

# **WASKADA LOWER AMARANTH UNIT NO. 1**

## **WATERFLOOD PROGRESS REPORT**

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

### **PennWest Exploration**

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## **INTRODUCTION**

The WASKADA LOWER AMARANTH UNIT NO.1 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, 1983 Board Order; Voluntary

First Enlargement, July. 1, 1983

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.

Lower Amaranth Unit # 1 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, siltstones, 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/M M</b>	<b>Org Operator Name</b>	<b>Ground Elevation (m)</b>	<b>TVD (m)</b>
00/09-23-001-26W1/0	7/3/1982	1982/08	Omega Hydcbns Ltd	465.9	953.0
02/10-23-001-26W1/0	5/30/1983	1983/06	Omega Hydcbns Ltd	465.3	948.0
00/15-23-001-26W1/0	1/24/1982	1982/02	Omega Hydcbns Ltd	464.3	940.5
00/16-23-001-26W1/0	9/20/1981	1981/11	Omega Hydcbns Ltd	464.6	965.0
00/09-24-001-26W1/2	11/28/1981	1983/01	NCE Petrofund Corp	468.8	944.0
00/10-24-001-26W1/0	2/7/1982	1982/03	Omega Hydcbns Ltd	466.1	935.0
00/11-24-001-26W1/0	2/12/1982	1982/03	Omega Hydcbns Ltd	465.6	935.0
00/12-24-001-26W1/2	11/3/1981	1983/02	NCE Petrofund Corp	463.9	952.0
02/12-24-001-26W1/0	1/9/2010	2010/05		468	912.0
02/13-24-001-26W1/0	9/12/1982		Omega Hydcbns Ltd	465.6	951.0
03/13-24-001-26W1/0	1/16/2010	2010/05		467.5	910.9
00/14-24-001-26W1/0	11/12/1981	1982/02	Omega Hydcbns Ltd	465.1	951.0
00/15-24-001-26W1/0	9/28/1981	1981/10	Omega Hydcbns Ltd	466.3	961.0
02/16-24-001-26W1/0	2/1/1982	1982/02	Omega Hydcbns Ltd	468.1	956.0

<b>Abbreviated Well ID</b>	<b>Date Well Spudded</b>	<b>On Prod YYYY/M M</b>	<b>Org Operator Name</b>	<b>Ground Elevation (m)</b>	<b>TVD (m)</b>
00/01-25-001-26W1/2	7/2/1981	1990/05	NCE Petrofund Corp	467.3	950.0
02/01-25-001-26W1/0	9/12/1982	1983/01	Omega Hydcbns Ltd	467.2	947.0
00/02-25-001-26W1/2	8/22/1981	1983/02	Omega Hydcbns Ltd	466.1	950.0
00/03-25-001-26W1/2	7/14/1981	1982/12	Omega Hydcbns Ltd	467	955.0
00/04-25-001-26W1/2	8/17/1981	1982/11	NCE Petrofund Corp	466.6	963.0
00/05-25-001-26W1/2	8/27/1981	1981/10	NCE Petrofund Corp	466.9	953.0
00/06-25-001-26W1/0	1/17/1982	1982/02	Omega Hydcbns Ltd	468.1	936.0
00/07-25-001-26W1/0	3/1/1982	1982/06	Omega Hydcbns Ltd	465.7	937.0
02/08-25-001-26W1/0	1/11/1982	1982/02	Omega Hydcbns Ltd	468.4	945.0
00/09-25-001-26W1/0	1/4/1982	1982/02	Omega Hydcbns Ltd	467	934.0
02/09-25-001-26W1/0	9/17/1994	1994/10	Omega Hydcbns Ltd	466.1	905.5
00/10-25-001-26W1/0	5/14/1982	1982/06	Omega Hydcbns Ltd	468.9	938.0
00/11-25-001-26W1/0	5/19/1982	1982/06	Omega Hydcbns Ltd	469.2	940.0
00/12-25-001-26W1/0	5/25/1982	1982/06	Omega Hydcbns Ltd	466.8	946.0
00/13-25-001-26W1/0	7/29/1982	1982/10	Omega Hydcbns Ltd	465.5	960.0
00/14-25-001-26W1/0	8/4/1982	1982/12	Omega Hydcbns Ltd	466.7	936.0
00/15-25-001-26W1/0	8/9/1982	1982/11	Omega Hydcbns Ltd	466.8	948.0
00/16-25-001-26W1/0	8/13/1982	1982/10	Omega Hydcbns Ltd	467.9	955.0
B0/16-25-001-26W1/0	10/23/1997	1997/11	NCE Rsres Grp Inc	469.7	929.0
00/01-26-001-26W1/2	9/14/1981	1982/02	NCE Petrofund Corp	466.1	960.0
00/02-26-001-26W1/0	11/17/1981	1982/02	Omega Hydcbns Ltd	463.1	952.0
00/07-26-001-26W1/0	7/7/1982	1982/10	Omega Hydcbns Ltd	463.6	949.0
00/08-26-001-26W1/0	10/28/1981	1982/01	Omega Hydcbns Ltd	465.4	948.0

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

Abbreviated Well ID	First Prod YYYY/MM	On Inject. YYYY/MM	Last Prod. YYYY/M M	Cumulative OIL Prod. (m3)	Cumulative WTR Prod. (m3)	Last Inject. YYYY/MM
00/09-23-001-26W1/0	1982/08		1990/12	10,673	32,946	
02/10-23-001-26W1/0	1983/06		1992/11	8,665	16,440	
00/15-23-001-26W1/0	1982/02	1983/10	1983/09	2,958	790	2004/05
00/16-23-001-26W1/0	1981/11		2011/11	49,400	44,524	
00/09-24-001-26W1/2	1983/01		2011/08	13,547	18,353	
00/10-24-001-26W1/0	1982/03		2011/11	5,065	1,626	
00/11-24-001-26W1/0	1982/03		1995/10	5,111	740	
00/12-24-001-26W1/2	1983/02		2008/05	24,643	23,213	
02/12-24-001-26W1/0	2010/05		2011/11	1,152	925	
02/13-24-001-26W1/0		1983/02				2006/11
03/13-24-001-26W1/0	2010/05		2011/11	3,153	3,137	
00/14-24-001-26W1/0	1982/02		2011/11	14,311	10,363	
00/15-24-001-26W1/0	1981/10	1983/02	1983/02	3,403	431	2006/11
02/16-24-001-26W1/0	1982/02		2002/05	12,749	18,034	
00/01-25-001-26W1/2	1990/05		1990/11	0	395	
02/01-25-001-26W1/0	1983/01		1990/12	3,357	15,964	
00/02-25-001-26W1/2	1983/02		2011/11	30,845	5,247	
00/03-25-001-26W1/2	1982/12		2011/11	30,258	11,519	
00/04-25-001-26W1/2	1982/11		2011/11	30,520	5,127	
00/05-25-001-26W1/2	1981/10	1983/02	1983/02	3,741	517	2011/ 02
00/06-25-001-26W1/0	1982/02		2010/11	45,230	66,022	
00/07-25-001-26W1/0	1982/06	1983/02	1983/02	1,959	608	2010/11
02/08-25-001-26W1/0	1982/02		1995/09	5,790	1,685	
00/09-25-001-26W1/0	1982/02		1991/02	4,928	6,496	
02/09-25-001-26W1/0	1994/10		2011/02	8,859	19,390	
00/10-25-001-26W1/0	1982/06		2011/11	22,083	10,032	
00/11-25-001-26W1/0	1982/06		2011/11	22,675	23,918	
00/12-25-001-26W1/0	1982/06		1992/03	16,862	39,233	

Abbreviated Well ID	First Prod YYYY/MM	On Inject. YYYY/MM	Last Prod. YYYY/M M	Cumulative OIL Prod. (m3)	Cumulative WTR Prod. (m3)	Last Inject. YYYY/MM
00/13-25-001-26W1/0	1982/10	1983/12	1983/12	344	242	2007/12
00/14-25-001-26W1/0	1982/12		1989/08	439	252	
00/15-25-001-26W1/0	1982/11	1983/12	1983/09	467	136	2011/02
00/16-25-001-26W1/0	1982/10		2008/09	3,667	1,630	
B0/16-25-001-26W1/0	1997/11		2011/04	1,261	206	
00/01-26-001-26W1/2	1982/02		2011/11	32,074	27,478	
00/02-26-001-26W1/0	1982/02		2011/02	26,495	21,949	
00/07-26-001-26W1/0	1982/10	1984/01	1983/12	2,446	306	2011/05
00/08-26-001-26W1/0	1982/01		2011/11	36,704	41,093	

## **DISCUSSION**

### **Production Performance**

Production Response versus Injection: Since injection began, more or less at the same time and the fact that 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 decrease in oil rate when injection was ceased in 1988-89.

### **Voidage Replacement Ratio Calculation**

With 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 1.08 and since there is no active injector in this unit, the current monthly VRR is zero. Although the CUM VRR is greater than one, this can be misleading, from one hand, as the injection across the pool is quite variable, and from other hand it is unknown how much of this water lost to Mission Canyon Formation, located just below the Amaranth Formation. All of the injectors are shut in currently because of formation damage due to fines migration or clay

swelling, injection water quality and compatibility with formation water, scale build up or channeling problems (see Appendix C).

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. See if we can continuously inject water 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. 00/16-23-001-26W1/0
2. 00/09-24-001-26W1/2
3. 00/10-24-001-26W1/0
4. 02/12-24-001-26W1/0
5. 03/13-24-001-26W1/0
6. 00/14-24-001-26W1/0
7. 00/02-25-001-26W1/2
8. 00/03-25-001-26W1/2
9. 02/09-25-001-26W1/0
10. 00/10-25-001-26W1/0
11. 00/11-25-001-26W1/0
12. 00/08-26-001-26W1/0

#### **Current Suspended Wells**

1. 00/09-24-001-26W1/2 (since 2010/10)
2. 00/12-24-001-26W1/2 (since 2008/06)
3. 00/04-25-001-26W1/2 (since 2010/12)
4. 00/06-25-001-26W1/0 (since 2010/12)
5. 00/10-25-001-26W1/0 (since 2010/11)
6. 00/16-25-001-26W1/0 (since 2008/10)

#### **Abandoned Wells**

1. 00/09-23-001-26W1/0 (since 1991/01)
2. 02/10-23-001-26W1/0 (since 1992/12)
3. 00/11-24-001-26W1/0 (since 1995/11)
4. 02/16-24-001-26W1/0 (since 2002/06)

5. 00/01-25-001-26W1/2 (since 1990/12)
6. 02/01-25-001-26W1/0 (since 1991/01)
7. 02/08-25-001-26W1/0 (since 1995/10)
8. 00/09-25-001-26W1/0 (since 1991/03)
9. 00/12-25-001-26W1/0 (since 1992/04)
10. 00/14-25-001-26W1/0 (since 1989/09)

## **Injectors**

### **Current Injecting Wells**

None

### **Current Suspended Injection Wells**

1. 00/15-23-001-26W1/0 (since 2004/06)
2. 02/13-24-001-26W1/0 (since 2006/12)
3. 00/15-24-001-26W1/0 (since 2006/12)
4. 00/05-25-001-26W1/2 (since 2011/01)
5. 00/07-25-001-26W1/0 (since 2010/12)
6. 00/13-25-001-26W1/0 (since 2008/01)
7. 00/15-25-001-26W1/0 (since 2010/12)
8. 00/07-26-001-26W1/0 (since 2011/01)

(See Appendix E for individual well profile)

### **Abandoned Wells**

None

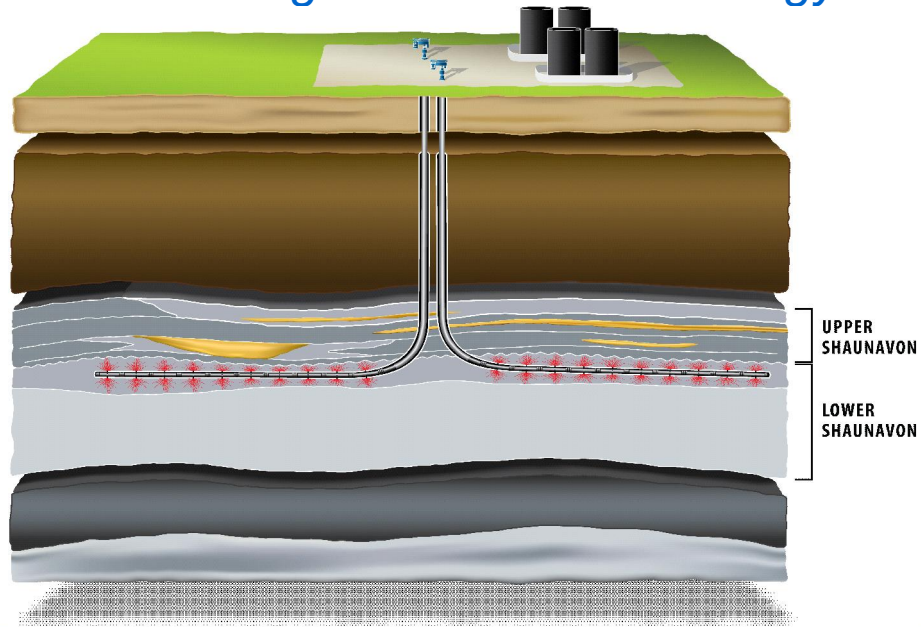
The behavior of a Lower Amaranth Unit 1 producers are indicated by examining the oil rate versus time plots (see Appendix B). Waskada Lower Amaranth Unit 1 exhibited relatively high initial oil productivity (most of the wells drilled in the past were verticals), rapidly declining to flat/low decline 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: Pressure Surveys)

Also, 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 resources 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 3 horizontal wells, to increase the Recovery Factor (RF), in year 2010, 102/12-24-001-26W1, 103/13-24-001-26W1 and 103/16-24-001-26W1/00. Penn West’s follow up plan once we have drilled more horizontal wells in the Units 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

## *HZ Multi Stage Fracture Technology*



## **TABLES**

### **Waskada Lower Amaranth Unit #1**

**Table 1: Rates History**

Date	Oil		Water		Injection Water	
Year	m3/year	m3/day	m3/year	m3/day	m3/year	m3/day
1981	1,293	3.54	647	1.77	0	0.00
1982	34,589	94.76	8,564	23.46	0	0.00
1983	63,455	173.85	26,801	73.43	98,755	270.56
1984	55,295	151.49	28,617	78.40	132,955	364.26
1985	41,787	114.48	27,555	75.49	86,897	238.07
1986	37,496	102.73	28,006	76.73	107,802	295.35
1987	32,268	88.41	39,340	107.78	82,230	225.29
1988	28,003	76.72	25,126	68.84	64,867	177.72
1989	23,117	63.33	20,406	55.91	9,366	25.66
1990	19,472	53.35	16,000	43.83	24,156	66.18
1991	13,902	38.09	16,050	43.97	31,802	87.13
1992	12,342	33.81	17,729	48.57	41,247	113.01
1993	10,180	27.89	20,905	57.28	81,517	223.33
1994	11,592	31.76	15,873	43.49	26,062	71.40
1995	11,593	31.76	18,340	50.25	56,183	153.92
1996	11,489	31.48	16,992	46.55	57,114	156.48
1997	8,731	23.92	15,108	41.39	46,833	128.31
1998	7,120	19.51	13,147	36.02	24,871	68.14
1999	5,829	15.97	11,053	30.28	17,130	46.93
2000	5,998	16.43	11,740	32.16	12,856	35.22
2001	6,356	17.41	10,508	28.79	15,584	42.70
2002	5,846	16.02	9,016	24.70	12,815	35.11
2003	5,399	14.79	7,476	20.48	10,947	29.99
2004	4,779	13.09	6,511	17.84	9,381	25.70
2005	4,146	11.36	7,149	19.59	8,353	22.88
2006	4,094	11.22	7,752	21.24	11,382	31.18
2007	3,775	10.34	8,308	22.76	36,593	100.26
2008	3,227	8.84	8,271	22.66	10,750	29.45
2009	4,690	12.85	10,887	29.83	6,697	18.35
2010	5,310	14.55	10,566	28.95	17,244	47.24
2011	2,664	8.80	6,526	17.88	119	0.32

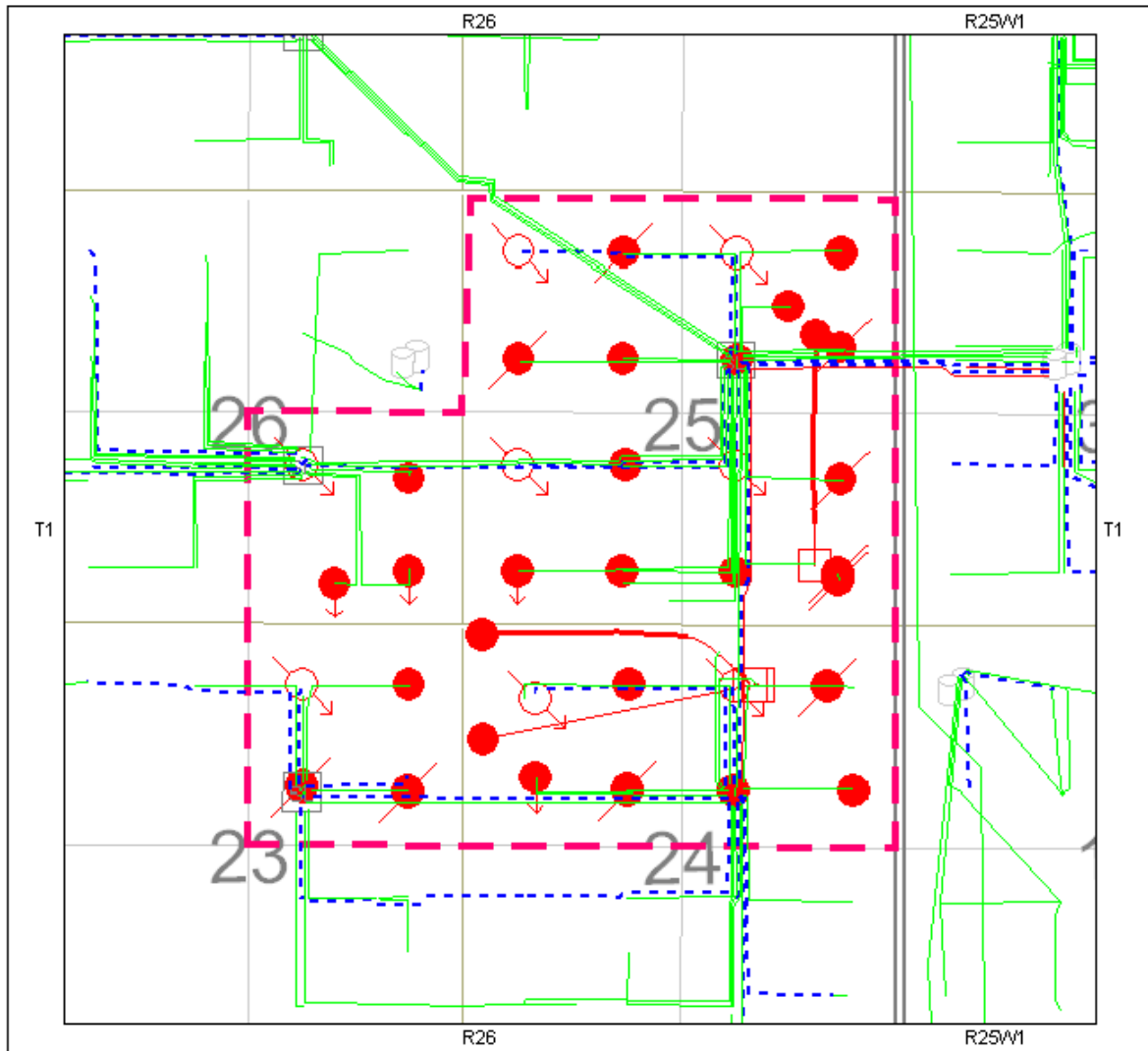
## Waskada Lower Amaranth Unit #1

**Table 2: Pressure Surveys**

<b>Location</b>	<b>Shut In Date</b>	<b>Date of Survey</b>	<b>Type of Survey</b>	<b>Pressure @ Datum Depth (kPa)</b>
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

## **APPENDIX A**

## Appendix A – Area Map



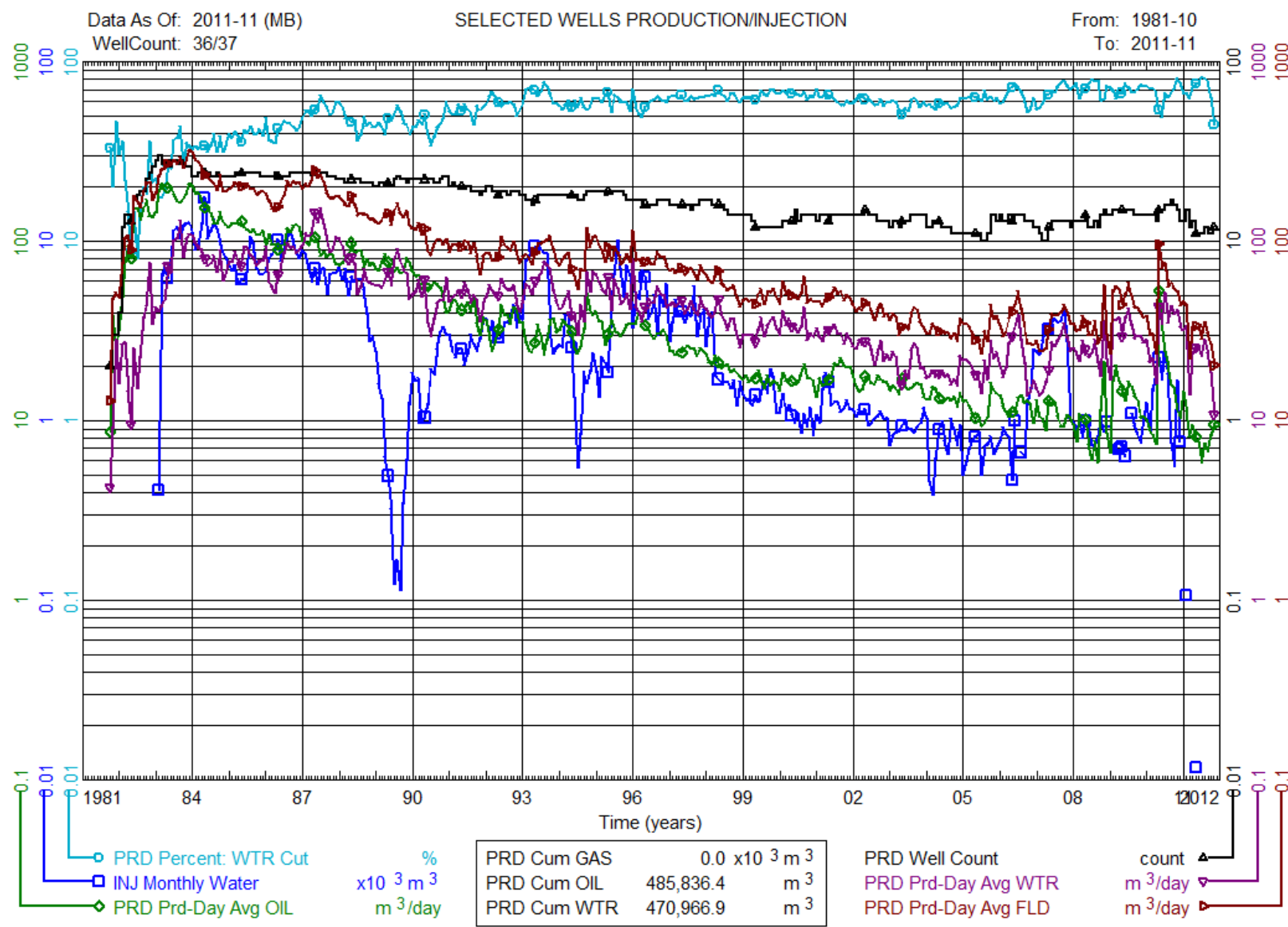
WELL SYMBOLS									
• OIL	✂ AO	⊕ PTN	⊕ D&A	⊕ WI					
○ LCT	✂ AWI	⊕ STN	⊕ CMM	⊕ DRL					
⊕ RDR	⊕ WD	⊕ AWD	⊕ AWD	⊕ SWI					
⊕ SO	⊕ WSC	⊕ J&A	⊕ SL						

