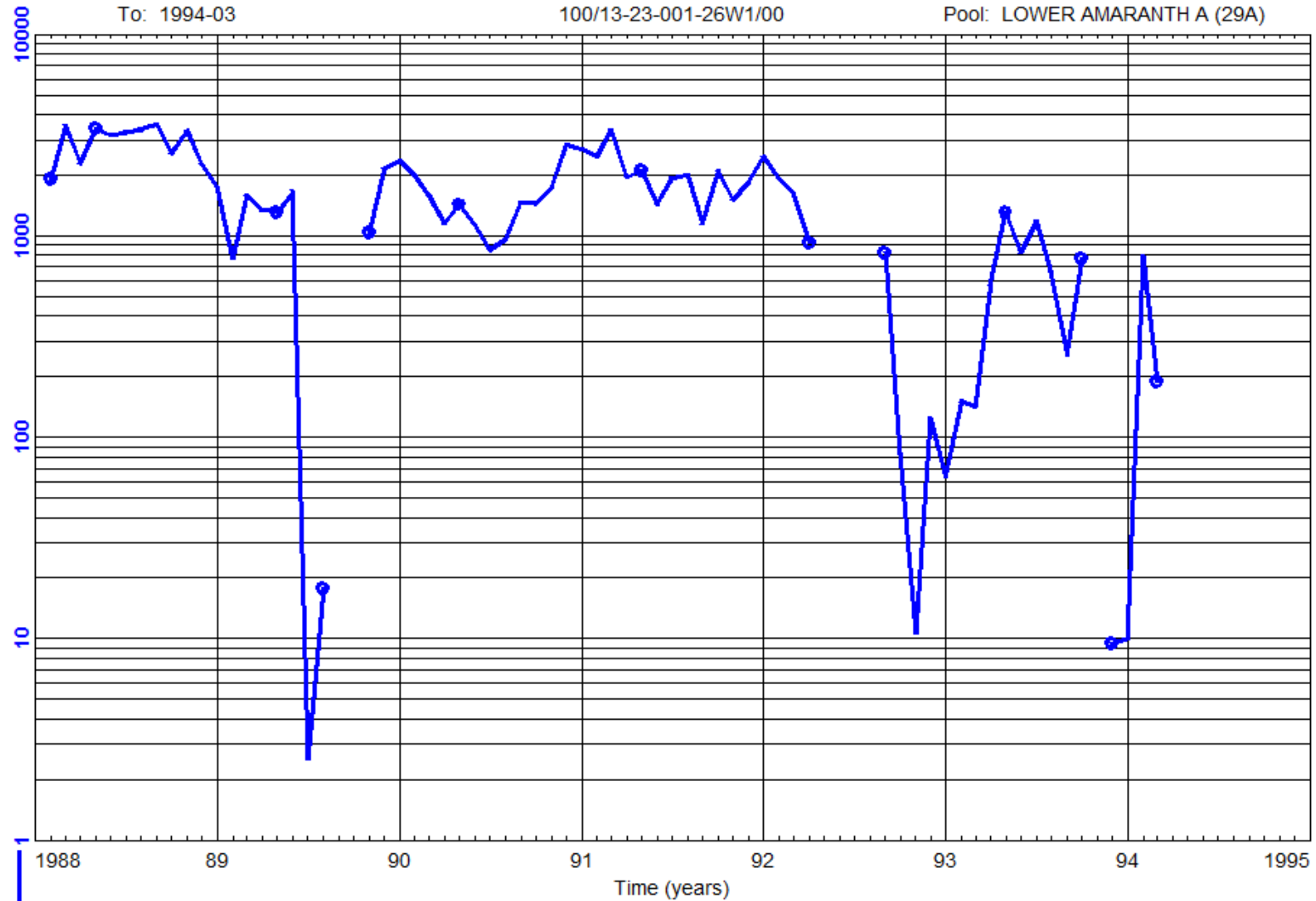
Waskada Unit No. 2 WIW

100/13-23-001-26W1/00

Status: Abandoned Water Inj Well

Field: WASKADA (03)

Pool: LOWER AMARANTH A (29A)



Monthly Water

Bbl

Cum Water	102,527.3	Bbl
Cum Gas	0.0	Mcf
Cum CO2	0.0	Mcf

Hours [No Data]

Pressure [No Data]



Data As Of: 2011-11 (MB)

From: 1984-01

To: 2011-05

INDIVIDUAL INJECTION

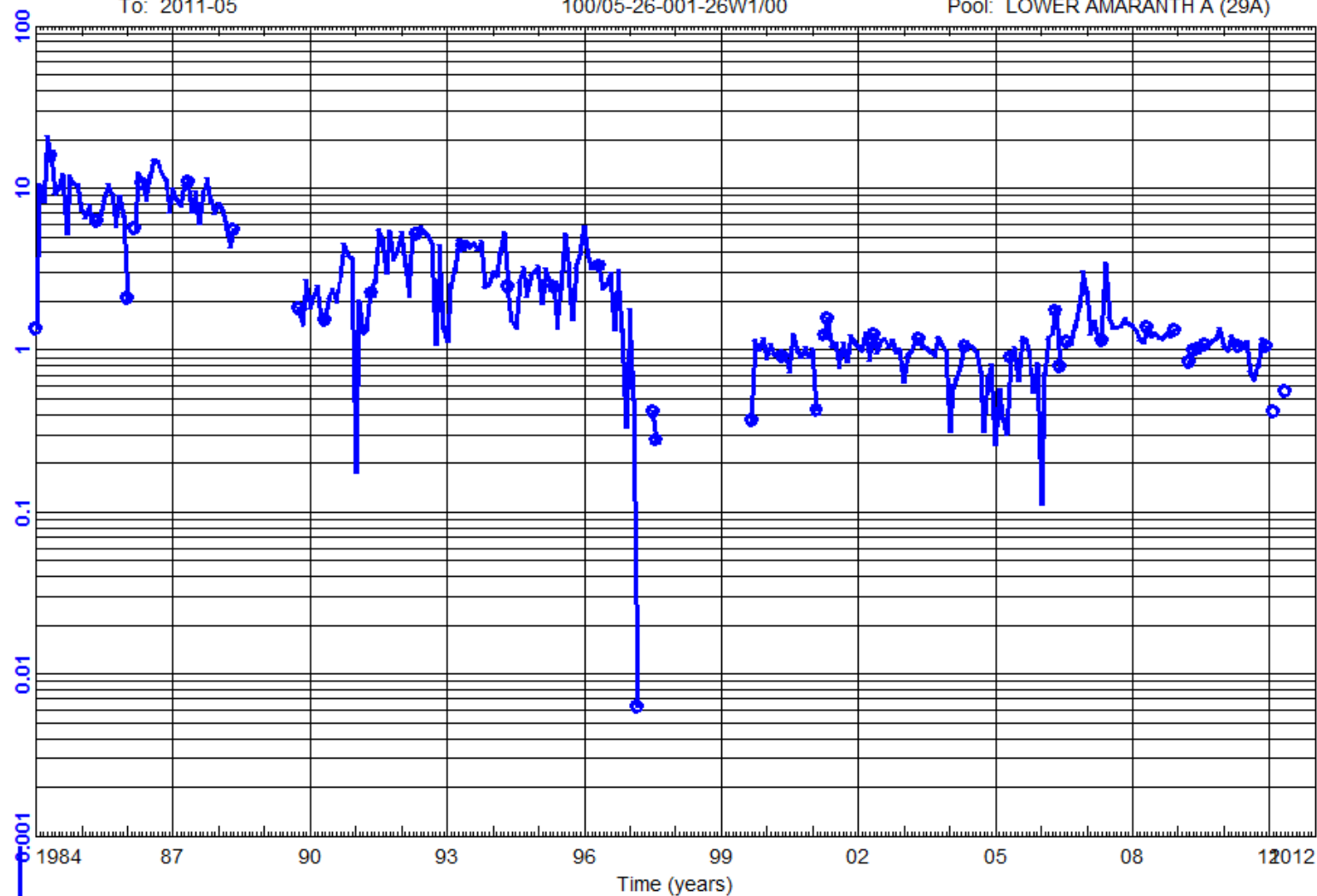
Waskada Unit No. 2 WIW

100/05-26-001-26W1/00

Status: Water Inj Well

Field: WASKADA (03)

Pool: LOWER AMARANTH A (29A)



Monthly Water MBbl

Cum Water	872,409.6	Bbl
Cum Gas	0.0	Mcf
Cum CO2	0.0	Mcf

Hours [No Data]

Pressure [No Data]

Data As Of: 2011-11 (MB)

From: 1984-02

To: 1987-03

INDIVIDUAL INJECTION

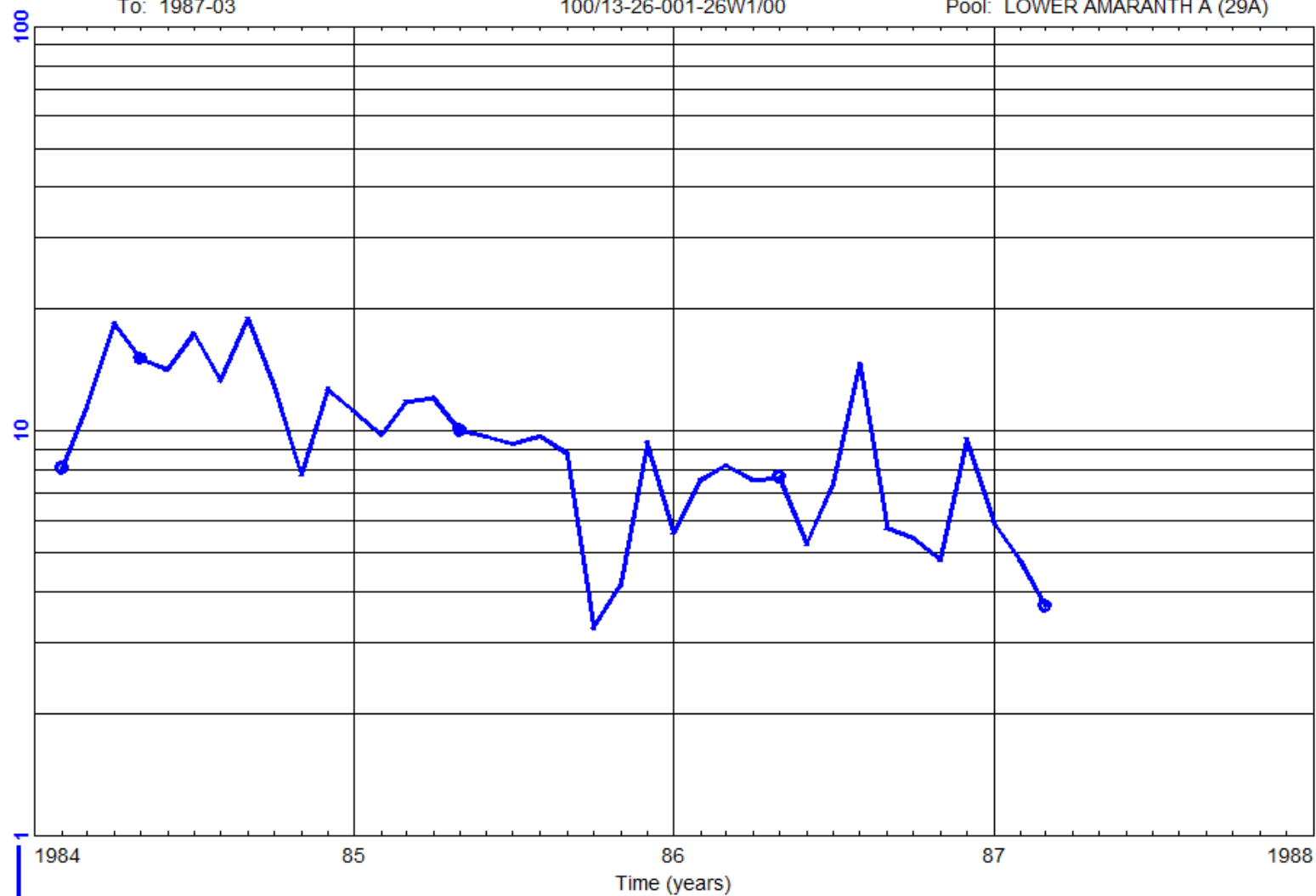
Omega Waskada WIW

100/13-26-001-26W1/00

Status: Abandoned Water Inj Well

Field: WASKADA (03)

Pool: LOWER AMARANTH A (29A)



Monthly Water

MBbl

Cum Water	362,940.5	Bbl
Cum Gas	0.0	Mcf
Cum CO2	0.0	Mcf

Hours [No Data]

Pressure [No Data]

Data As Of: 2011-11 (MB)

From: 1984-01

To: 1987-03

INDIVIDUAL INJECTION

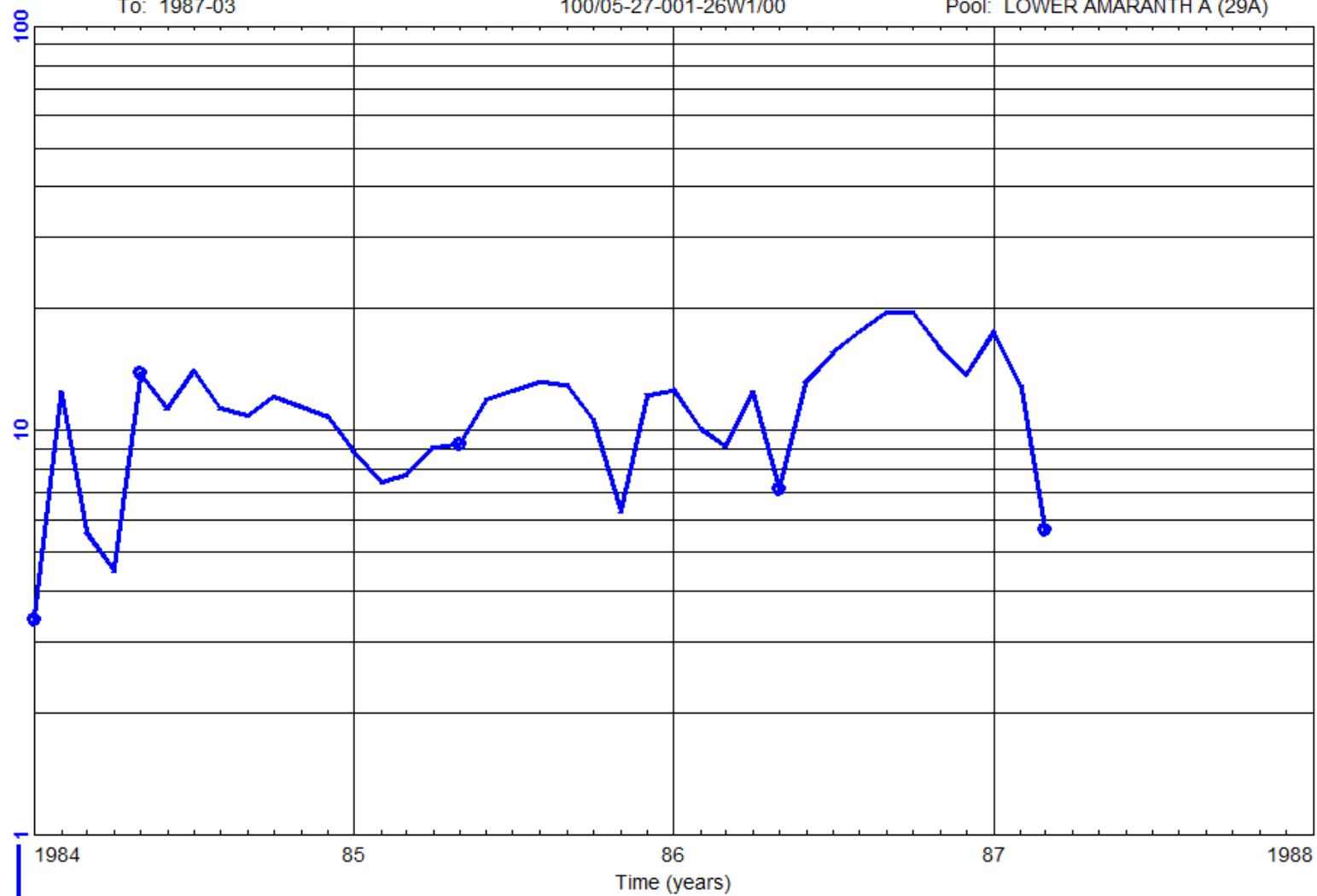
Omega Waskada WIW

100/05-27-001-26W1/00

Status: Abandoned Water Inj Well

Field: WASKADA (03)

Pool: LOWER AMARANTH A (29A)



Monthly Water MBbl

Cum Water	445,870.5	Bbl
Cum Gas	0.0	Mcf
Cum CO2	0.0	Mcf

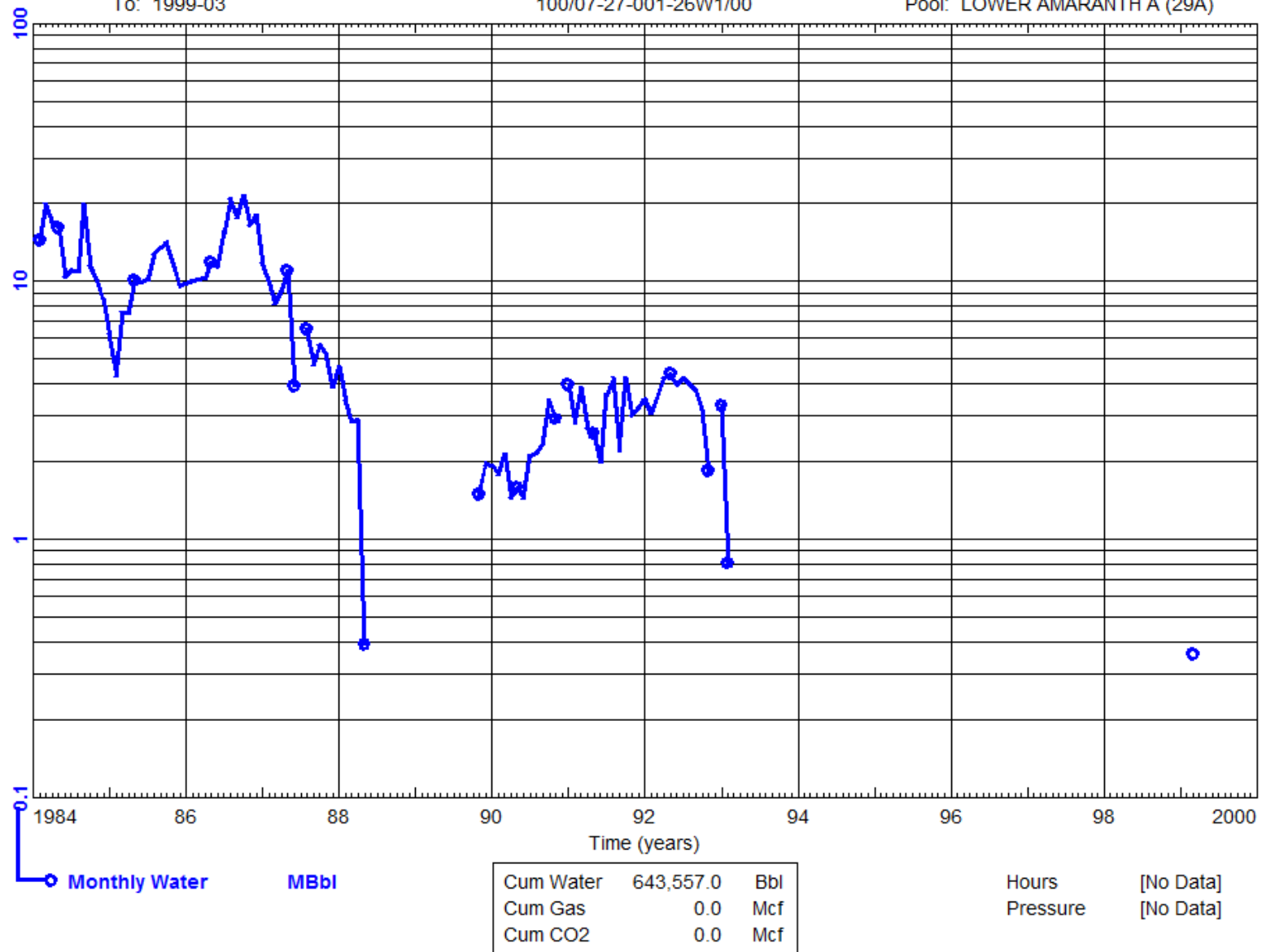
Hours [No Data]

Pressure [No Data]

Data As Of: 2011-11 (MB)  
From: 1984-02  
To: 1999-03

INDIVIDUAL INJECTION  
Waskada Unit No. 2 WIW  
100/07-27-001-26W1/00

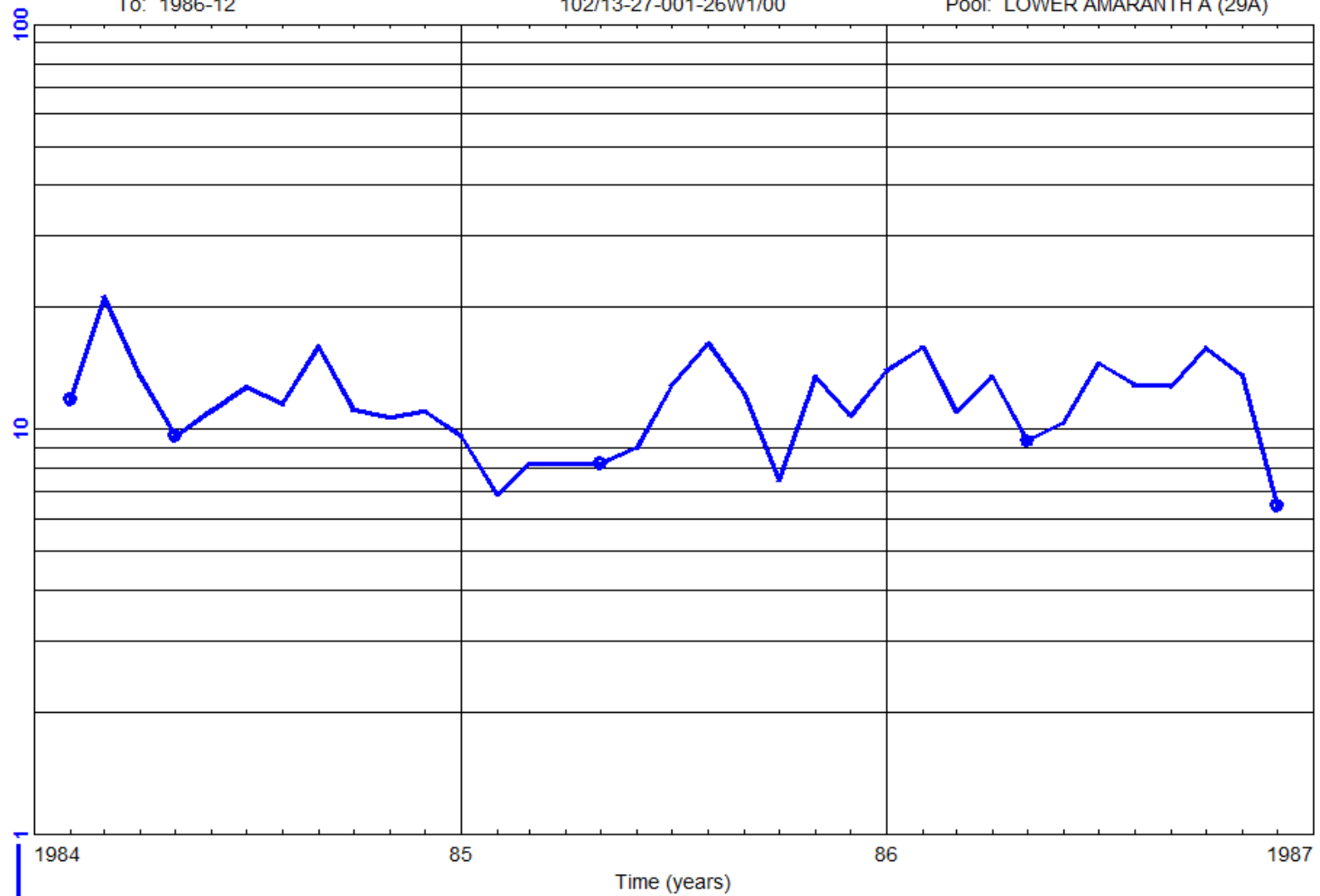
Status: Abandoned Water Inj Well  
Field: WASKADA (03)  
Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1984-02  
 To: 1986-12

