

WASKADA UNIT NO. 1

WATERFLOOD PROGRESS REPORT

January 1, through December 31, 2011

PennWest Exploration

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INTRODUCTION

The Waskada Unit No.1 pressure maintenance project commenced water injection into the Mission Canyon designed and in accordance with Manitoba Energy and Mines Approval No. PM 47. (See Appendix A – Area Map)

PRESSURE MAINTENANCE: Governed by Board Order No. PM 47

Unit Information

UNITIZED ZONE: Mission Canyon

Original Unit, June 1, 1976 Board Order; Unitization Order No. 22

POOL: Waskada Mission Canyon 3b A (03 42A)

This report documents the performance of the Waskada Unit No.1 pressure maintenance project for the period of January 1 to December 31, 2011.

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 Unit #1 (Unit History)

Abbreviated Well ID	Date Well Spudded	On Prod YYYY/MM	Org Operator Name	Ground Elevation (m)	TVD (m)
00/03-30-001-25W1/0	11/21/1967	1967/12	Omega Hydcbns Ltd	467	954
00/04-30-001-25W1/0	11/28/1967	1967/12	Omega Hydcbns Ltd	469.4	958.3
00/05-30-001-25W1/0	3/16/1967	1967/05	Intl Hydcbns Lmted	467.9	973.8
00/06-30-001-25W1/0	11/6/1967	1967/12	Omega Nat Gas Co Ltd	468.2	952.2
00/11-30-001-25W1/0	12/29/1966	1967/01	Intl Hydcbns Lmted	468.2	957.7
00/12-30-001-25W1/0	11/14/1967	1967/12	Omega Hydcbns Ltd	467.6	964.1
02/09-24-001-26W1/0	11/24/2011			466.6	910.7
03/09-24-001-26W1/0	11/1/2011			468.1	912.4
04/09-24-001-26W1/0	11/12/2011			468	909.8
02/10-24-001-26W1/0	11/18/2011			466.9	
03/10-24-001-26W1/0	11/7/2011			467.7	909.4
02/12-24-001-26W1/0	1/9/2010	2010/05		468	912
03/13-24-001-26W1/0	1/16/2010	2010/05		467.5	910.9
03/16-24-001-26W1/2	7/8/1994	2010/11		467.5	909
02/11-25-001-26W1/0	2/14/2011			465.2	904.5
03/11-25-001-26W1/0	2/6/2011			465	906.5

Abbreviated Well ID	Date Well Spudded	On Prod YYYY/MM	Org Operator Name	Ground Elevation (m)	TVD (m)
02/14-25-001-26W1/0	3/7/2011			465.7	904.7
03/14-25-001-26W1/0	2/28/2011			465.7	905.7
04/14-25-001-26W1/0	2/21/2011			465.5	903.1

Waskada Unit #1 (Production & Injection History)

Abbreviated Well ID	First Prod YYYY/MM	On Inject. YYYY/MM	Last Prod. YYYY/MM	Cumulative OIL Prod. (m3)	Cumulative WTR Prod. (m3)	First 12 mo. Ave WC%	Last Inject. YYYY/MM
00/03-30-001-25W1/0	1967/12		2011/04	22573	36917	0	
00/04-30-001-25W1/0	1967/12		1991/09	23250	56279	0	
00/05-30-001-25W1/0	1967/05		1977/06	15933	2776	0	
00/06-30-001-25W1/0	1967/12	1976/04	1975/02	10286	0	0	1996/04
00/11-30-001-25W1/0	1967/01		1980/05	6146	840	0	
00/12-30-001-25W1/0	1967/12		1993/07	15552	13590	0	
02/09-24-001-26W1/0							
03/09-24-001-26W1/0							
04/09-24-001-26W1/0							
02/10-24-001-26W1/0							
03/10-24-001-26W1/0							
02/12-24-001-26W1/0	2010/05		2011/11	1152	925	43.6	
03/13-24-001-26W1/0	2010/05		2011/11	3153	3137	47.4	
03/16-24-001-26W1/2	2010/11		2011/11	3844	5964	60.5	
02/11-25-001-26W1/0							
03/11-25-001-26W1/0							
02/14-25-001-26W1/0							
03/14-25-001-26W1/0							
04/14-25-001-26W1/0							

DISCUSSION

Production Performance

Board Order No. PM 47 provided for pressure maintenance operations in the Waskada Unit No.1. The Unit included an injection wells, 00/06-30-001-25W1/0 (abandoned since 1987/04), and eighteen producers (only 13 of them active now) in the Waskada unit No 1 Pool. Pressure maintenance by water injection in 1976 and continued until 1983. The injector was shut in until 1991. It was put on injection on May 1991, and was shut in again until Jan 1995. It was injecting until March 1996. The injector was abandoned in May 1996. (See Appendix D for oil, water and injection rates).

Voidage Replacement Ratio Calculation:

Upon review of the voidage replacement ratio (VRR) for the Waskada Unit # 1 area, it was shown that the area has been under injected (Cum VRR), although monthly VRR was very high, initially, for few years. This is shown by instantaneous and cumulative VRR for the Waskada Unit # 1 (see Appendix C). Currently there is no active injector in this unit, and PennWest has no plans to re-activate any of the old 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 Well

1. 02/09-24-001-26W1/0
2. 03/09-24-001-26W1/0
3. 04/09-24-001-26W1/0
4. 02/10-24-001-26W1/0
5. 03/10-24-001-26W1/0
6. 02/12-24-001-26W1/0
7. 03/13-24-001-26W1/0
8. 03/16-24-001-26W1/2
9. 02/11-25-001-26W1/0
10. 03/11-25-001-26W1/0
11. 02/14-25-001-26W1/0
12. 03/14-25-001-26W1/0
13. 04/14-25-001-26W1/0

Current Suspended Producing Wells

None

Abandoned Producing Wells

1. 00/04-30-001-25W1/0 (since 1991/10)
2. 00/05-30-001-25W1/0 (since 1977/07)
3. 00/11-30-001-25W1/0 (since 1980/06)
4. 00/12-30-001-25W1/0 (since 1993/08)

Injectors

Current Injecting Wells

None

Current Suspended Injection Wells

None

Abandoned Injection Wells

1. 00/06-30-001-25W1/0 (since 1996/05)

Currently, there are only one active producers and no injection well in Waskada Unit 1; we do not have any plan for this unit other than monitoring the producer. PennWest's plan is to concentrate on Lower Amaranth Formation for now.