<b>PennWest</b> Exploration		
<b>Waskada Lower Amaranth Unit #1</b>		
<b>geoSCOUT</b> www.geoscout.com	By :	Date : 2011/04/20
	Scale = 1:21401	Project : Waskada



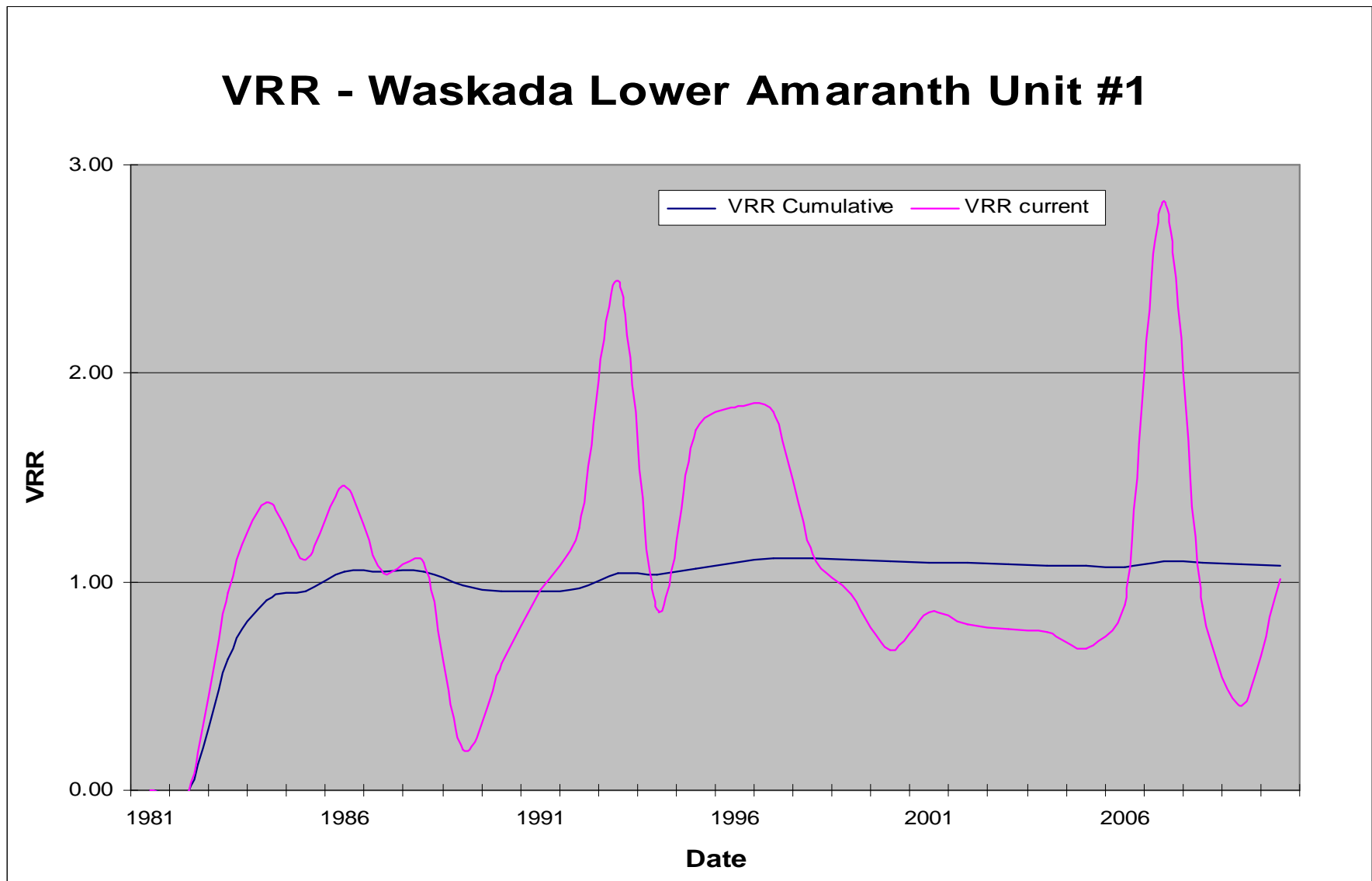
## **APPENDIX B**

## Appendix B – Production and Injection History plot



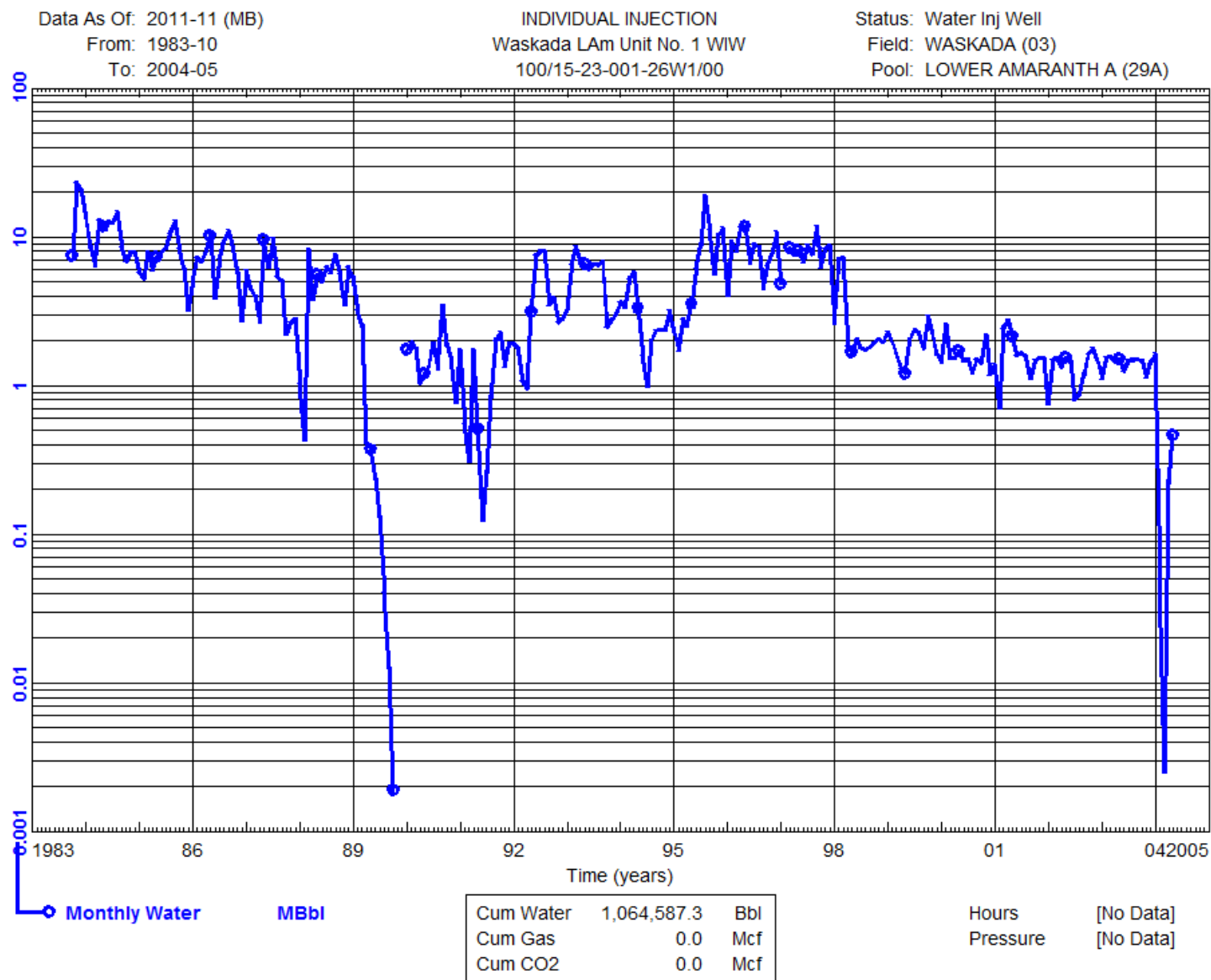
## **APPENDIX C**

**Appendix C – Voidage Replacement Ratio VRR**



## **APPENDIX D**

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



Data As Of: 2011-11 (MB)

From: 1983-02

To: 2006-11

INDIVIDUAL INJECTION

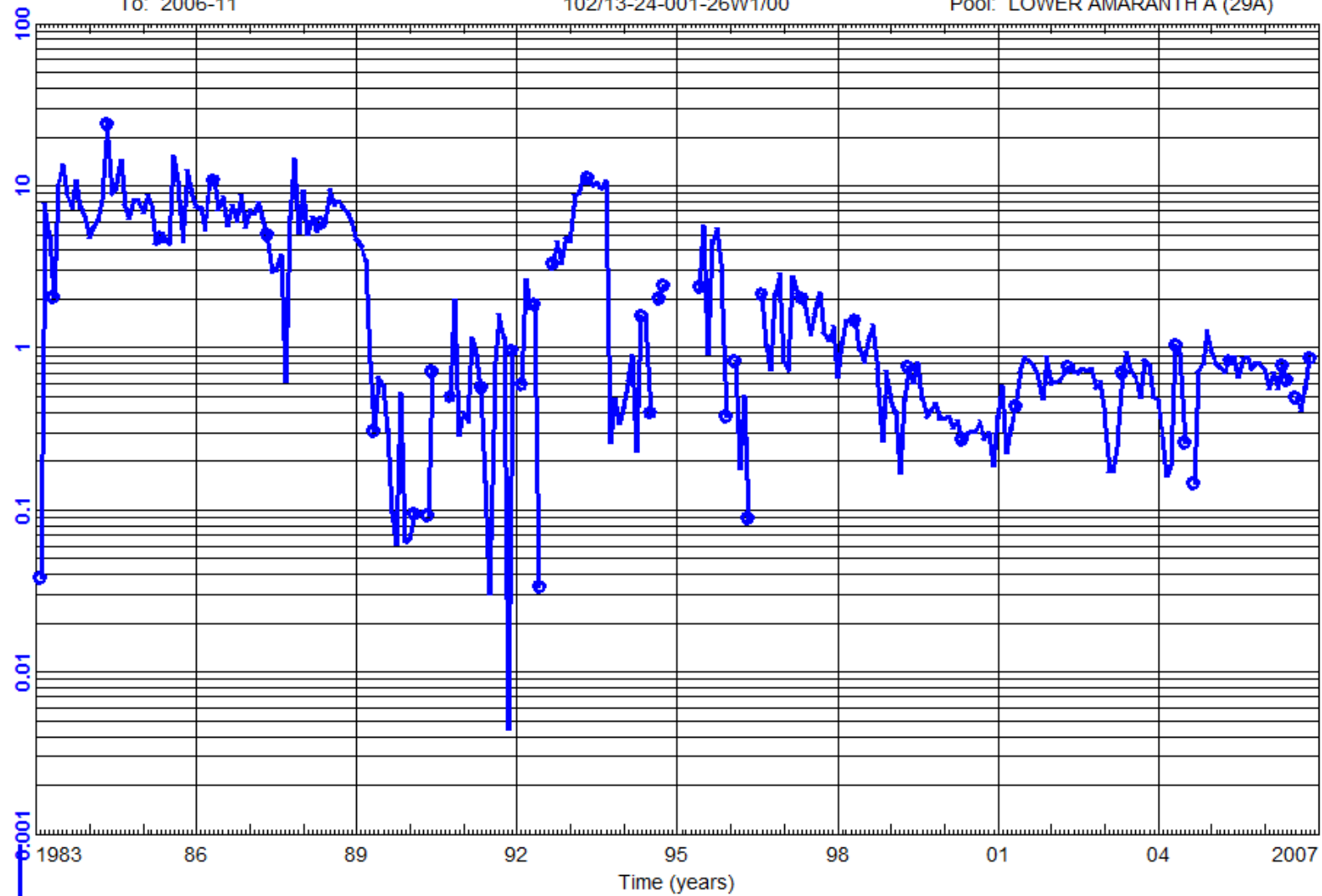
Waskada LAm Unit No. 1 WIW

102/13-24-001-26W1/00

Status: Water Inj Well

Field: WASKADA (03)

Pool: LOWER AMARANTH A (29A)



Monthly Water

MBbl

Cum Water	788,993.5	Bbl
Cum Gas	0.0	Mcf
Cum CO2	0.0	Mcf

Hours [No Data]

Pressure [No Data]

Data As Of: 2011-11 (MB)

From: 1983-02

To: 2006-11

INDIVIDUAL INJECTION

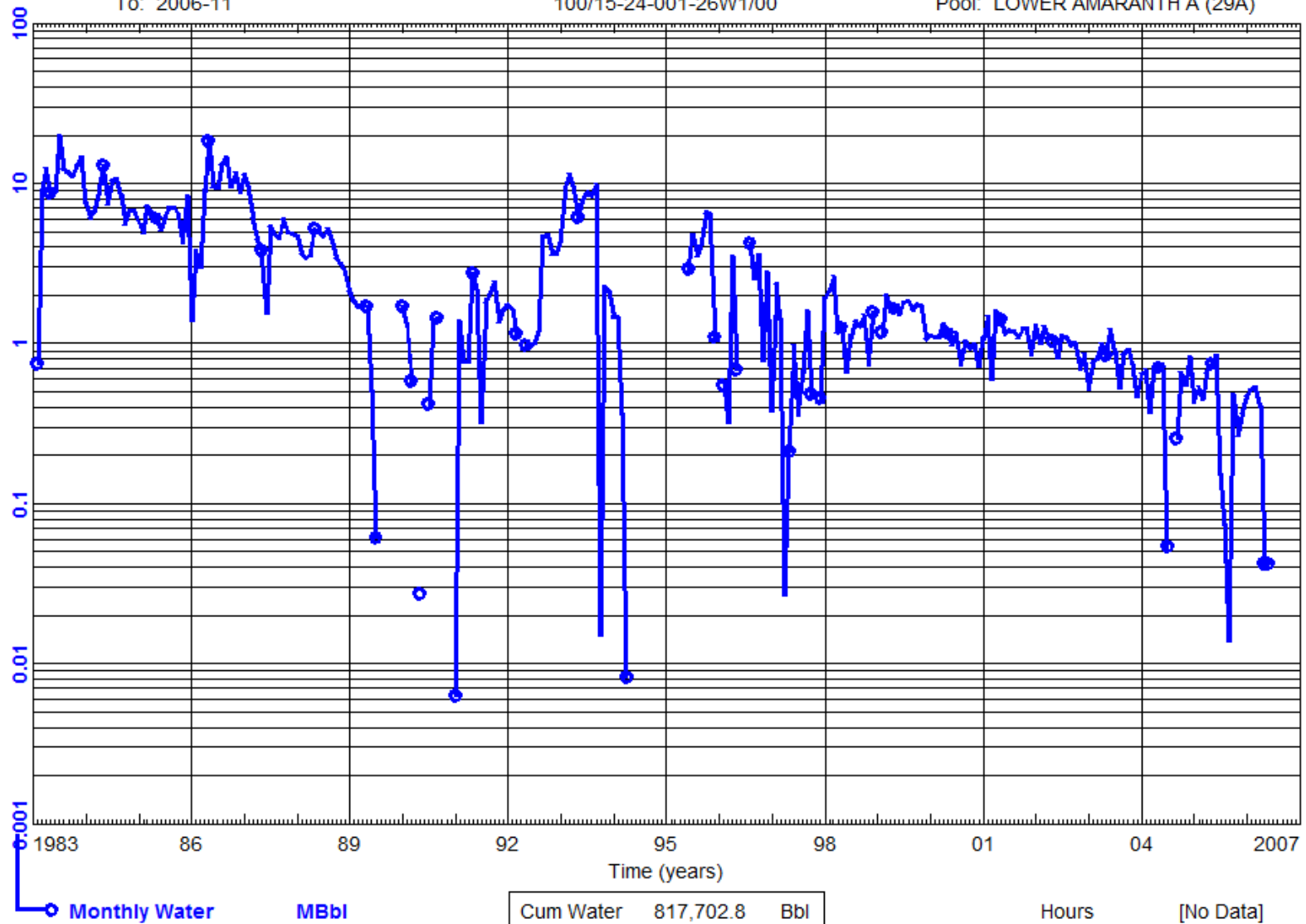
Waskada LAm Unit No. 1 WIW

100/15-24-001-26W1/00

Status: Water Inj Well

Field: WASKADA (03)

Pool: LOWER AMARANTH A (29A)





Data As Of: 2011-11 (MB)

From: 1983-02

To: 2011-02

INDIVIDUAL INJECTION

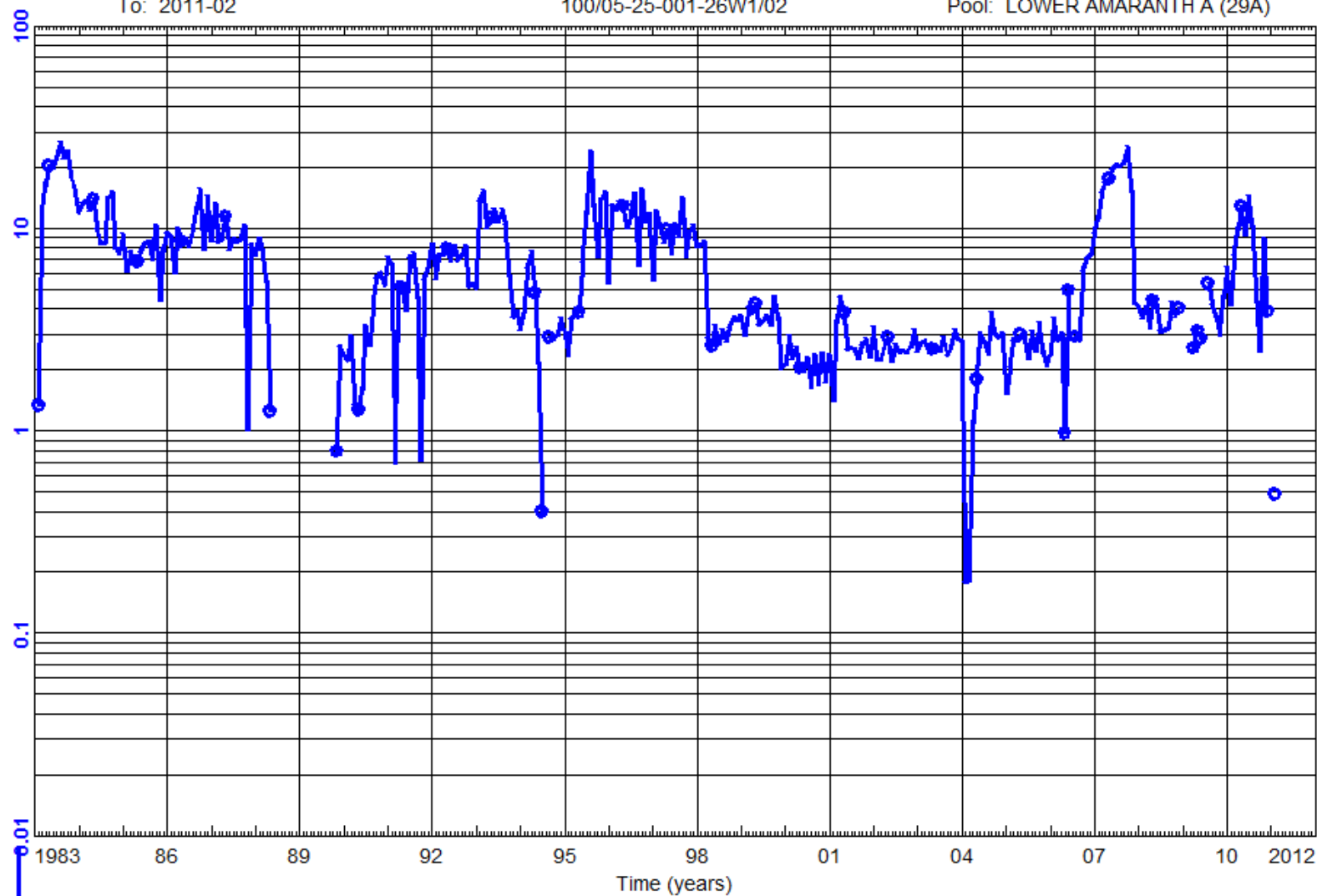
Waskada LAm Unit No. 1 WIW

100/05-25-001-26W1/02

Status: Water Inj Well

Field: WASKADA (03)

Pool: LOWER AMARANTH A (29A)



Monthly Water

MBbl

Cum Water	2,073,065.0	Bbl
Cum Gas	0.0	Mcf
Cum CO2	0.0	Mcf

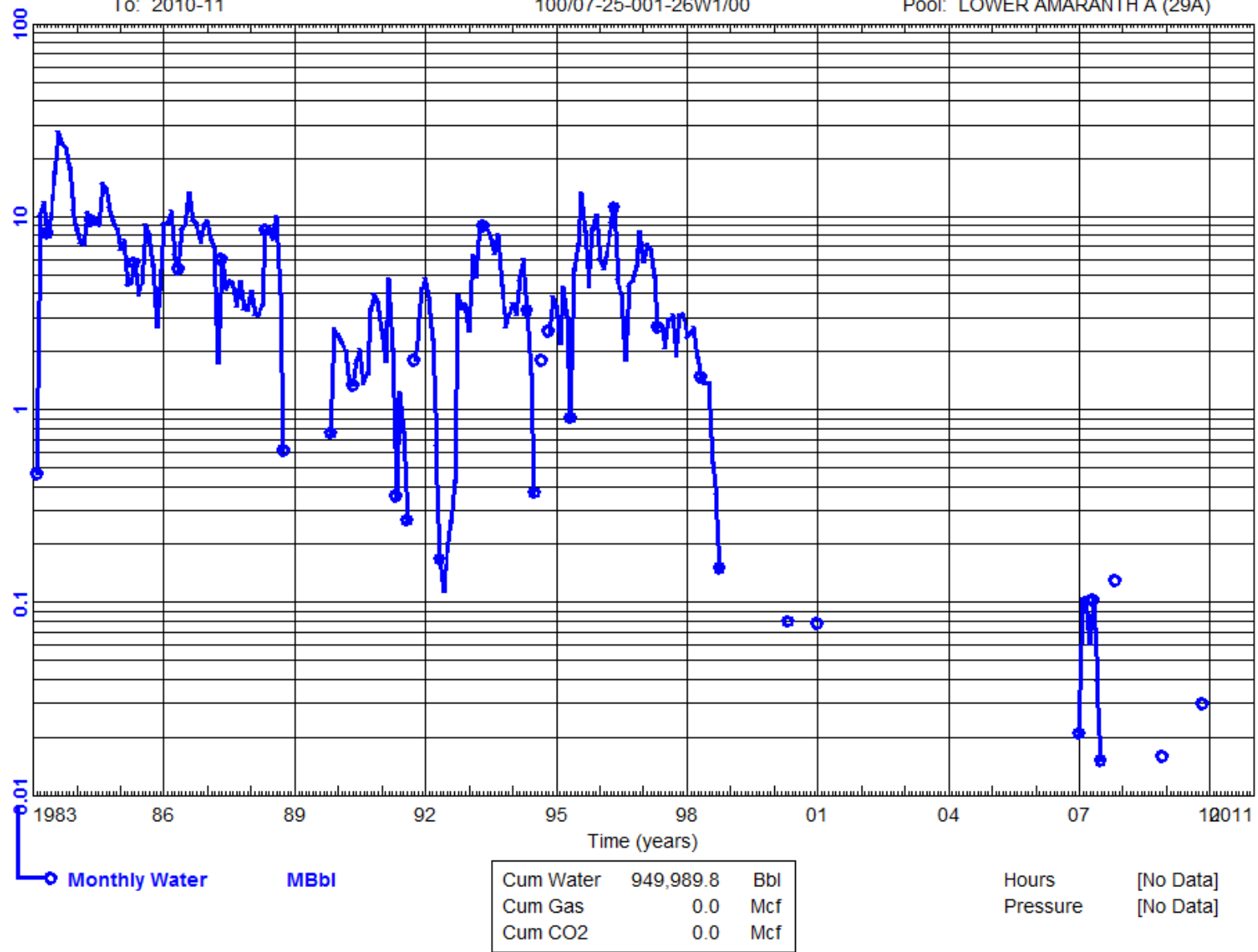
Hours [No Data]

Pressure [No Data]

