

Waskada Unit No. 9

Waterflood Progress Report

January 1st – December 31st, 2013

PennWest

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Table of Contents:

Introduction

Unit Information and Geology

Discussion

Production Performance
Voidage Replacement Ratio
Pressure Surveys
Corrosion and Scale Prevention

Summary and Recommendations

Attachments

- 1 Area Map.
- 2 A summary of the Unit Well List and History.
- 3 A Production and Injection plot of the Unit.
- 4 A summary of Unit Annual Volumes and Rates.
- 5 A Cumulative Production and Injection plot of the Unit.
- 6 A Unit Voidage Replacement Ratio Plot.
- 7 Individual Injection Well Performance Plots (2)

Introduction:

The Waskada Unit No.9 pressure maintenance project commenced water injection into the Mission Canyon designed and in accordance with Manitoba Energy and Mines Approval No. PM 49.

Please refer to Attachment 1 – Area Map.

PRESSURE MAINTENANCE: Governed by Board Order No. PM 49

Unit Information

UNITIZED ZONE: Mission Canyon
Original Unit, April 1, 1986 Board Order; Voluntary

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

POOL: Waskada Mission Canyon 3b C (03 42C) – one well 02/12-27-001-26W1/0

This report documents the performance of the Waskada Unit No.9 pressure maintenance project for the period of January 1 to December 31, 2013. The Unit had production from 1 well and no injection in 2013.

Unit 9 is part of the main Waskada field. 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 W1.

Geology

The Mission Canyon in the Waskada area produces light density crude (approximately 36° API). Stratigraphically the Mission Canyon can be divided up into various members and marker beds (ie. MC3b, MC3a, MC2, MC1). It is overlain by the Charles Formation or the angular Paleozoic/Mississippian Unconformity, with beds dipping to the southwest. The lithology consists of complex interbedded grainstones, packstones, wackestones, and mudstones with some members consisting of predominantly primary anhydrite (ie. MC2). Porous members typically have porosity of 13-15% and permeabilities of 20-40 mD), although localized alteration due to the truncating Mississippian Unconformity can significantly reduce or eliminate those values in certain areas. Oil accumulation is generally found on isolated structural highs or areas with associated updip permeability degradation.

Discussion

Production and Injection Performance

Board Order No. PM 49 provided for pressure maintenance operations in Waskada Unit No.9. The Unit includes 2 injection wells and 10 producers. None are currently active except 14-27, a producer. Pressure maintenance by water injection began in May 1986 and ceased in January 1988 when former Operator Omega made application to suspend water injection.

Please refer to Attachment 2 – A summary of the Unit Well List and History.

Please refer to Attachment 3 – A Production and Injection plot of the Unit.

Please refer to Attachment 4 – A summary of Unit Annual Volumes and Rates.

Please refer to Attachment 5 – A Cumulative Production and Injection plot of the Unit.

Voidage Replacement Ratio Calculation:

The Cumulative VRR from production start is at 0.10 and the Cumulative VRR from injection start is at 0.14. Both have declined gradually since ceasing injection in 1988. The VRR's for the short period of injection in the late 1980's struggled to reach unity. Currently there is no active injector in this Unit and PennWest has no plans to reactivate injection.

Please refer to Attachment 6 – A Unit Voidage Replacement Ratio Plot.

Please refer to Attachment 7 – Individual Injection Well Performance Plots (1)

Pressure Surveys:

No pressure surveys were conducted in 2013.

