STATE OF NEW MEXICO
DEPARTMENT OF ENERGY, MINERALS AND NATURAL RESOURCES
OIL CONERVATION DIVISION

Case No. 14310

EXHIBIT

2

NEBU 321 PC Infill Recompletion

Agenda

- Geology Overview
- Reservoir Engineering Overview
- Offset Decline Curve Analysis vs. Volumetric OGIP Estimate
- Volumetric Calculation Support
- Horizontal well comparison

Oil Conservation Division
Case No. 14310
Exhibit No. 2

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Geology Overview

- The Pictured Cliffs sands are Upper Cretaceous. The sandstones are fine grained and shaly. Typically it has a blocky well log response and is made up of amalgamated sand bodies 40-120'

- The Pictured Cliffs was deposited in northwest trending shorelines. As the sea level fell the shorelines migrated to the northeastward

- Have isopach map, structure map, and area cross section.

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Reservoir Engineering Overview

- Existing well is approximately centered among 4 commercial PC producers. Very few DK/MV wells drilled off pattern with PC. This well has a lower producing rate than the other location (344M) where this is possible

- Decline Curve EUR vs volumetric OGIP calculation shows only 40% of GIP will be recovered from the offset wells (640 acres).

- Drainage area calculation for offsetting wells NEBU 223 and NEBU 224 results in 75 and 99 acres.

- Horizontal PC wells drilled within 160 acre proration units nearby have EURs 2.2x offset vertical wells (shows there is more gas to recover in 160 acre unit)

- Will allow for cheap pressure test to determine if a full scale infill pilot project is justified.

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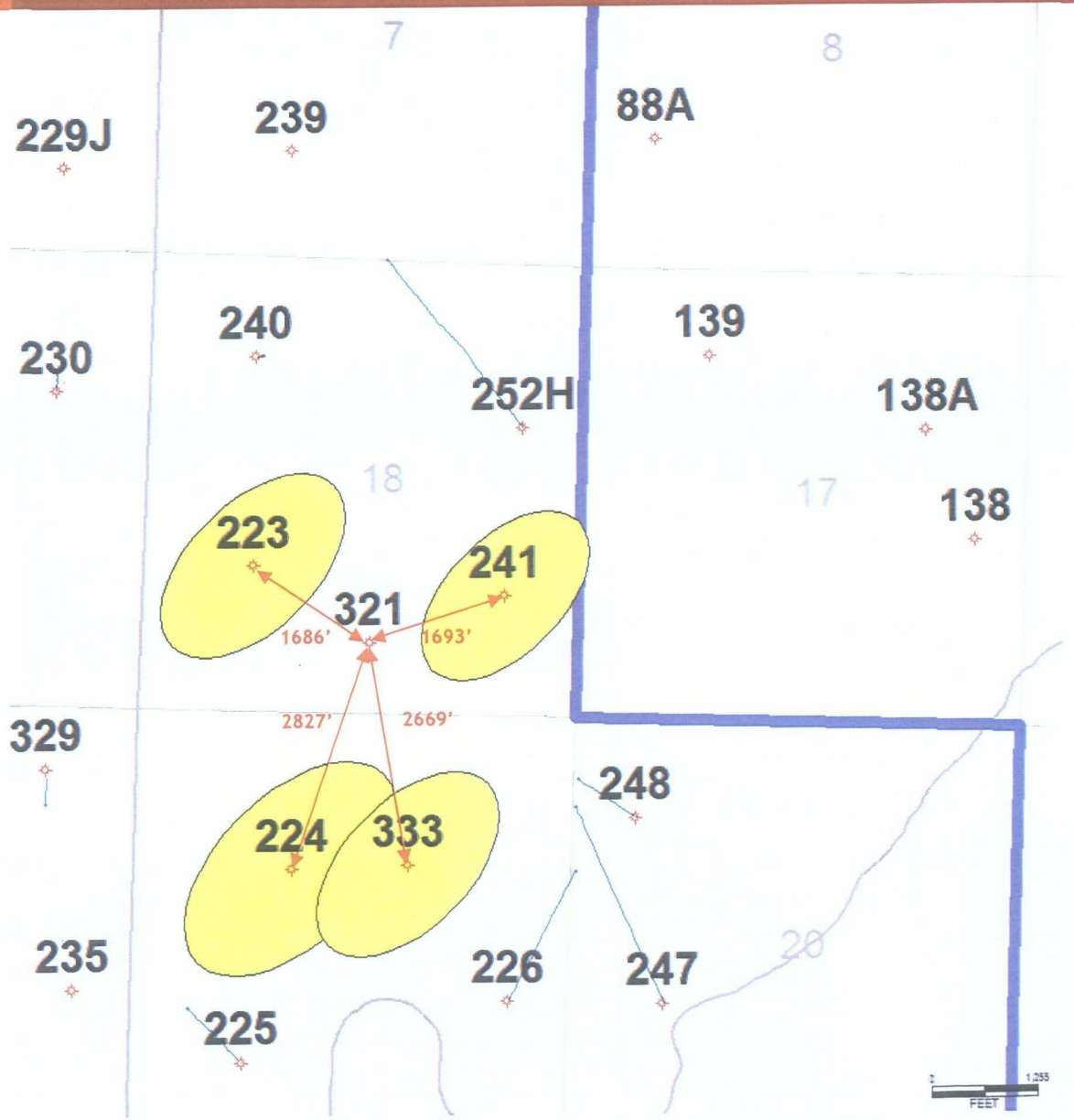
Overview