Data As Of: 2011-11 (MB)  
From: 1983-02  
To: 2010-11

INDIVIDUAL INJECTION  
Waskada LAm Unit No. 1 WIW  
100/07-25-001-26W1/00

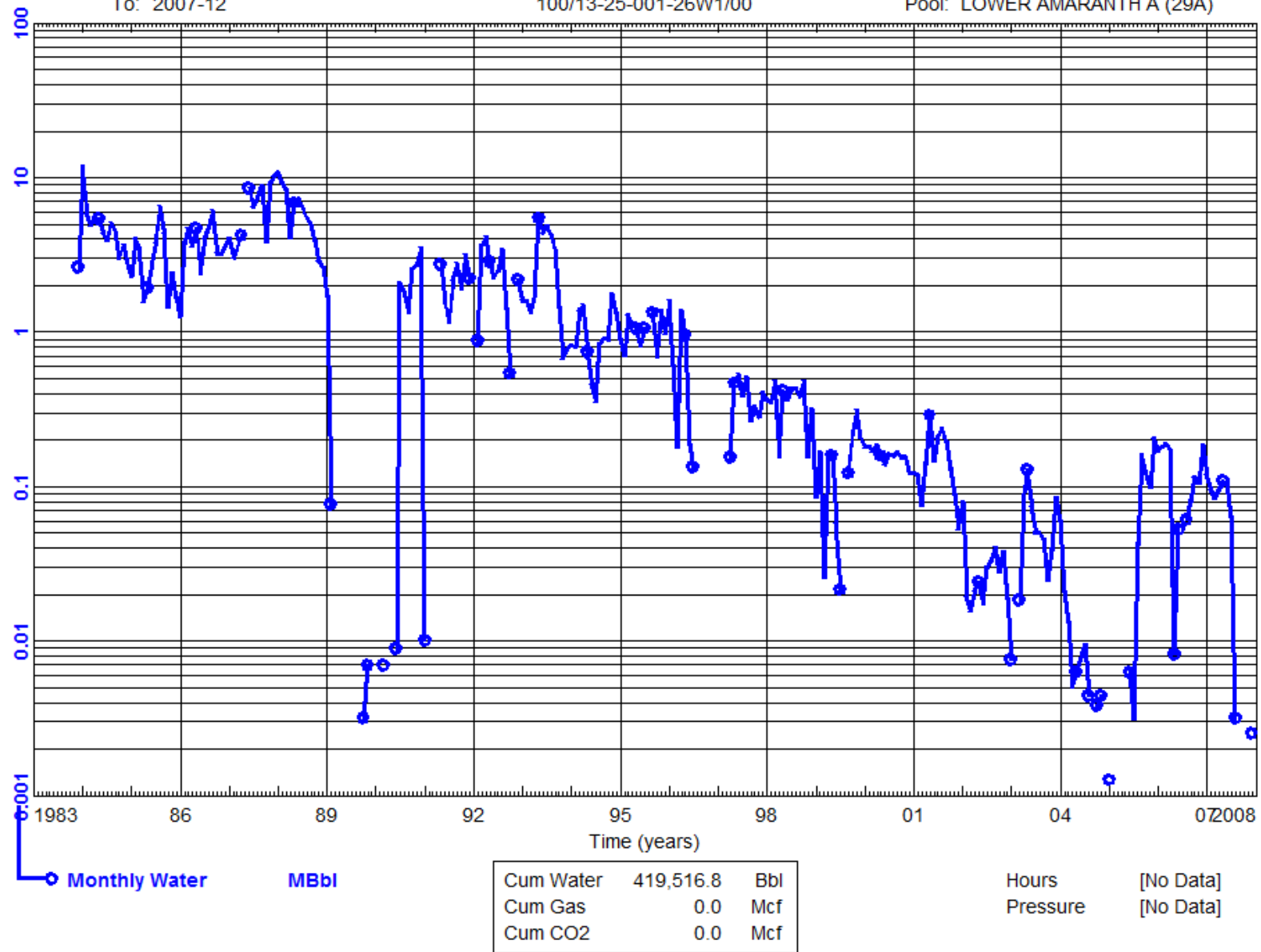
Status: Water Inj Well  
Field: WASKADA (03)  
Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
From: 1983-12  
To: 2007-12

INDIVIDUAL INJECTION  
Waskada LAm Unit No. 1 WW  
100/13-25-001-26W1/00

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



Data As Of: 2011-11 (MB)

From: 1983-12

To: 2011-02

INDIVIDUAL INJECTION

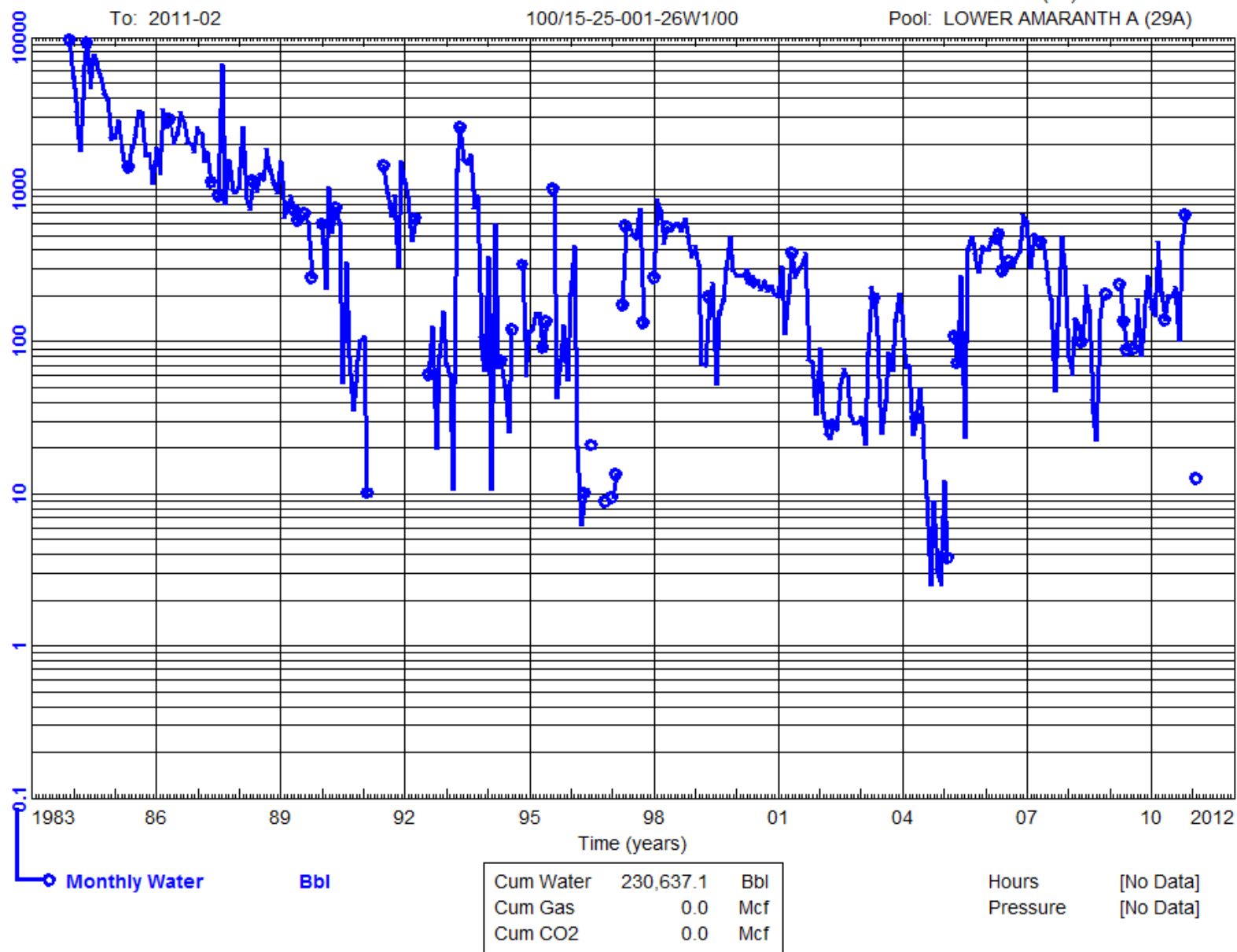
Waskada LAm Unit No. 1 WIW

100/15-25-001-26W1/00

Status: Water Inj Well

Field: WASKADA (03)

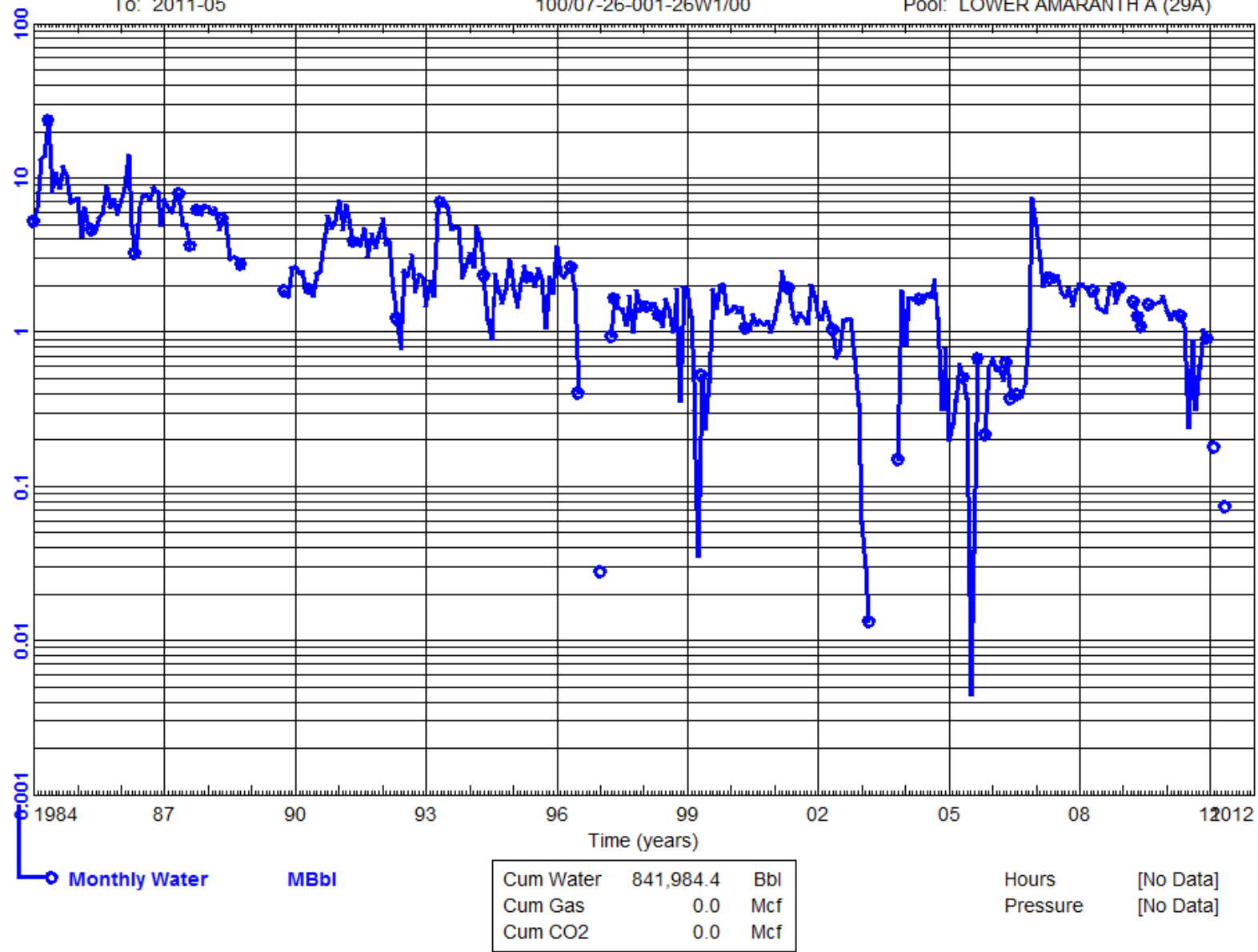
Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
From: 1984-01  
To: 2011-05

INDIVIDUAL INJECTION  
Waskada Unit No. 1 WIW  
100/07-26-001-26W1/00

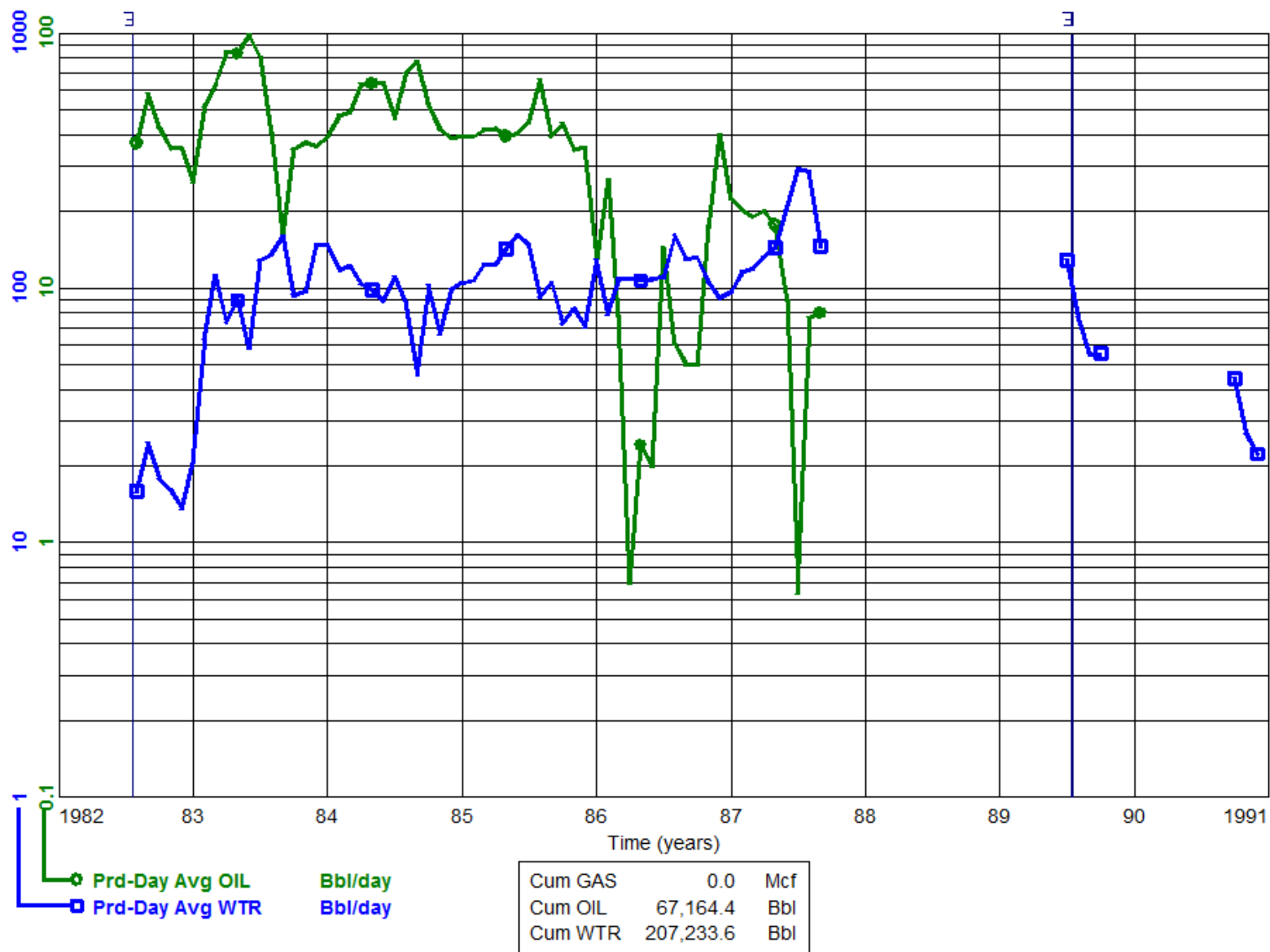
Status: Water Inj Well  
Field: WASKADA (03)  
Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-08  
 To: 1990-12

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1  
 100/09-23-001-26W1/00

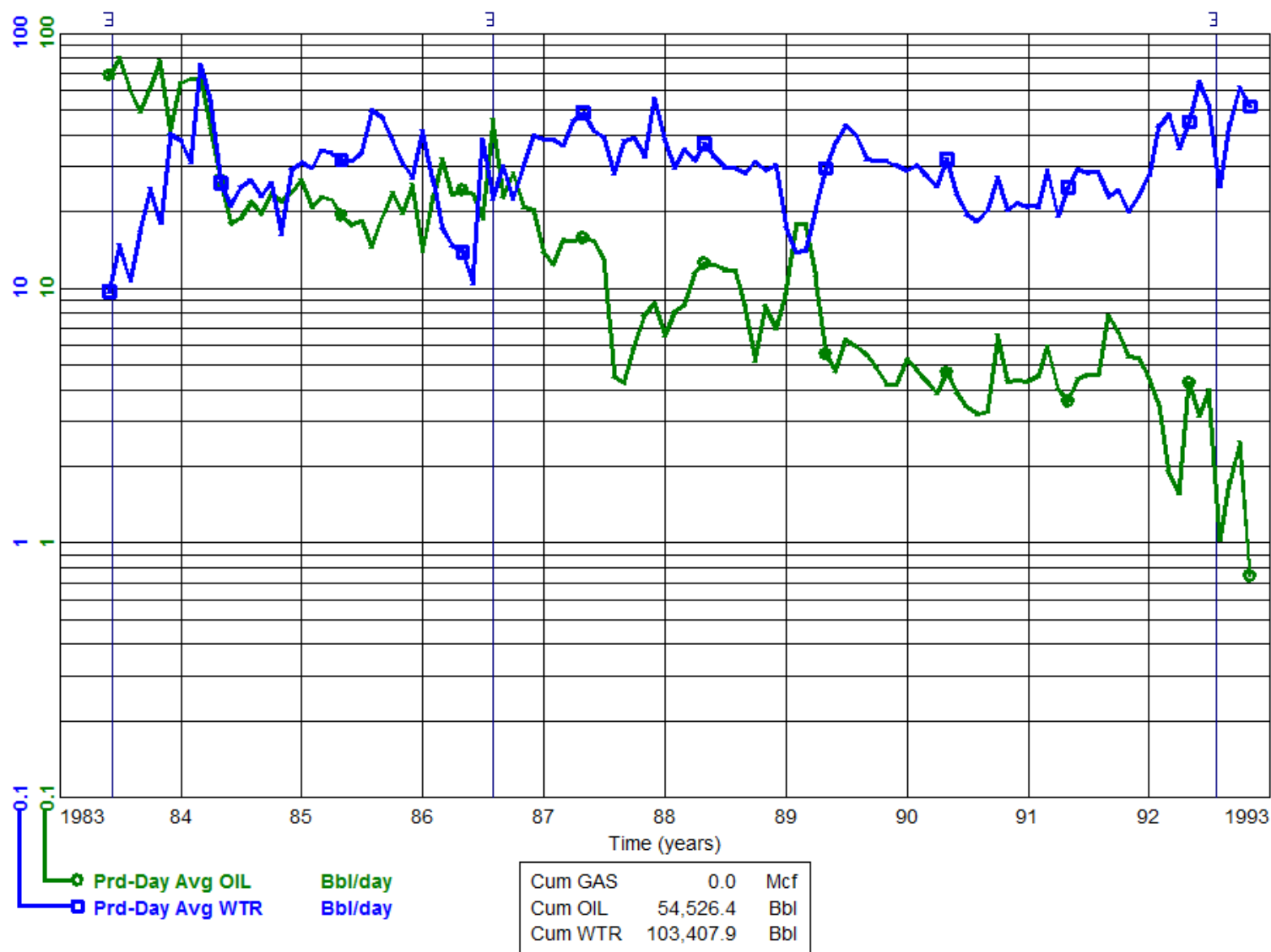
Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1983-06  
 To: 1992-11

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1  
 102/10-23-001-26W1/00

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



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

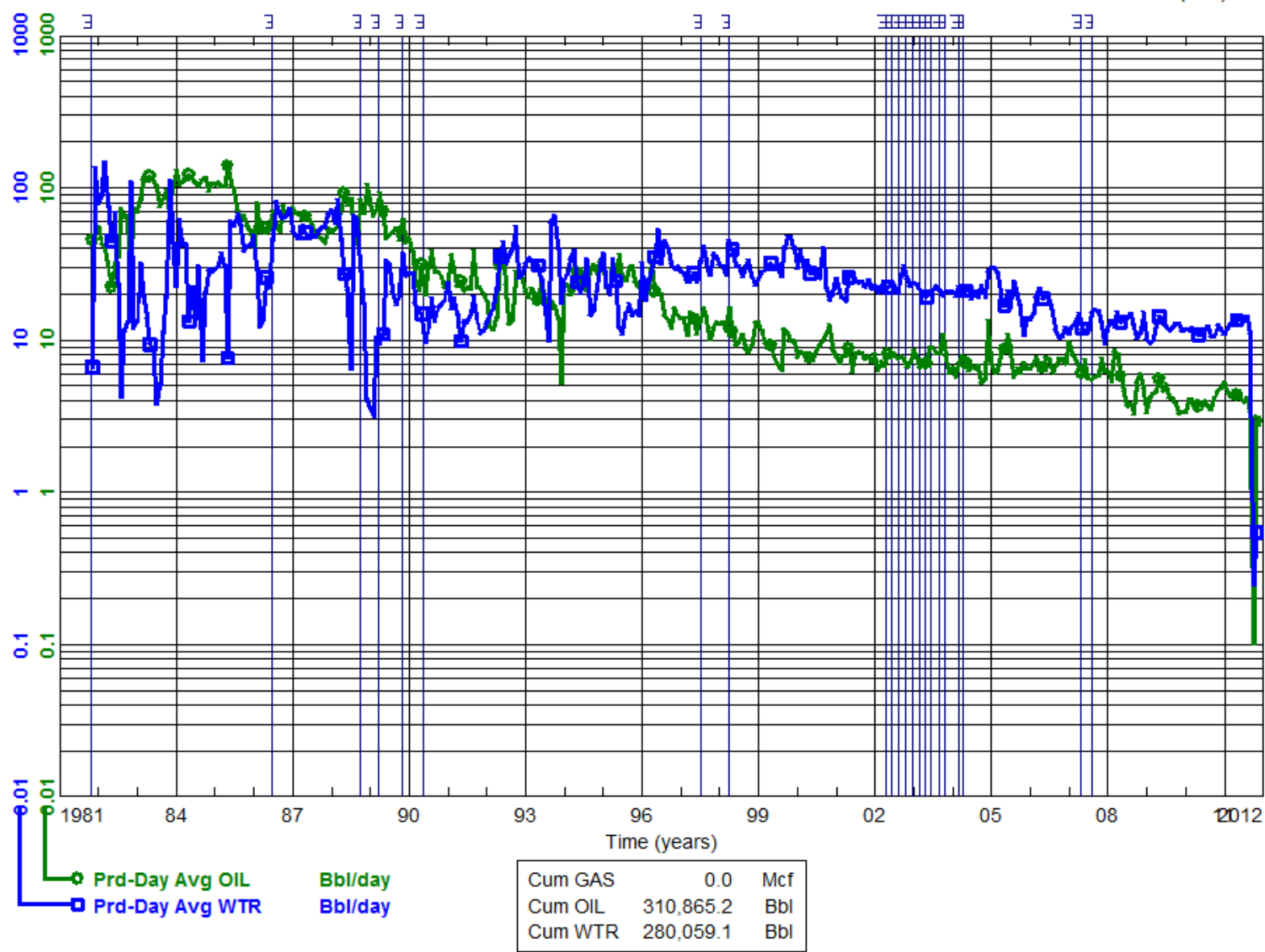




Data As Of: 2011-11 (MB)  
 From: 1981-11  
 To: 2011-11

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1  
 100/16-23-001-26W1/00

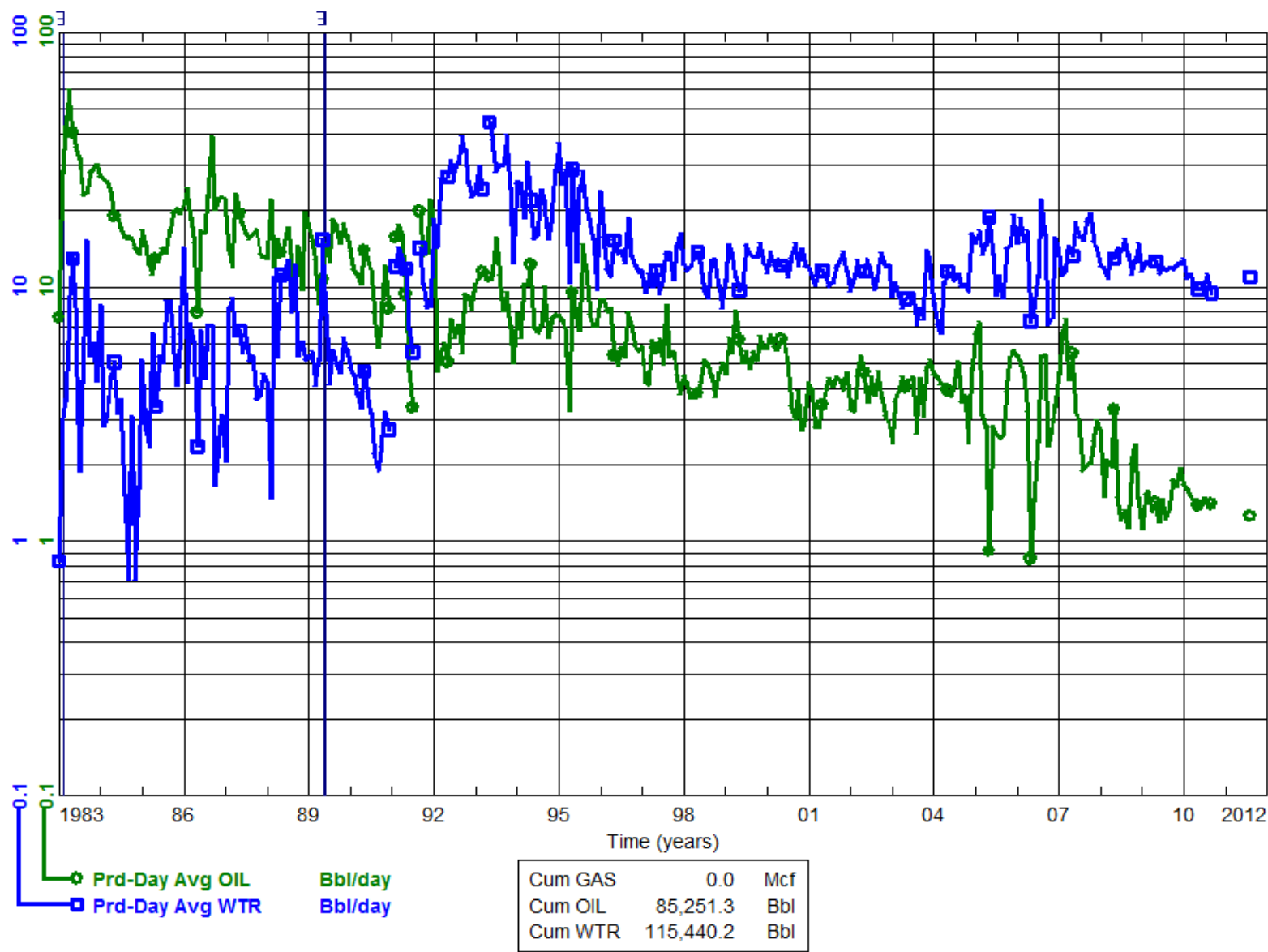
Status: Capable Of Oil Prod  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1983-01  
 To: 2011-08