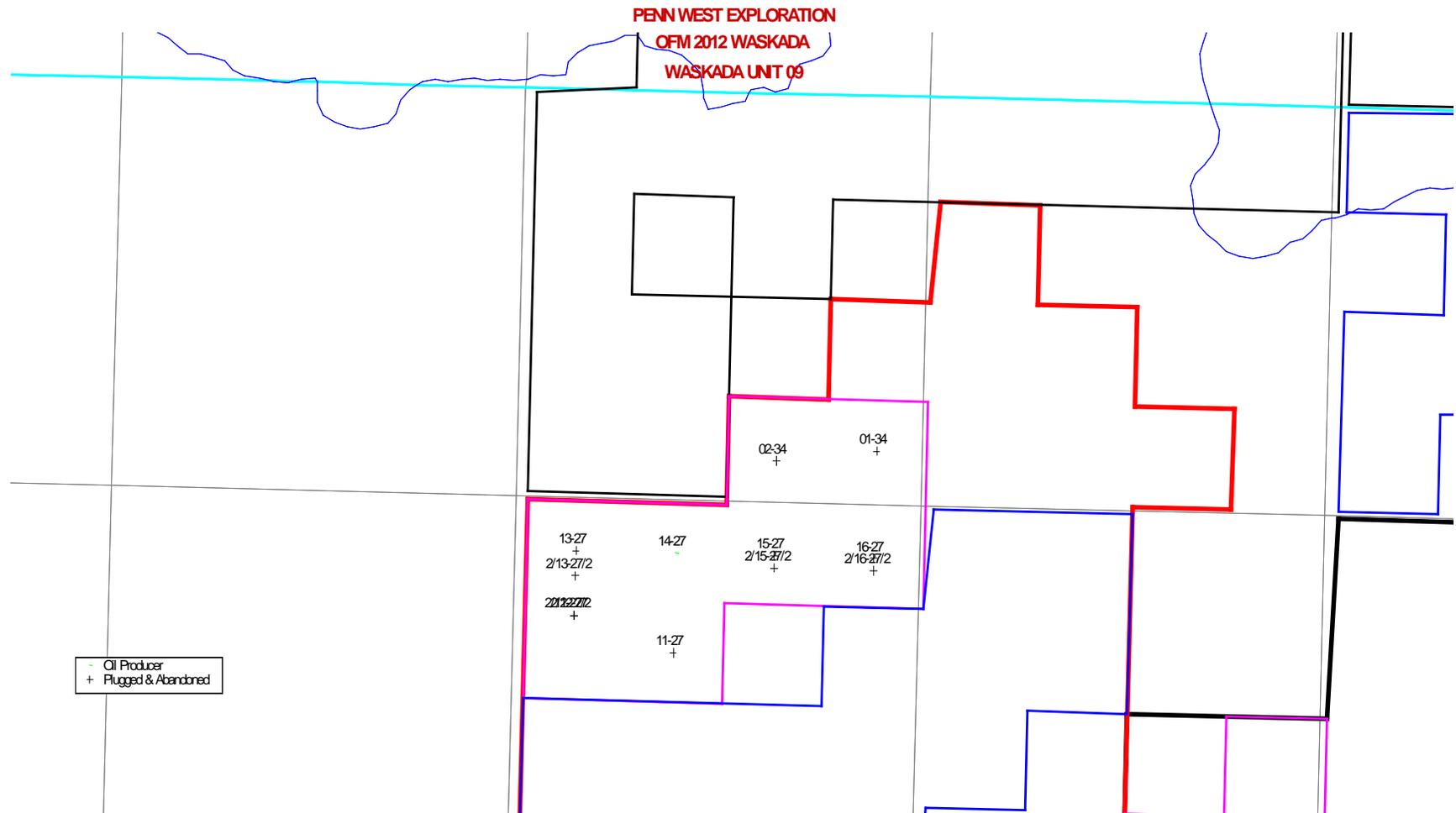
Corrosion and Scale Prevention Program:

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

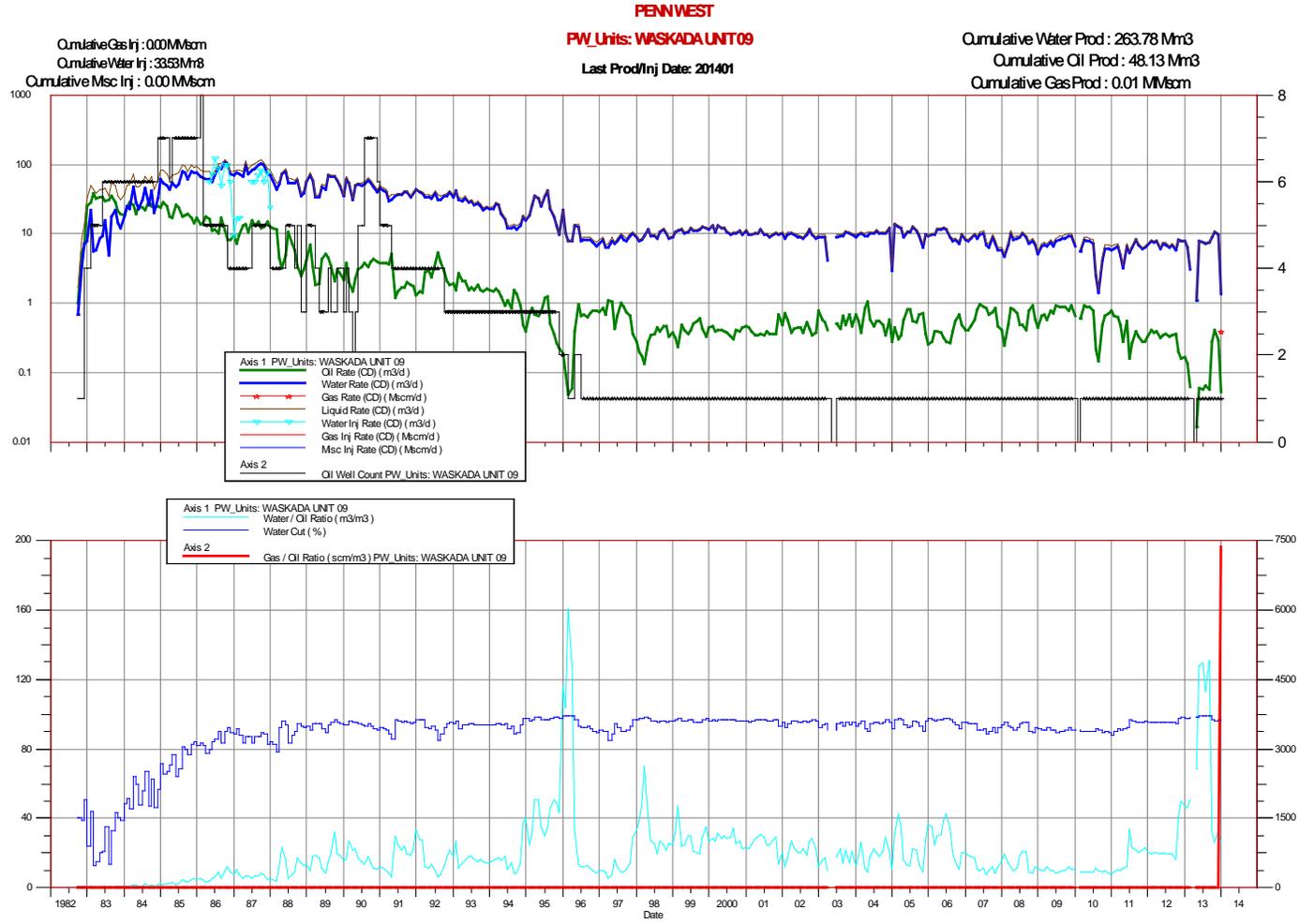
Summary and Recommendations

Since there is only one producer and no injection wells in this unit, we do not have any plans for this unit other than monitoring the only producer.