TABLES

Waskada Unit #1

Table 1: Rates History

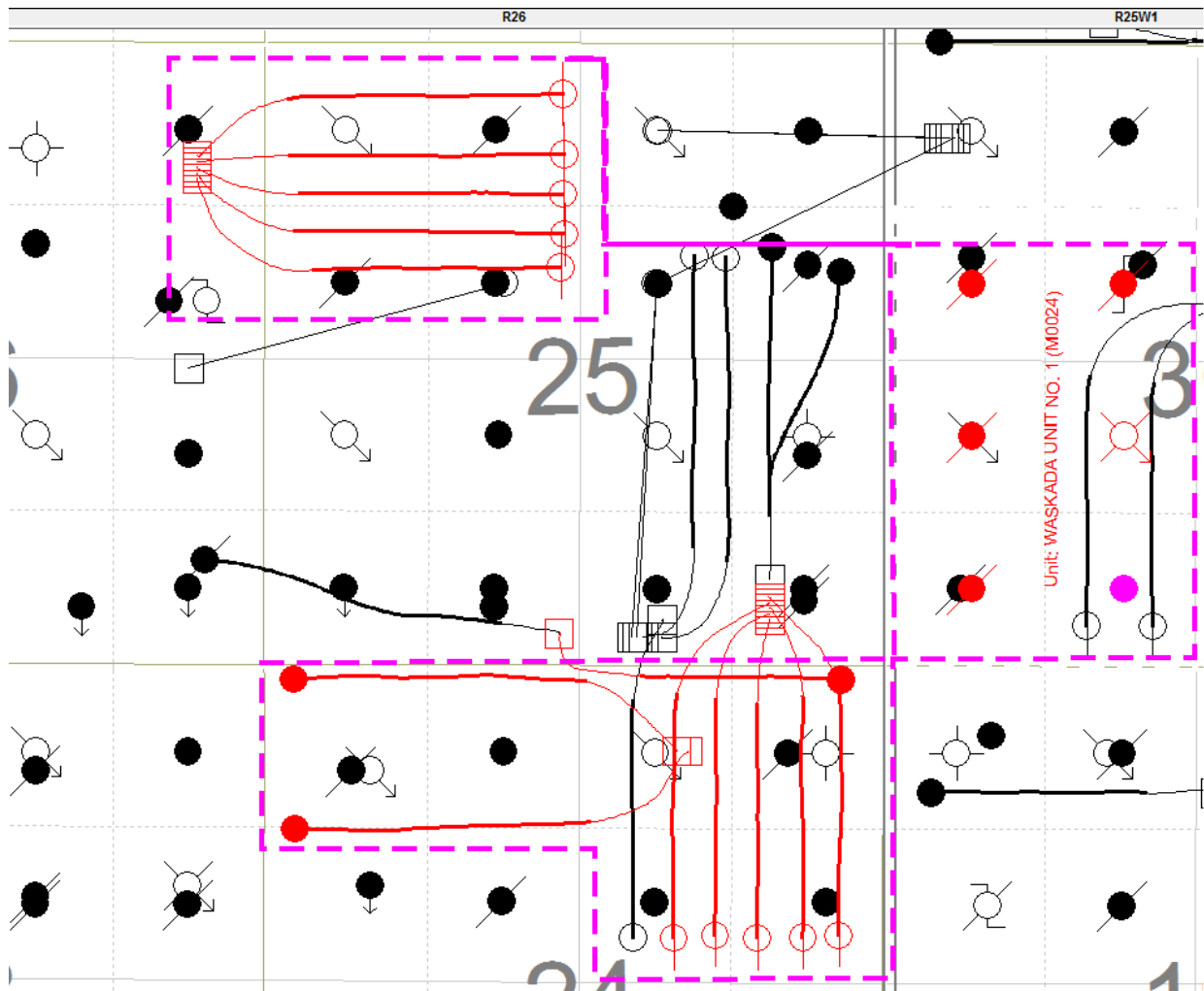
Date	Oil		Water		Injection Water	
Year	m3/year	m3/day	m3/year	m3/day	m3/year	m3/day
1967	3,459	9.48	0	0.00	0	0.00
1968	11,851	32.47	0	0.00	0	0.00
1969	8,960	24.55	0	0.00	0	0.00
1970	7,926	21.72	0	0.00	0	0.00
1971	6,743	18.48	0	0.00	0	0.00
1972	4,544	12.45	0	0.00	0	0.00
1973	3,604	9.87	0	0.00	0	0.00
1974	2,415	6.62	0	0.00	0	0.00
1975	2,390	6.55	0	0.00	0	0.00
1976	4,313	11.82	1,797	4.92	38,042	104.22
1977	6,712	18.39	3,317	9.09	12,109	33.18
1978	3,359	9.20	3,969	10.87	11,609	31.81
1979	1,986	5.44	2,883	7.90	6,729	18.44
1980	1,704	4.67	4,146	11.36	8,176	22.40
1981	2,014	5.52	9,351	25.62	15,005	41.11
1982	742	2.03	6,083	16.67	14,360	39.34
1983	1,190	3.26	9,346	25.61	19,474	53.35
1984	1,308	3.58	8,836	24.21	0	0.00
1985	3,056	8.37	9,208	25.23	0	0.00
1986	2,549	6.98	11,575	31.71	0	0.00
1987	3,083	8.45	7,413	20.31	0	0.00
1988	2,537	6.95	5,102	13.98	0	0.00

Date	Oil		Water		Injection Water	
Year	m3/year	m3/day	m3/year	m3/day	m3/year	m3/day
1990	1,226	3.36	3,991	10.93	0	0.00
1991	499	1.37	3,451	9.46	5,194	14.23
1992	322	0.88	2,626	7.19	0	0.00
1993	584	1.60	1,016	2.78	0	0.00
1994	384	1.05	888	2.43	0	0.00
1995	252	0.69	872	2.39	1,530	4.19
1996	421	1.15	539	1.48	215	0.59
1997	316	0.86	935	2.56	0	0.00
1998	15	0.04	53	0.14	0	0.00
1999	142	0.39	105	0.29	0	0.00
2000	191	0.52	330	0.90	0	0.00
2001	357	0.98	841	2.30	0	0.00
2002	347	0.95	934	2.56	0	0.00
2003	264	0.72	835	2.29	0	0.00
2004	66	0.18	238	0.65	0	0.00
2005	32	0.09	80	0.22	0	0.00
2006	222	0.61	920	2.52	0	0.00
2007	74	0.20	413	1.13	0	0.00
2008	154	0.42	1,228	3.36	0	0.00
2009	67	0.18	934	2.56	0	0.00
2010	3284	14.17	3506	13.98	0	0.00
2011	4944	15.68	7641	24.46	0	0.00

Recent pressure test was performed on 103/13-24-001-26W1/00 on July 2011 and the results of the test are attached to the report.