INDIVIDUAL INJECTION  
 Waskada Unit No. 9  
 102/13-27-001-26W1/00

Status: Abandoned Water Inj Well  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Monthly Water

MBbl

Cum Water	413,855.1	Bbl
Cum Gas	0.0	Mcf
Cum CO2	0.0	Mcf

Hours [No Data]

Pressure [No Data]

Data As Of: 2011-11 (MB)

From: 1984-01

To: 1987-12

INDIVIDUAL INJECTION

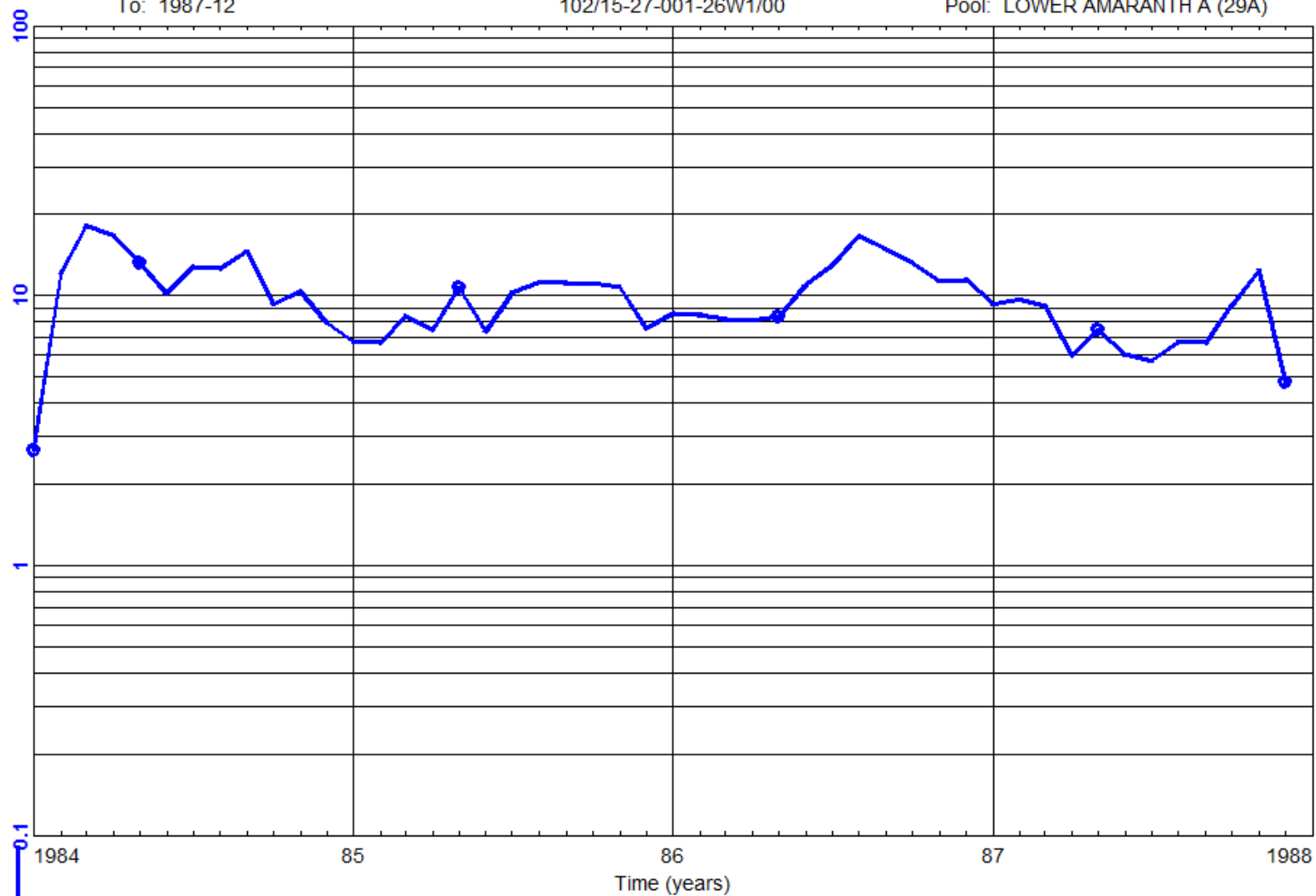
Omega Waskada

102/15-27-001-26W1/00

Status: Abandoned Water Inj Well

Field: WASKADA (03)

Pool: LOWER AMARANTH A (29A)



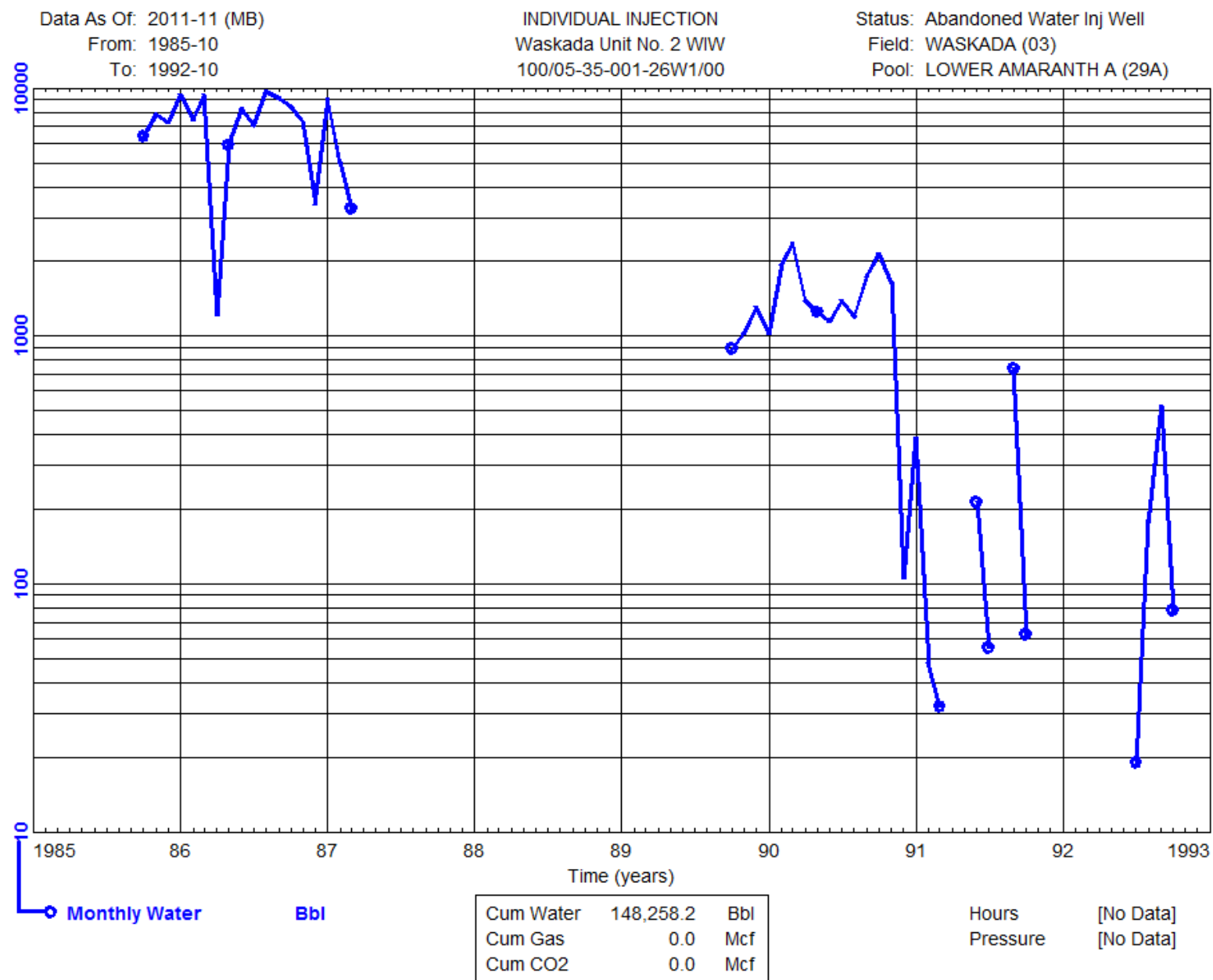
Monthly Water

MBbl

Cum Water	476,662.4	Bbl
Cum Gas	0.0	Mcf
Cum CO2	0.0	Mcf

Hours [No Data]

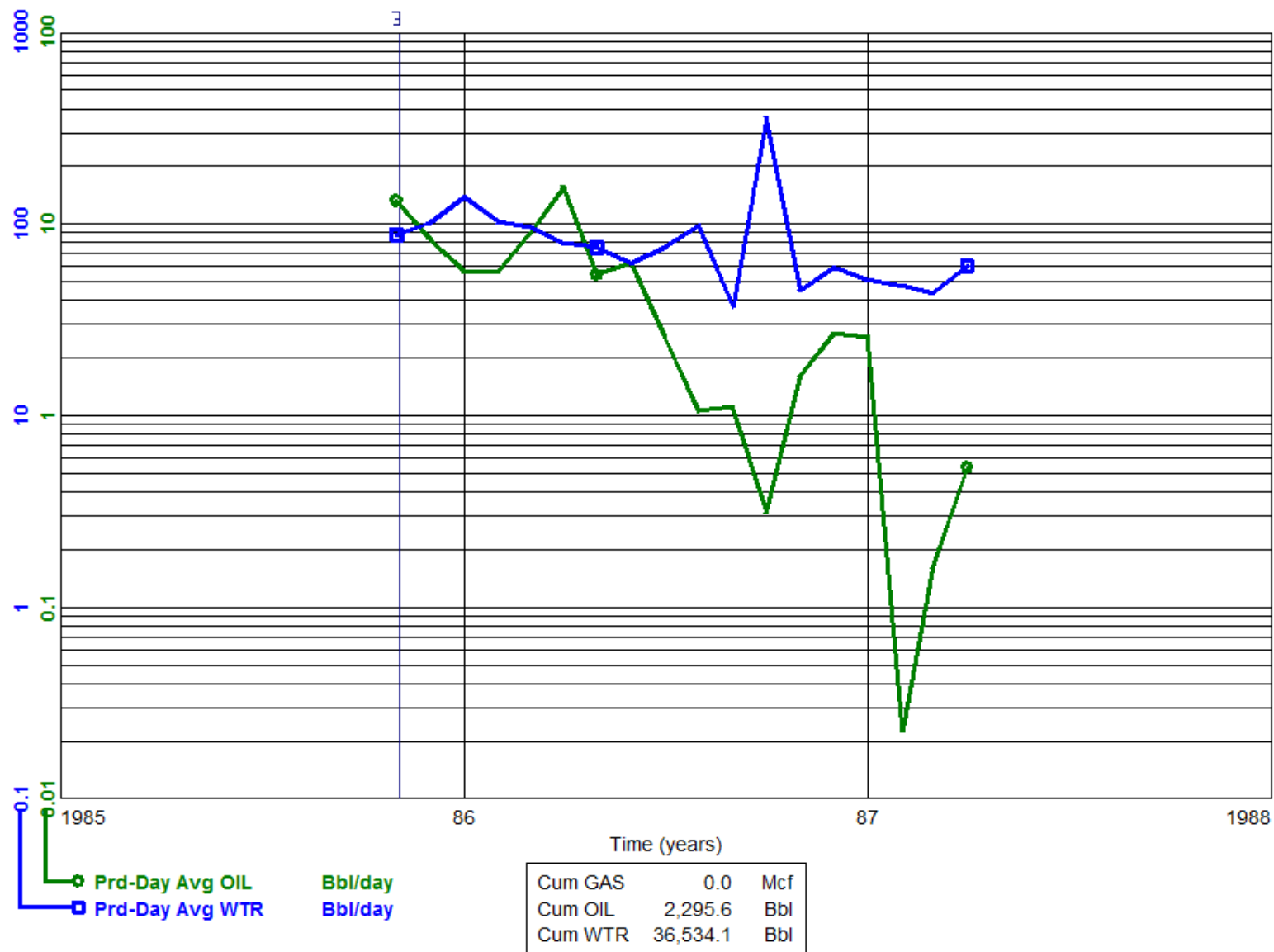
Pressure [No Data]



Data As Of: 2011-11 (MB)  
 From: 1985-11  
 To: 1987-04

INDIVIDUAL PRODUCTION  
 Omega Waskada  
 100/14-22-001-26W1/00

Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)

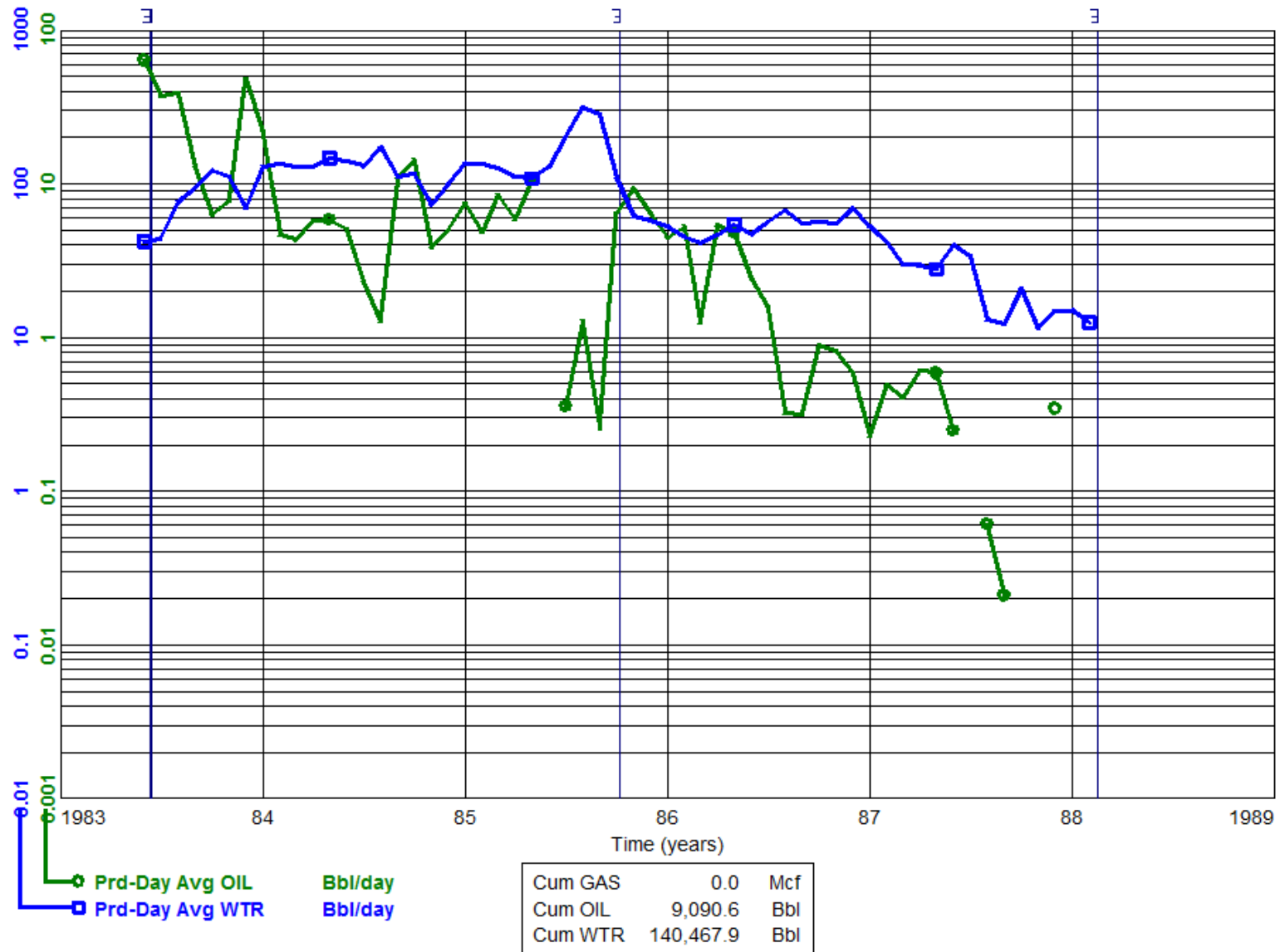




Data As Of: 2011-11 (MB)  
 From: 1983-06  
 To: 1988-02

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2 WIW  
 100/13-23-001-26W1/00

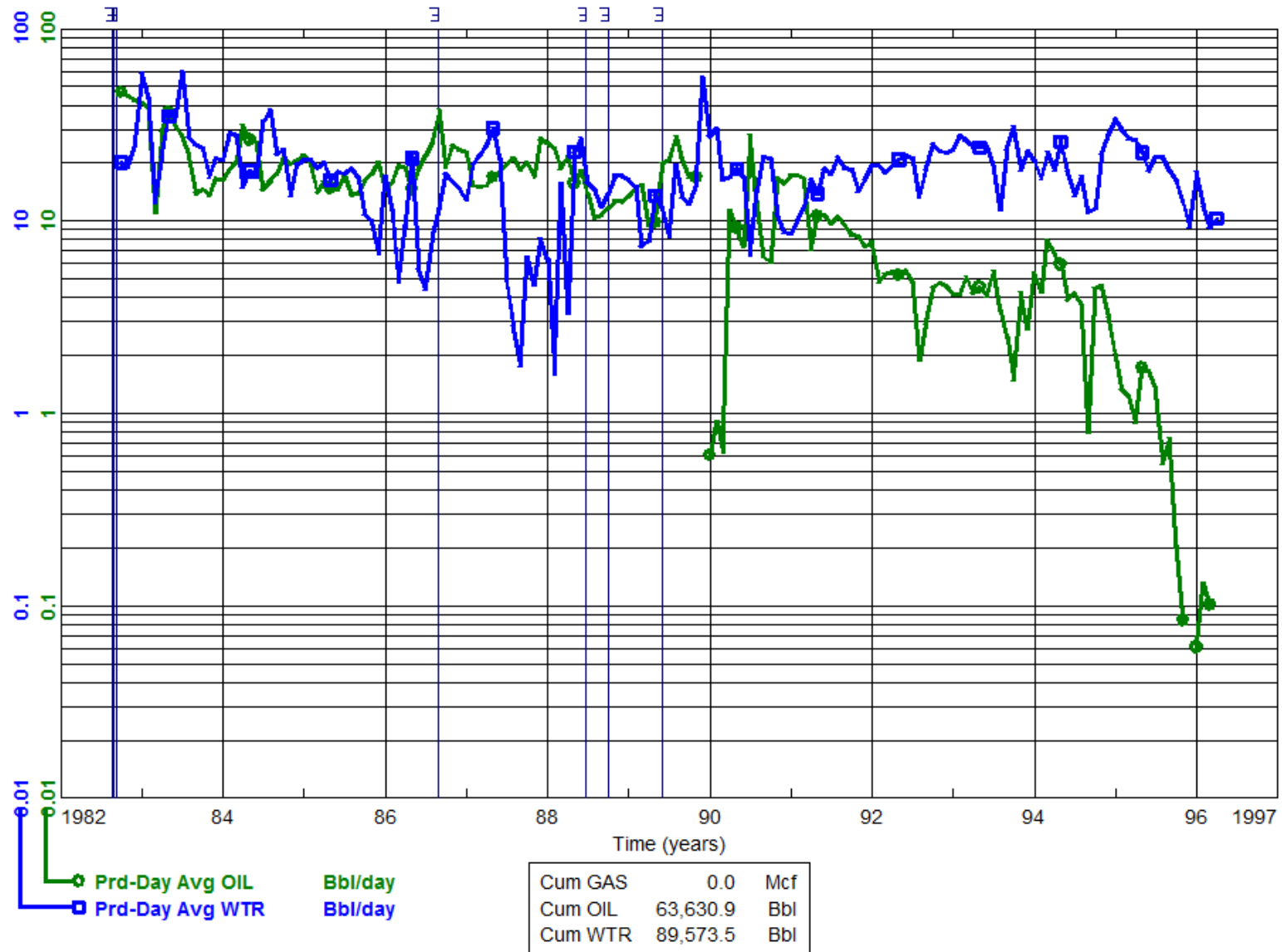
Status: Abandoned Water Inj Well  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
From: 1982-10  
To: 1996-04

INDIVIDUAL PRODUCTION  
Waskada Unit No. 2  
100/14-23-001-26W1/00

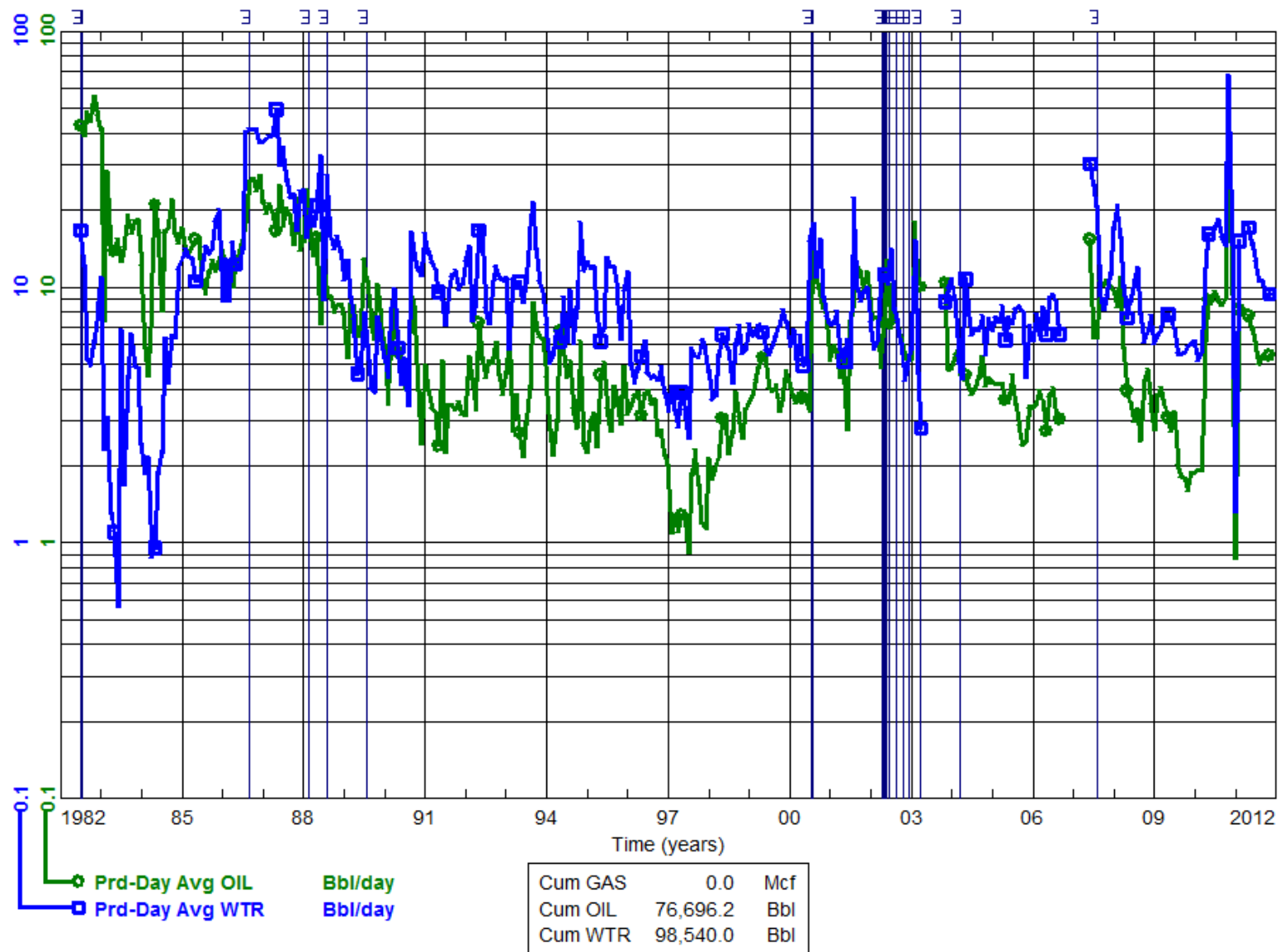
Status: Abandoned Producer  
Field: WASKADA (03)  
Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-07  
 To: 2011-11