ATTACHMENT 1 – Unit Area Map



ATTACHMENT 3 – Unit Production and Injection Plot



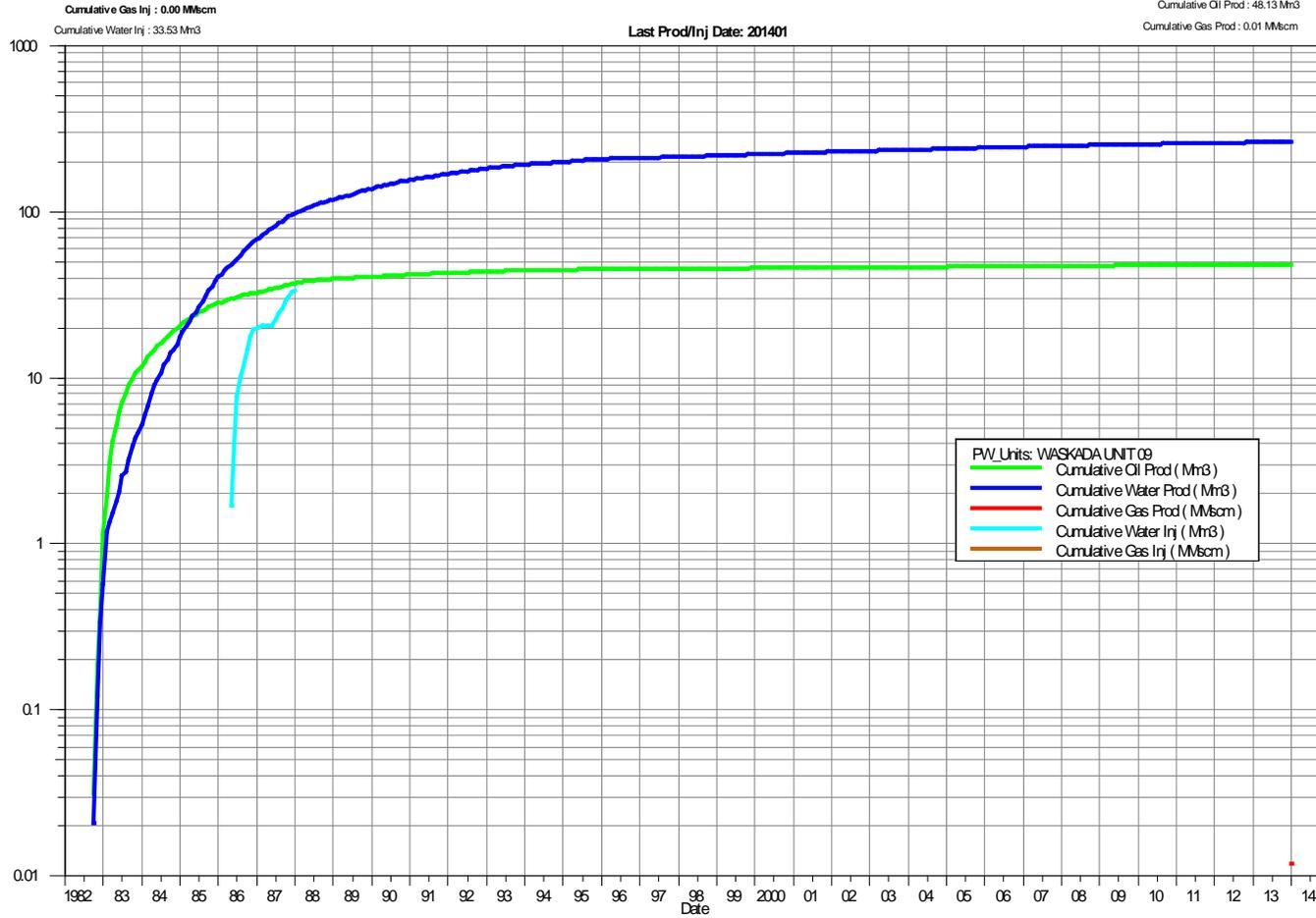
ATTACHMENT 5 – Unit Cumulative Production and Injection Plot