APPENDIX A

Appendix A – Area Map

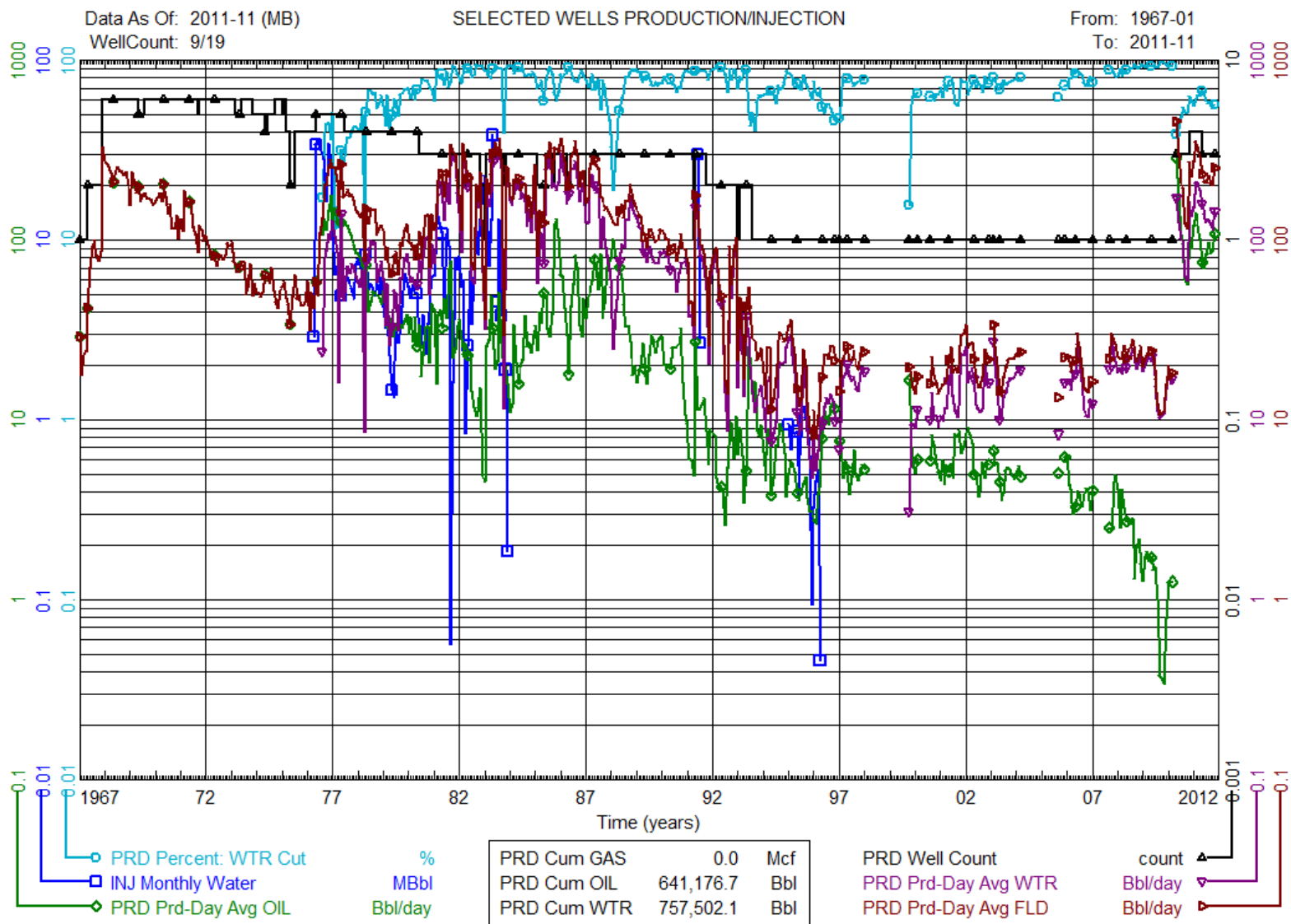


WELL SYMBOLS					
♦ OIL	↗ AO	⬇ PTN	⬇ D&A	⬇ WI	
○ LCT	⊗ A/WI	⬇ STN	⬇ CMM	⬇ DRL	
⬇ RDR	⬇ WD	⬇ A/W/S	⬇ A/W/D	⬇ SWI	
⬇ SO	⬇ W/S/C	⬇ J&A	□ SL		

PennWest Exploration		
Waskada Unit #1		
	By :	Date : 2011/04/14
	Scale = 1:10000	Project : Waskada