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1  
 100/09-24-001-26W1/02

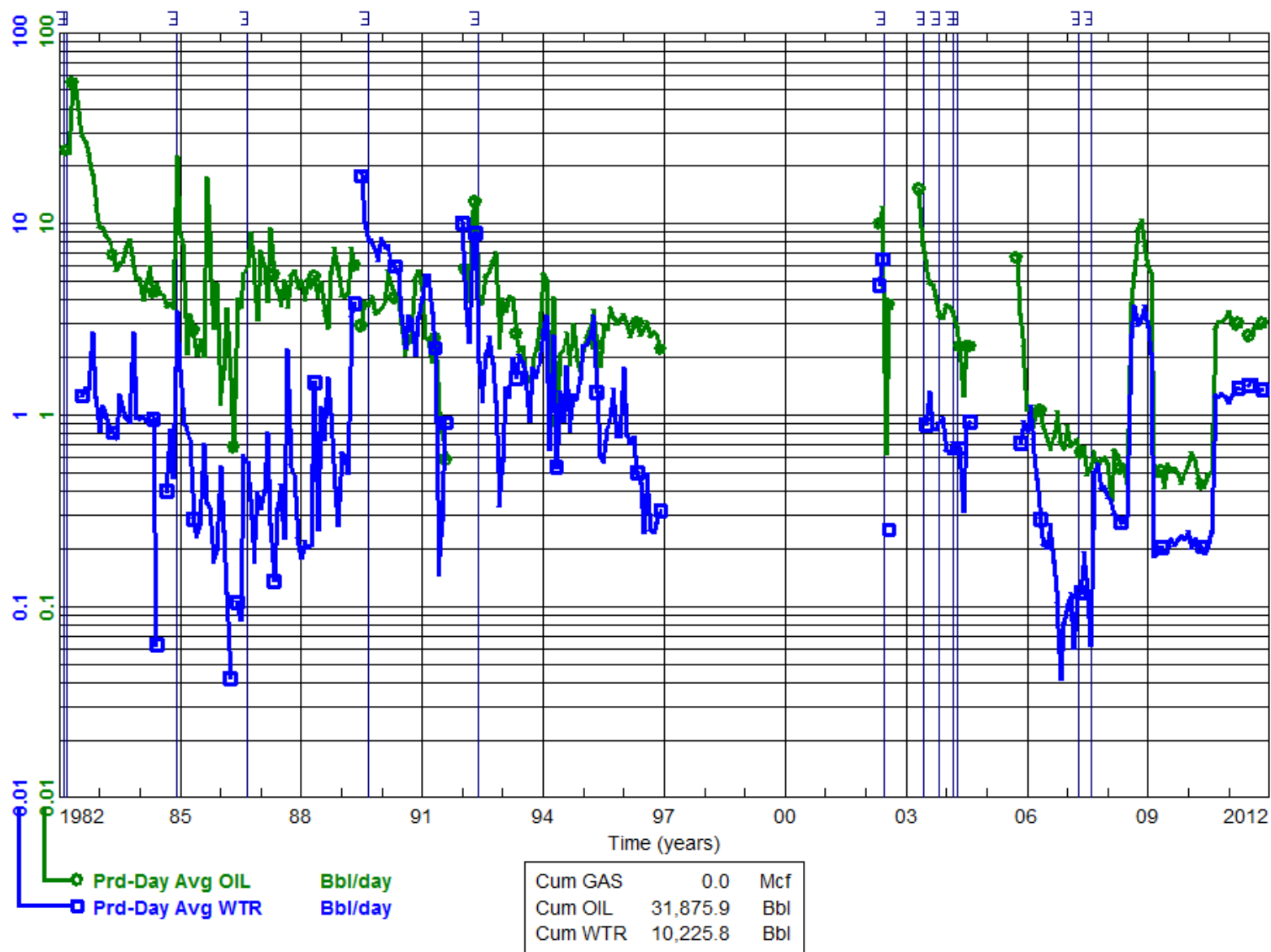
Status: Capable Of Oil Prod  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-03  
 To: 2011-11

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1  
 100/10-24-001-26W1/00

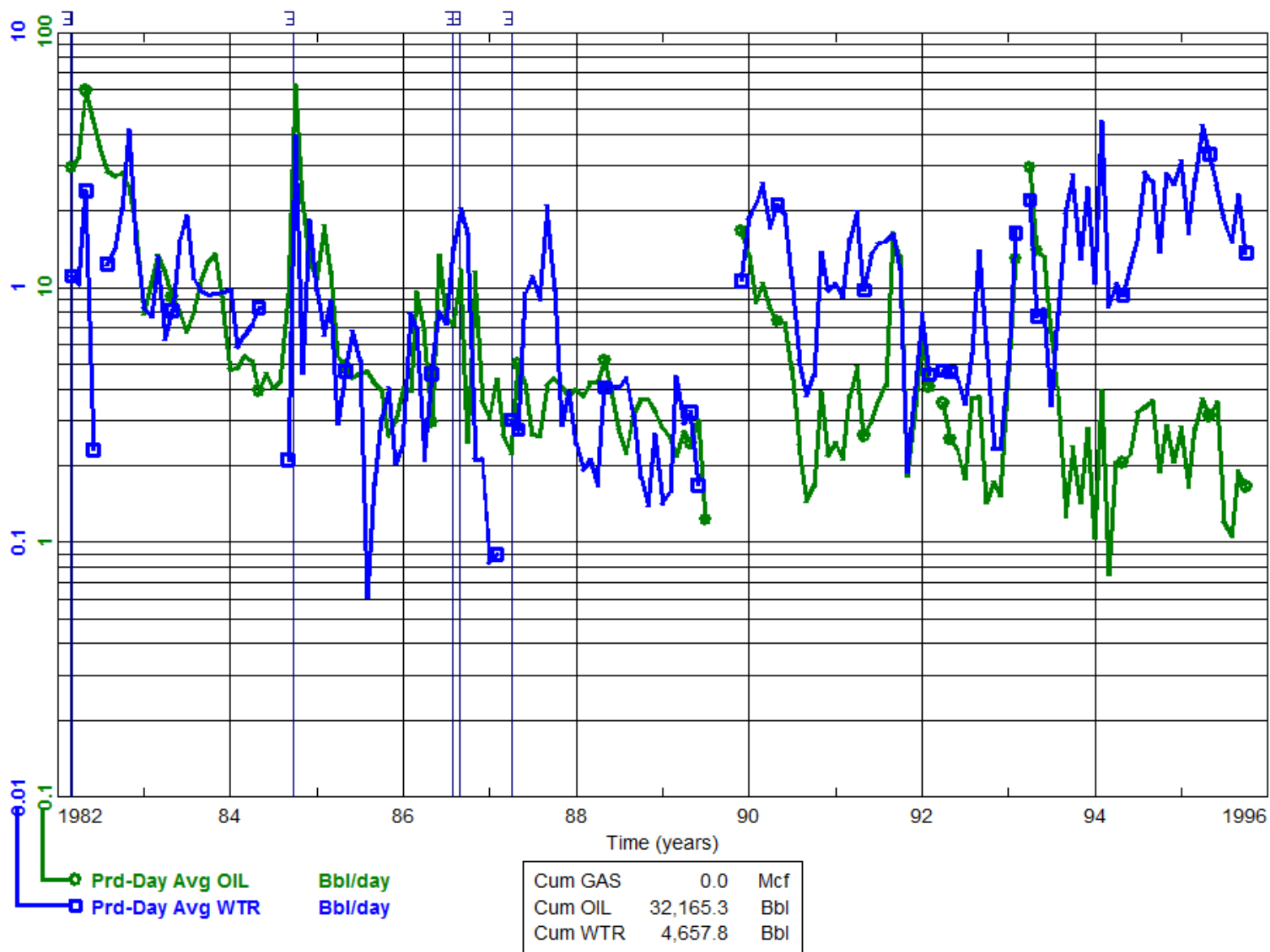
Status: Capable Of Oil Prod  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-03  
 To: 1995-10

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1  
 100/11-24-001-26W1/00

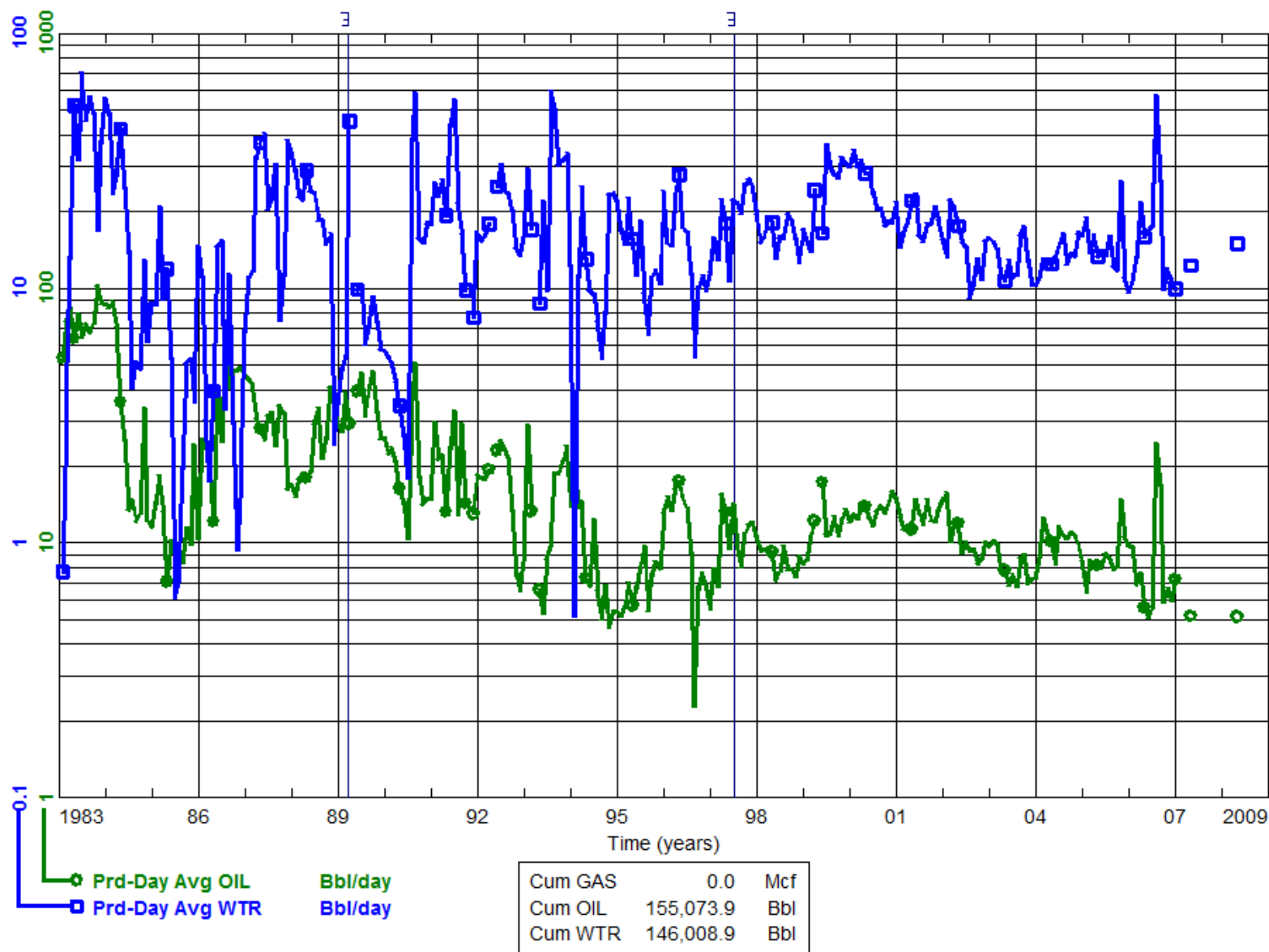
Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1983-02  
 To: 2008-05

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 12 COM  
 100/12-24-001-26W1/02

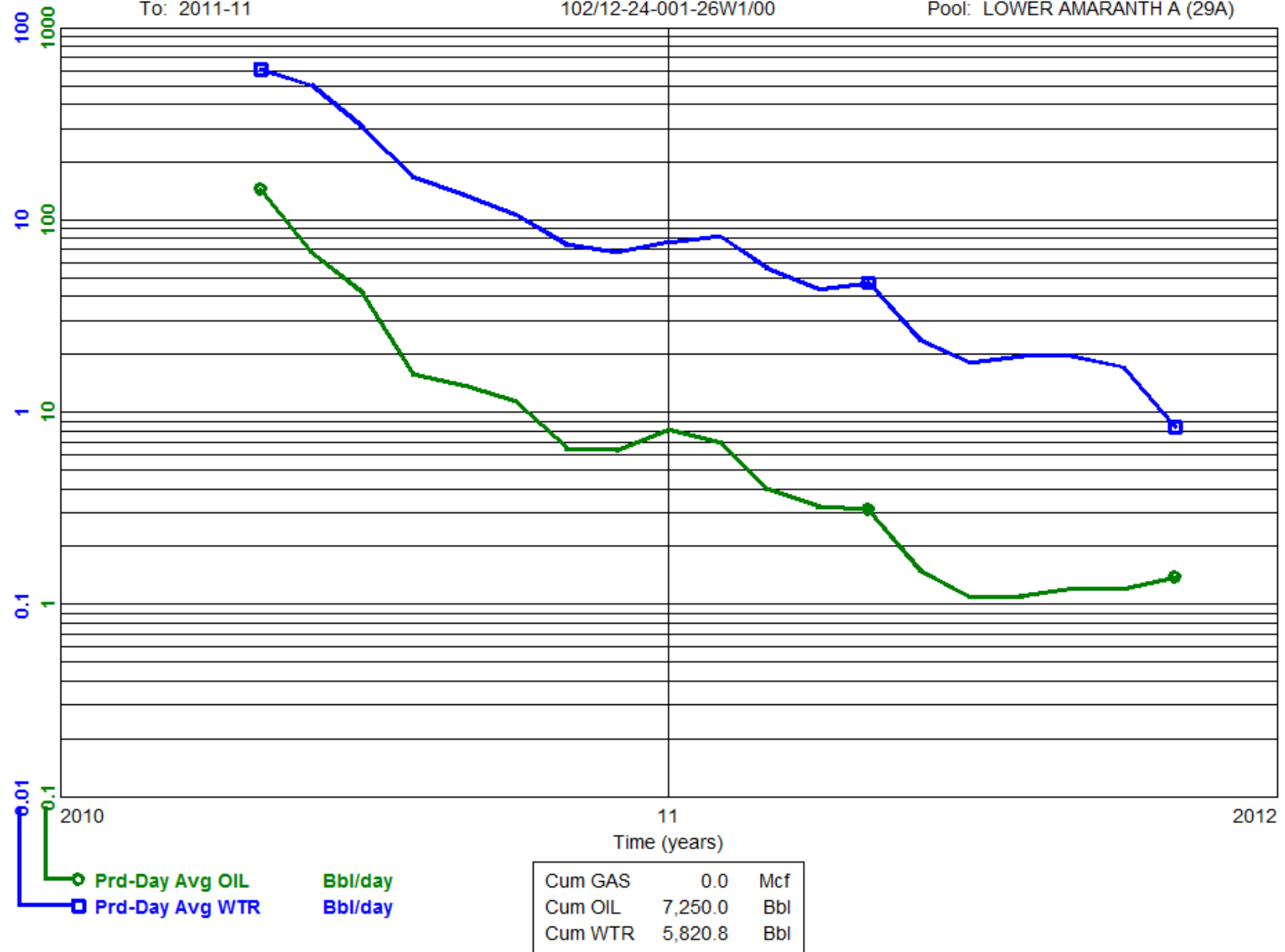
Status: Comingled  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 2010-05  
 To: 2011-11

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1 HZNTL  
 102/12-24-001-26W1/00

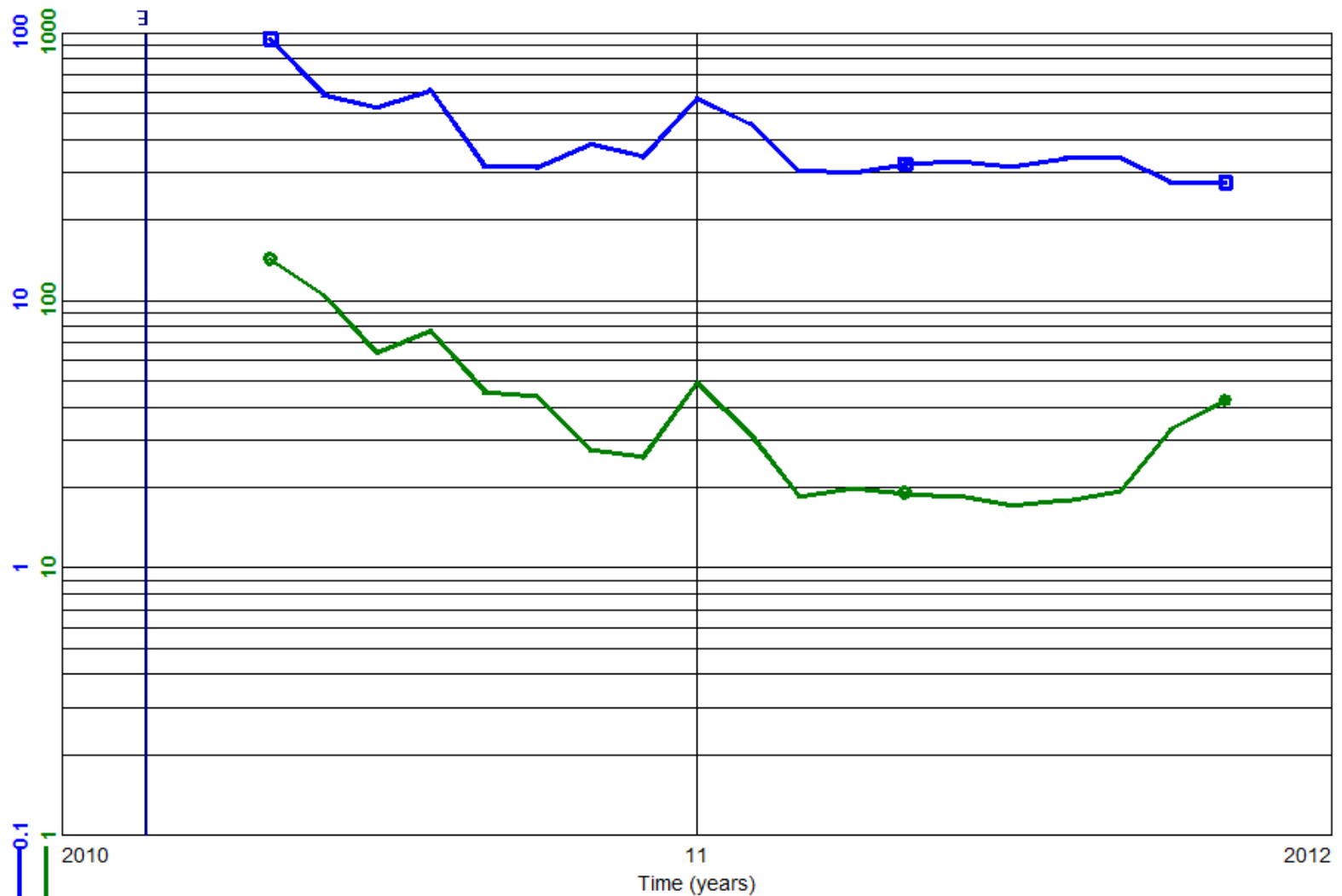
Status: Capable Of Oil Prod  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 2010-05  
 To: 2011-11

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1 HZNTL  
 103/13-24-001-26W1/00