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2  
 100/03-26-001-26W1/00

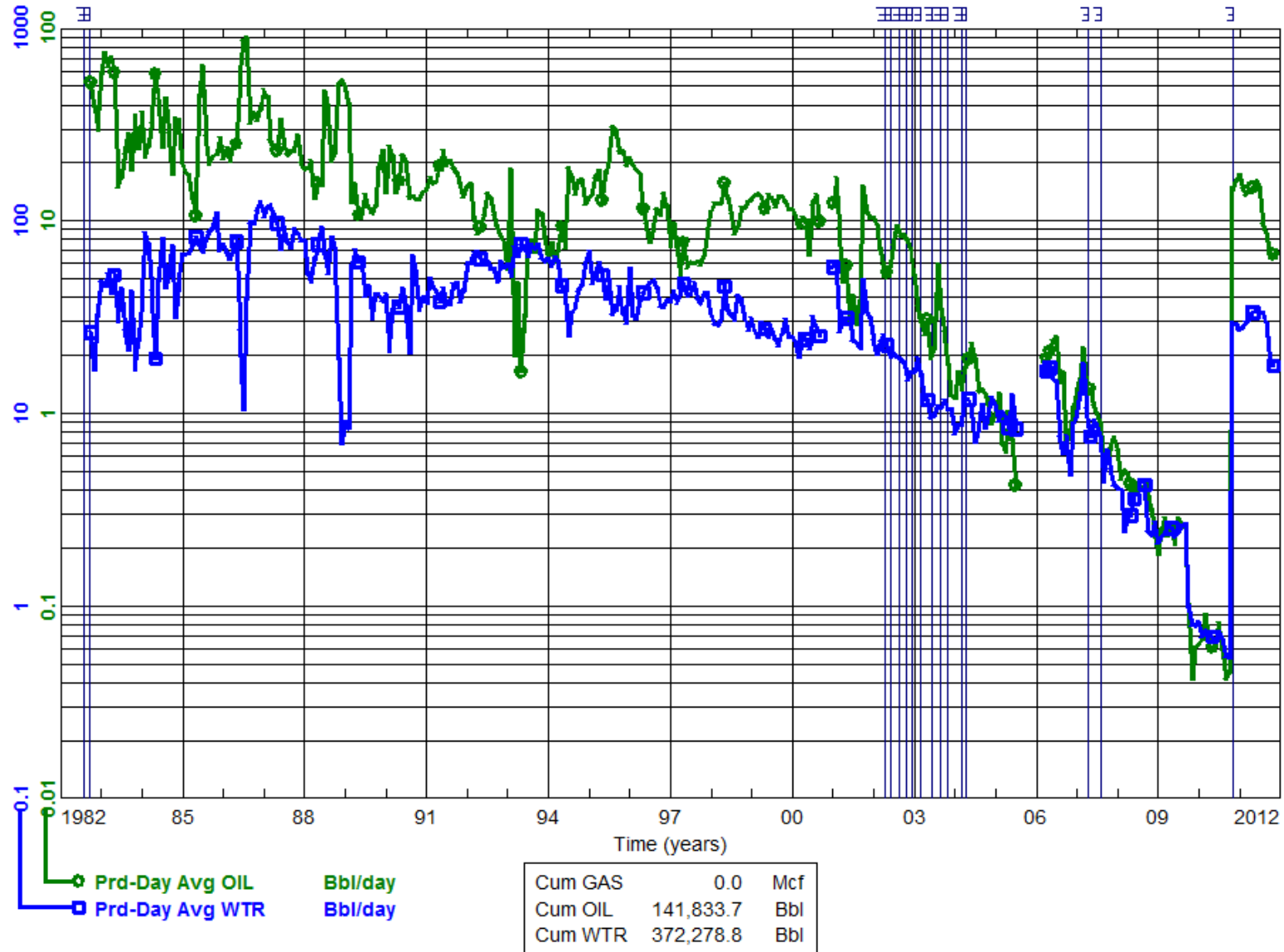
Status: Capable Of Oil Prod  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-10  
 To: 2011-11

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2  
 100/04-26-001-26W1/00

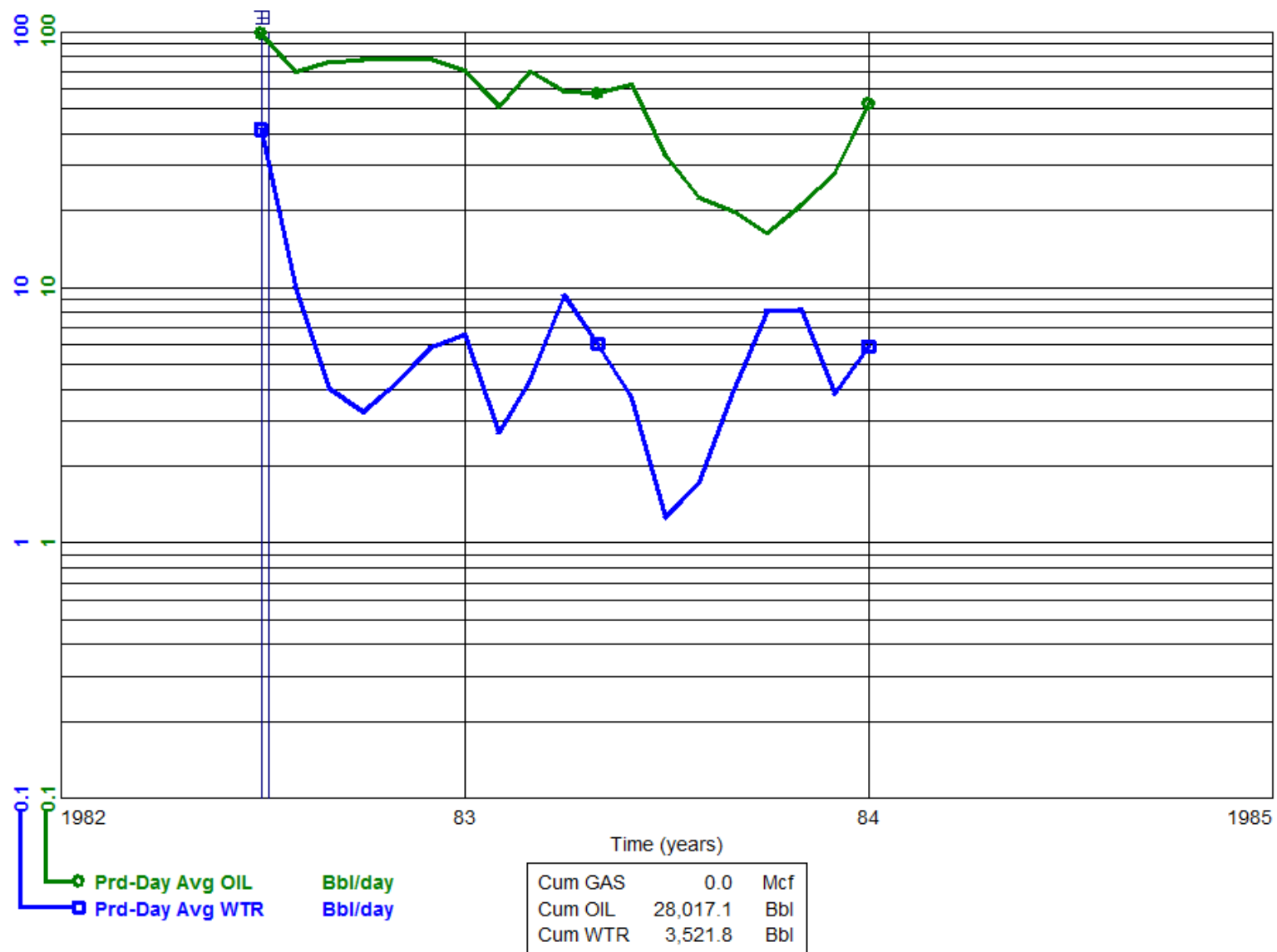
Status: Capable Of Oil Prod  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-07  
 To: 1984-01

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2 WIW  
 100/05-26-001-26W1/00

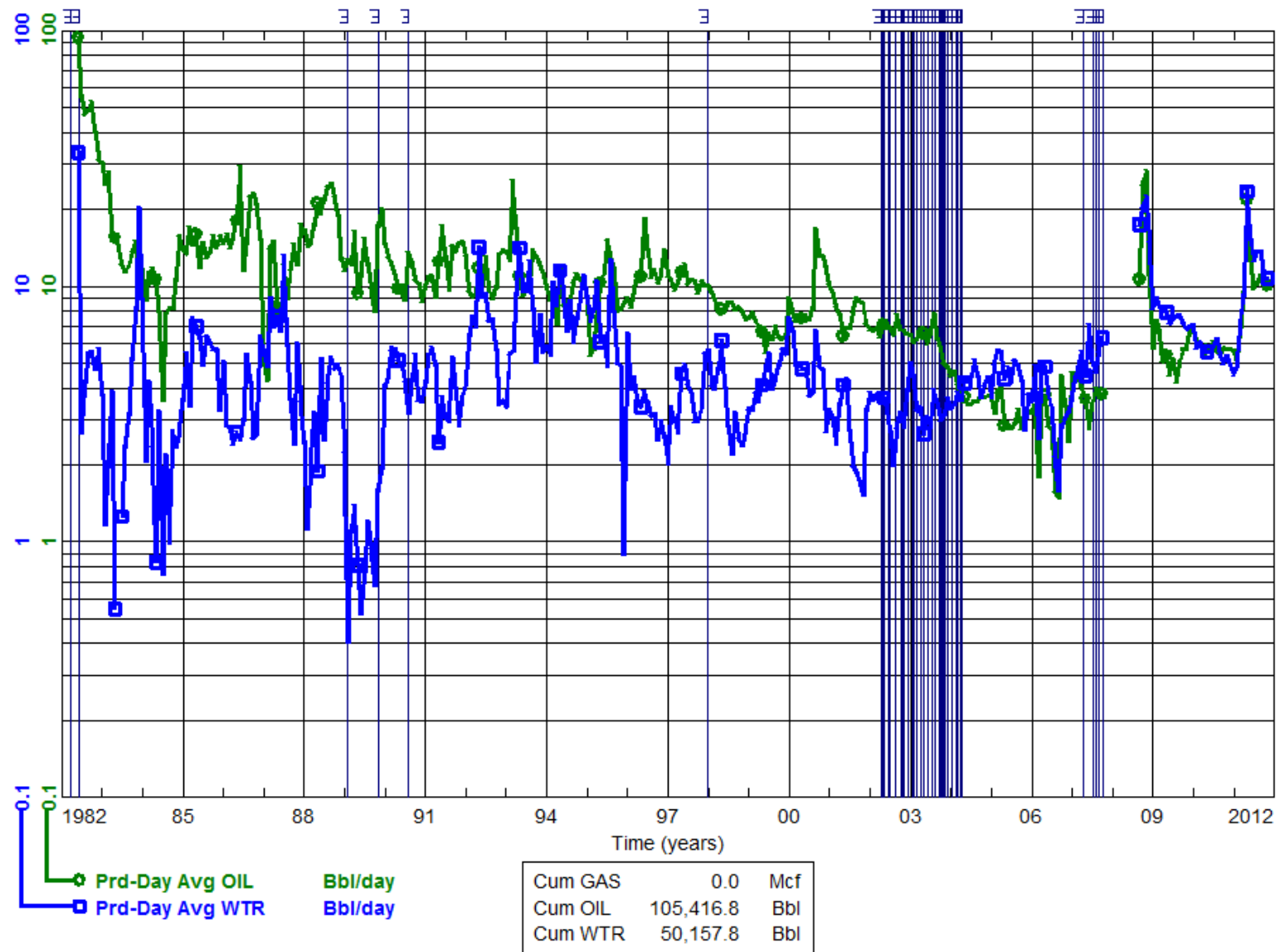
Status: Water Inj Well  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-06  
 To: 2011-11

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2  
 100/06-26-001-26W1/00

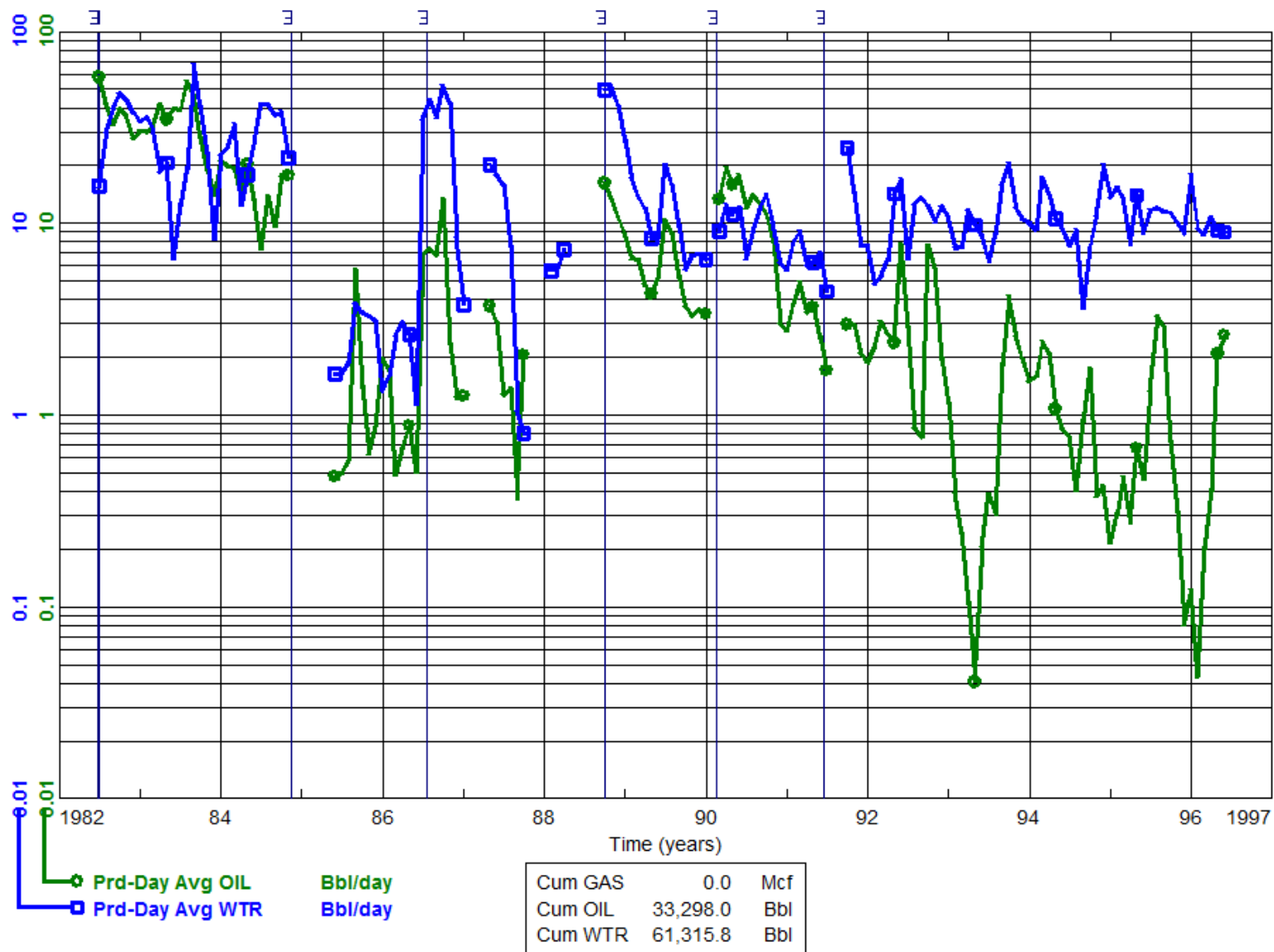
Status: Capable Of Oil Prod  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-07  
 To: 1996-06

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2  
 100/11-26-001-26W1/00

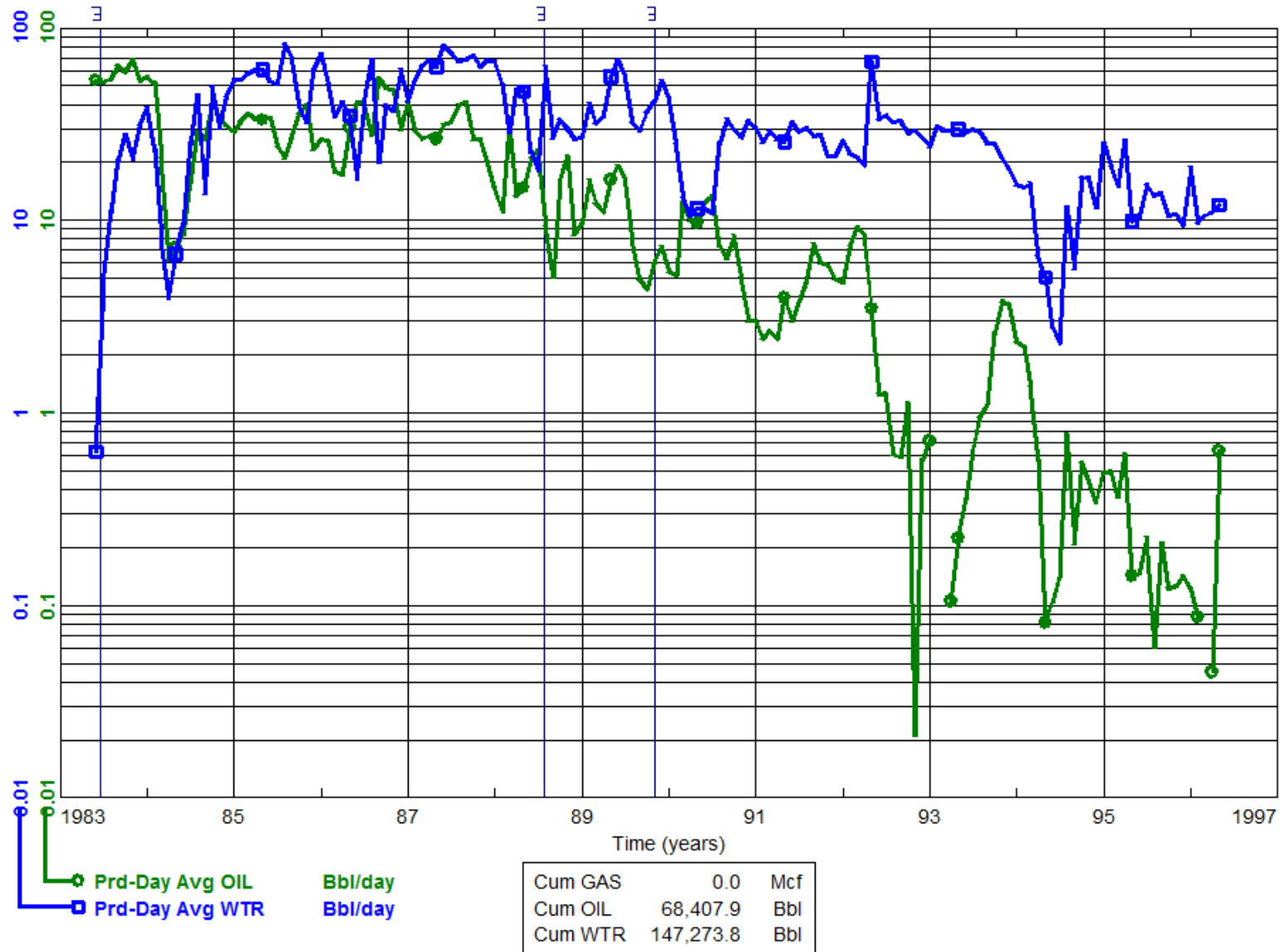
Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1983-06  
 To: 1996-05

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2  
 102/12-26-001-26W1/00

Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)

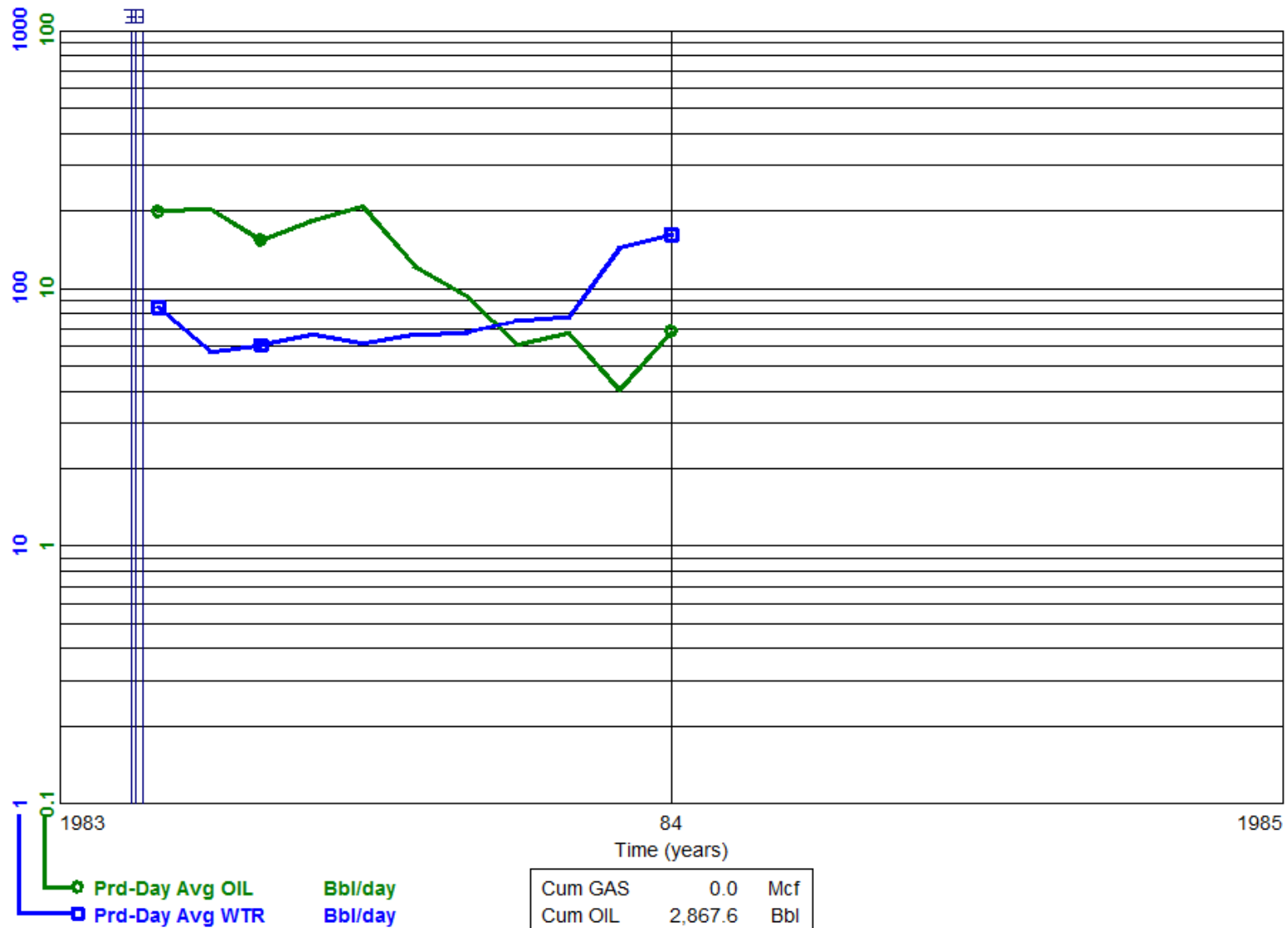




Data As Of: 2011-11 (MB)  
 From: 1983-03  
 To: 1984-01

INDIVIDUAL PRODUCTION  
 Omega Waskada WIW  
 100/13-26-001-26W1/00

Status: Abandoned Water Inj Well  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)