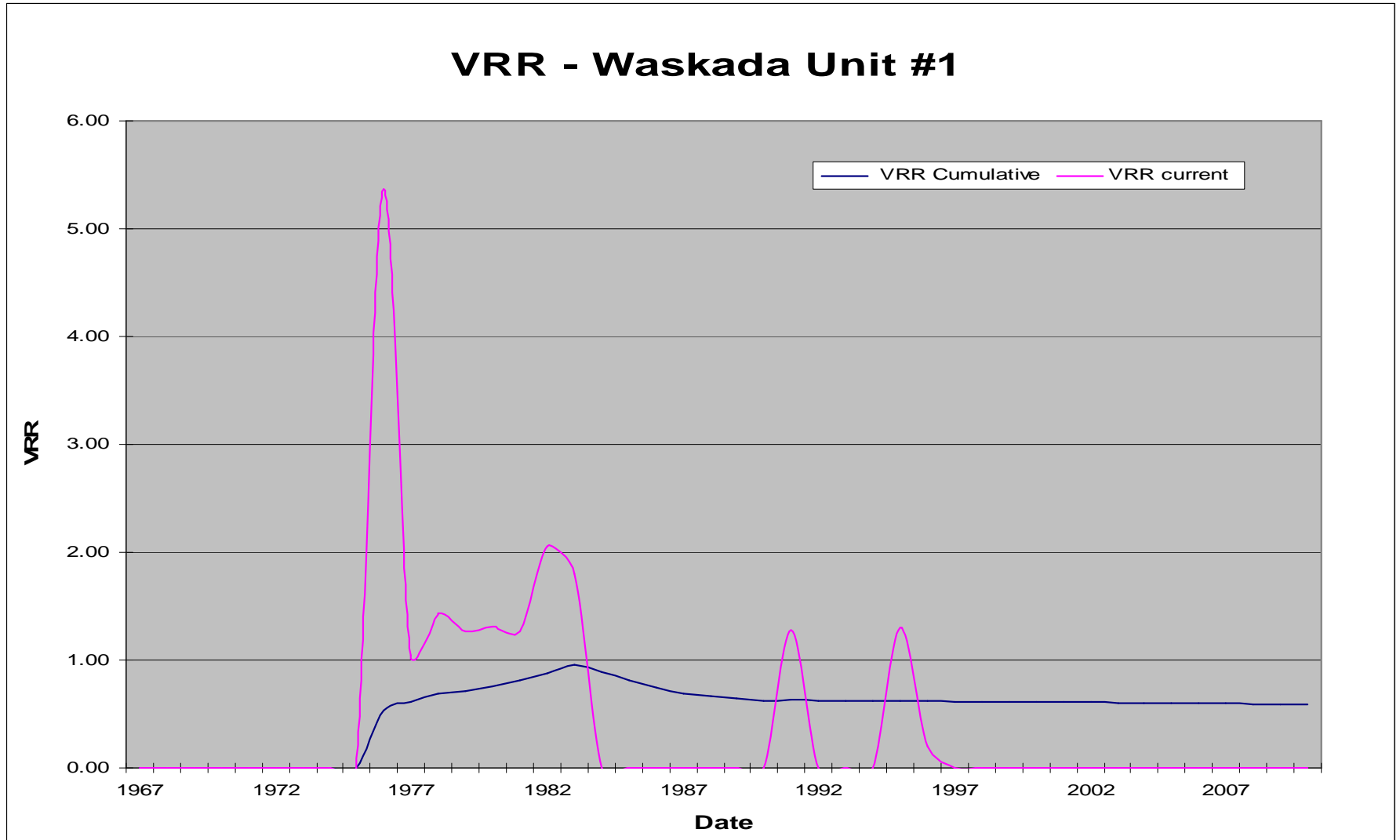
APPENDIX B

Appendix B – Production and Injection History plot



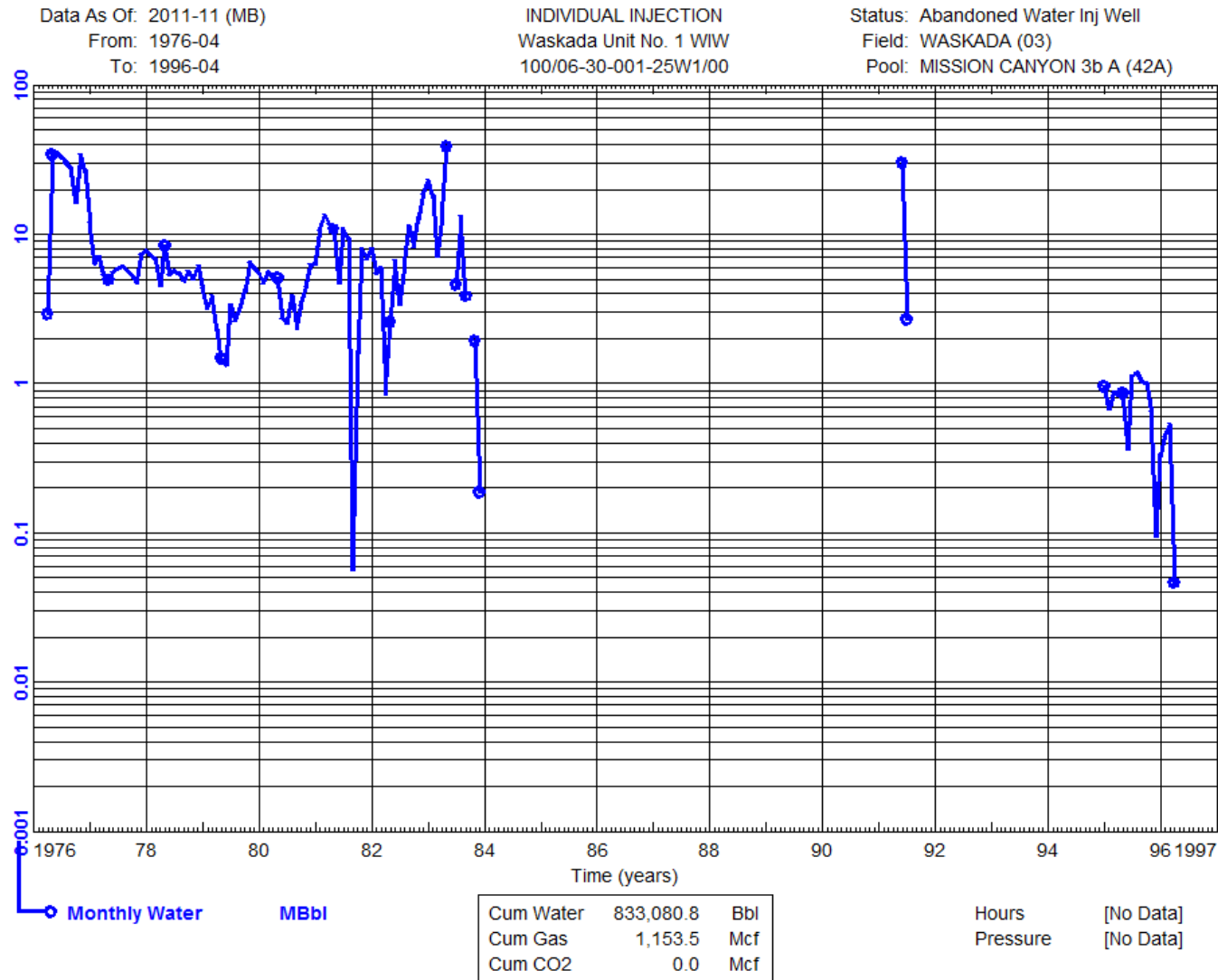
APPENDIX C