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



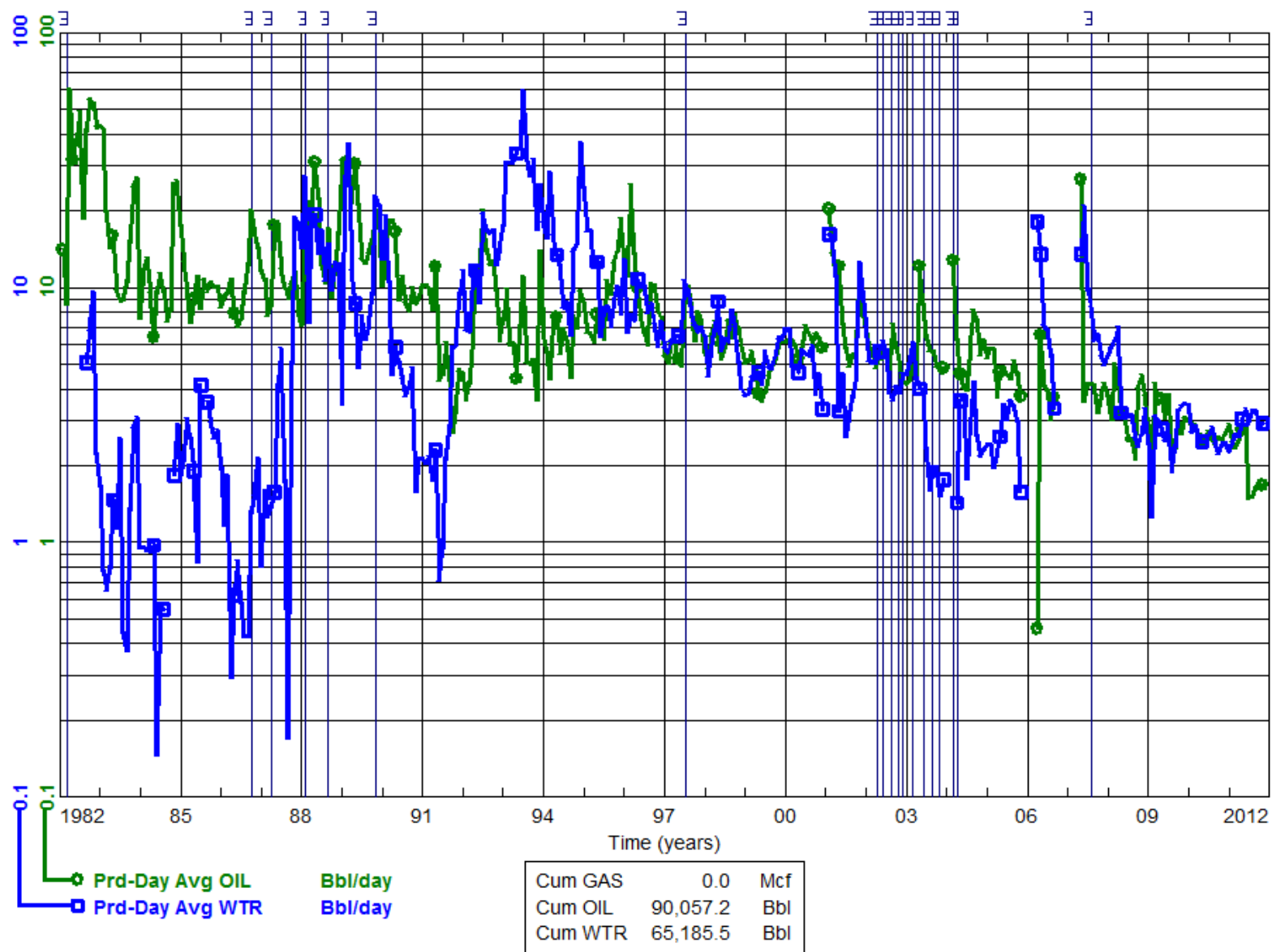
● Prd-Day Avg OIL      Bbl/day  
■ Prd-Day Avg WTR      Bbl/day

Cum GAS	0.0	Mcf
Cum OIL	19,838.2	Bbl
Cum WTR	19,732.6	Bbl

Data As Of: 2011-11 (MB)  
From: 1982-02  
To: 2011-11

INDIVIDUAL PRODUCTION  
Waskada LAm Unit No. 1  
100/14-24-001-26W1/00

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

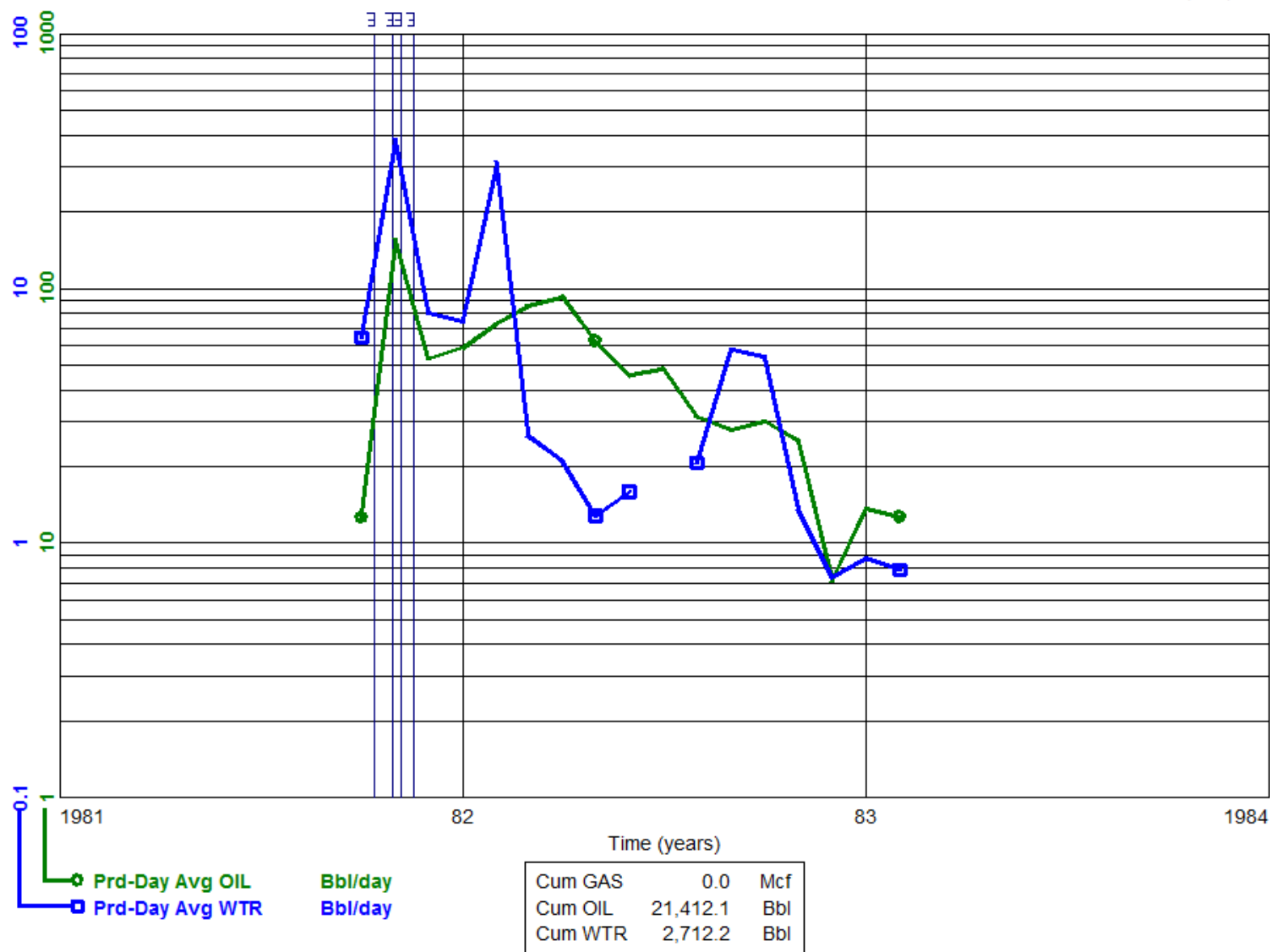




Data As Of: 2011-11 (MB)  
 From: 1981-10  
 To: 1983-02

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1 WIW  
 100/15-24-001-26W1/00

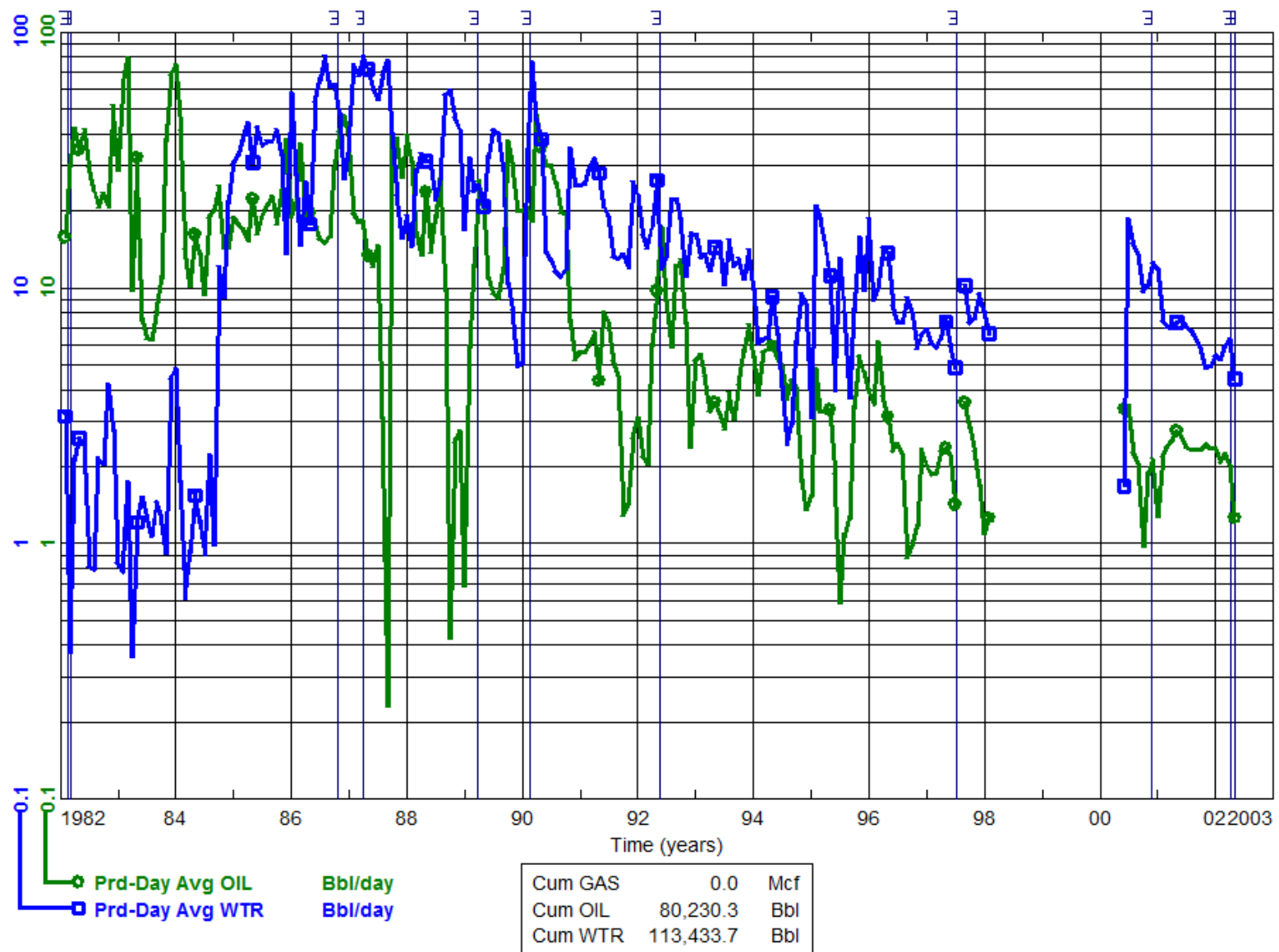
Status: Water Inj Well  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
From: 1982-02  
To: 2002-05

INDIVIDUAL PRODUCTION  
Waskada LAm Unit No. 1  
102/16-24-001-26W1/00

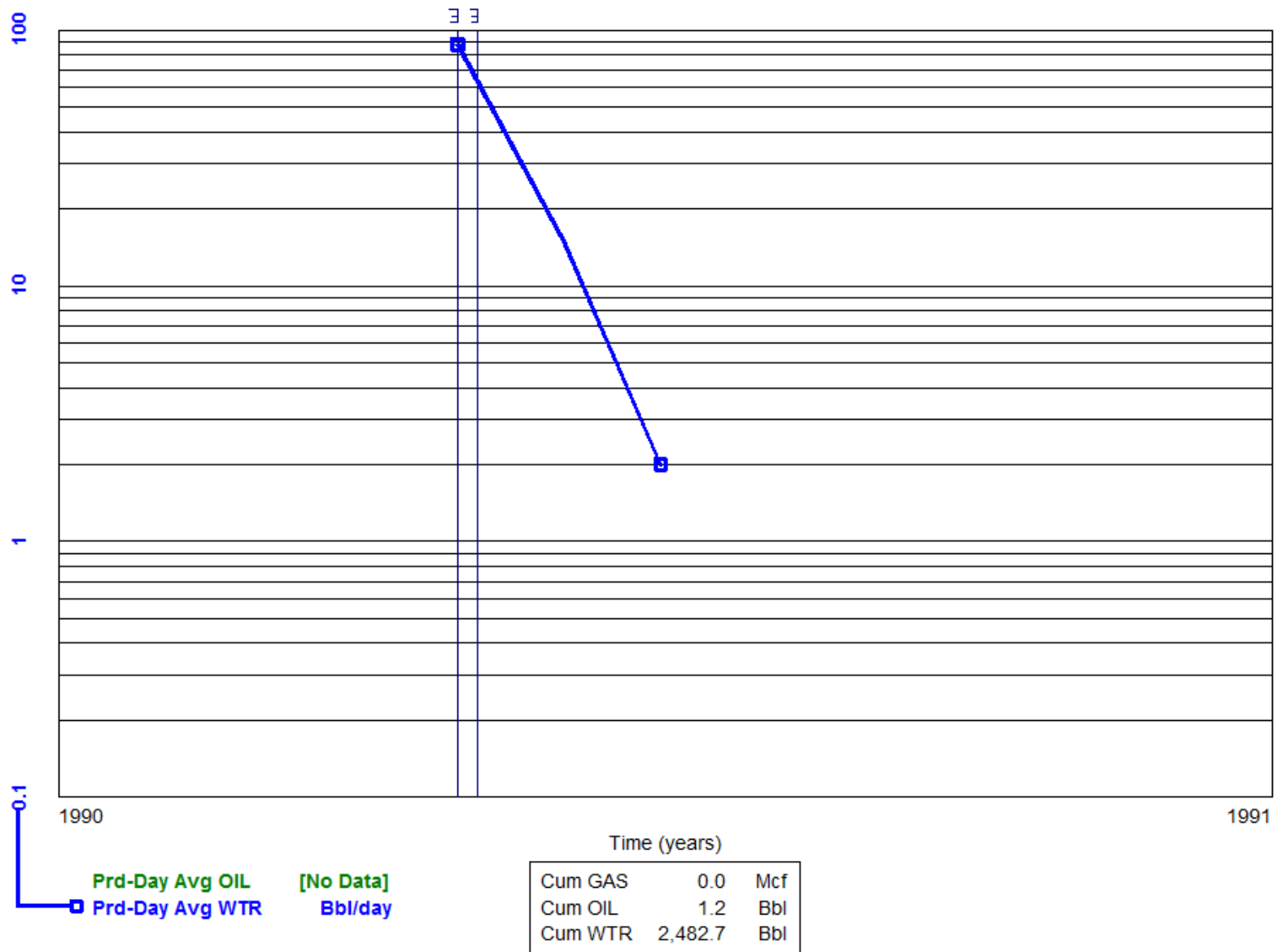
Status: Abandoned Producer  
Field: WASKADA (03)  
Pool: LOWER AMARANTH A (29A)



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

INDIVIDUAL PRODUCTION  
Waskada LAm Unit No. 1  
100/01-25-001-26W1/02

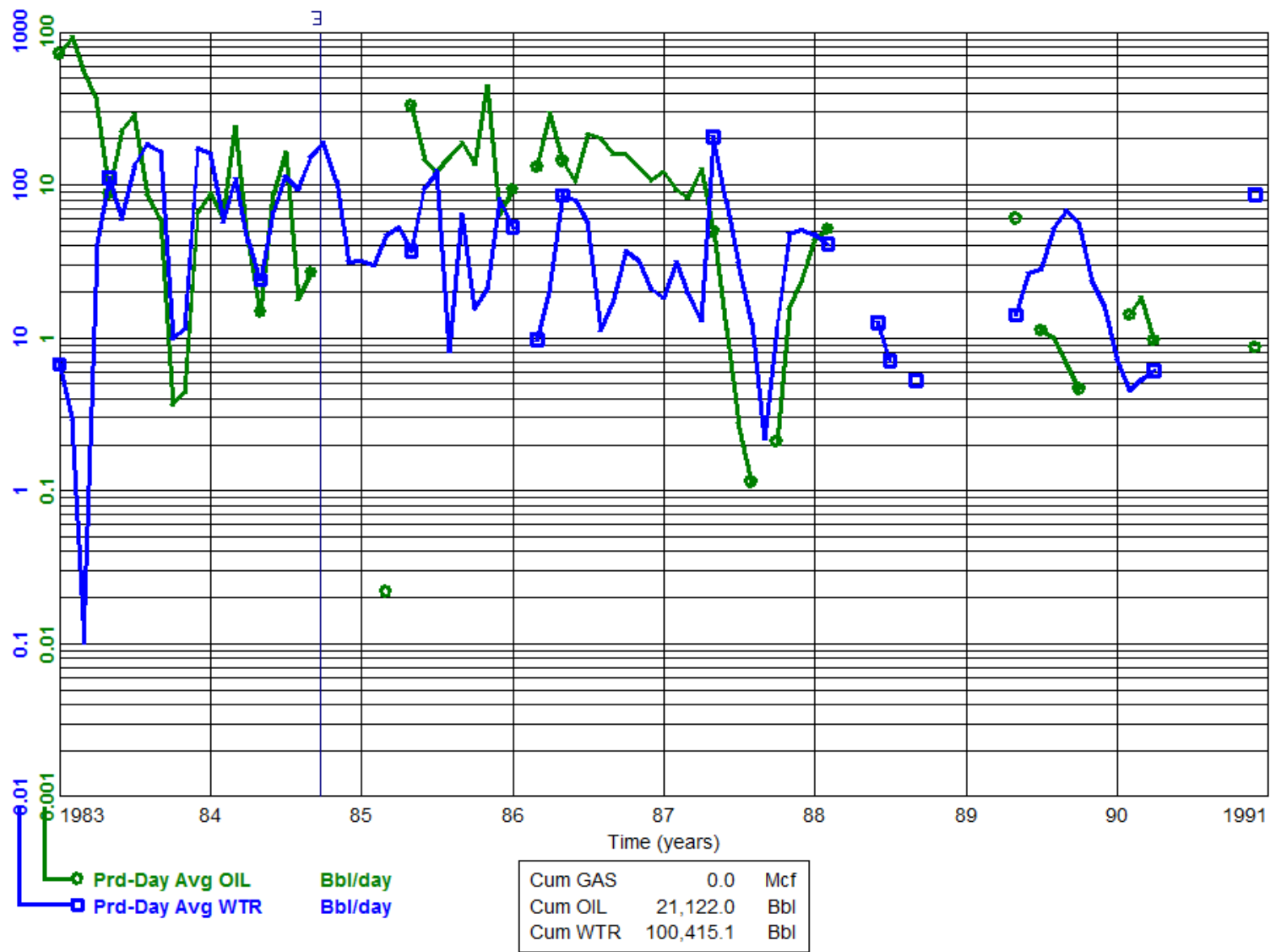
Status: Abandoned Producer  
Field: WASKADA (03)  
Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1983-01  
 To: 1990-12

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1  
 102/01-25-001-26W1/00

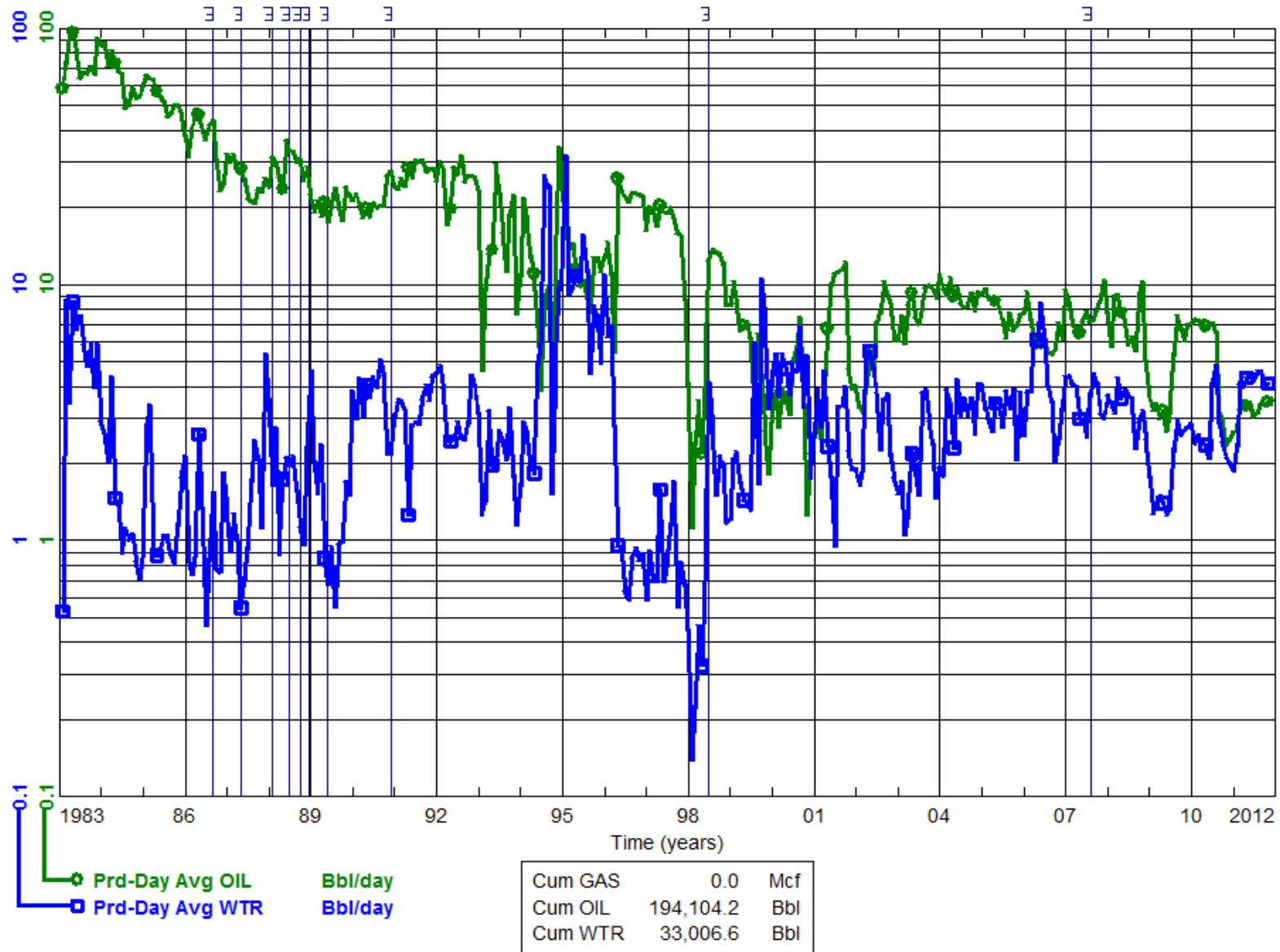
Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



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

INDIVIDUAL PRODUCTION  
Waskada LAm Unit No. 1  
100/02-25-001-26W1/02

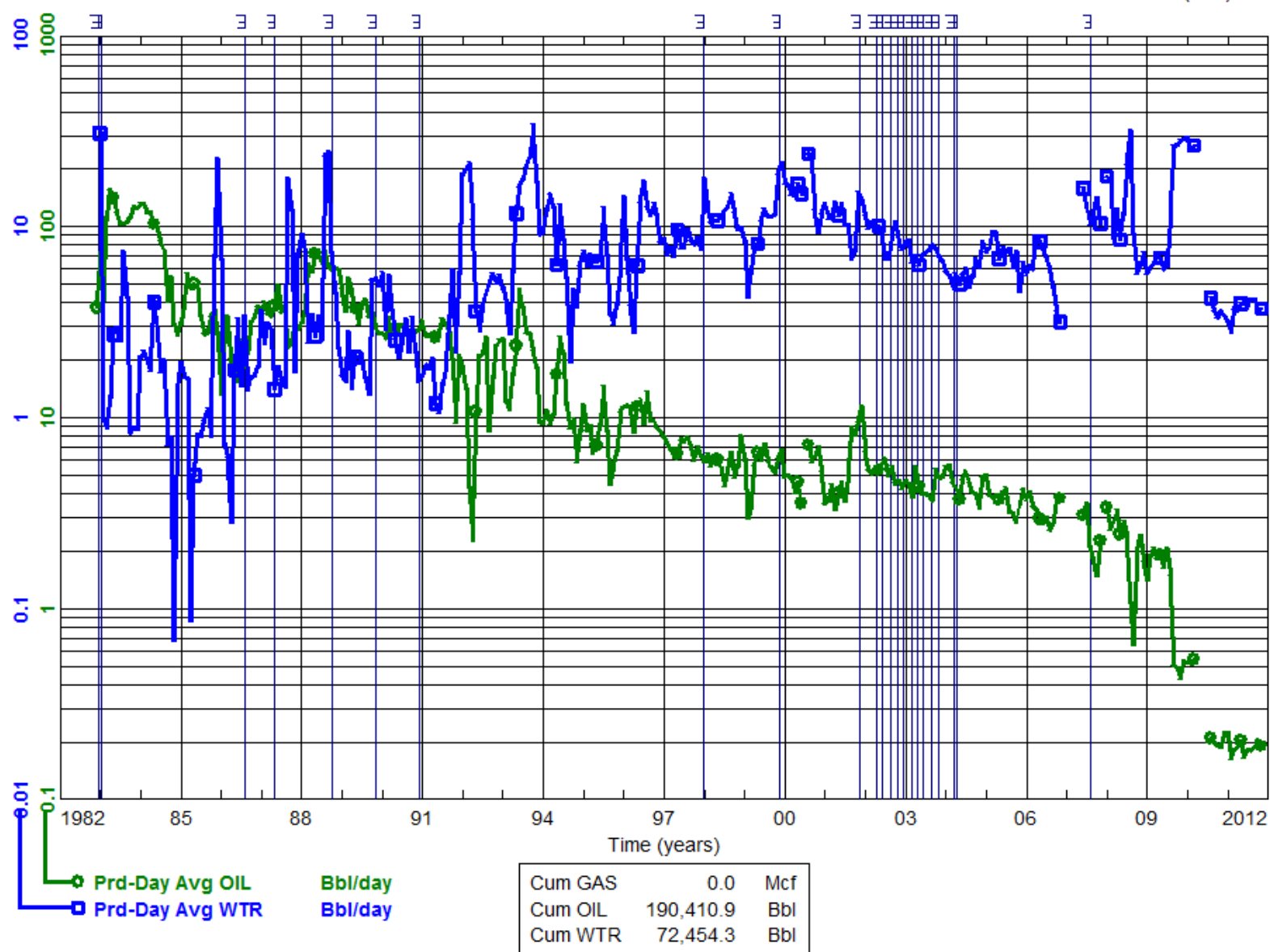
Status: Capable Of Oil Prod  
Field: WASKADA (03)  
Pool: LOWER AMARANTH A (29A)