From: 1982-07

To: 1989-10

INDIVIDUAL PRODUCTION

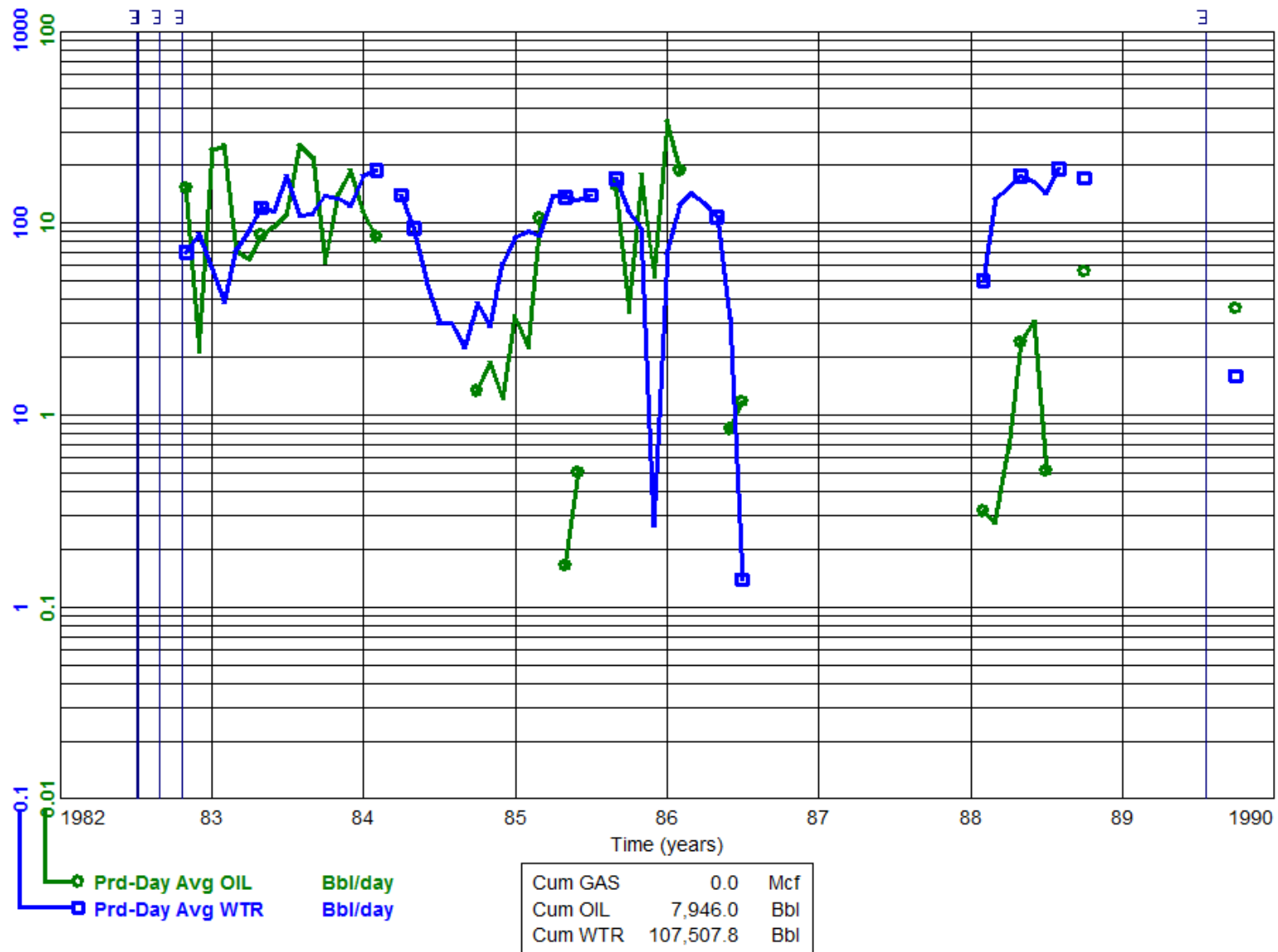
Omega Waskada

100/14-26-001-26W1/00

Status: Abandoned Producer

Field: WASKADA (03)

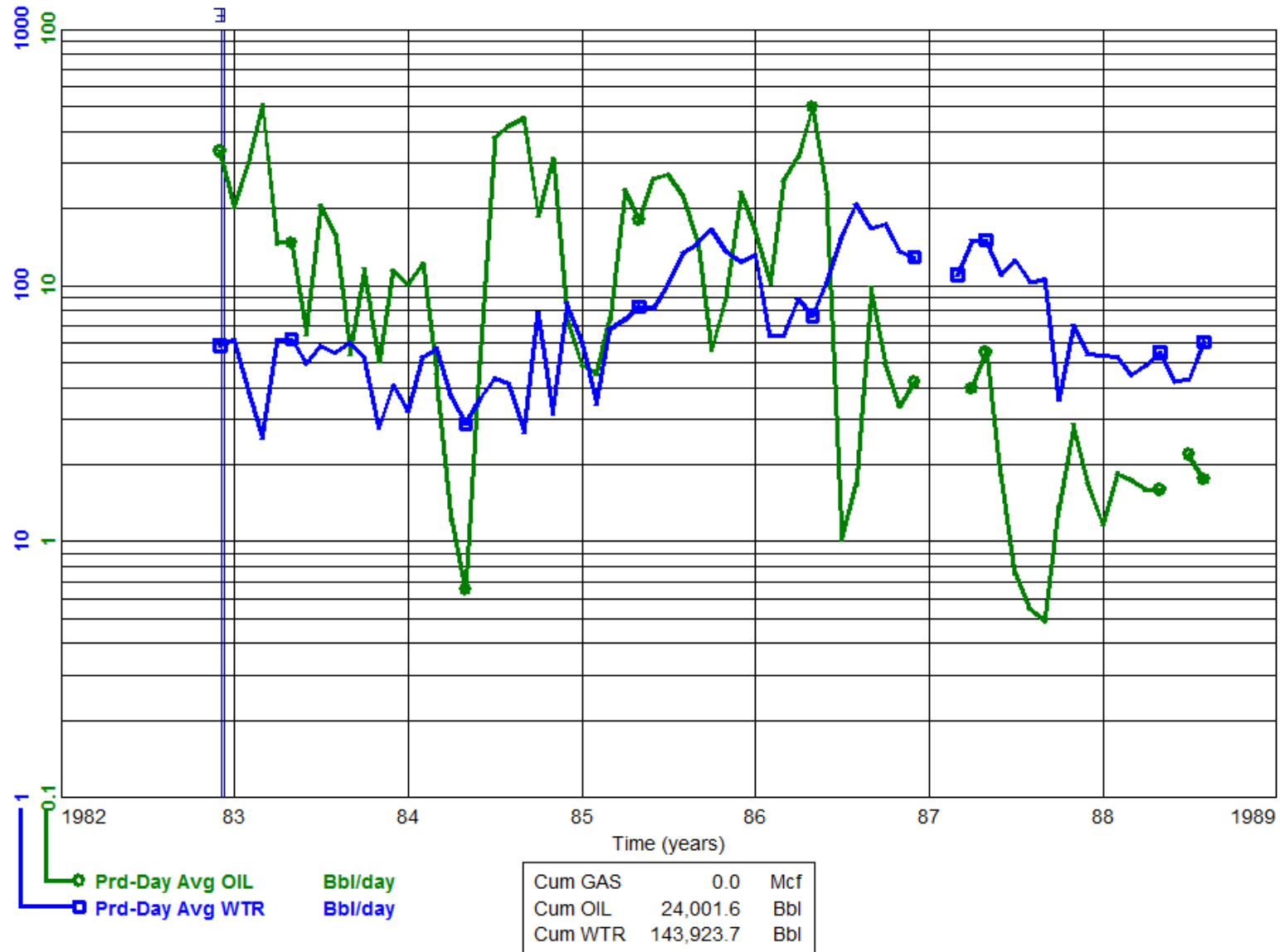
Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-12  
 To: 1988-08

INDIVIDUAL PRODUCTION  
 Omega Waskada  
 100/01-27-001-26W1/00

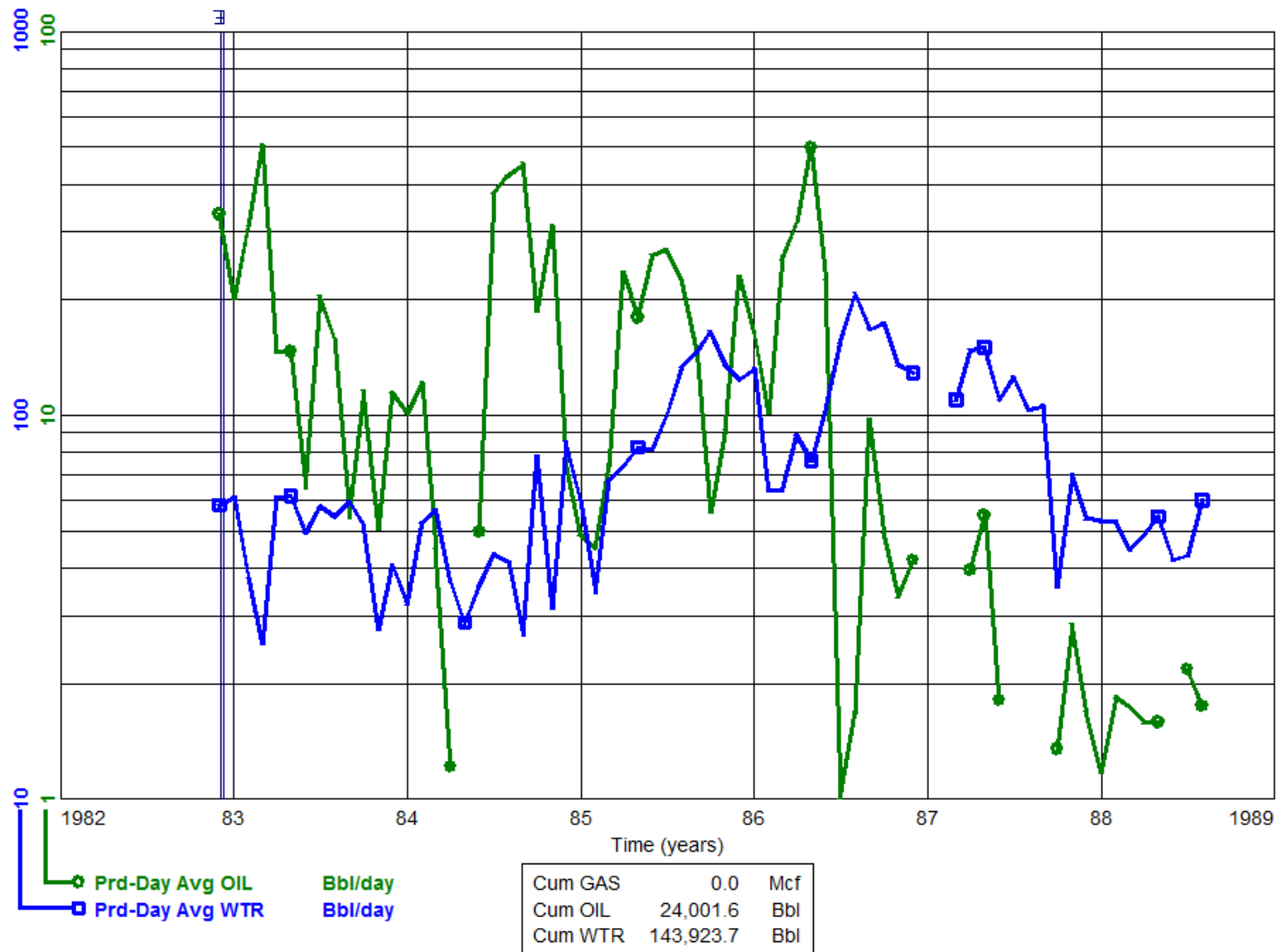
Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-12  
 To: 1988-08

INDIVIDUAL PRODUCTION  
 Omega Waskada  
 100/01-27-001-26W1/00

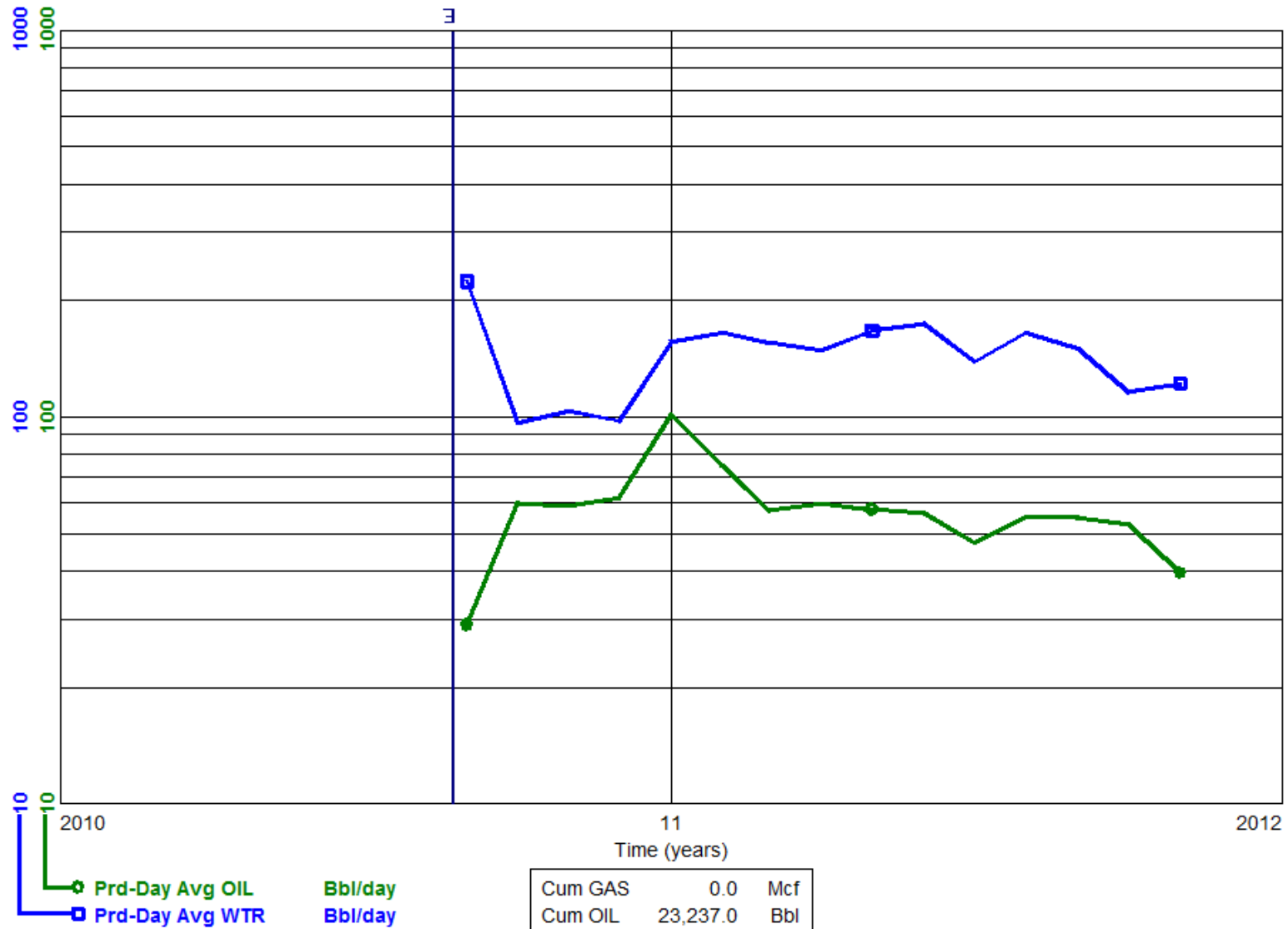
Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 2010-09  
 To: 2011-11

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2 HZNTL  
 103/01-27-001-26W1/00

Status: Capable Of Oil Prod  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)

From: 1982-11

To: 1991-12

INDIVIDUAL PRODUCTION

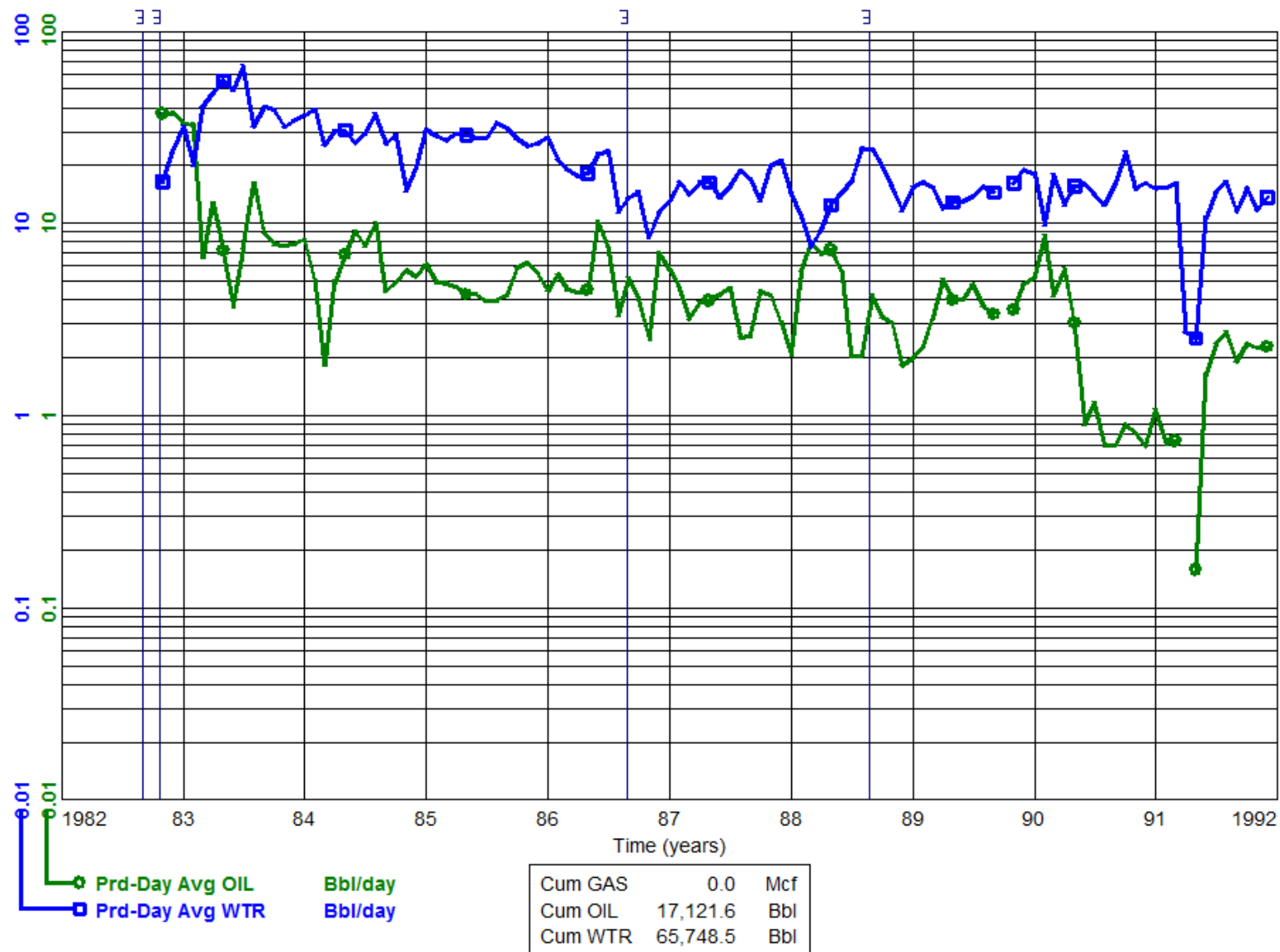
Waskada Unit No. 2

100/02-27-001-26W1/00

Status: Abandoned Producer

Field: WASKADA (03)

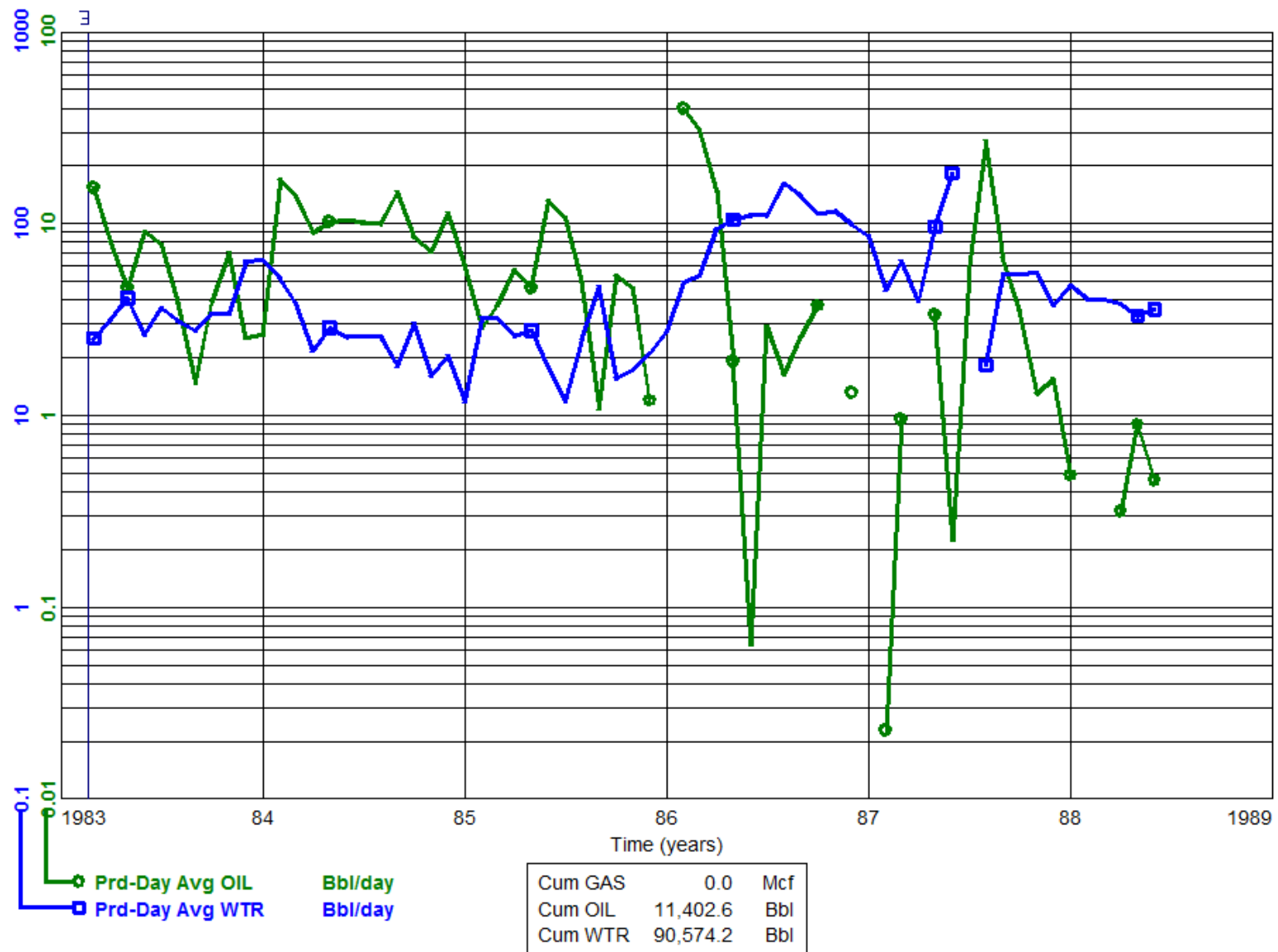
Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1983-03  
 To: 1988-06