Appendix C – Voidage replacement Ratio VRR



APPENDIX D

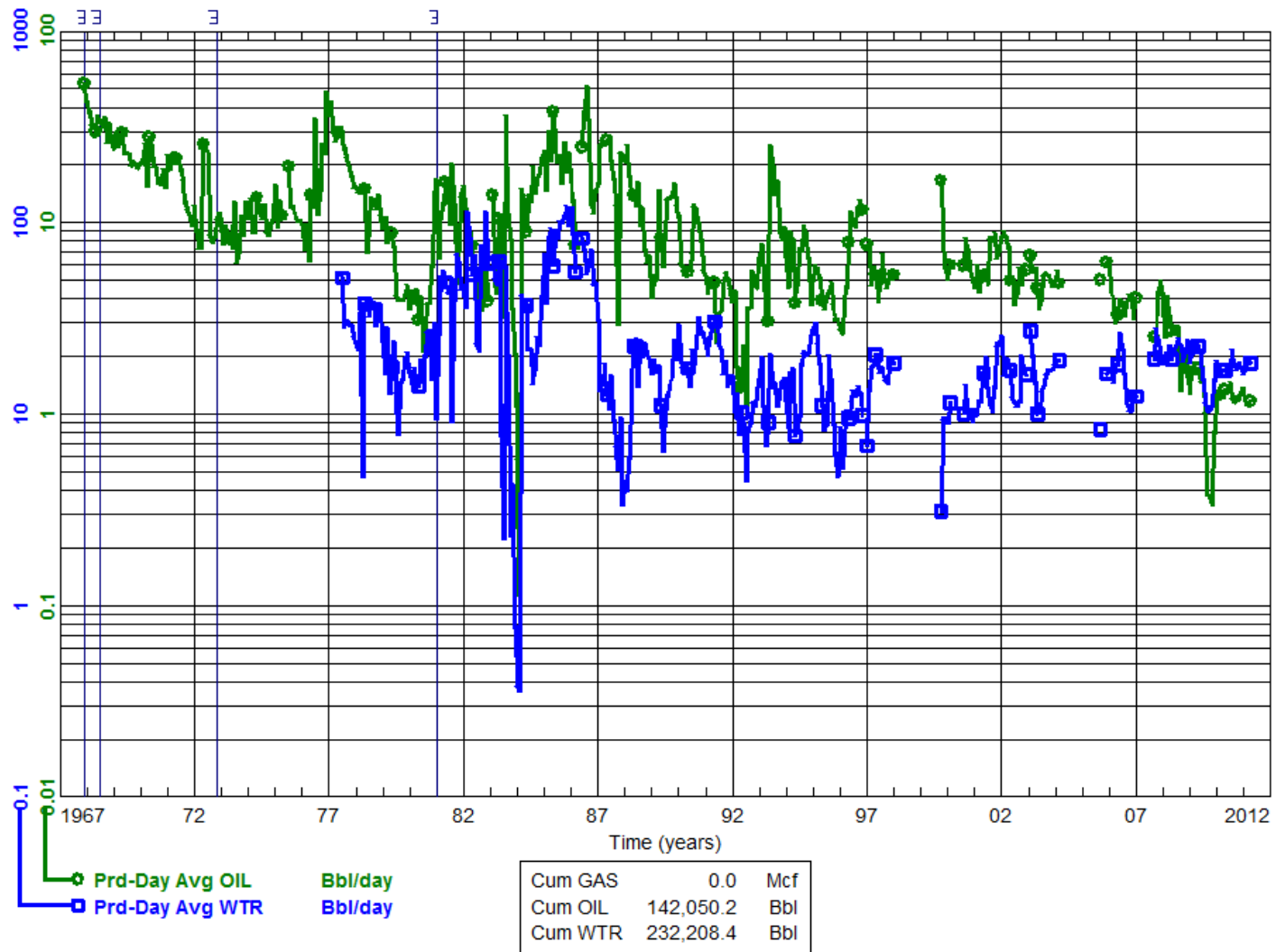
Appendix D – Production and Injection Profiles (Individual wells)