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

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1  
 100/03-25-001-26W1/02

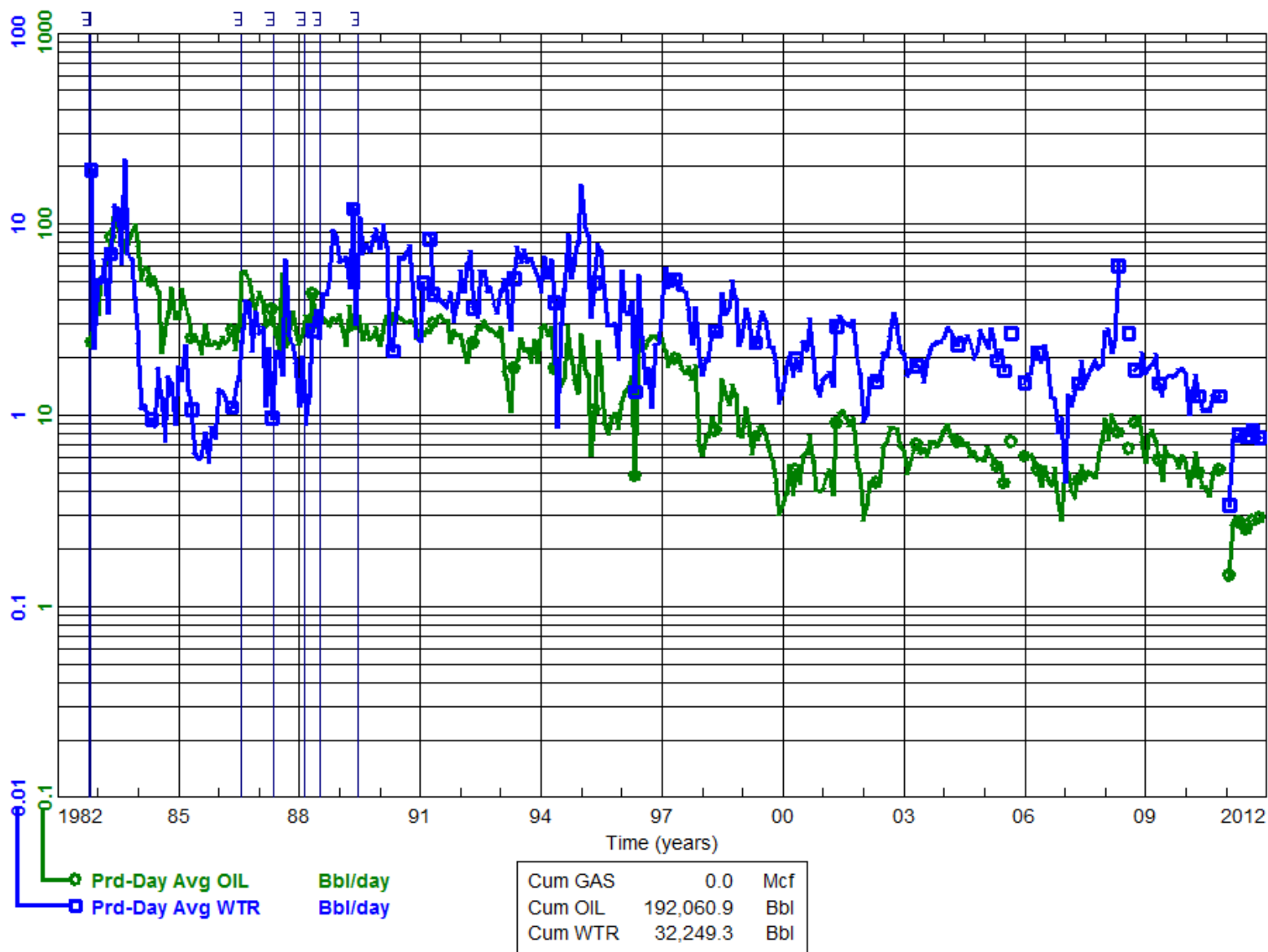
Status: Capable Of Oil Prod  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



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

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 12 COM  
 100/04-25-001-26W1/02

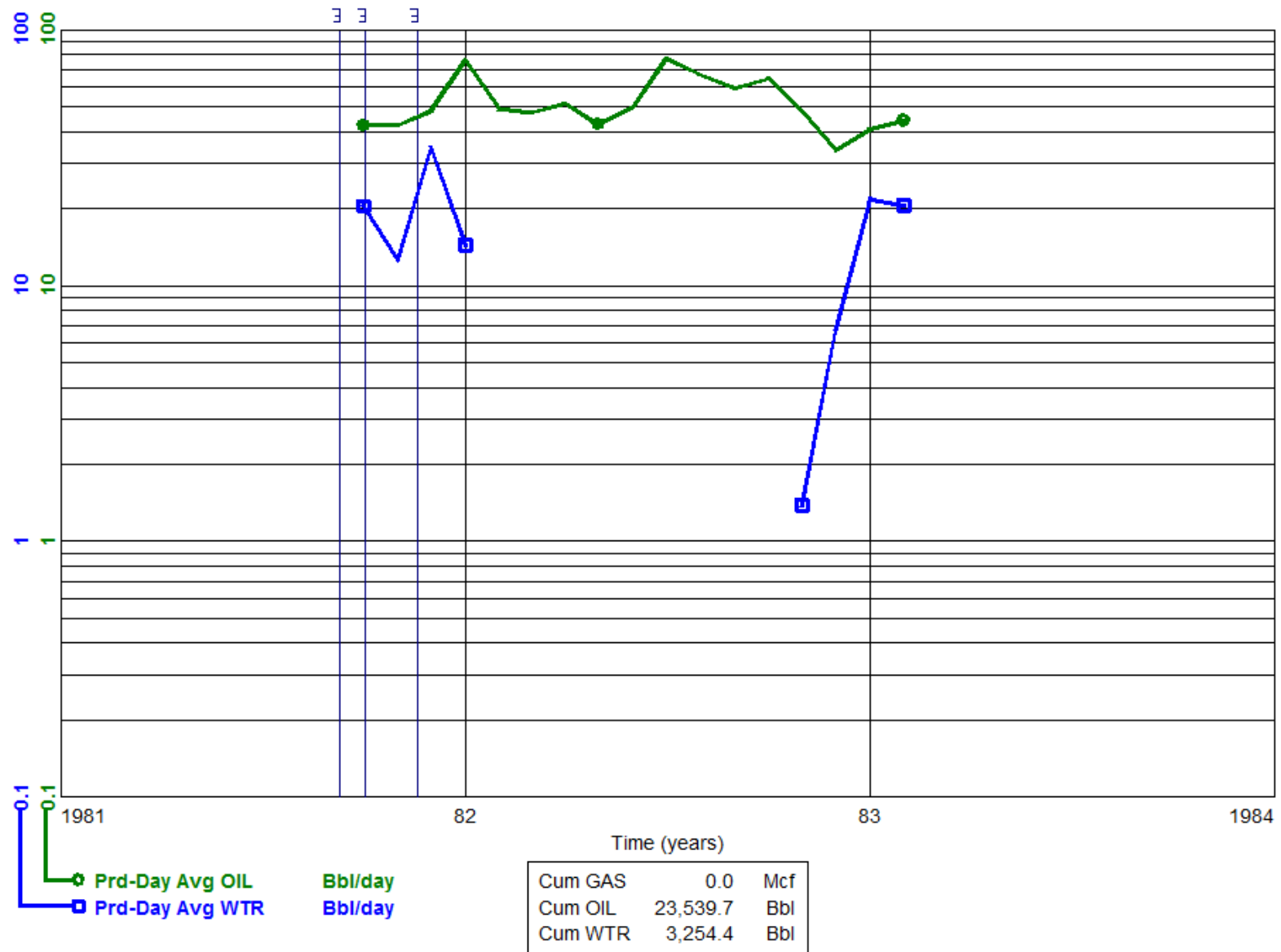
Status: Comingled  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1981-10  
 To: 1983-02

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1 WIW  
 100/05-25-001-26W1/02

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

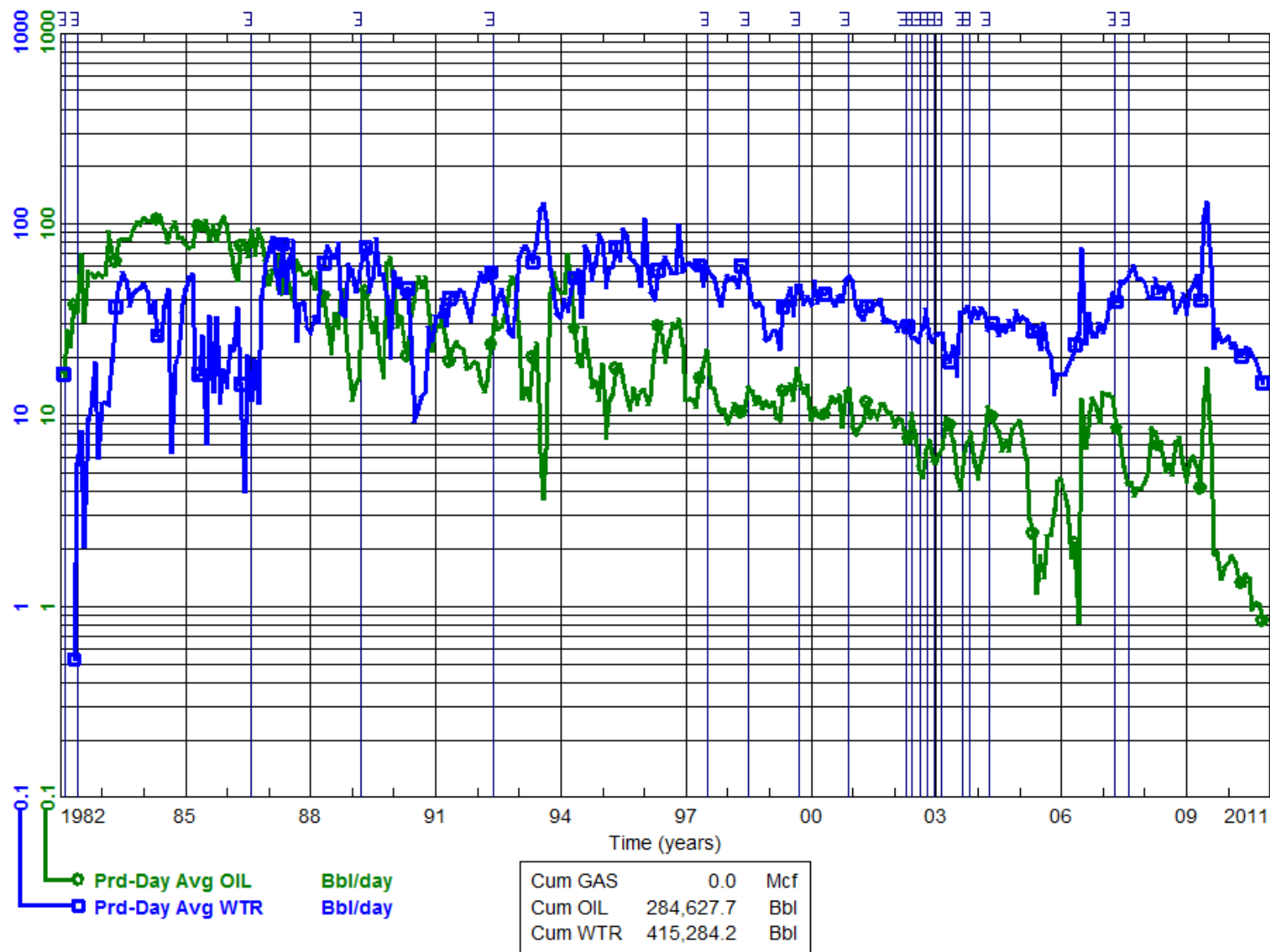




Data As Of: 2011-11 (MB)  
 From: 1982-02  
 To: 2010-11

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1  
 100/06-25-001-26W1/00

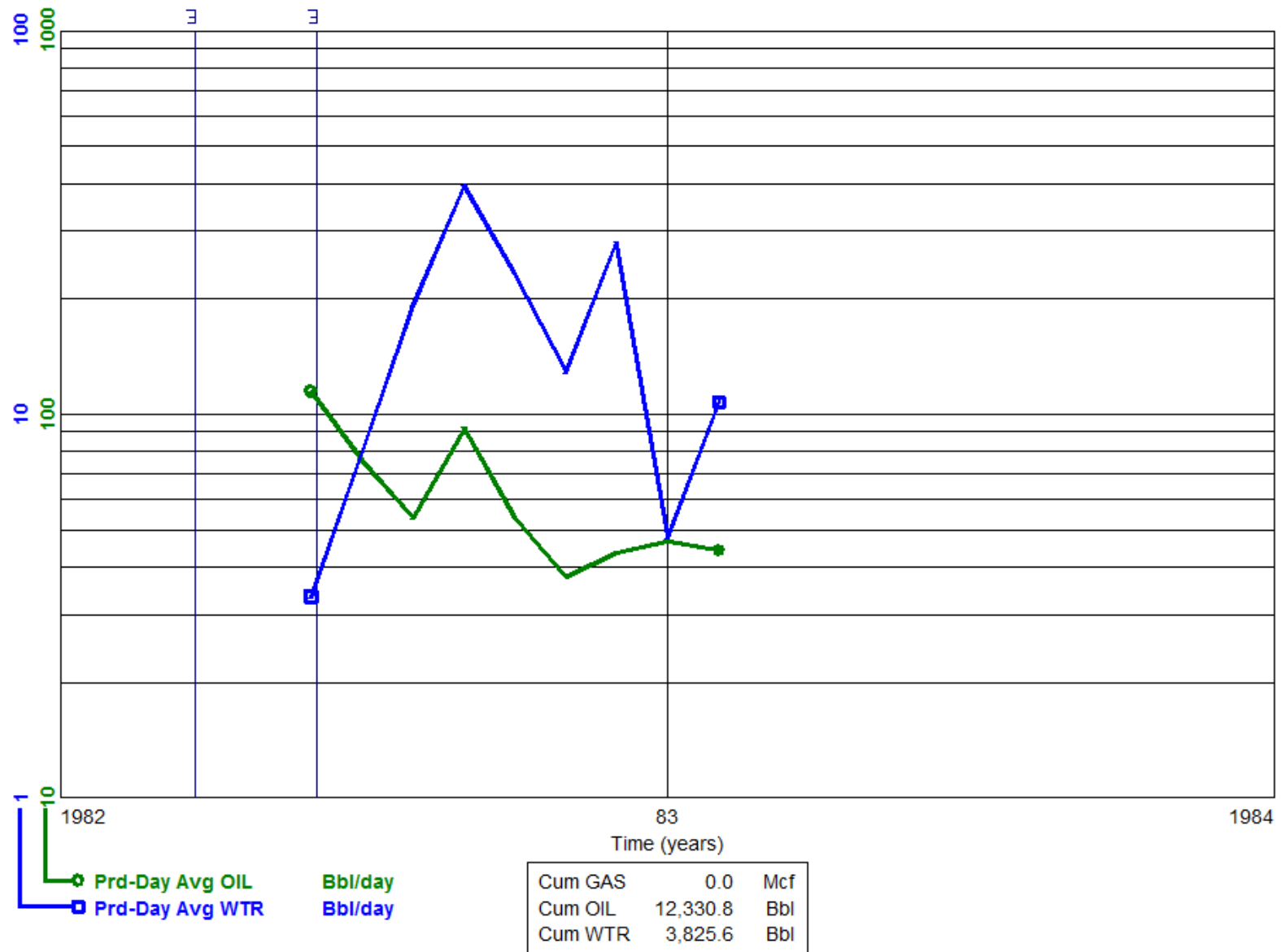
Status: Capable Of Oil Prod  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-06  
 To: 1983-02

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1 WIW  
 100/07-25-001-26W1/00

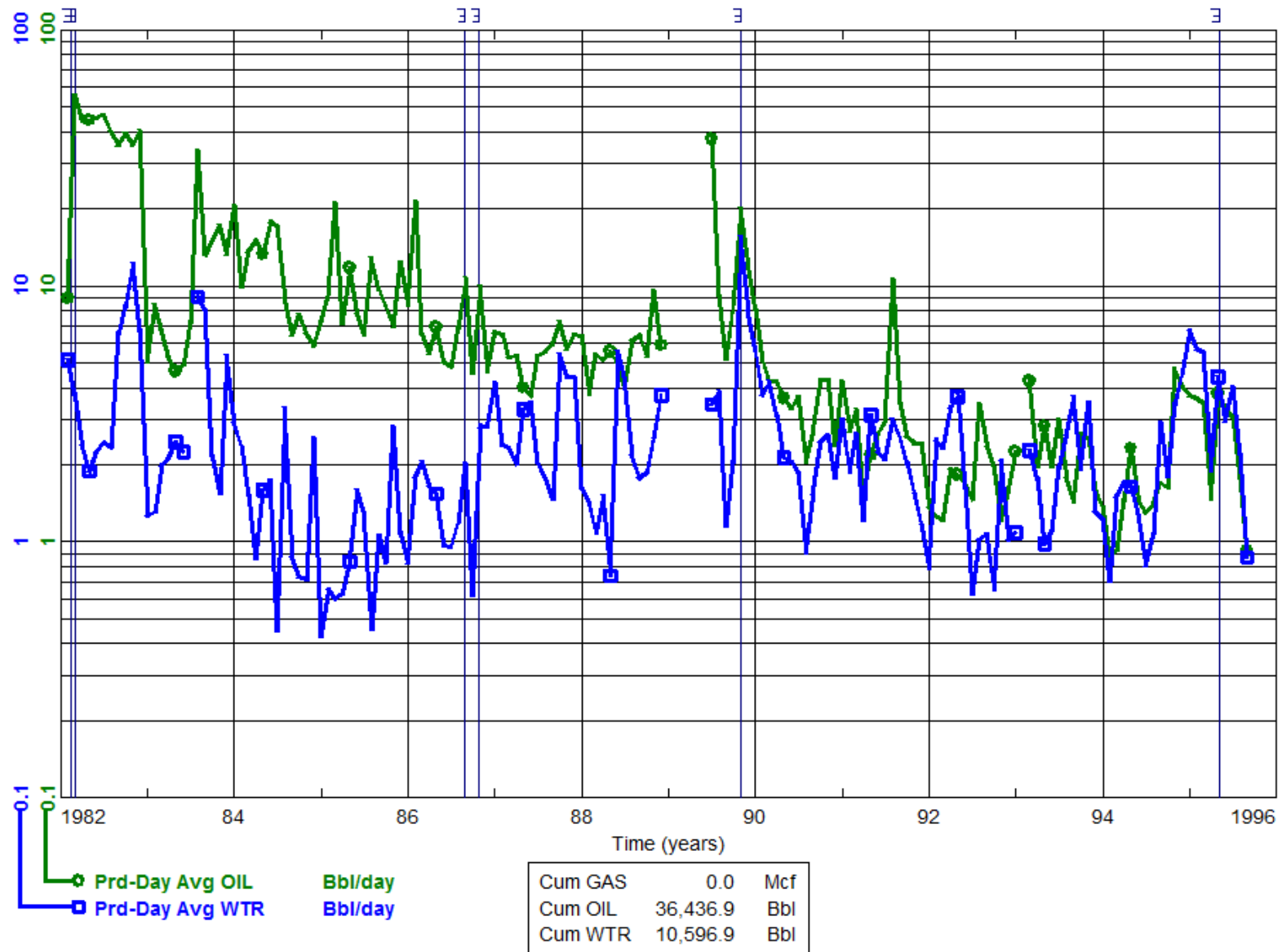
Status: Water Inj Well  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-02  
 To: 1995-09

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1  
 102/08-25-001-26W1/00

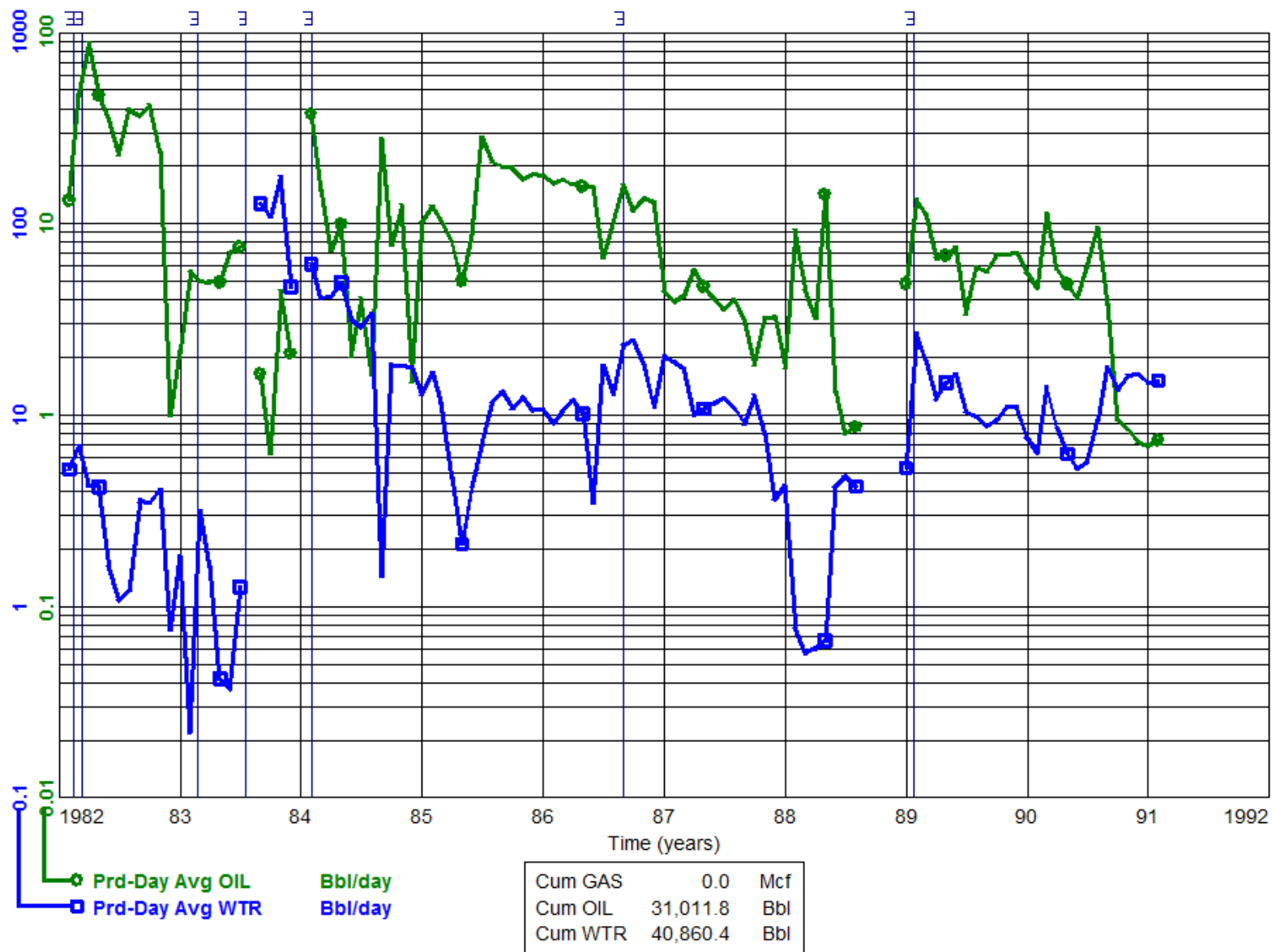
Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-02  
 To: 1991-02