INDIVIDUAL PRODUCTION  
 Omega Waskada  
 100/03-27-001-26W1/00

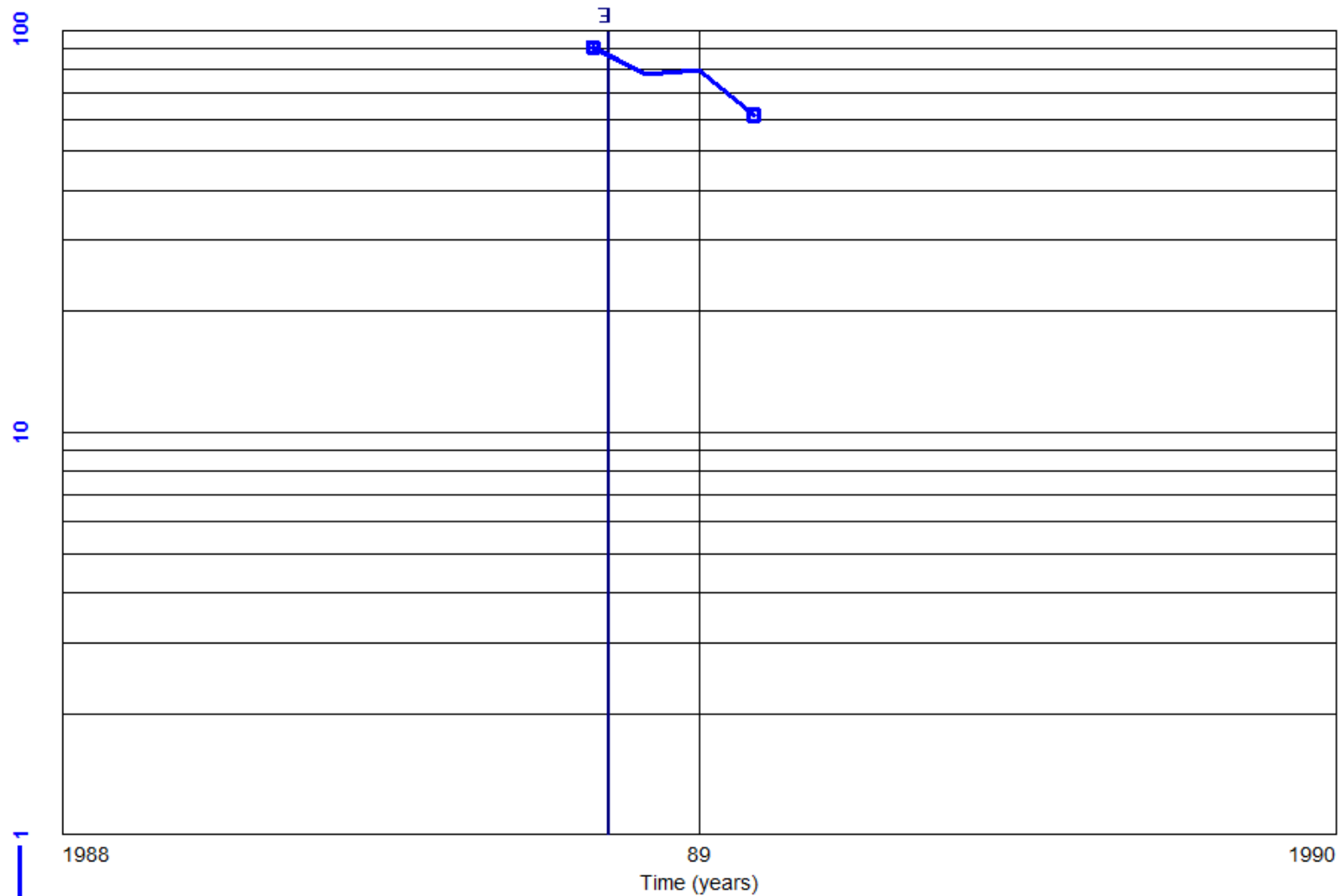
Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1988-11  
 To: 1989-02

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2 WIW  
 102/03-27-001-26W1/02

Status: Abandoned Dry  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Prd-Day Avg OIL [No Data]  
 Prd-Day Avg WTR Bbl/day

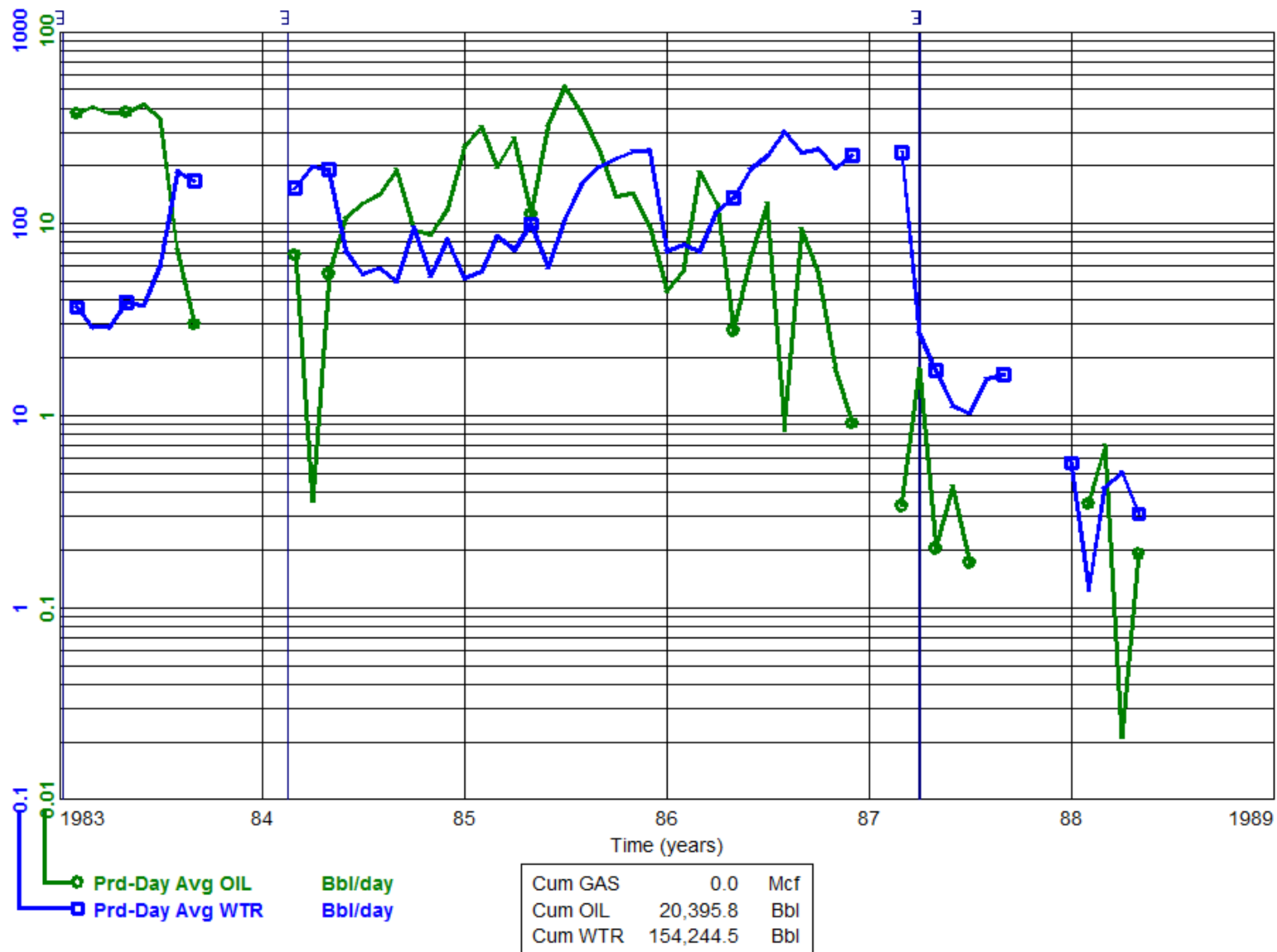
Cum GAS	0.0	Mcf
Cum OIL	0.0	Bbl
Cum WTR	8,032.4	Bbl



Data As Of: 2011-11 (MB)  
 From: 1983-02  
 To: 1988-05

INDIVIDUAL PRODUCTION  
 Omega Waskada  
 100/04-27-001-26W1/00

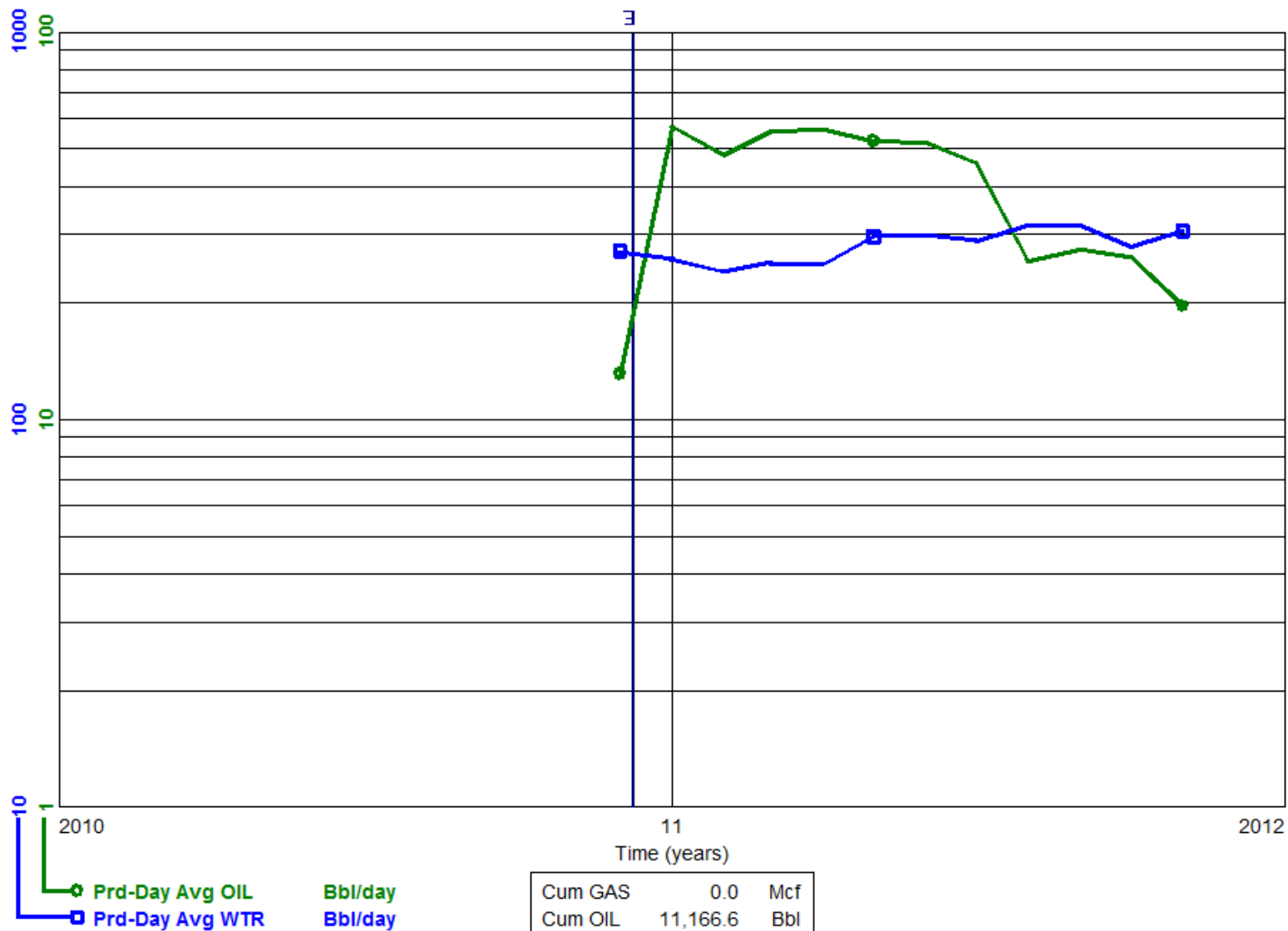
Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 2010-12  
 To: 2011-11

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2 HZNTL  
 102/04-27-001-26W1/00

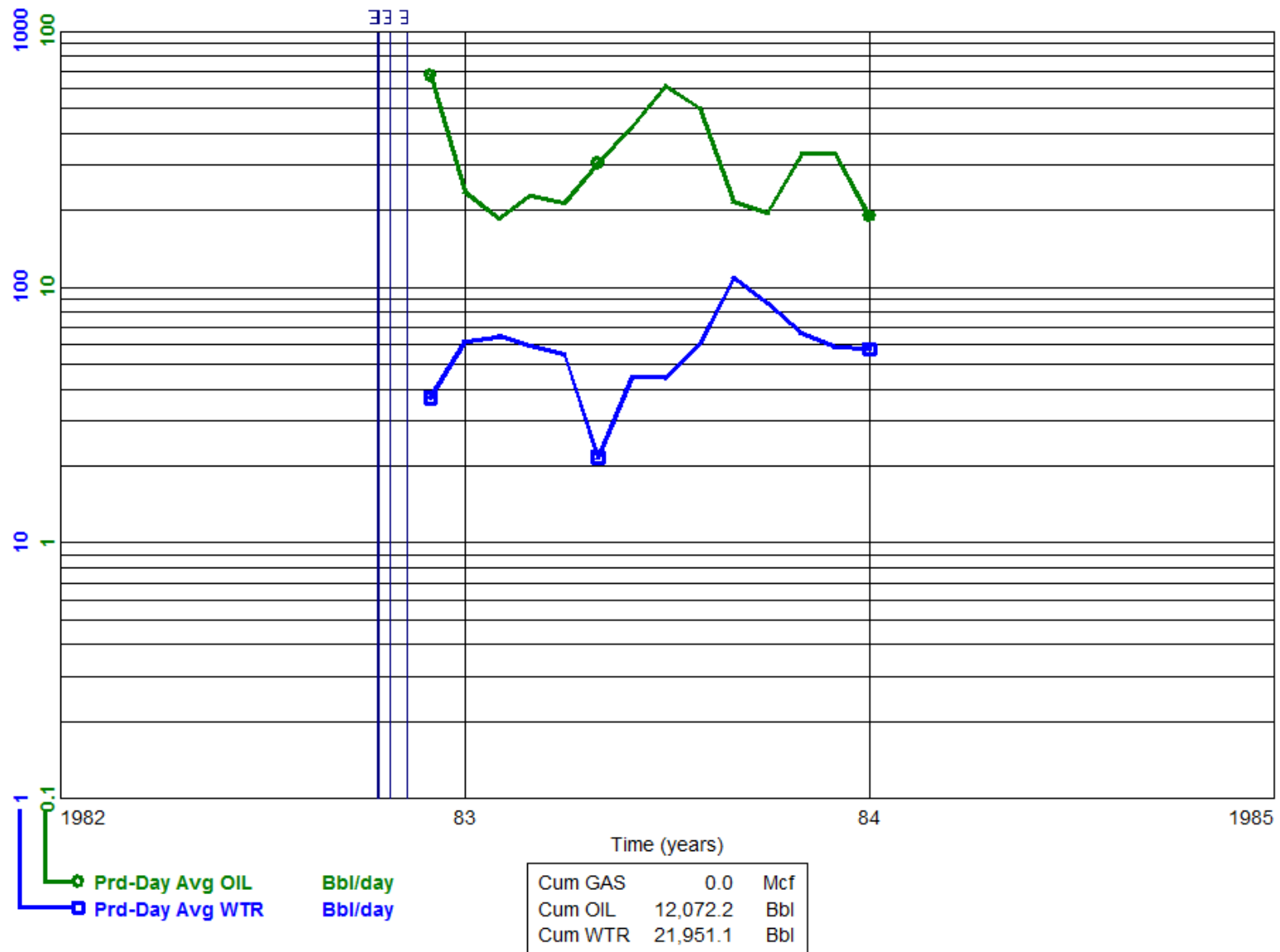
Status: Capable Of Oil Prod  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-12  
 To: 1984-01

INDIVIDUAL PRODUCTION  
 Omega Waskada WIW  
 100/05-27-001-26W1/00

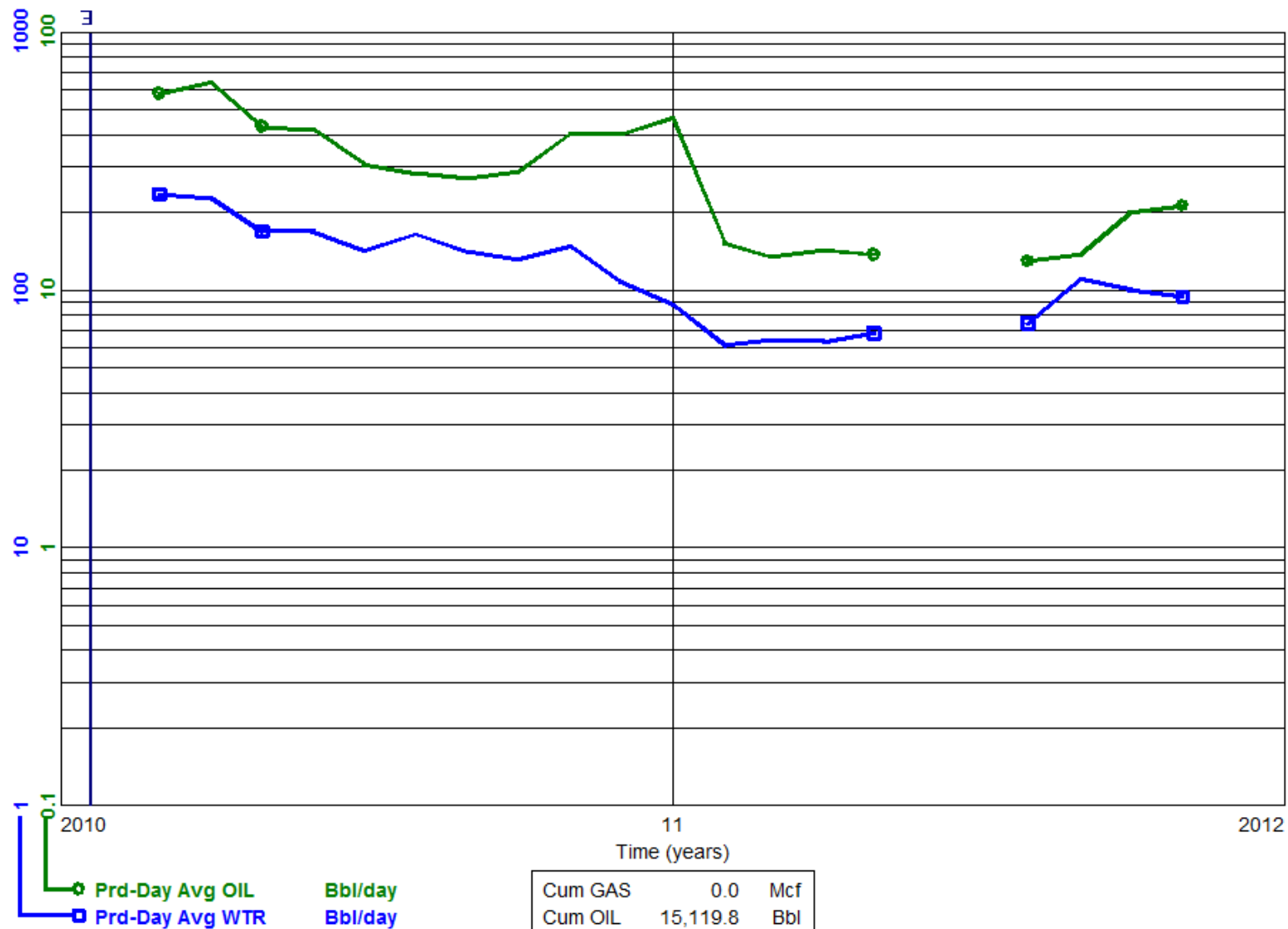
Status: Abandoned Water Inj Well  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 2010-03  
 To: 2011-11

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2 HZNTL  
 102/05-27-001-26W1/00

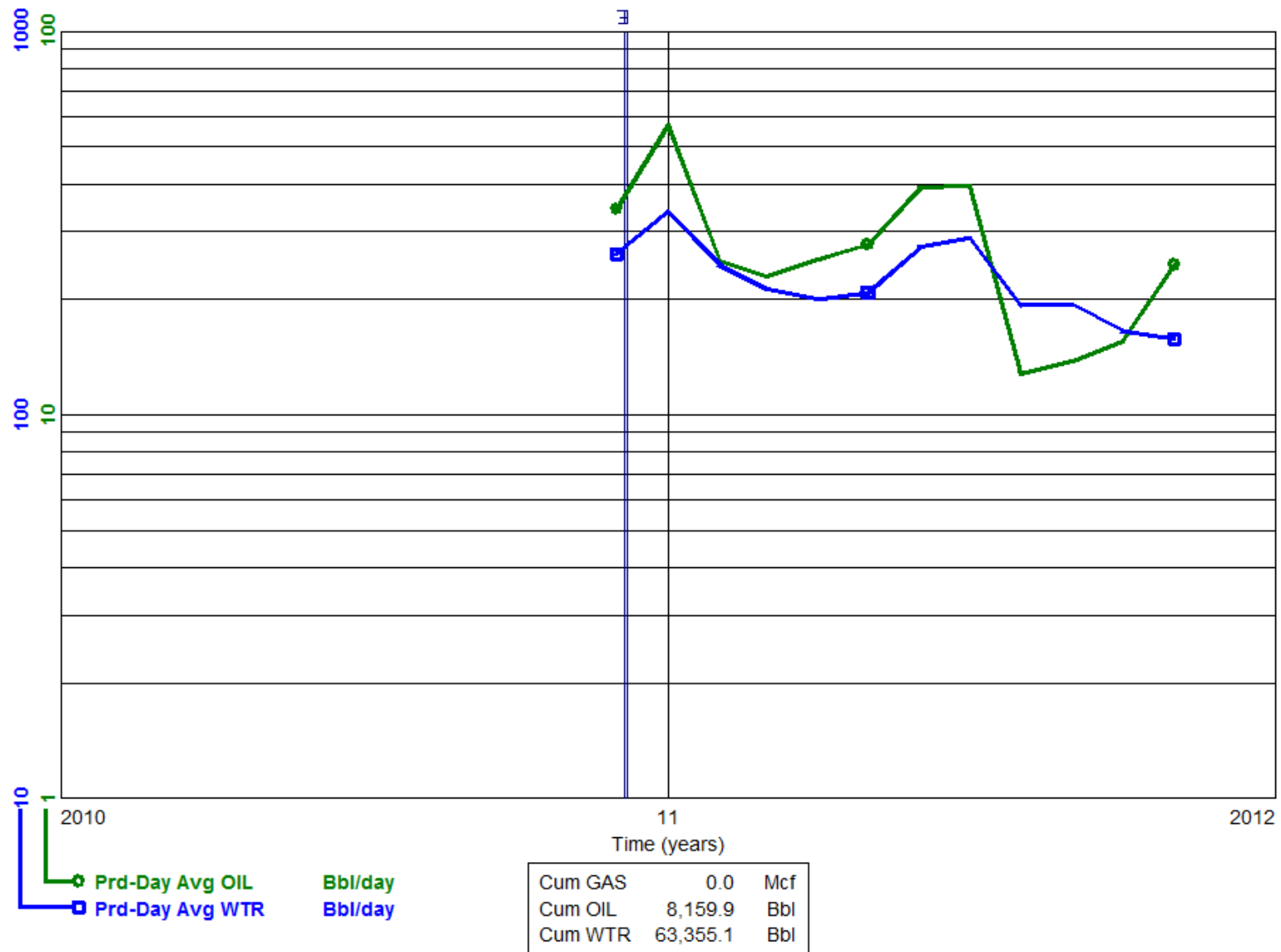
Status: Capable Of Oil Prod  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 2010-12  
 To: 2011-11

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2 HZNTL  
 103/05-27-001-26W1/00

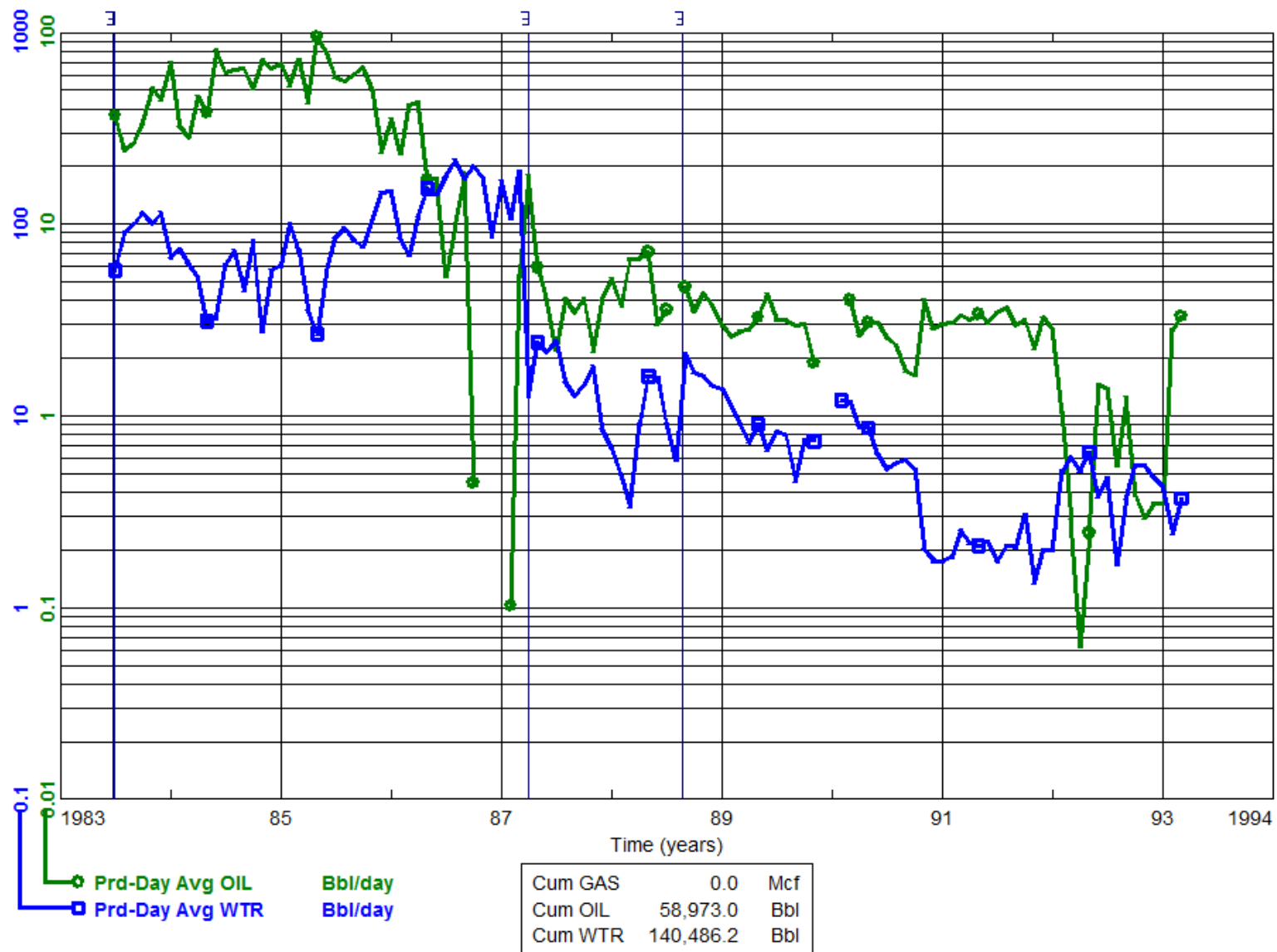
Status: Capable Of Oil Prod  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1983-07  
 To: 1993-03