PENNWEST
PW_Units: WASKADA UNIT 09

Cumulative Water Prod : 263.78 Mr3

Cumulative Oil Prod : 48.13 Mr3

Cumulative Gas Prod : 0.01 MMscm



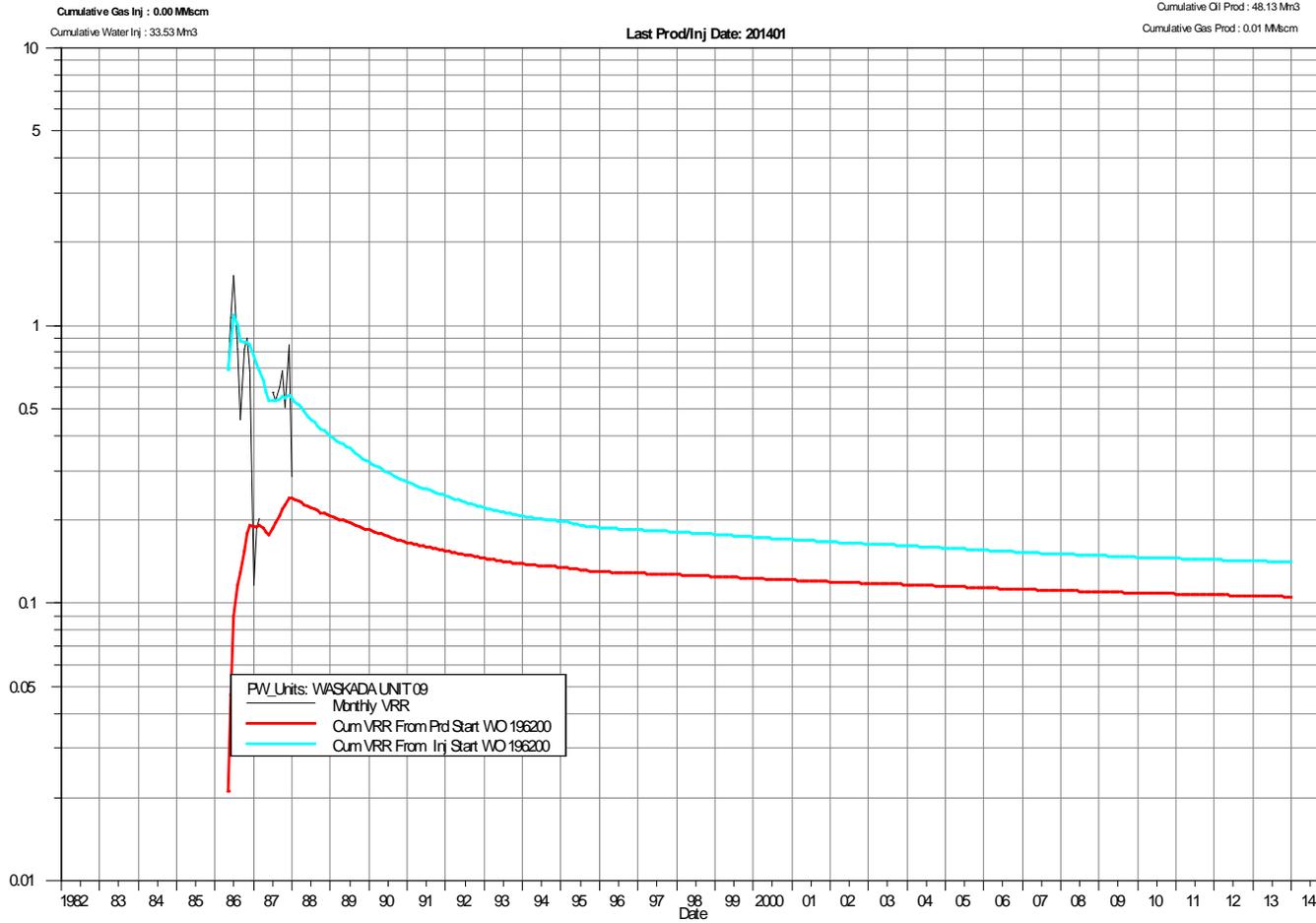
ATTACHMENT 6 – Unit Voidage Replacement Ratio Plot