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 1  
 100/09-25-001-26W1/00

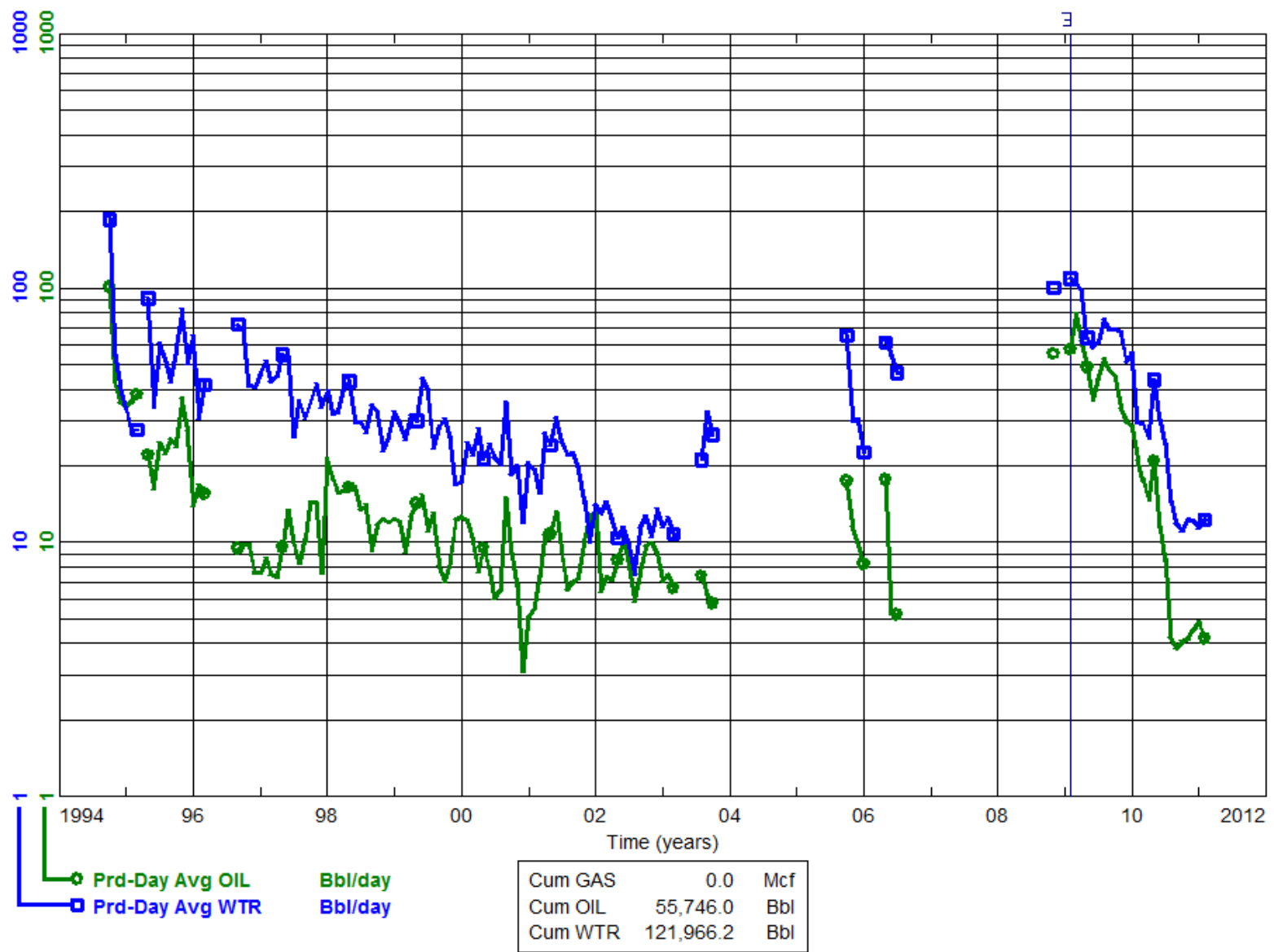
Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
From: 1994-10  
To: 2011-02

INDIVIDUAL PRODUCTION  
Waskada LAm Unit No. 1 HZNTL  
102/09-25-001-26W1/00

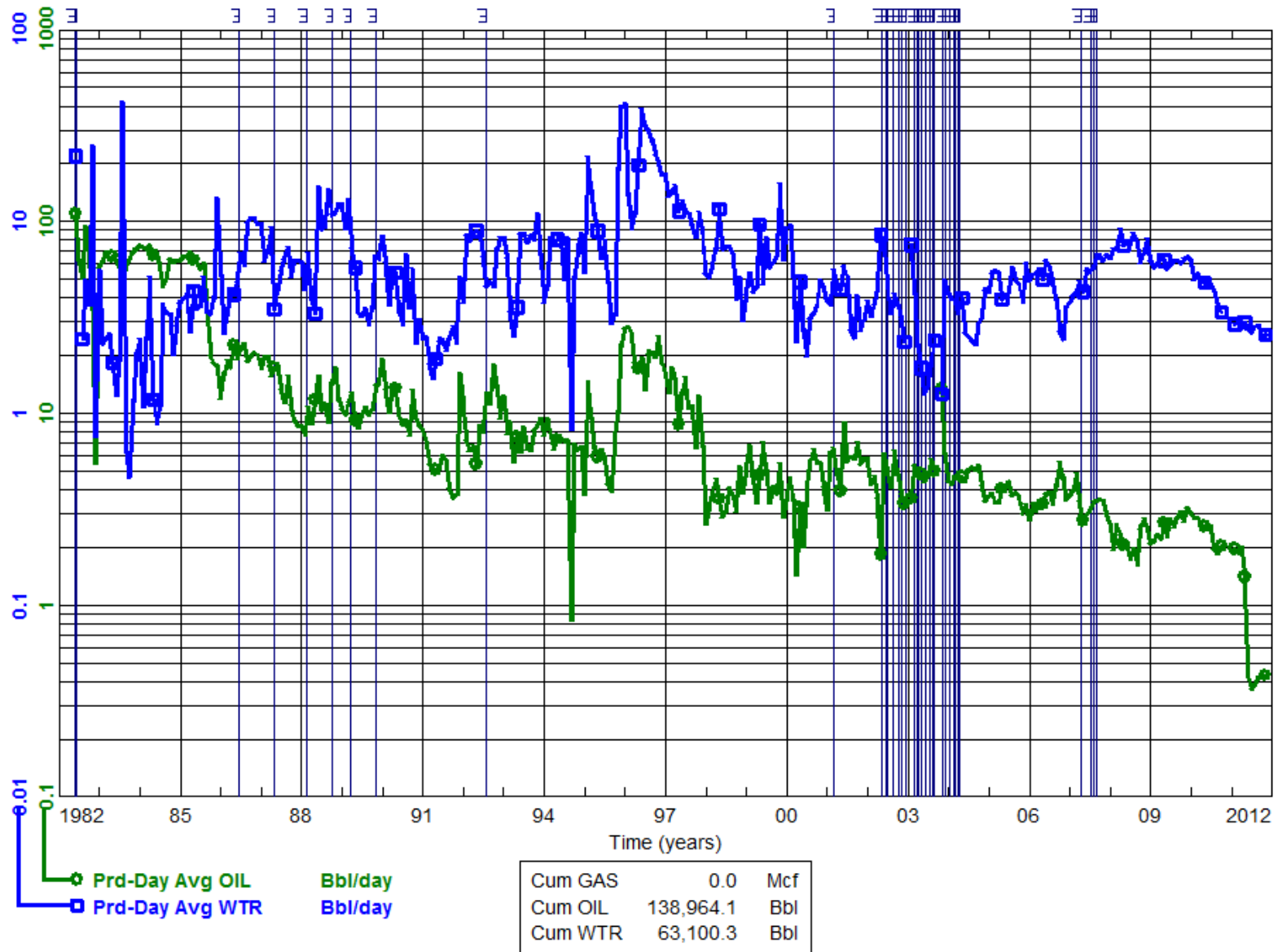
Status: Capable Of Oil Prod  
Field: WASKADA (03)  
Pool: LOWER AMARANTH A (29A)



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

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1  
 100/10-25-001-26W1/00

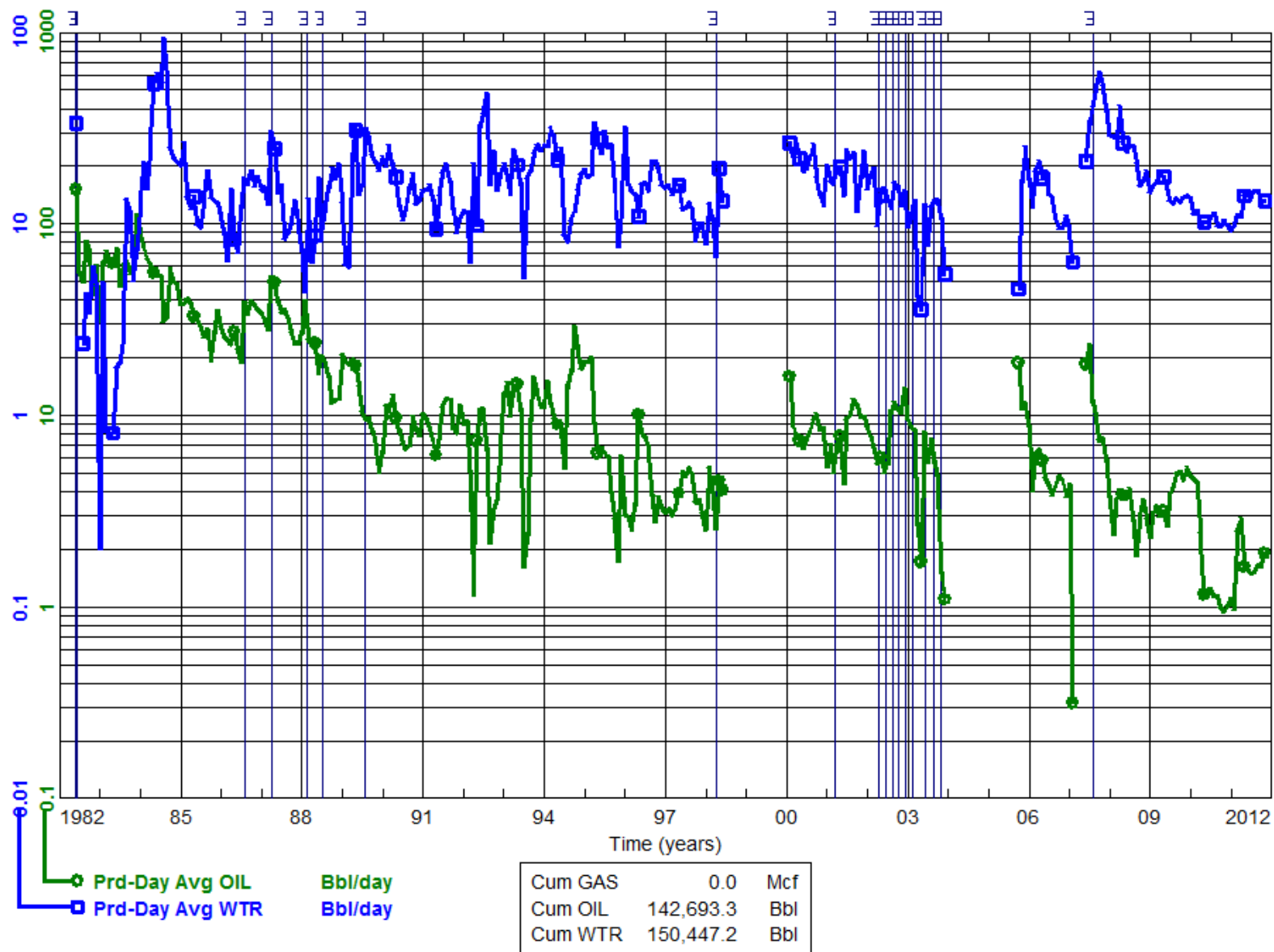
Status: Capable Of Oil Prod  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



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

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1  
 100/11-25-001-26W1/00

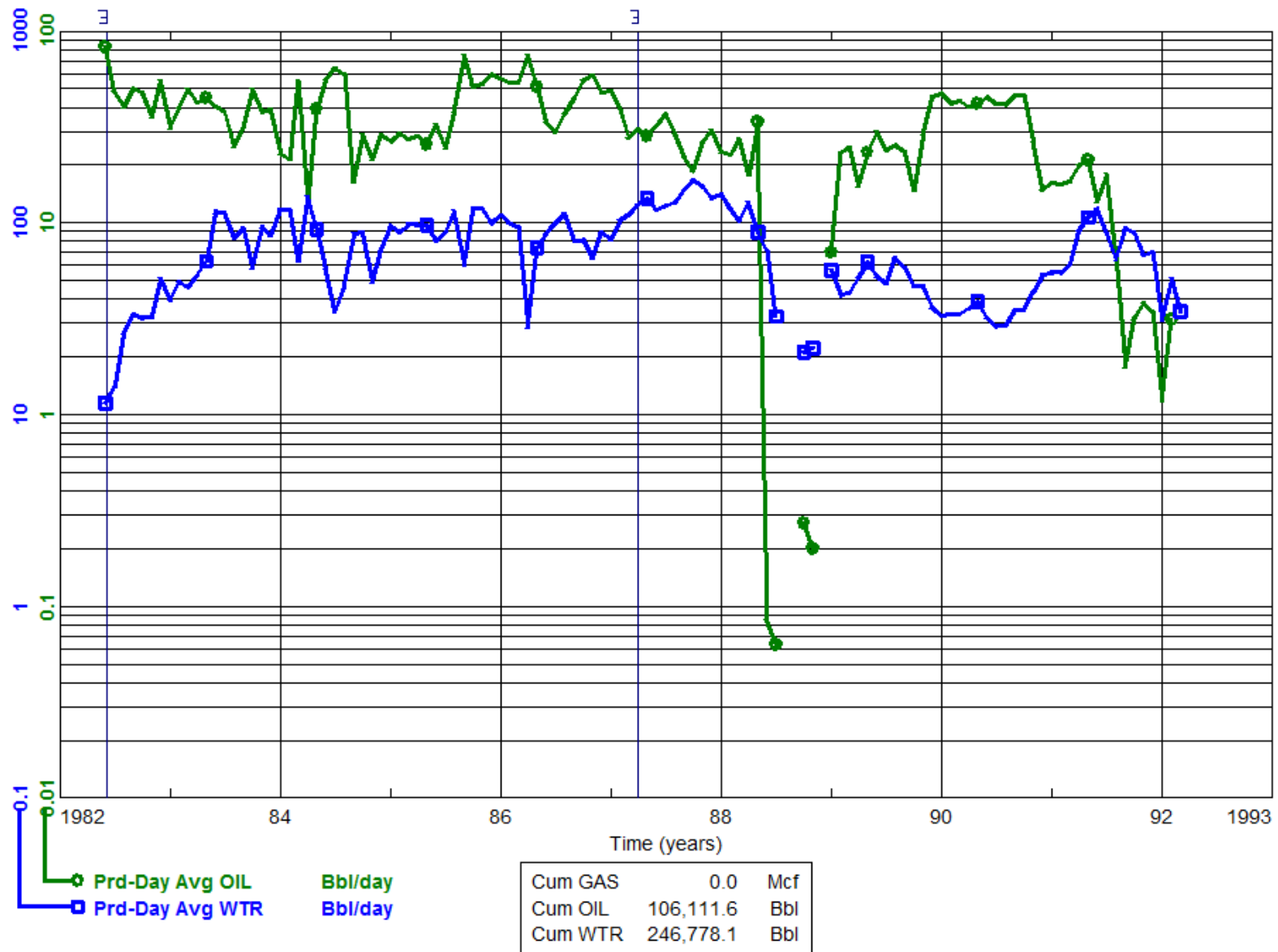
Status: Capable Of Oil Prod  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-06  
 To: 1992-03

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1  
 100/12-25-001-26W1/00

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

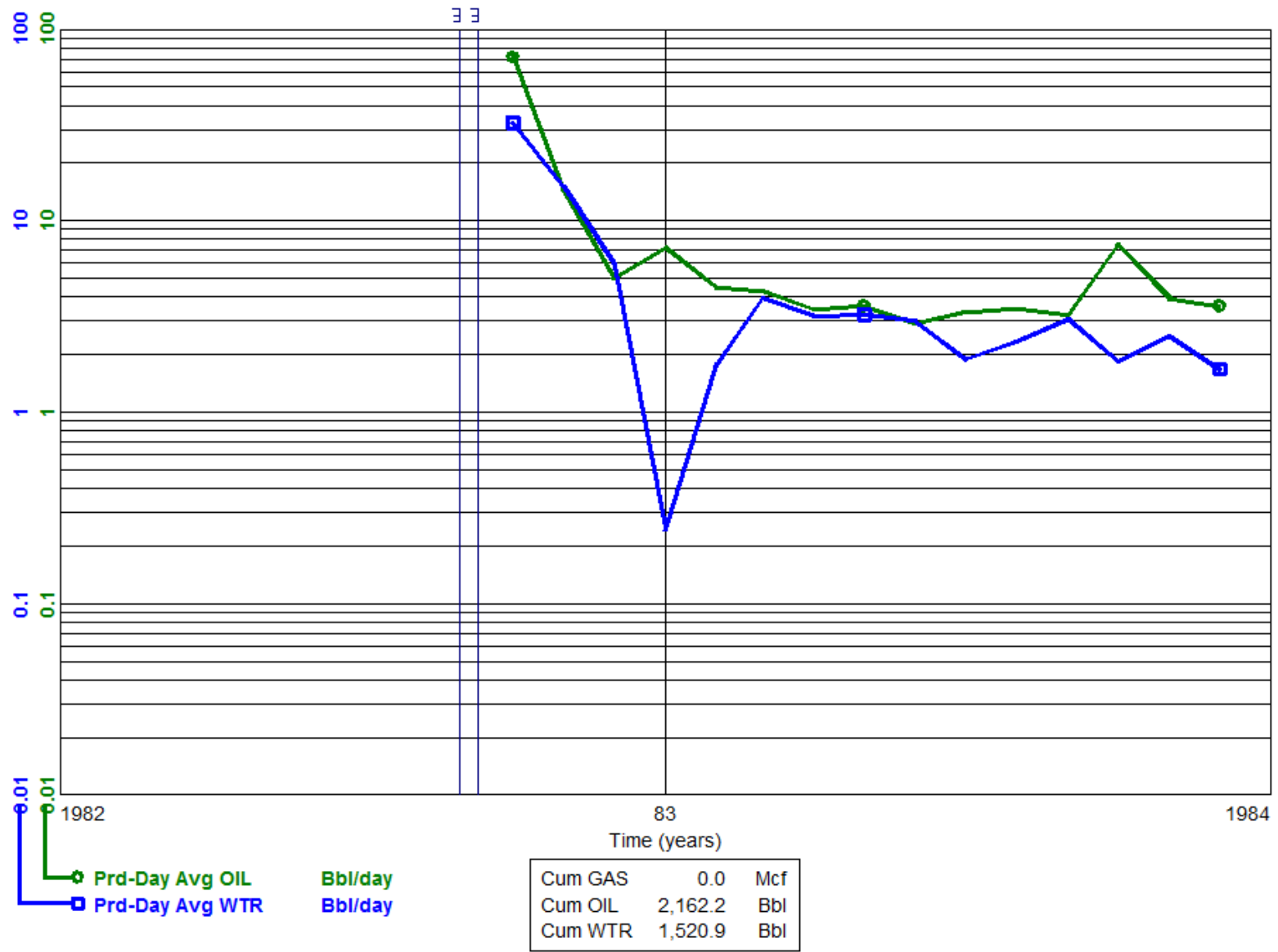




Data As Of: 2011-11 (MB)  
 From: 1982-10  
 To: 1983-12

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1 WIW  
 100/13-25-001-26W1/00

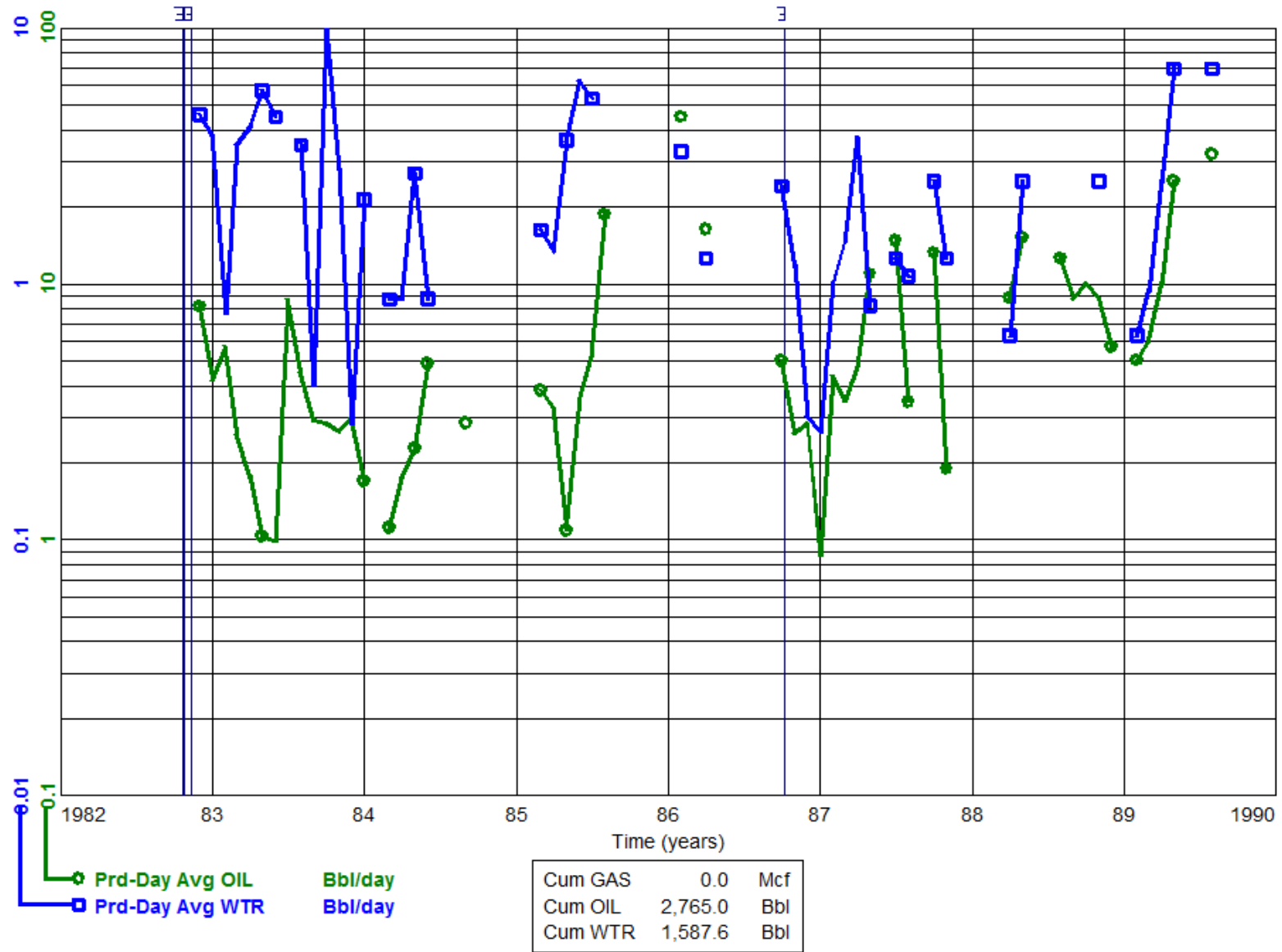
Status: Water Inj Well  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-12  
 To: 1989-08