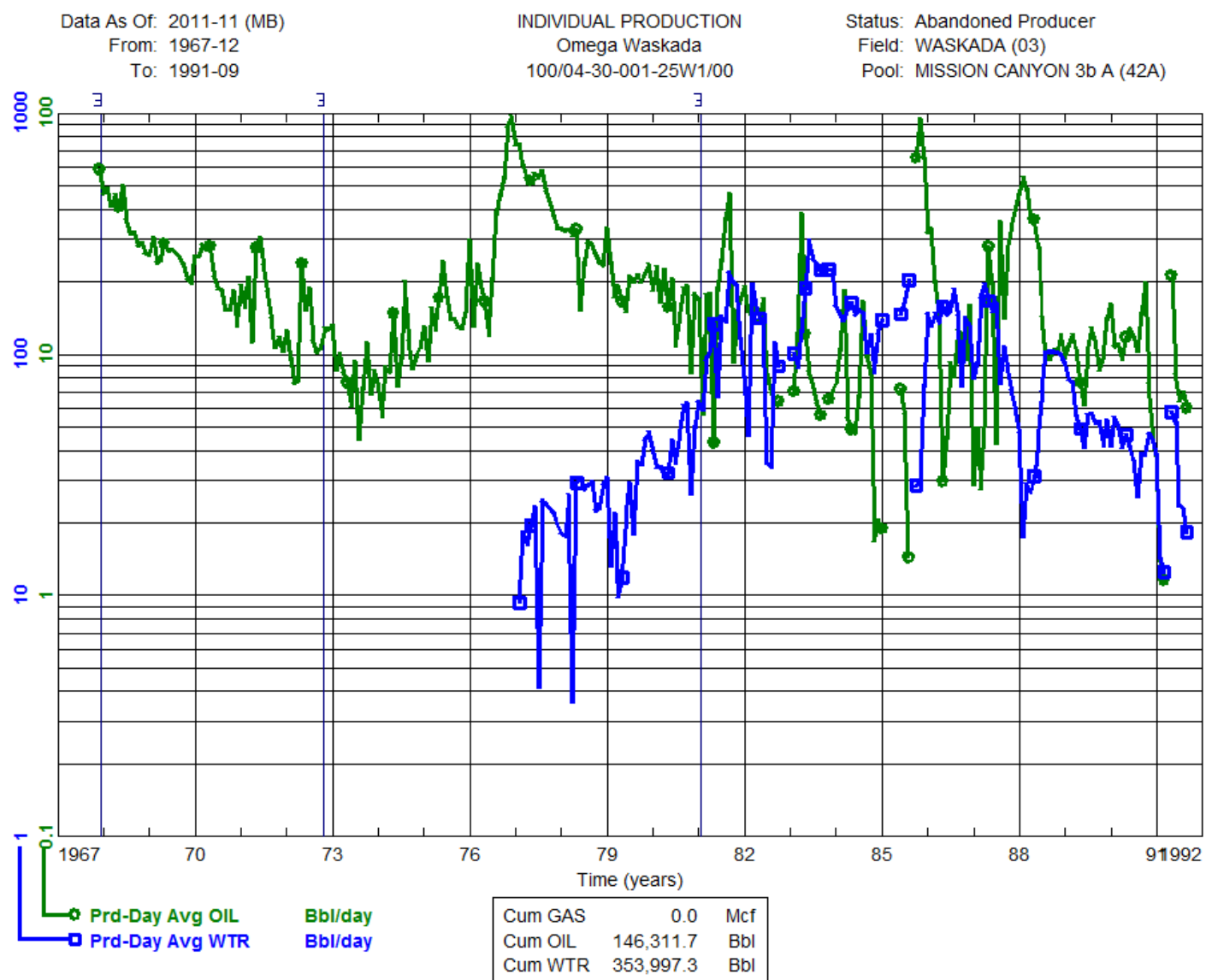


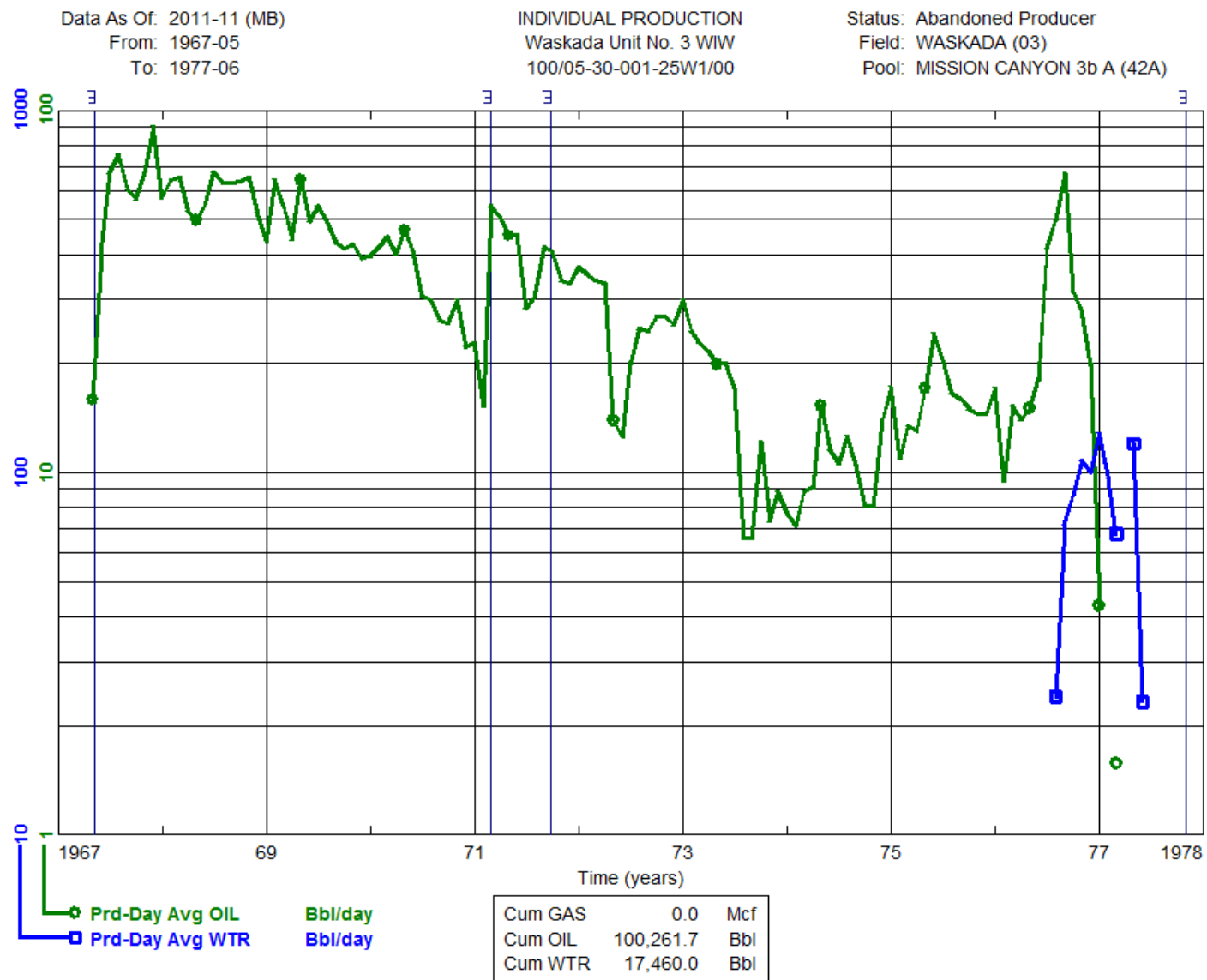
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From: 1967-12
To: 2011-04

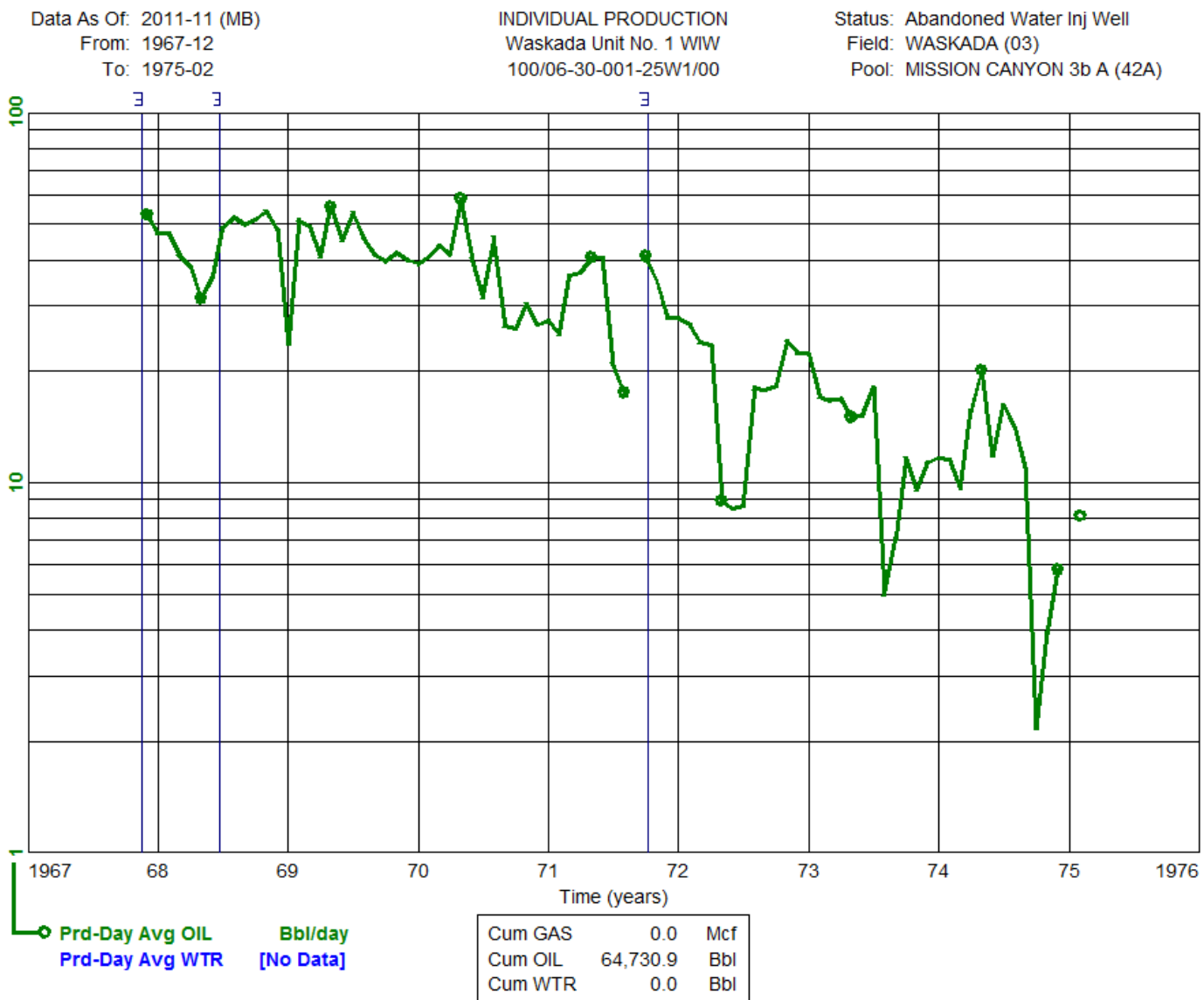
INDIVIDUAL PRODUCTION
Waskada Unit No. 1
100/03-30-001-25W1/00