PENWEST
PW_Units: WASKADA UNIT 09

Cumulative Water Prod : 263.78 Mm3

Cumulative Oil Prod : 48.13 Mm3

Cumulative Gas Prod : 0.01 MMscm

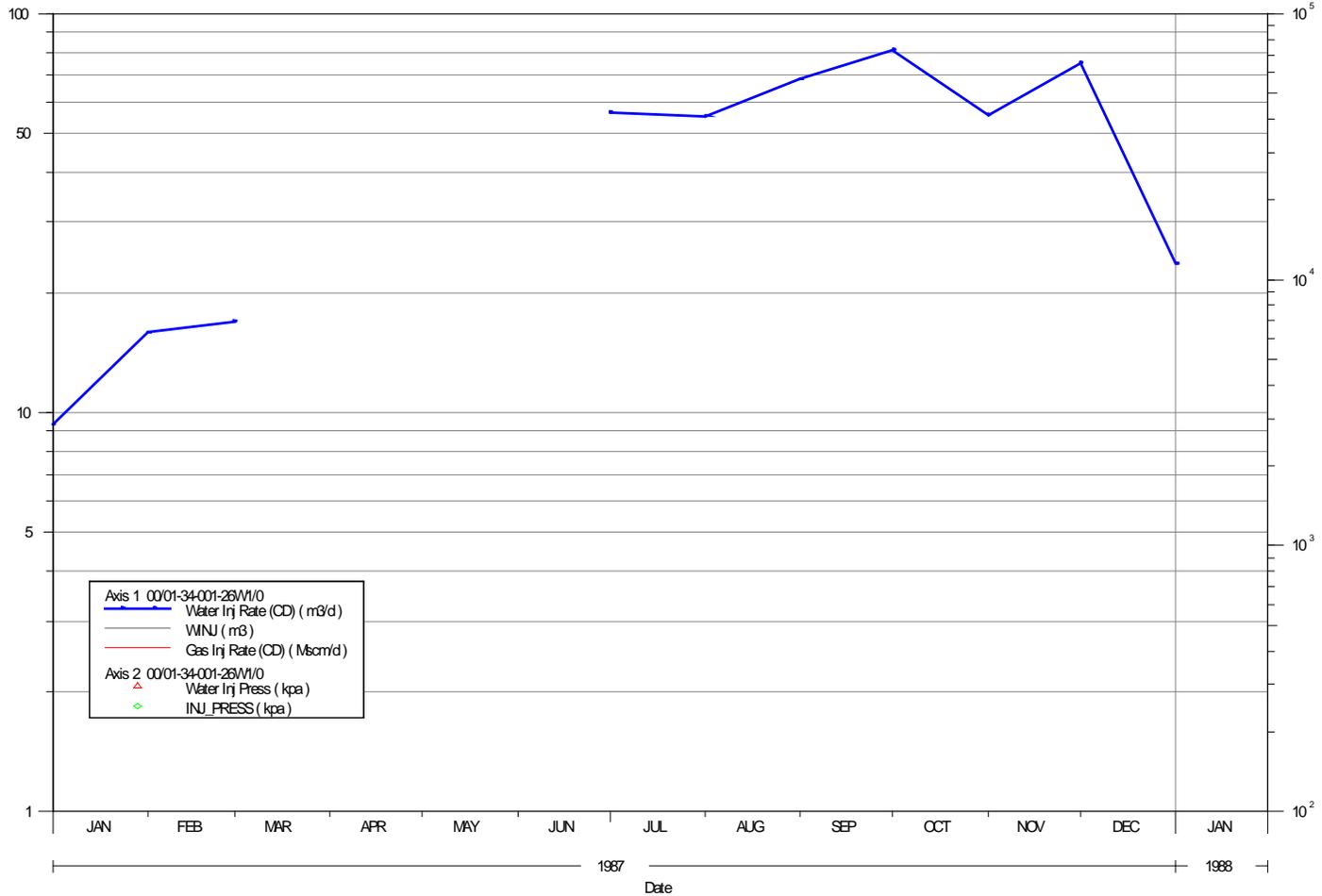


ATTACHMENT 7 – Individual Injection Well performance Plots (2 Wells)

Status: ABD-OIL
 Unit: WASKADA_UNT_NO_9_-_PM_49
 Zone: MISSION_CANYON_3B_B
 Operator: PENN_WEST Approval: Amaranth

PENNWEST EXPLORATION
00/01-34-001-26W1/0

Cumulative Gas Inj : 0.00 MMscm Cumulative Water Inj : 14.03 Mn3
 Cumulative Water Prod : 4.18 Mn3
 Cumulative Oil Prod : 0.28 Mn3
 Cumulative Gas Prod : 0.00 MMscm



Status: ABD-OIL

Unit: WASKADA_UNIT_NO_9_-_PM_49

Zone: MISSION_CANYON_3B_B

Operator: OMEGA_HYDROC Approval: Amaranth

PENNAEST EXPLORATION

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

Cumulative Gas Inj : 0.00 MMscm

Cumulative Water Inj : 19.50 Mn3

Cumulative Water Prod : 6.47 Mn3

Cumulative Oil Prod : 2.58 Mn3

Cumulative Gas Prod : 0.00 MMscm