INDIVIDUAL PRODUCTION  
 Omega Waskada  
 100/14-25-001-26W1/00

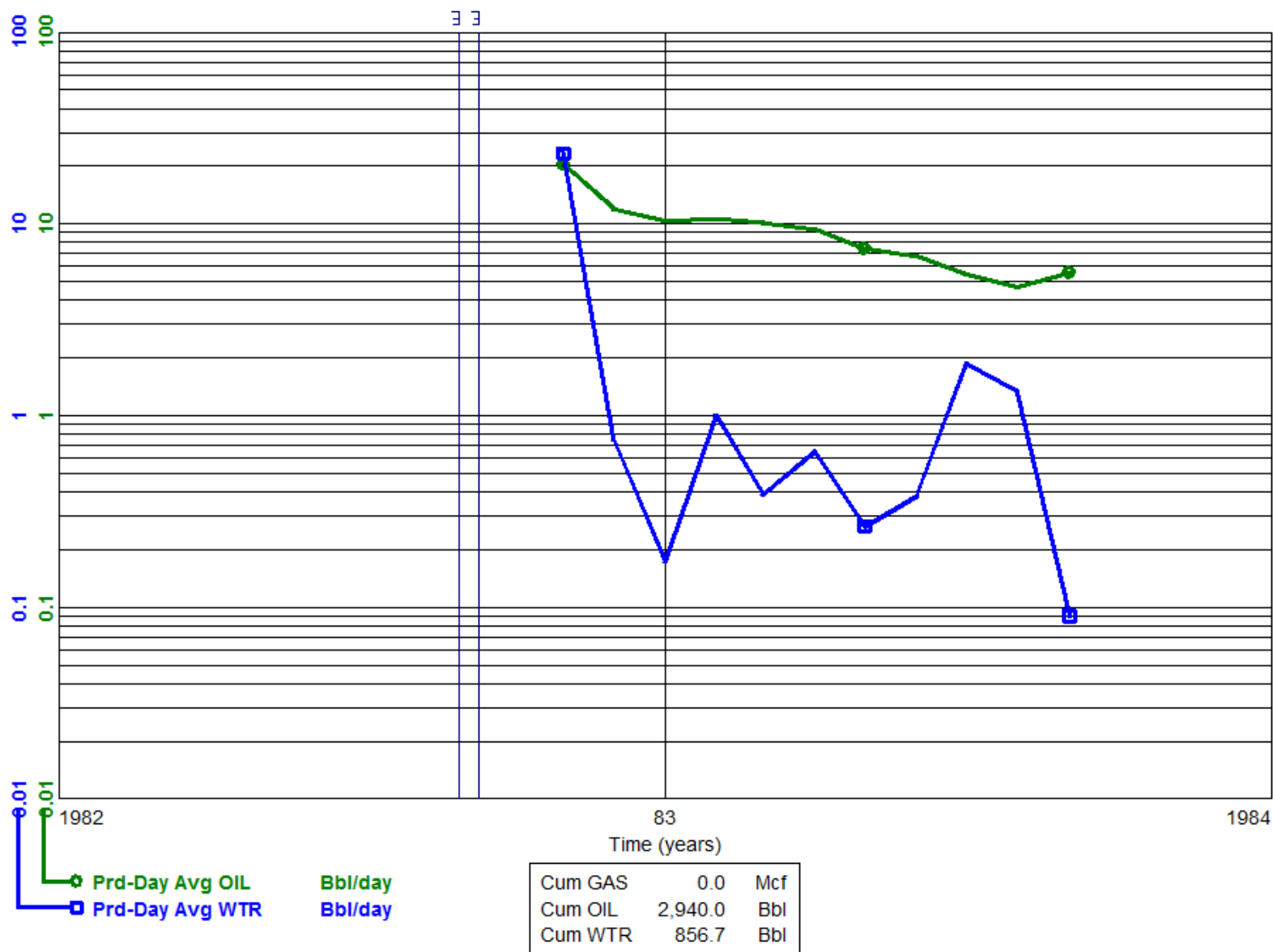
Status: Abandoned Producer  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-11  
 To: 1983-09

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1 WIW  
 100/15-25-001-26W1/00

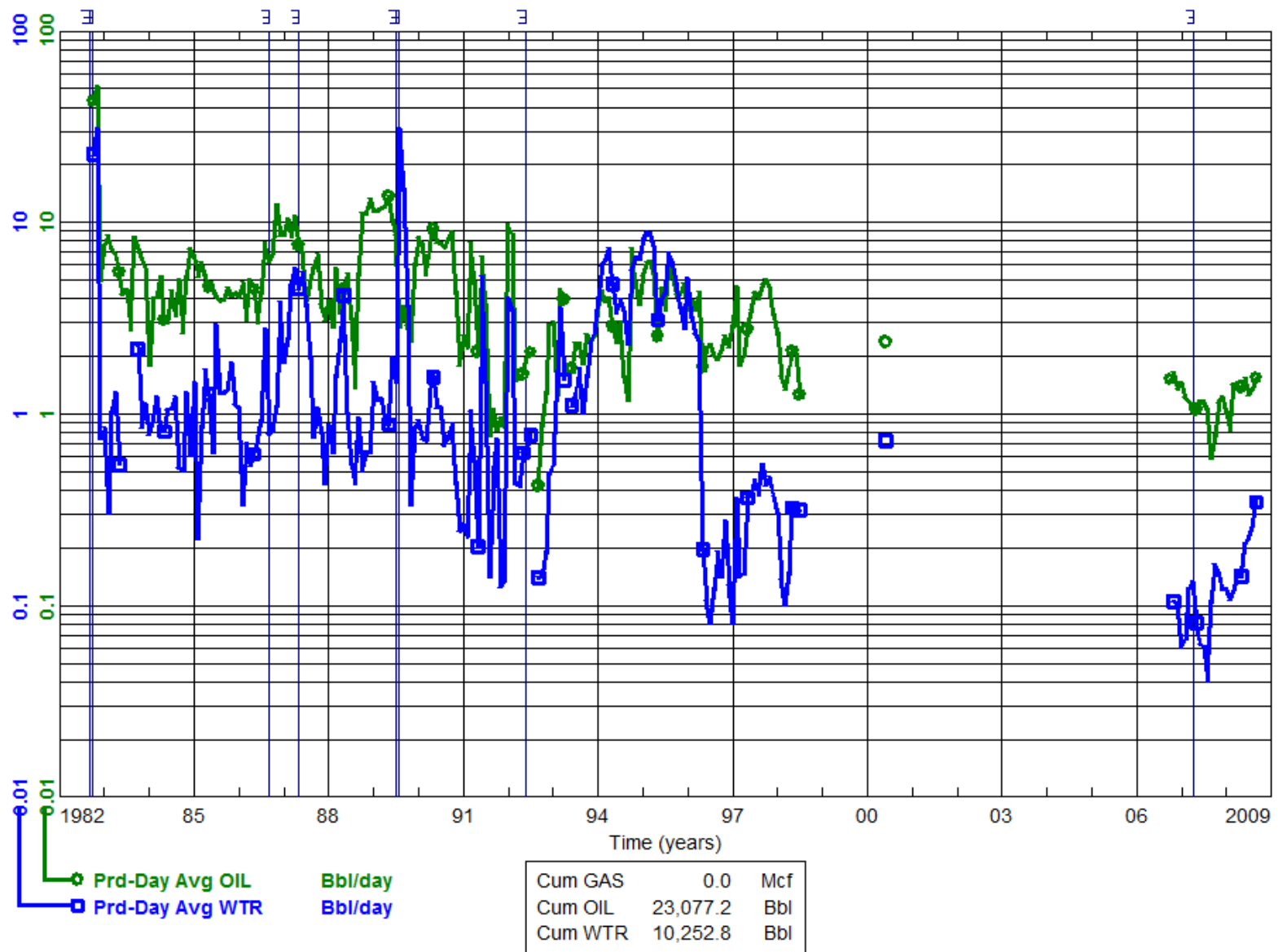
Status: Water Inj Well  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-10  
 To: 2008-09

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1  
 100/16-25-001-26W1/00

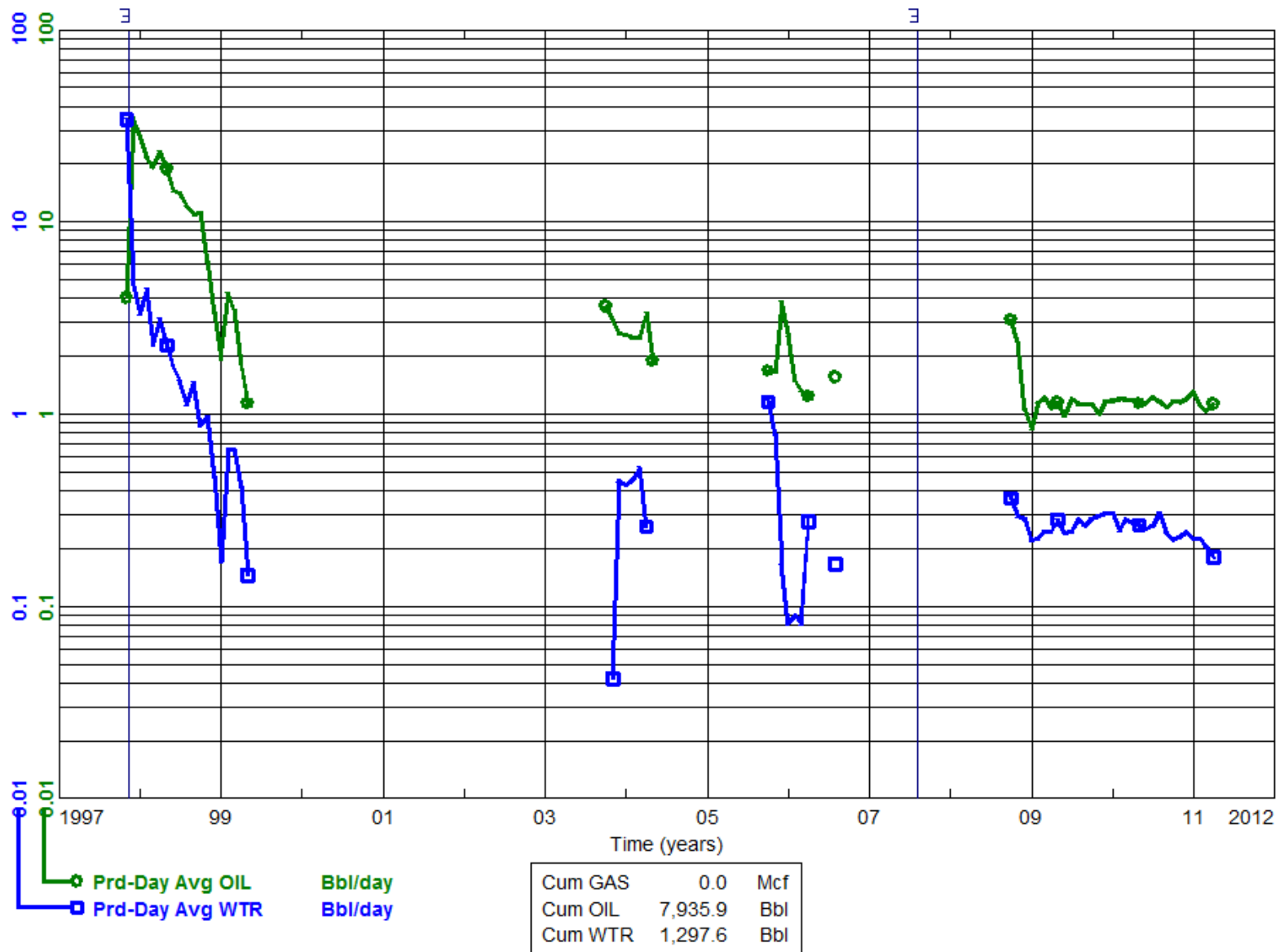
Status: Capable Of Oil Prod  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1997-11  
 To: 2011-04

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1  
 1B0/16-25-001-26W1/00

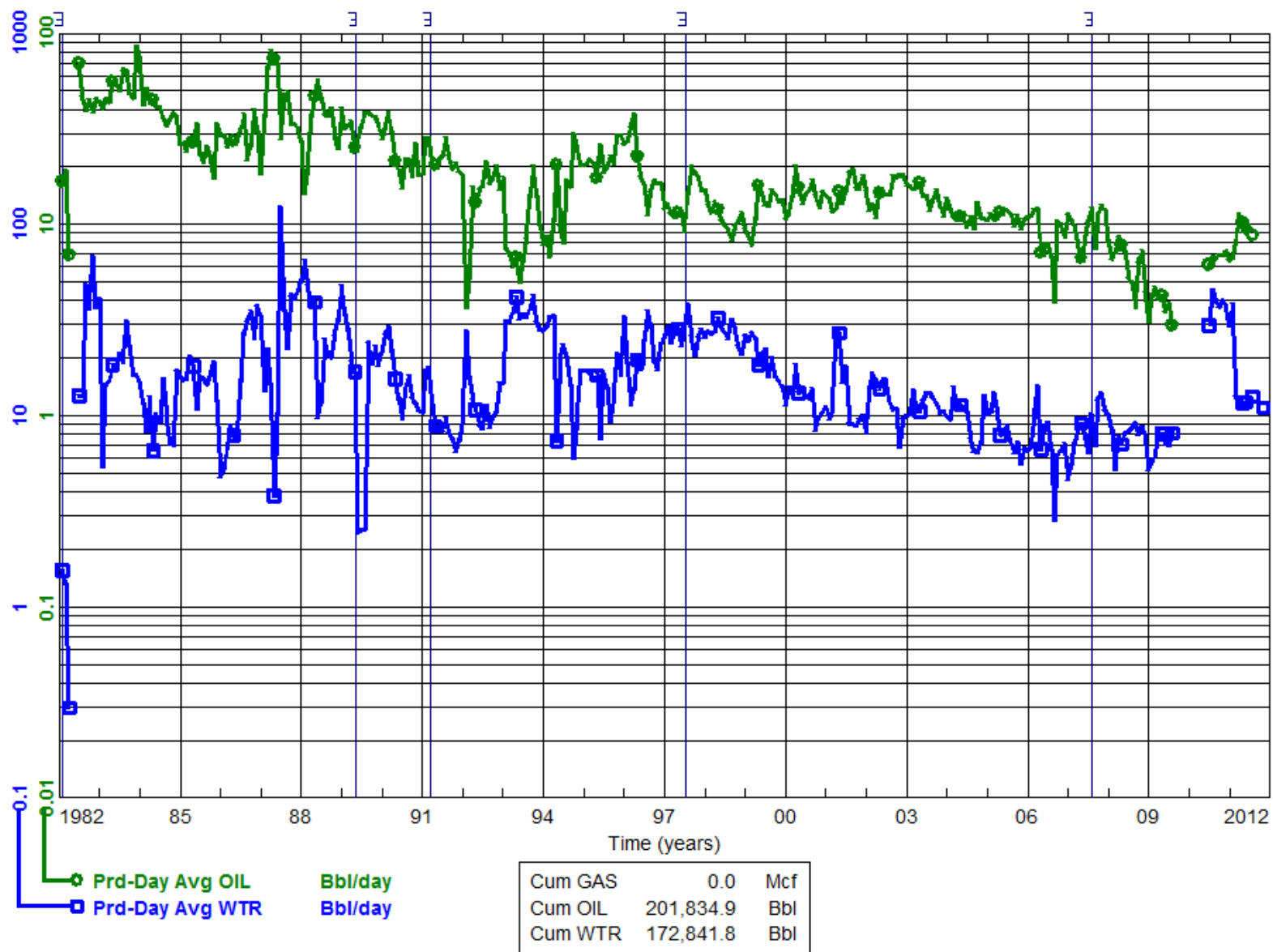
Status: Capable Of Oil Prod  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-02  
 To: 2011-11

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1  
 100/01-26-001-26W1/02

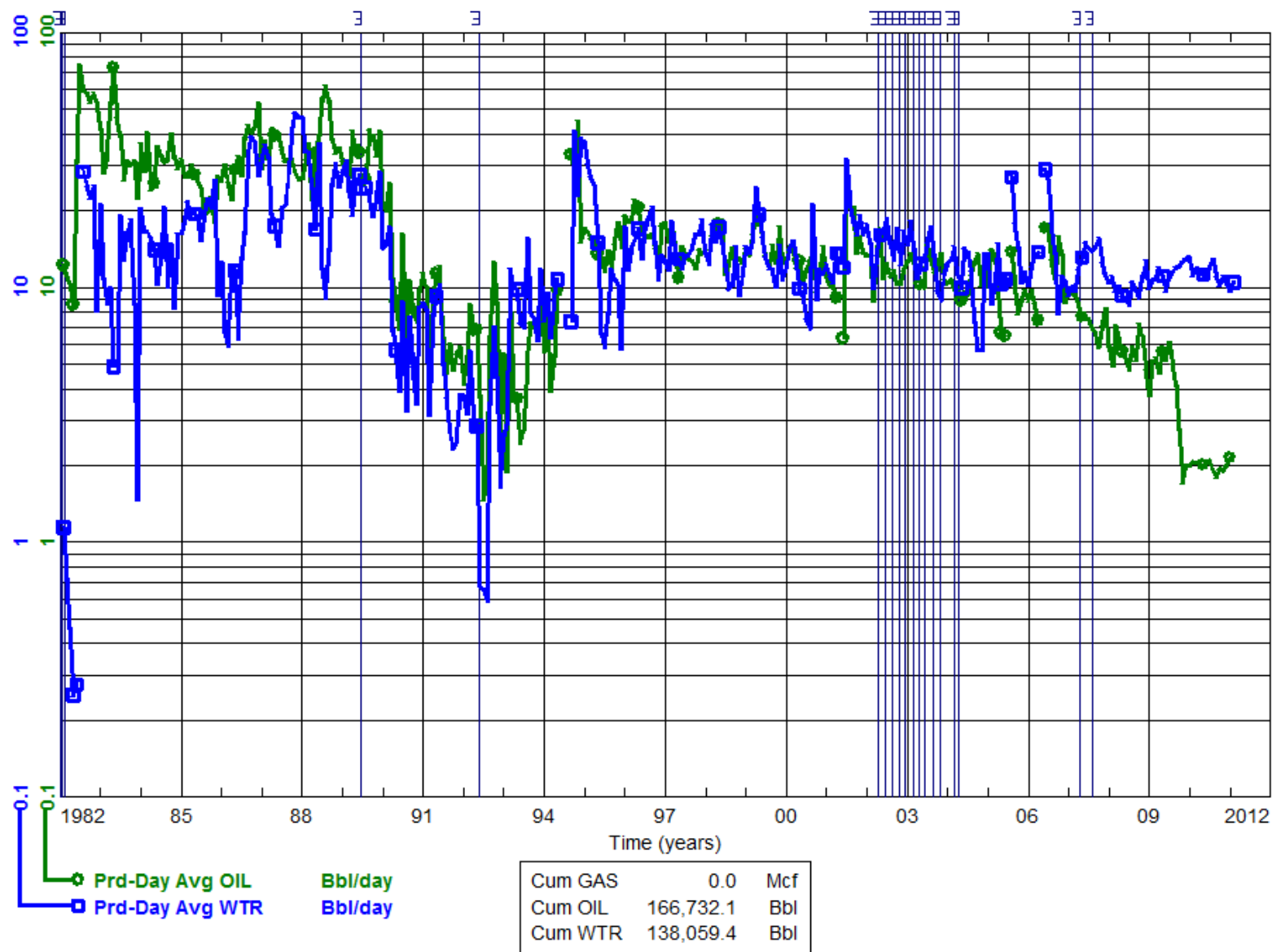
Status: Comingled  
 Field: WASKADA (03)  
 Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
From: 1982-02  
To: 2011-02

INDIVIDUAL PRODUCTION  
Waskada LAm Unit No. 1 COM  
100/02-26-001-26W1/00

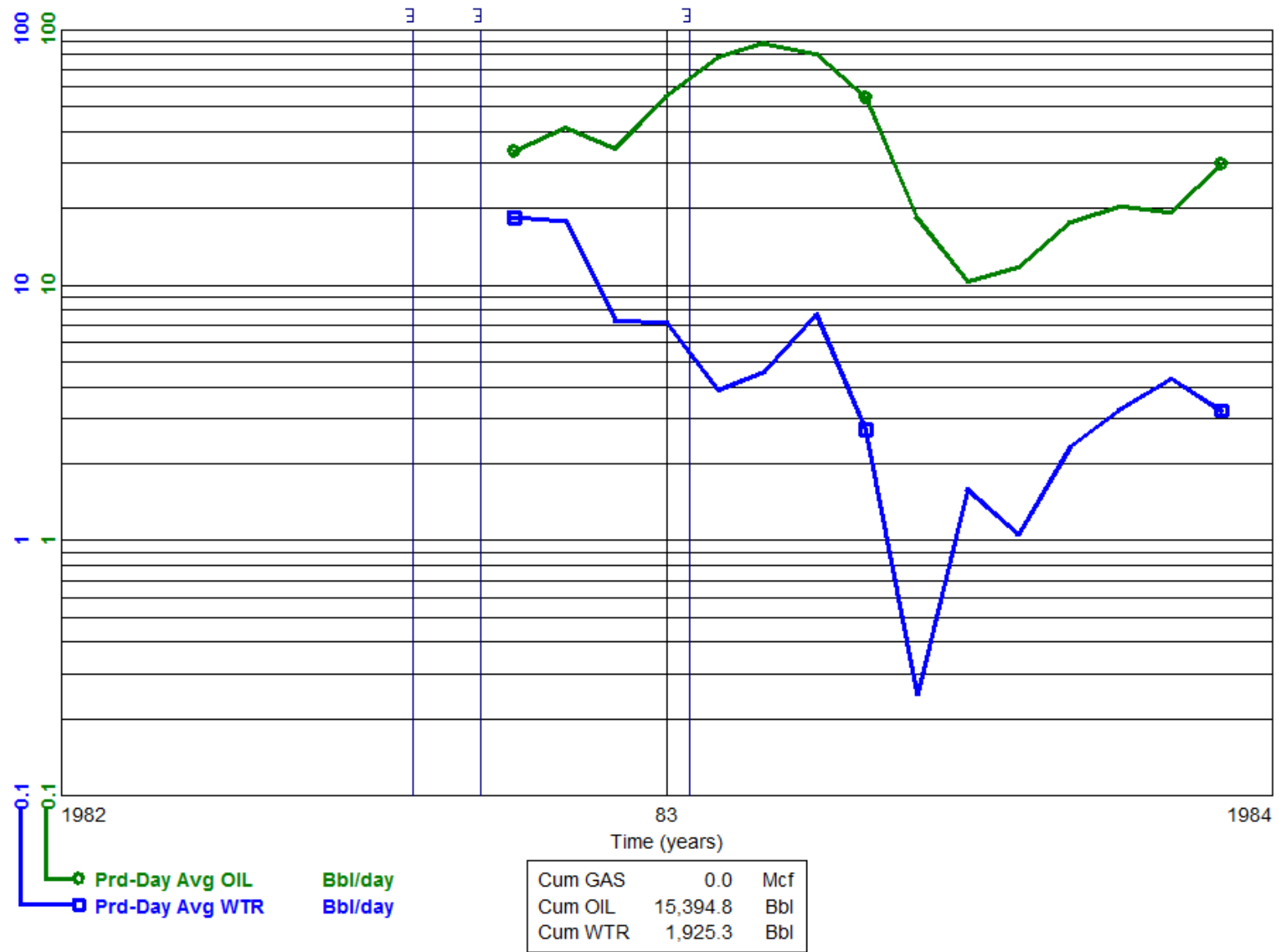
Status: Comingled  
Field: WASKADA (03)  
Pool: LOWER AMARANTH A (29A)



Data As Of: 2011-11 (MB)  
 From: 1982-10  
 To: 1983-12

INDIVIDUAL PRODUCTION  
 Waskada Unit No. 1 WIW  
 100/07-26-001-26W1/00

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





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

INDIVIDUAL PRODUCTION  
 Waskada LAm Unit No. 1  
 100/08-26-001-26W1/00

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