Status: Capable Of Oil Prod
Field: WASKADA (03)
Pool: MISSION CANYON 3b A (42A)





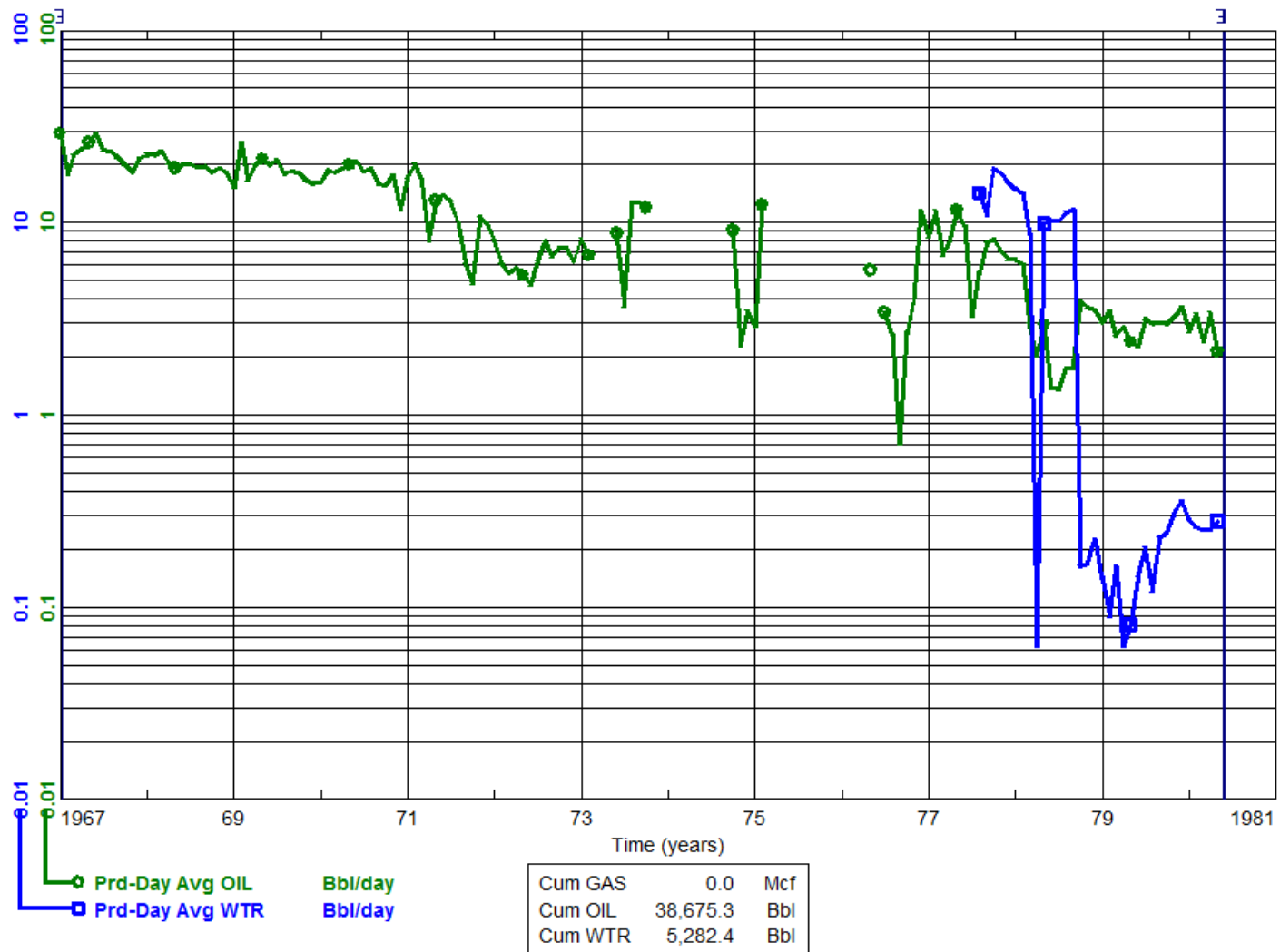


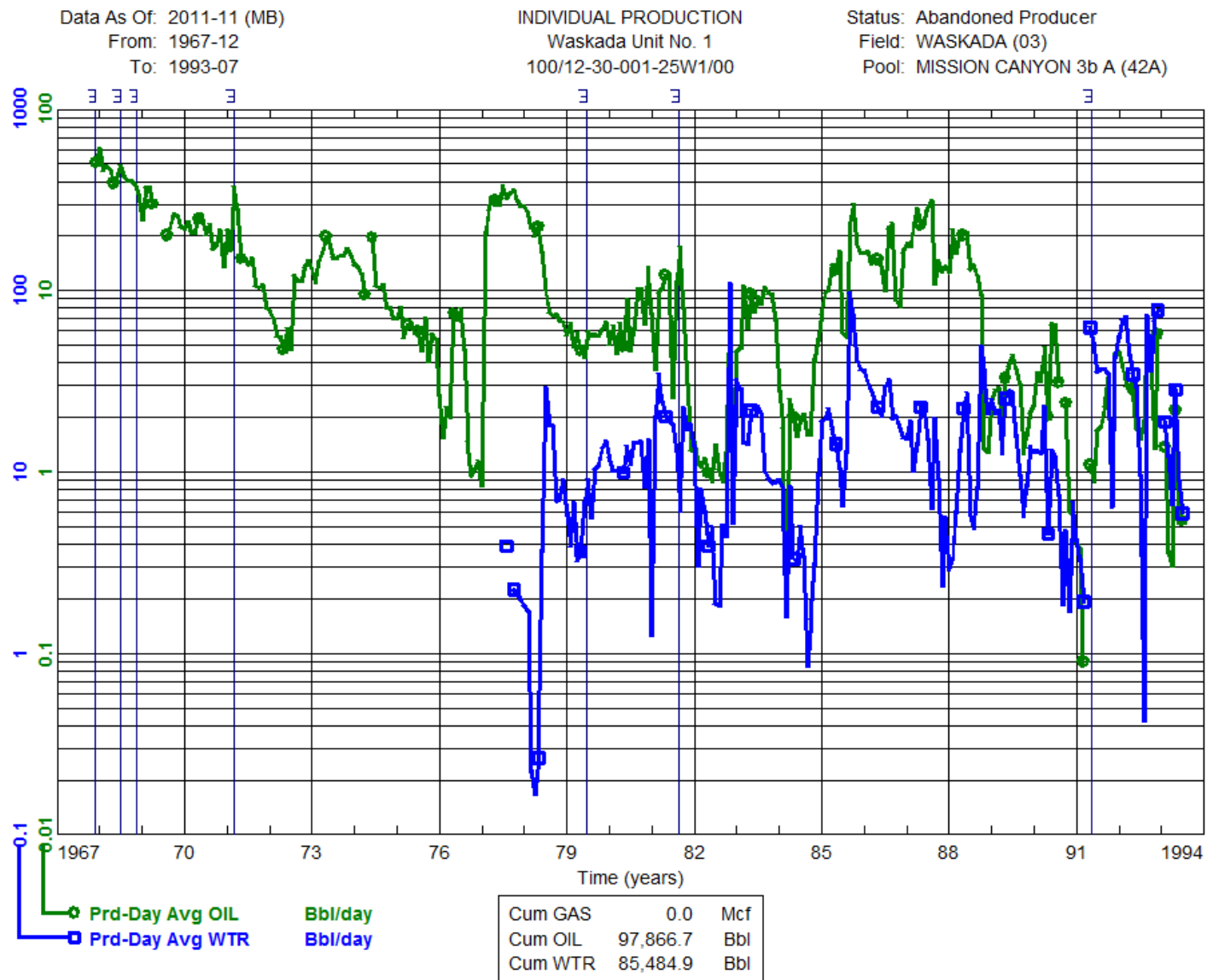


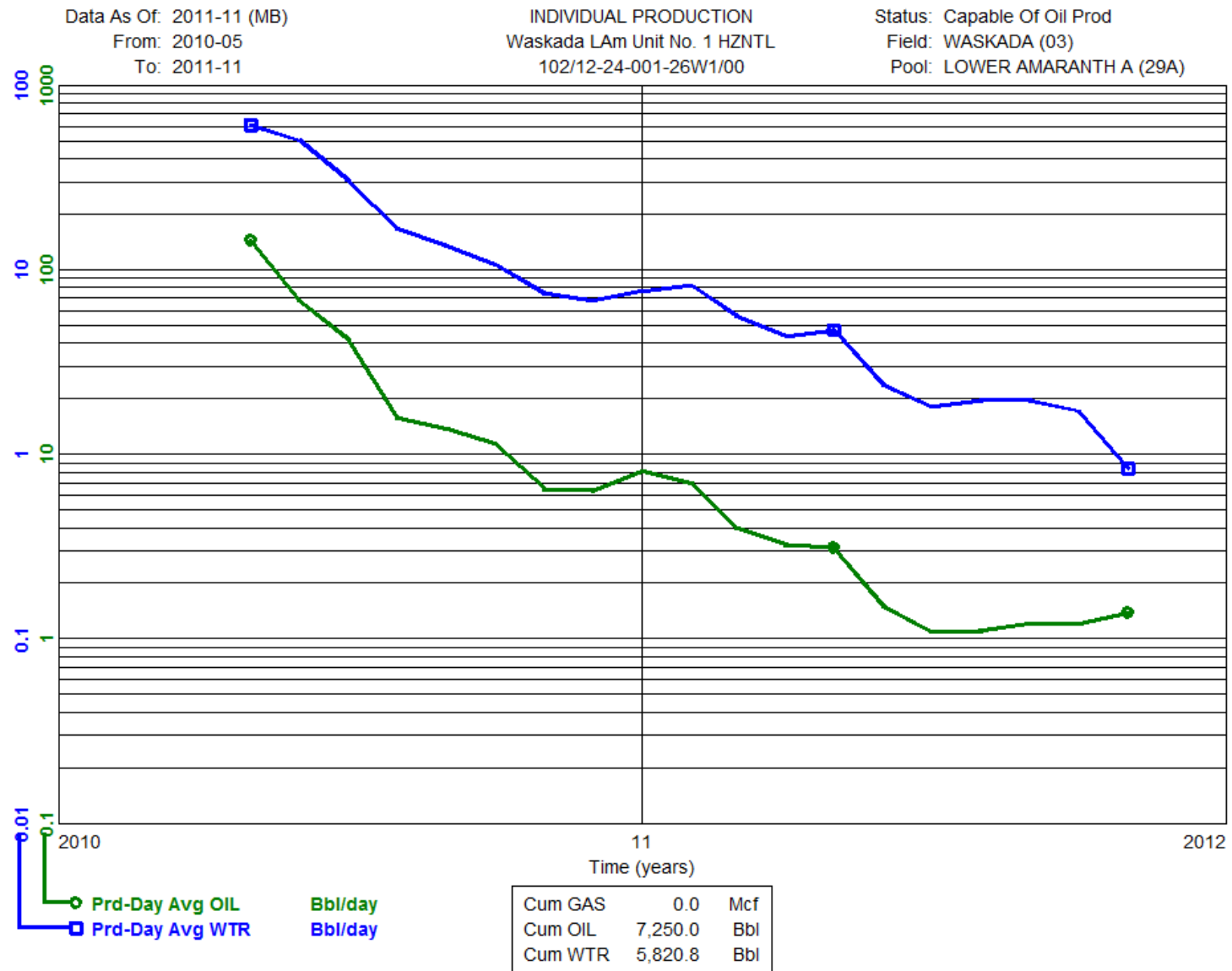
Data As Of: 2011-11 (MB)
 From: 1967-01
 To: 1980-05

INDIVIDUAL PRODUCTION
 Waskada Unit No. 3 WSW
 100/11-30-001-25W1/00

Status: Abandoned Producer
 Field: WASKADA (03)
 Pool: MISSION CANYON 3b A (42A)







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)