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2  
 102/06-27-001-26W1/00

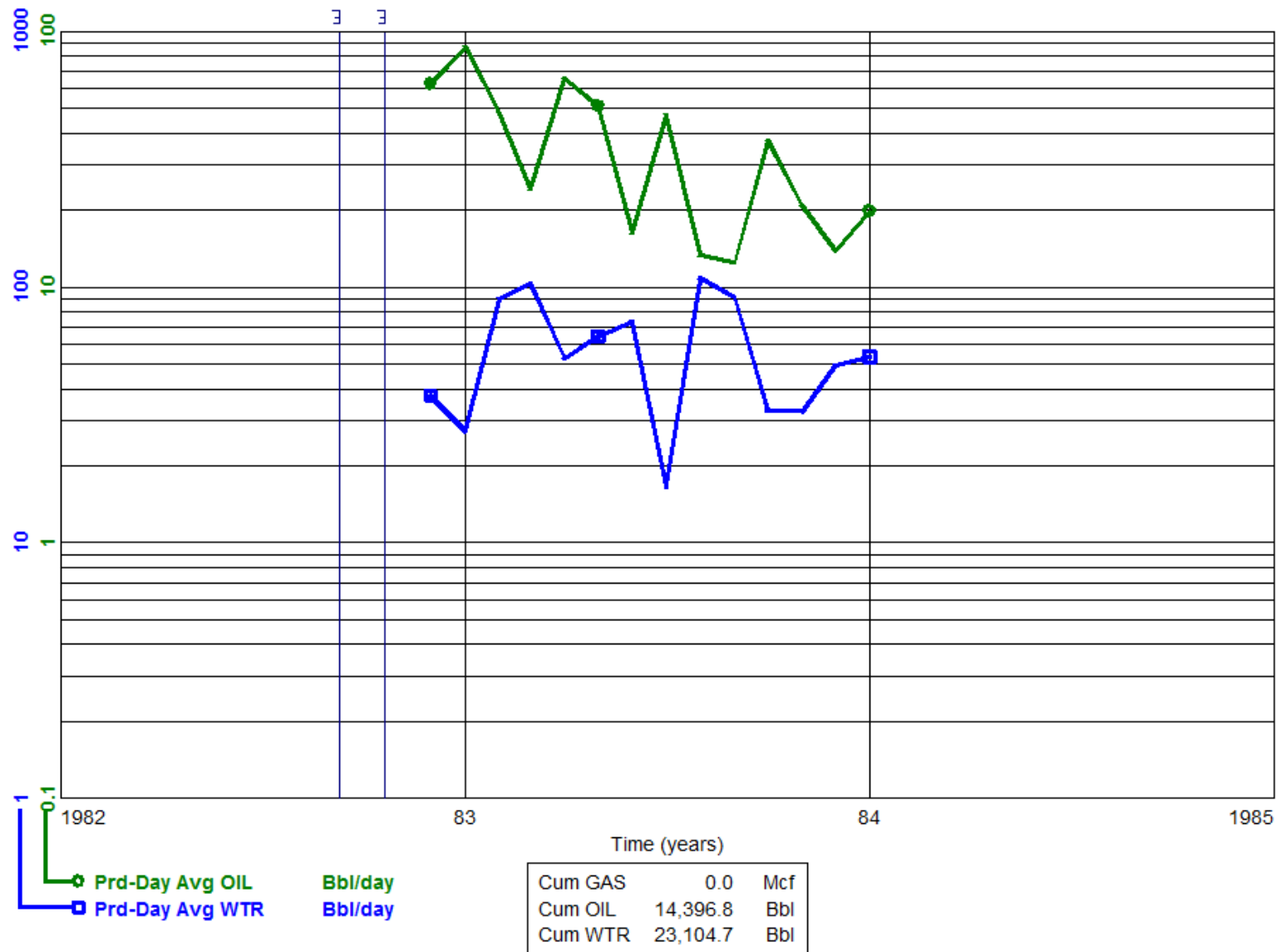
Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-12  
 To: 1984-01

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2 WIW  
 100/07-27-001-26W1/00

Status: Abandoned Water Inj Well  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)

From: 1982-08

To: 1992-04

# INDIVIDUAL PRODUCTION

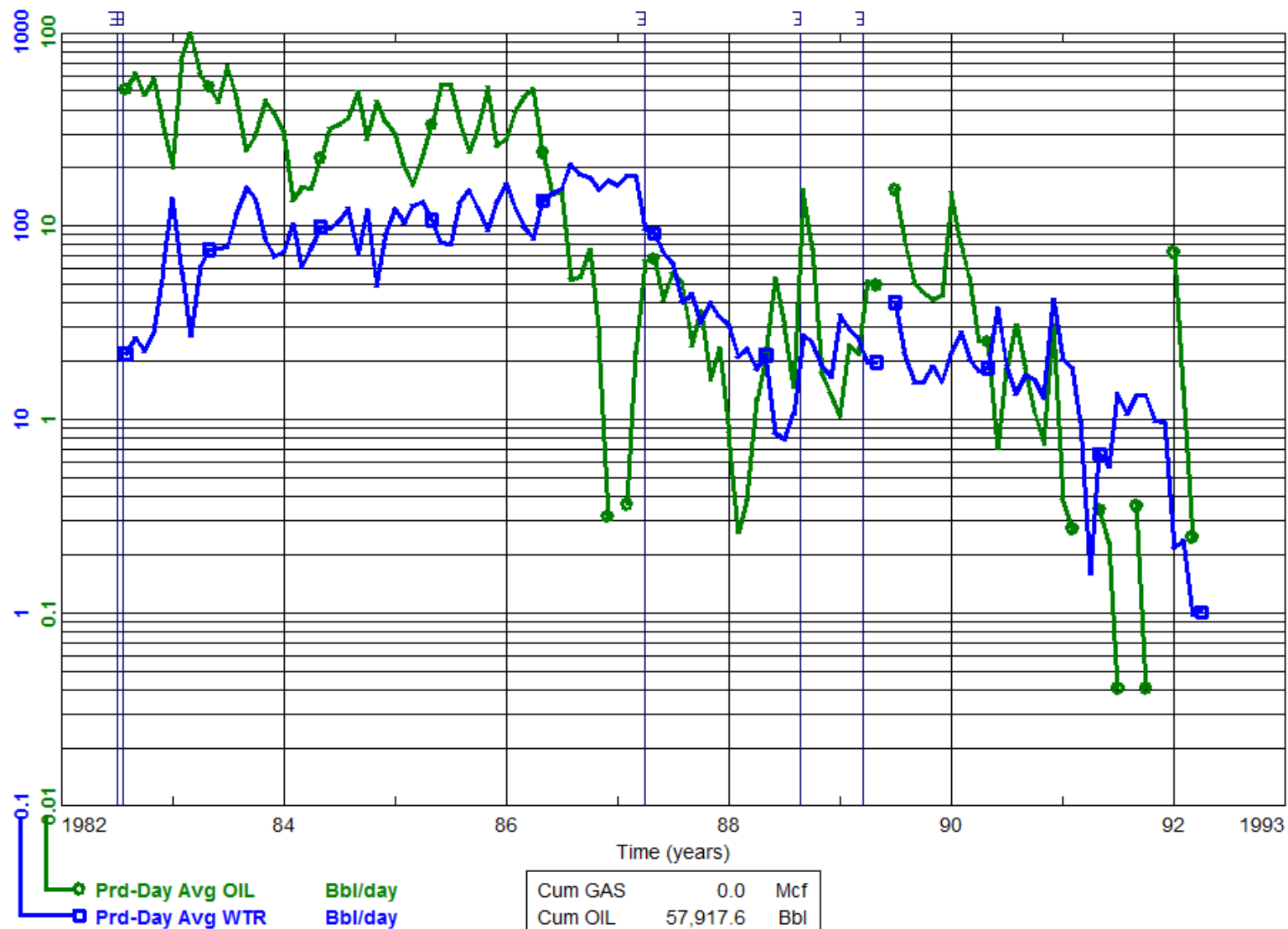
Waskada Unit No. 2

100/08-27-001-26W1/00

Status: Abandoned Producer

Field: WASKADA (03)

Pool: LOWER AMARANTH A (29A)

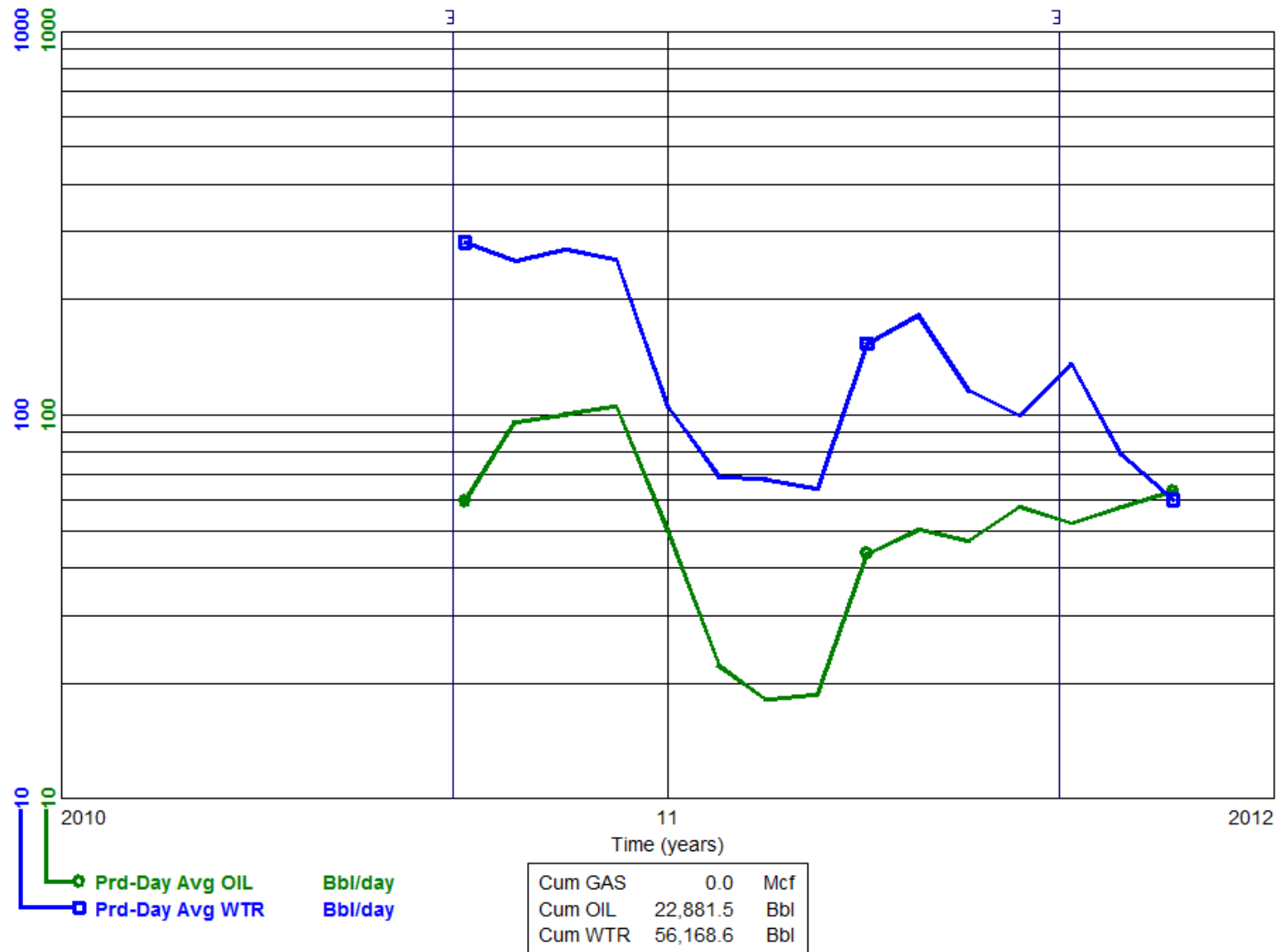




Data As Of: 2011-11 (MB)  
 From: 2010-09  
 To: 2011-11

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2 HZNTL  
 102/08-27-001-26W1/00

Status: Capable Of Oil Prod  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)

From: 1982-12

To: 1990-01

INDIVIDUAL PRODUCTION

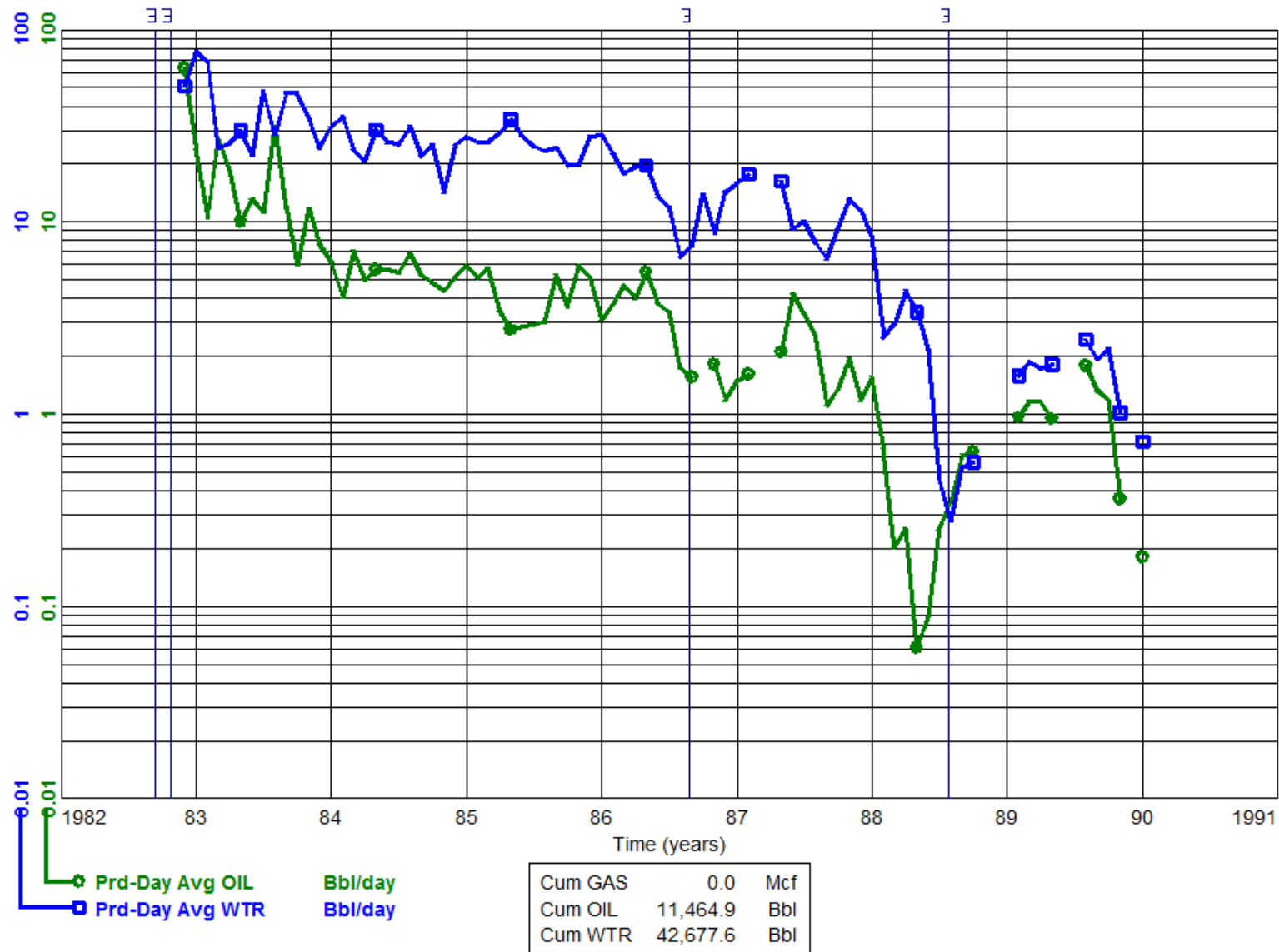
Omega Waskada

100/09-27-001-26W1/00

Status: Abandoned Producer

Field: WASKADA (03)

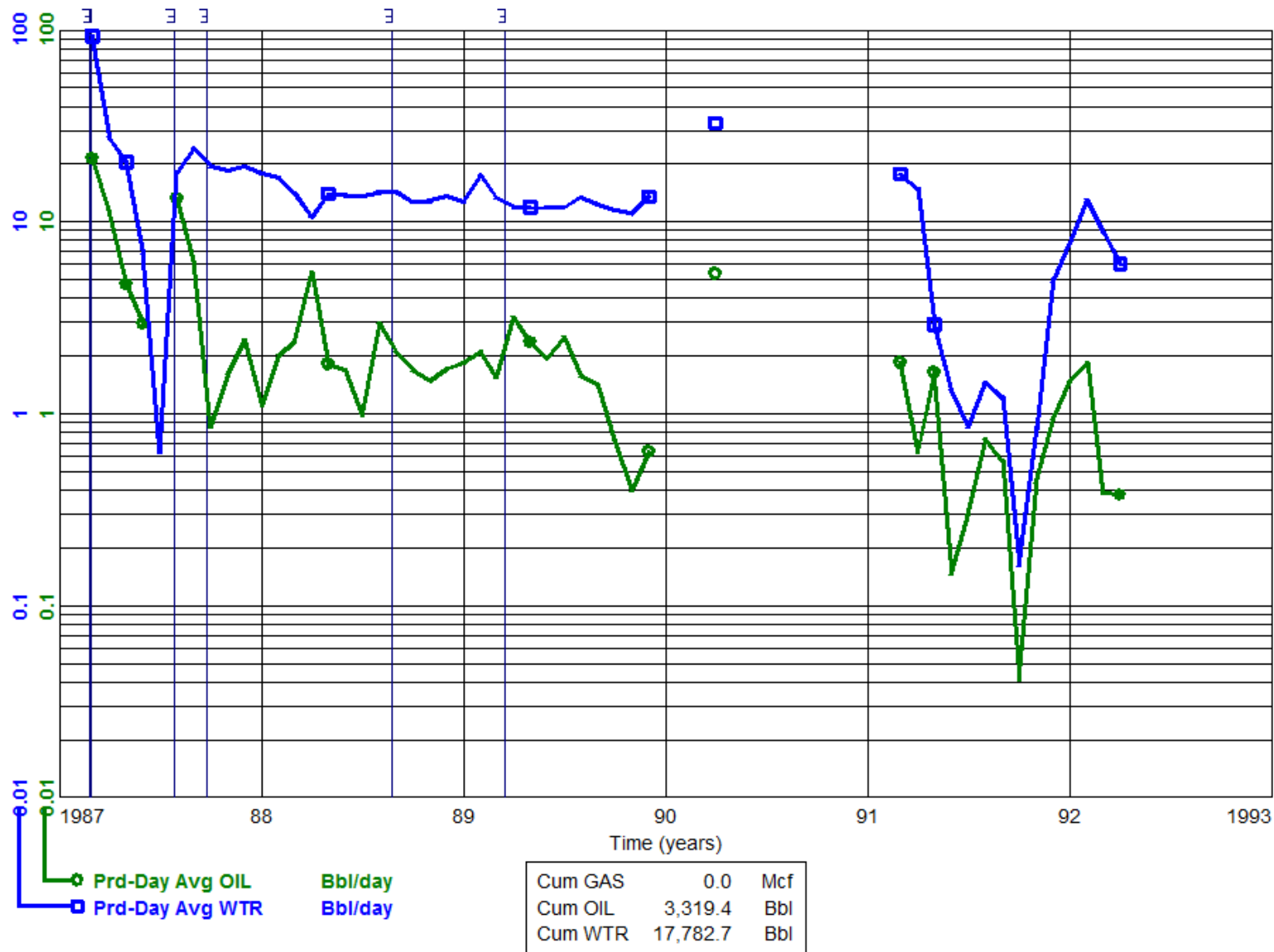
Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1987-03  
 To: 1992-04

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2  
 102/09-27-001-26W1/02

Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)

From: 1982-12

To: 1995-12

# INDIVIDUAL PRODUCTION

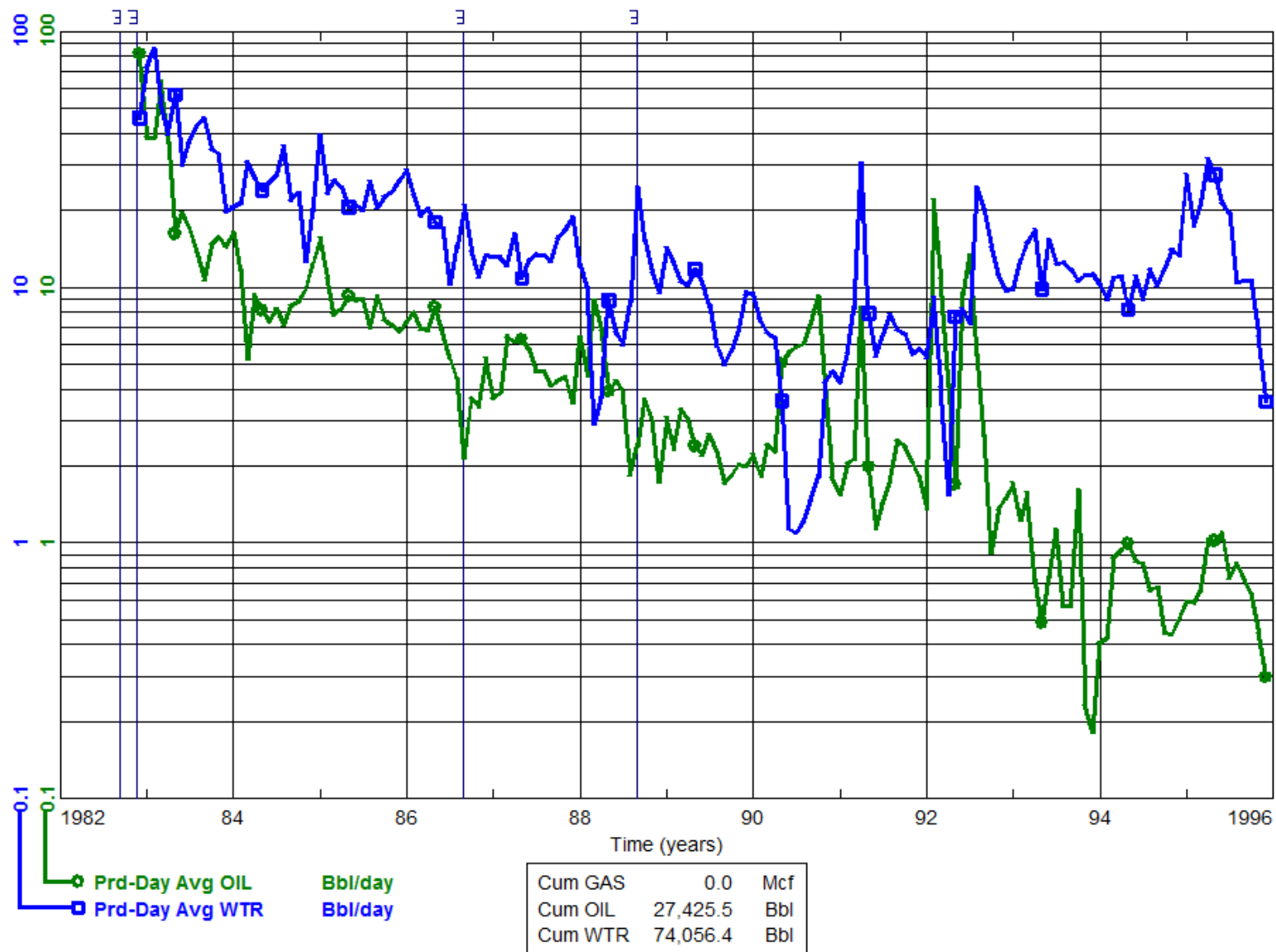
Waskada Unit No. 2

100/10-27-001-26W1/00

Status: Abandoned Producer

Field: WASKADA (03)

Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)

From: 1983-08

To: 1989-04

INDIVIDUAL PRODUCTION

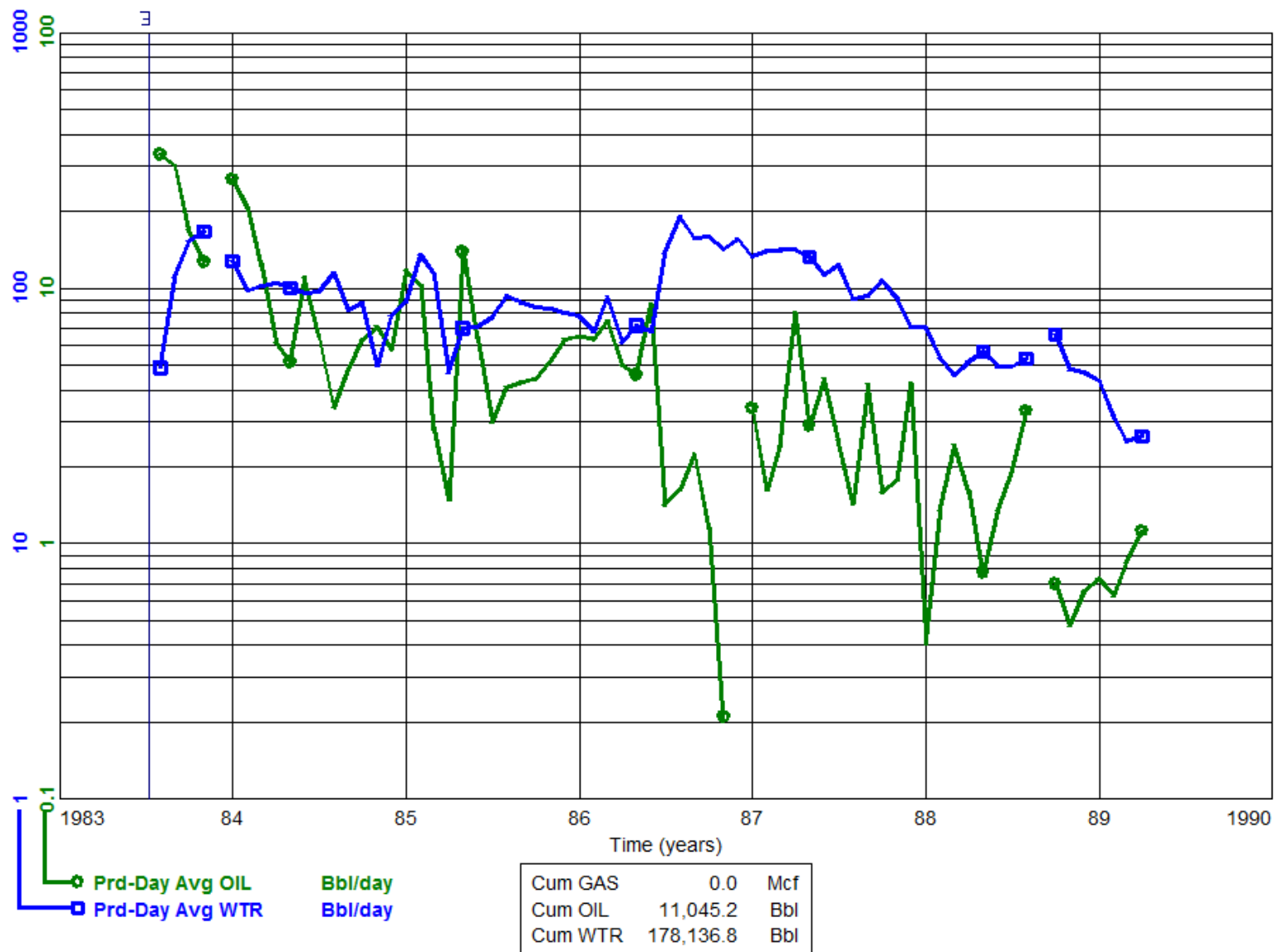
Omega Waskada

102/11-27-001-26W1/00

Status: Abandoned Producer

Field: WASKADA (03)

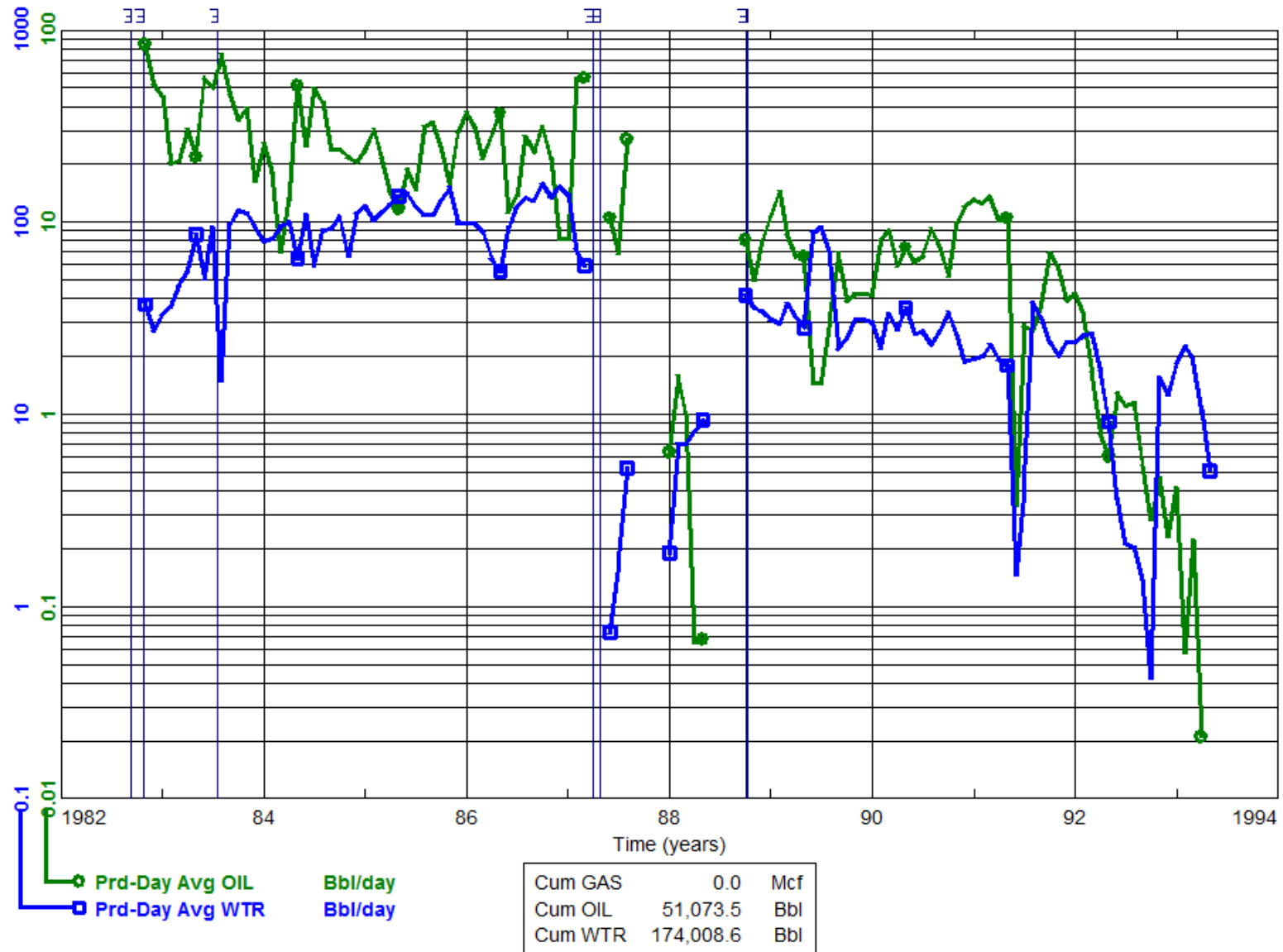
Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-11  
 To: 1993-05

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2  
 100/12-27-001-26W1/00

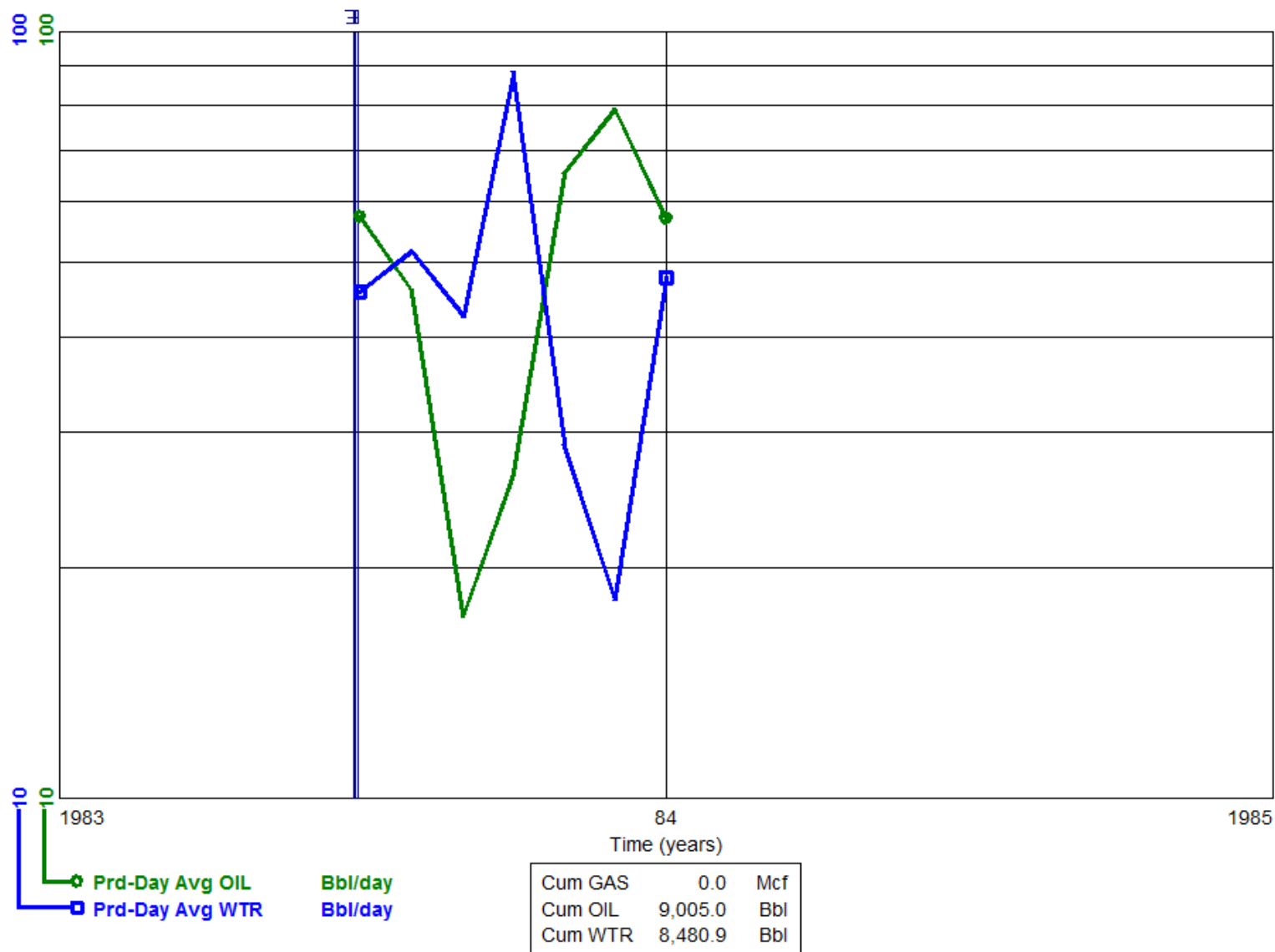
Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1983-07  
 To: 1984-01

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 9  
 102/13-27-001-26W1/00

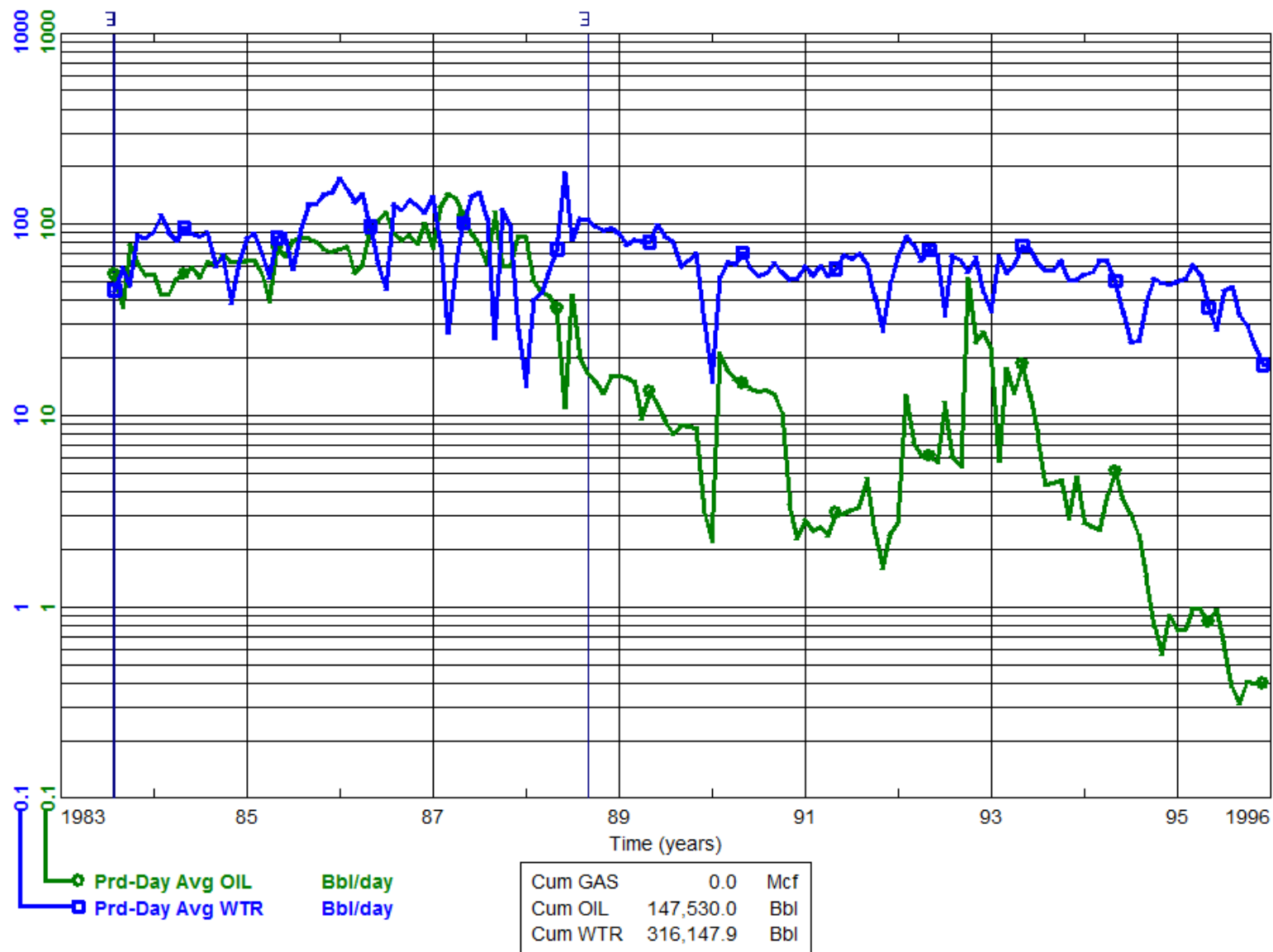
Status: Abandoned Water Inj Well  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1983-08  
 To: 1995-12

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2  
 102/14-27-001-26W1/00

Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)

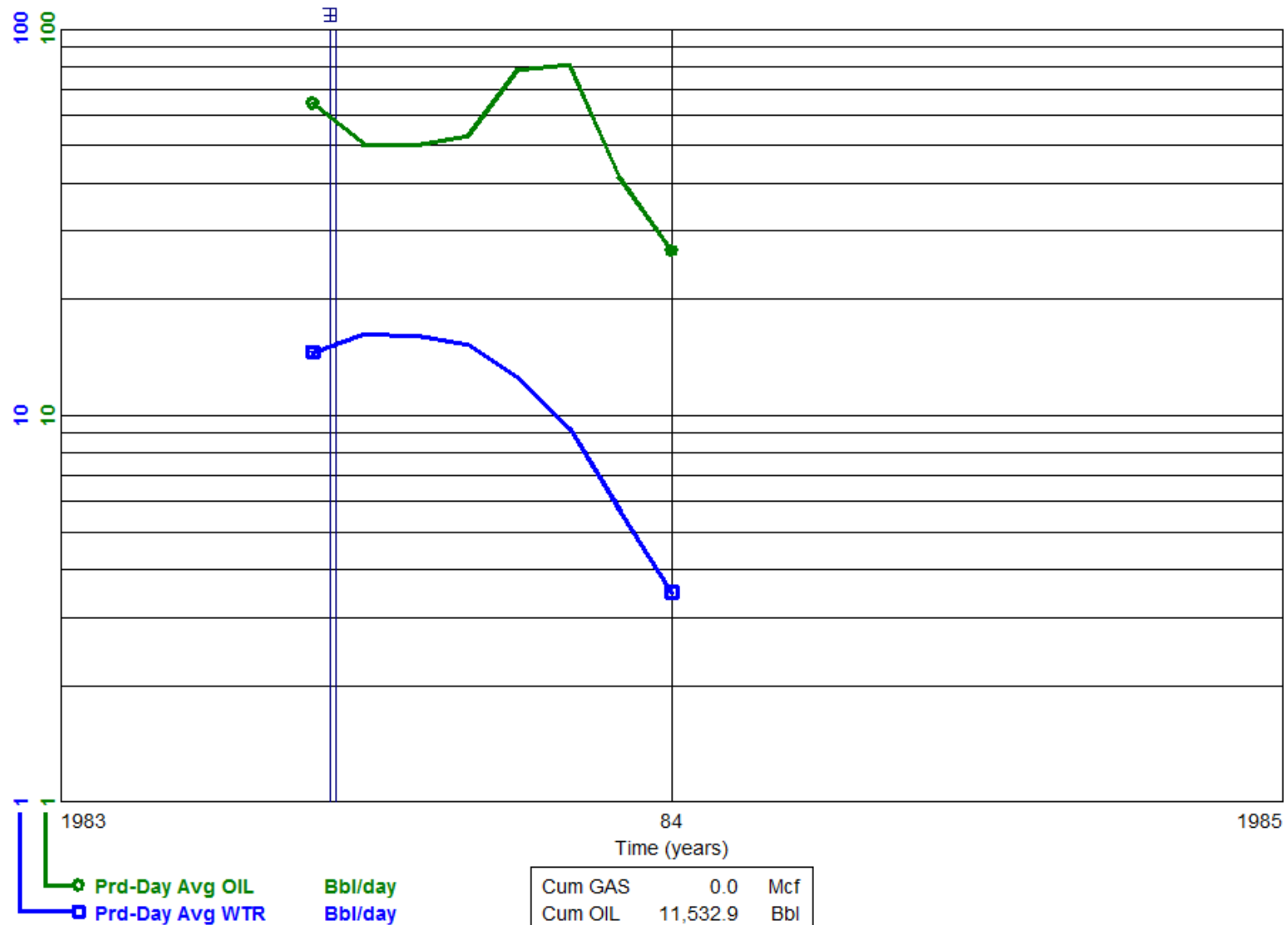




Data As Of: 2011-11 (MB)  
 From: 1983-06  
 To: 1984-01

INDIVIDUAL PRODUCTION  
 Omega Waskada  
 102/15-27-001-26W1/00

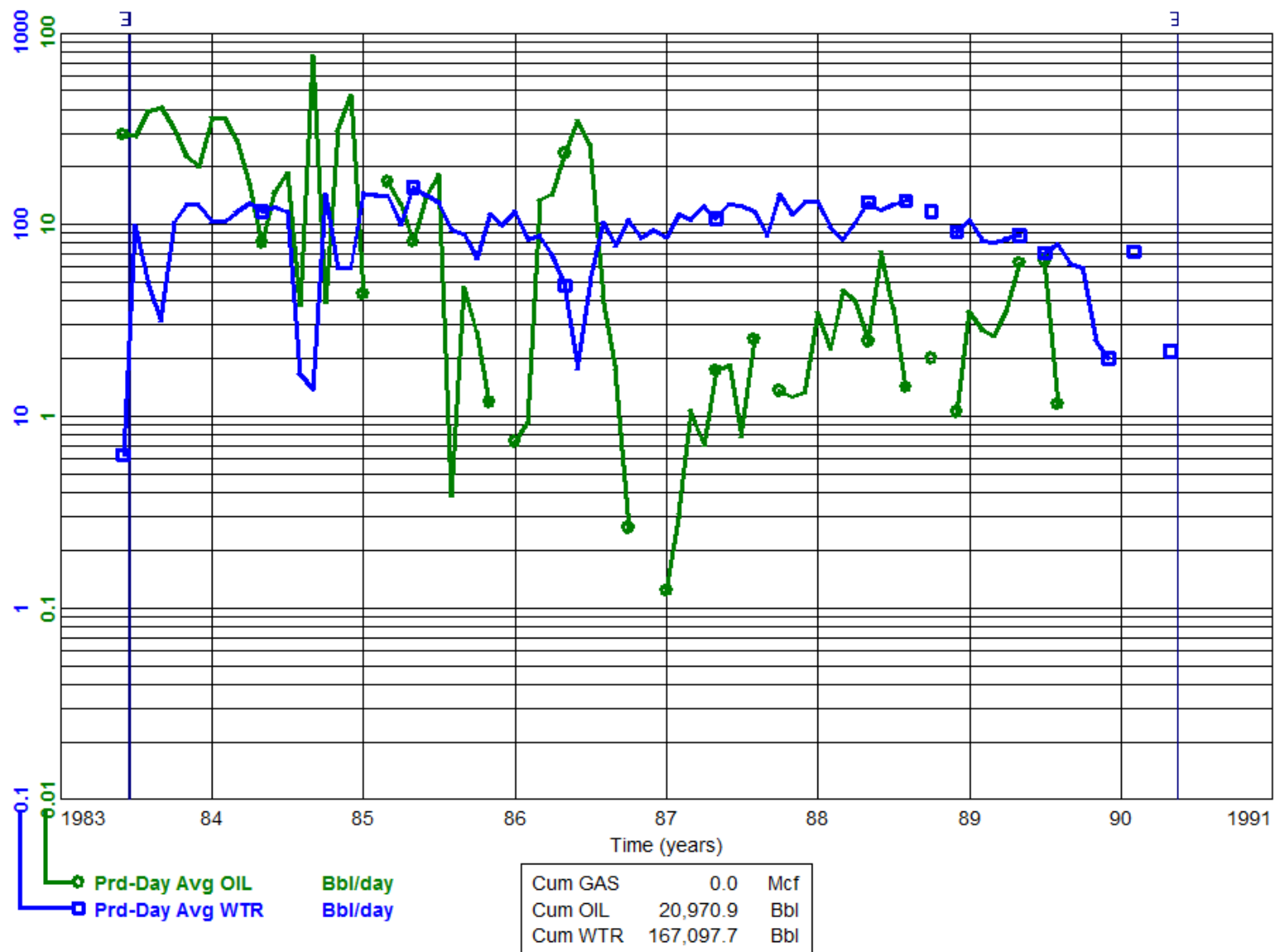
Status: Abandoned Water Inj Well  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1983-06  
 To: 1990-05

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2  
 102/16-27-001-26W1/00

Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)

From: 1983-08

To: 1990-03

INDIVIDUAL PRODUCTION

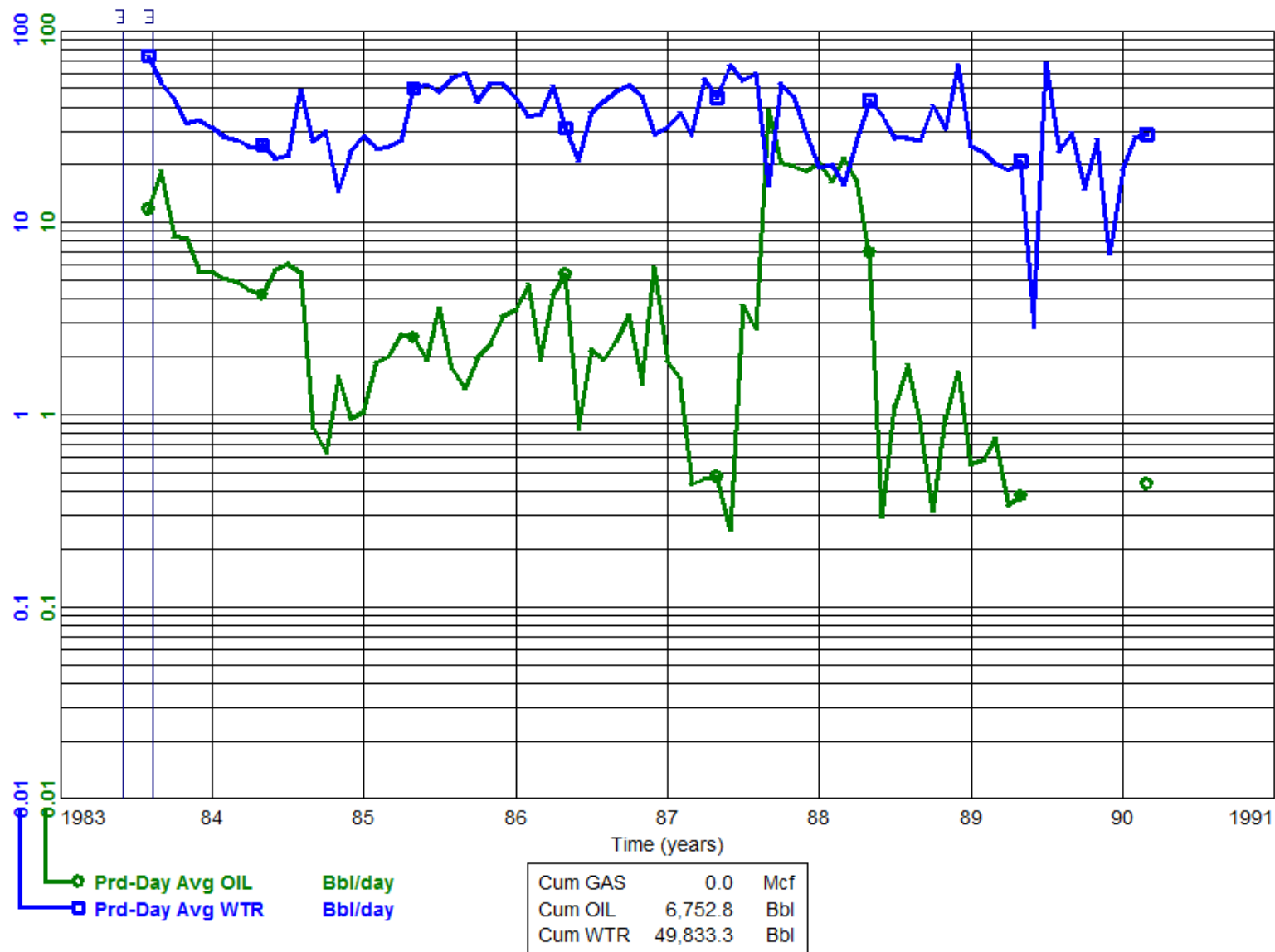
Omega Waskada Prov.

100/02-34-001-26W1/02

Status: Abandoned Producer

Field: WASKADA (03)

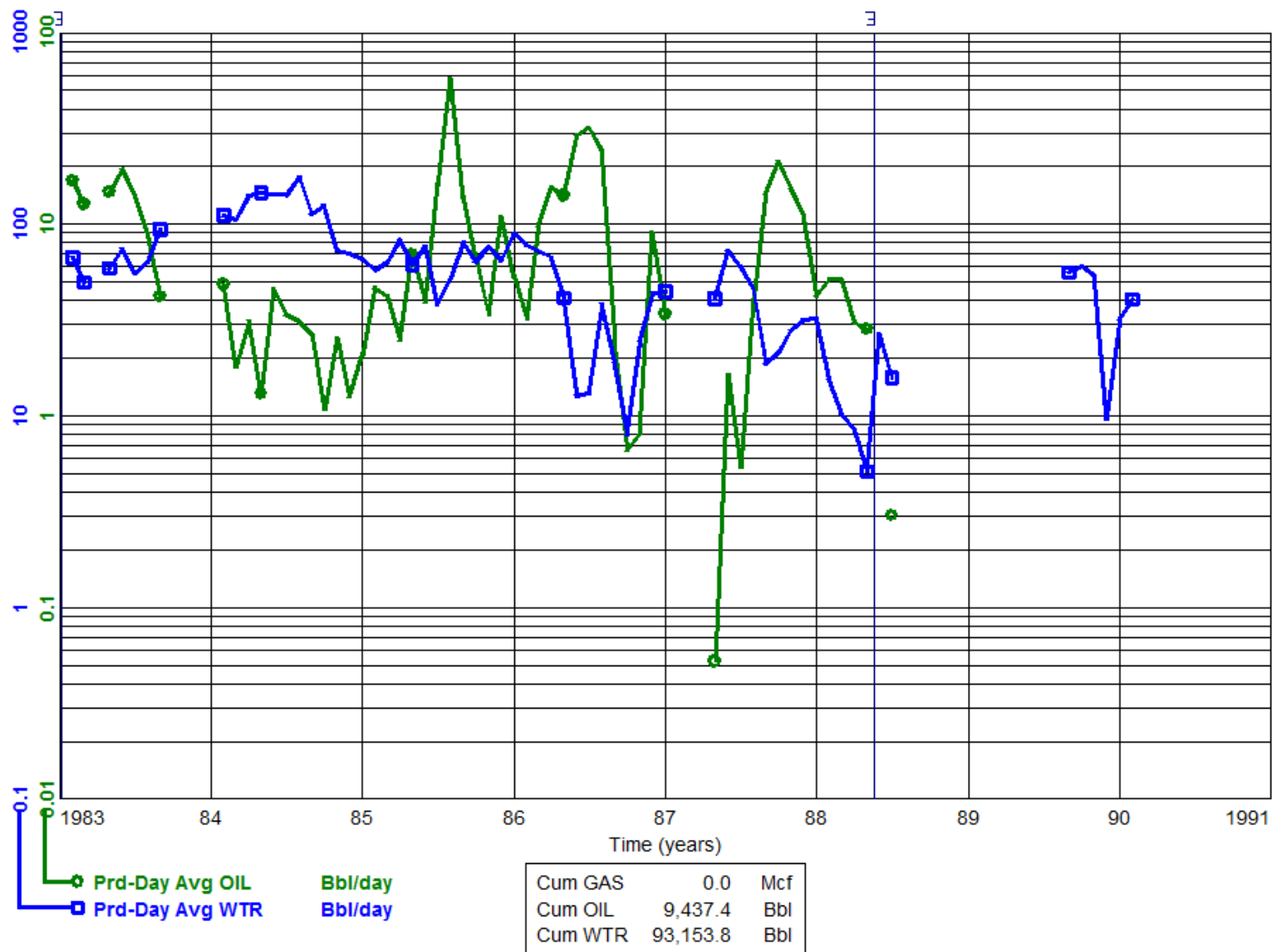
Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1983-02  
 To: 1990-02

INDIVIDUAL PRODUCTION  
 Omega Waskada Prov.  
 100/08-34-001-26W1/00

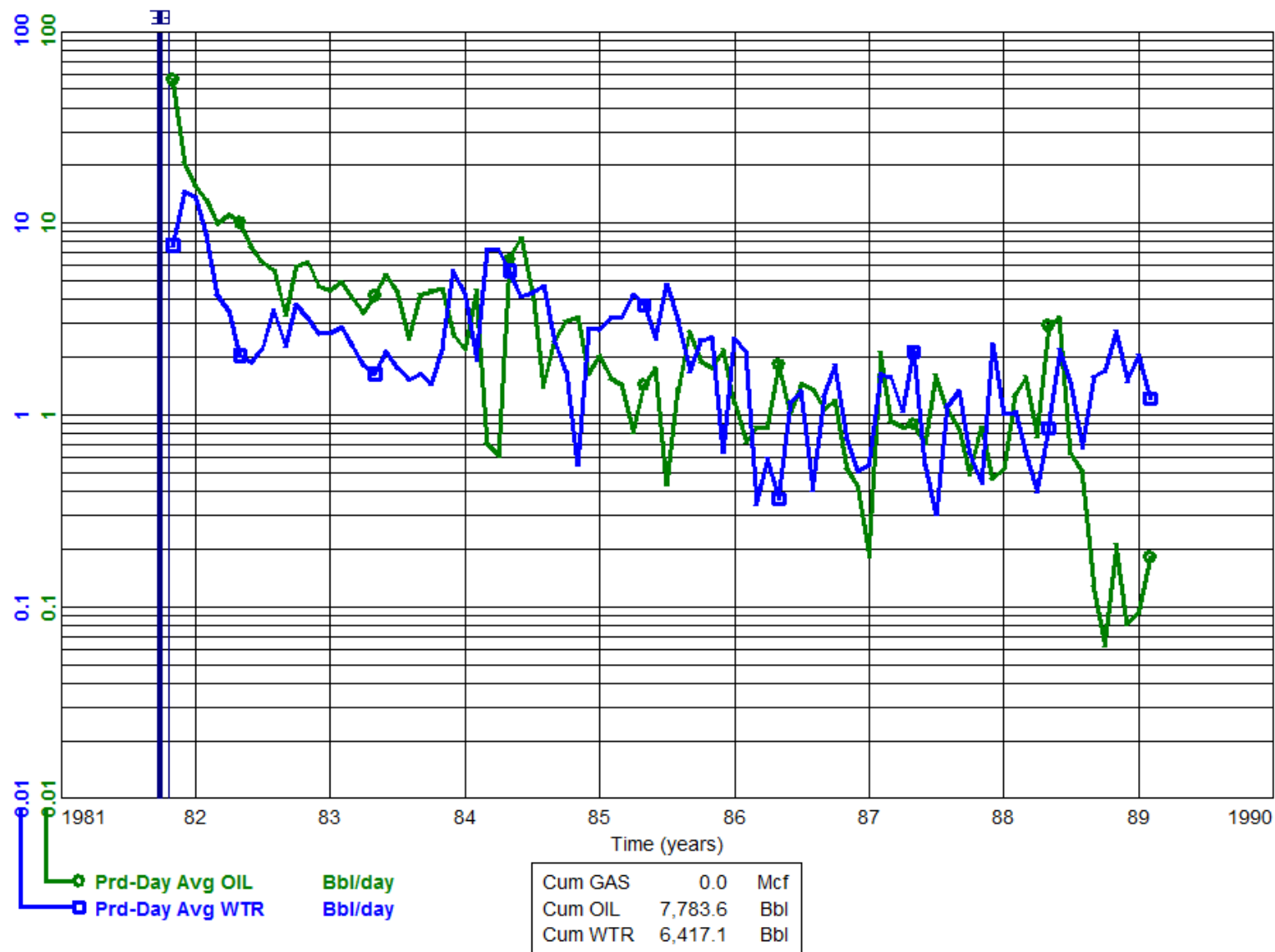
Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1981-11  
 To: 1989-02

INDIVIDUAL PRODUCTION  
 Omega Waskada  
 100/02-35-001-26W1/00

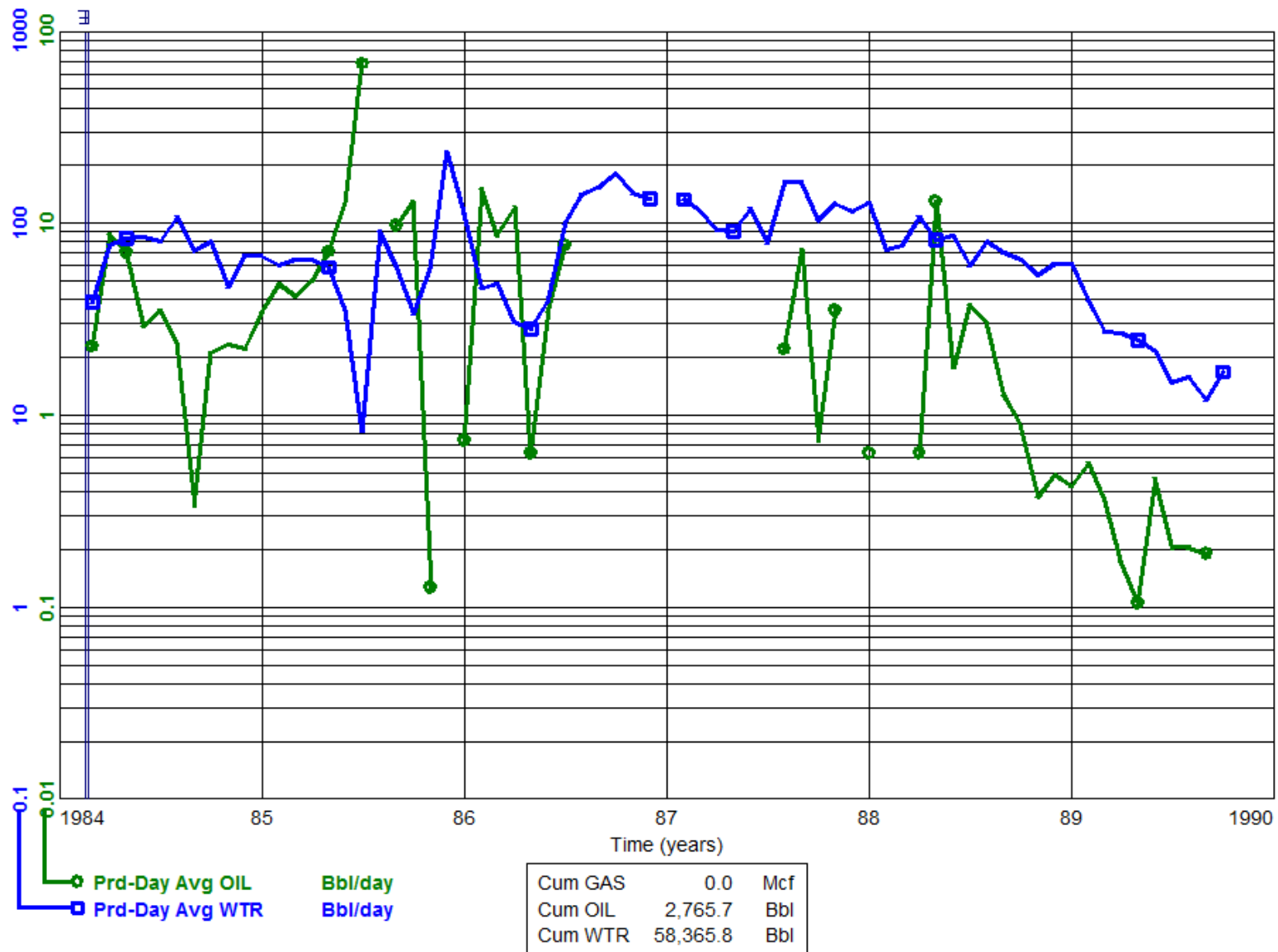
Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1984-03  
 To: 1989-10

INDIVIDUAL PRODUCTION  
 Omega Waskada  
 100/03-35-001-26W1/02

Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)

From: 1983-10

To: 1985-09

# INDIVIDUAL PRODUCTION

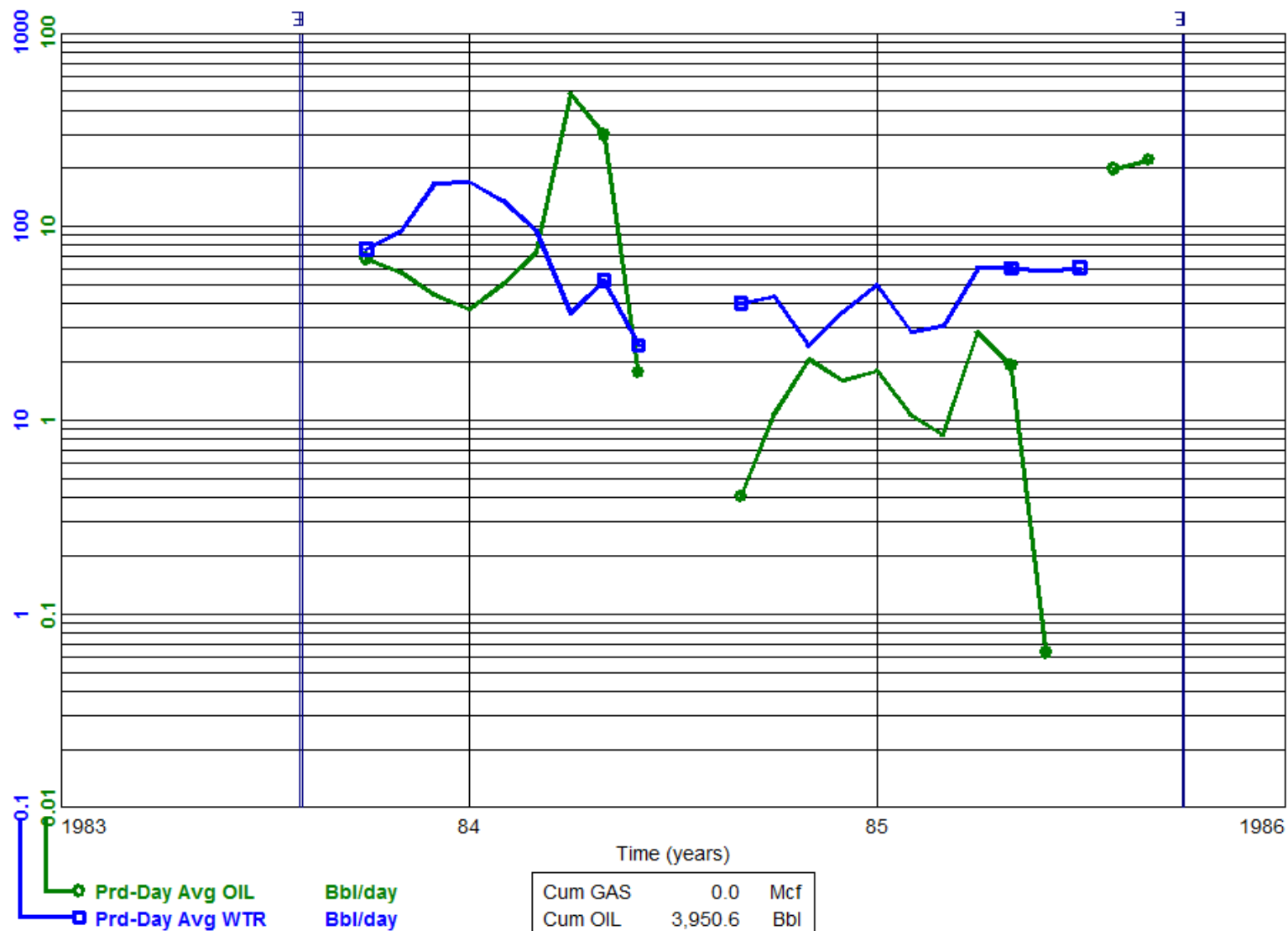
Waskada Unit No. 2 WIW

100/05-35-001-26W1/00

Status: Abandoned Water Inj Well

Field: WASKADA (03)

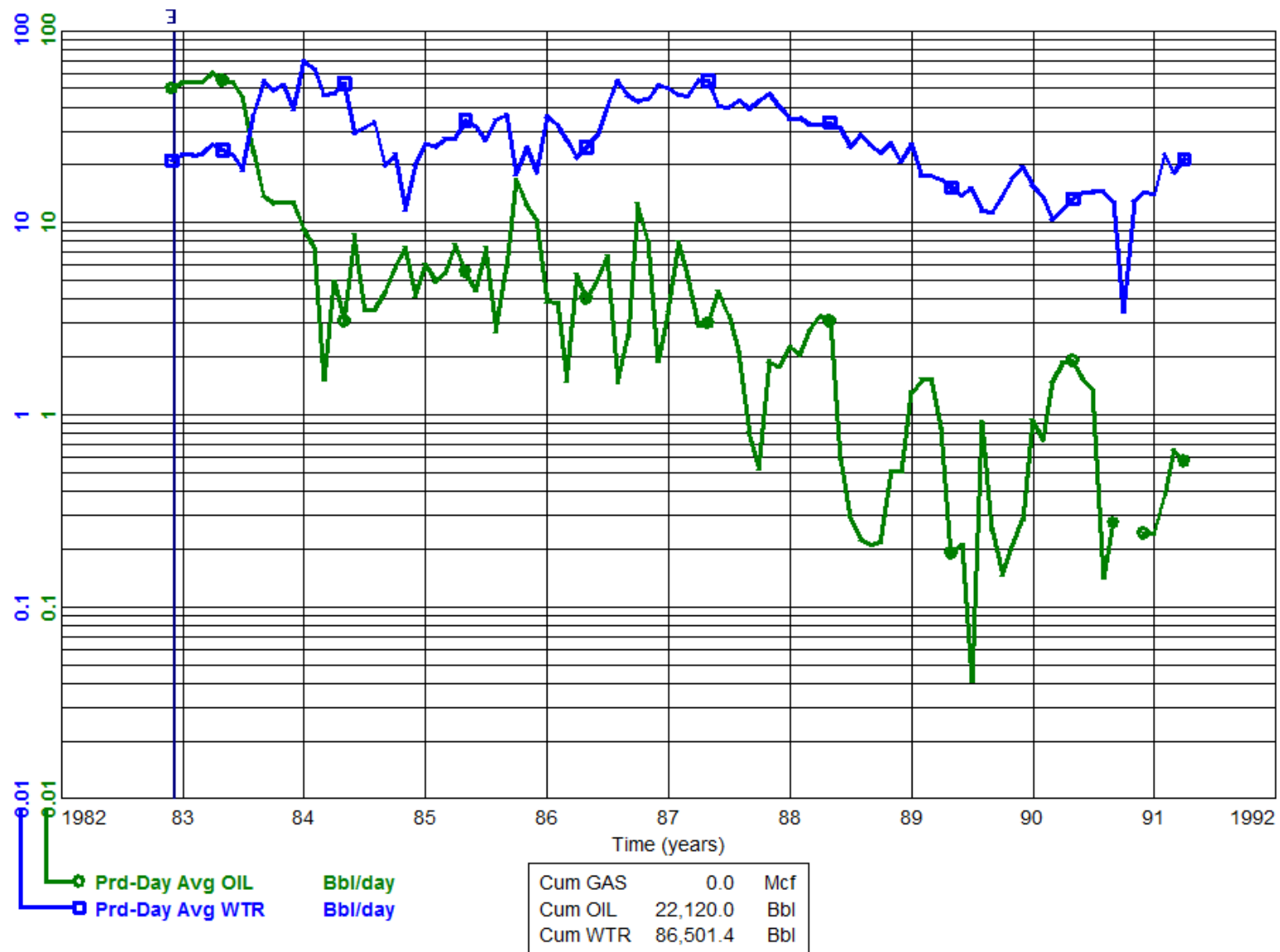
Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-12  
 To: 1991-04

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2  
 100/06-35-001-26W1/00

Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)





Data As Of: 2011-11 (MB)  
 From: 1983-10  
 To: 1989-11

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 2  
 100/12-35-001-26W1/00

Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)