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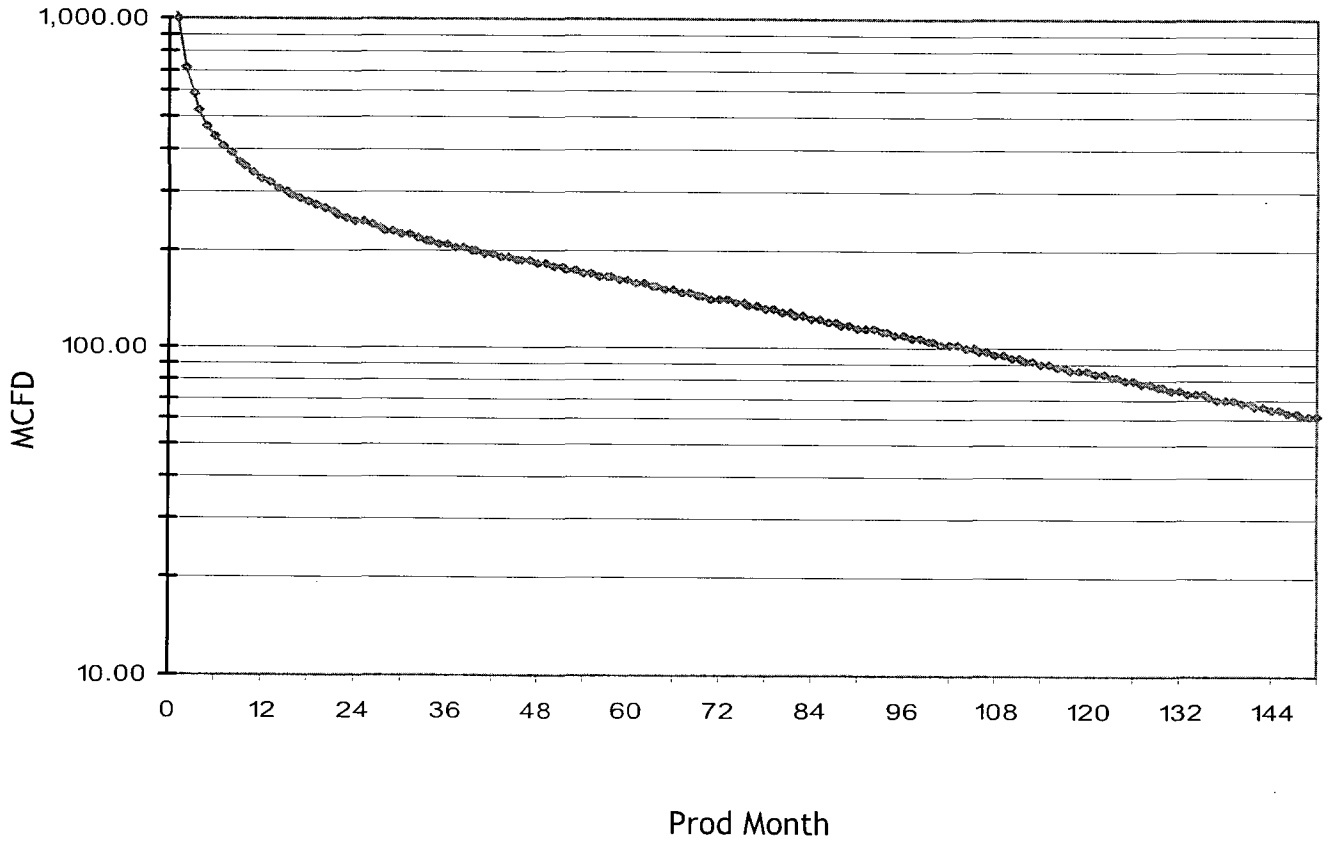
PC Type Curve



Type Curve Metrics

IP (MCFD)	1400
1st 30 Day Avg (MCFD)	1008
Hyperbolic Exponent	2.4
Initial Effective Decline	77%
Hyp/Exp Final Dec Rate	12%
Final Rate (MCFD)	30
EUR (MMCF)	864

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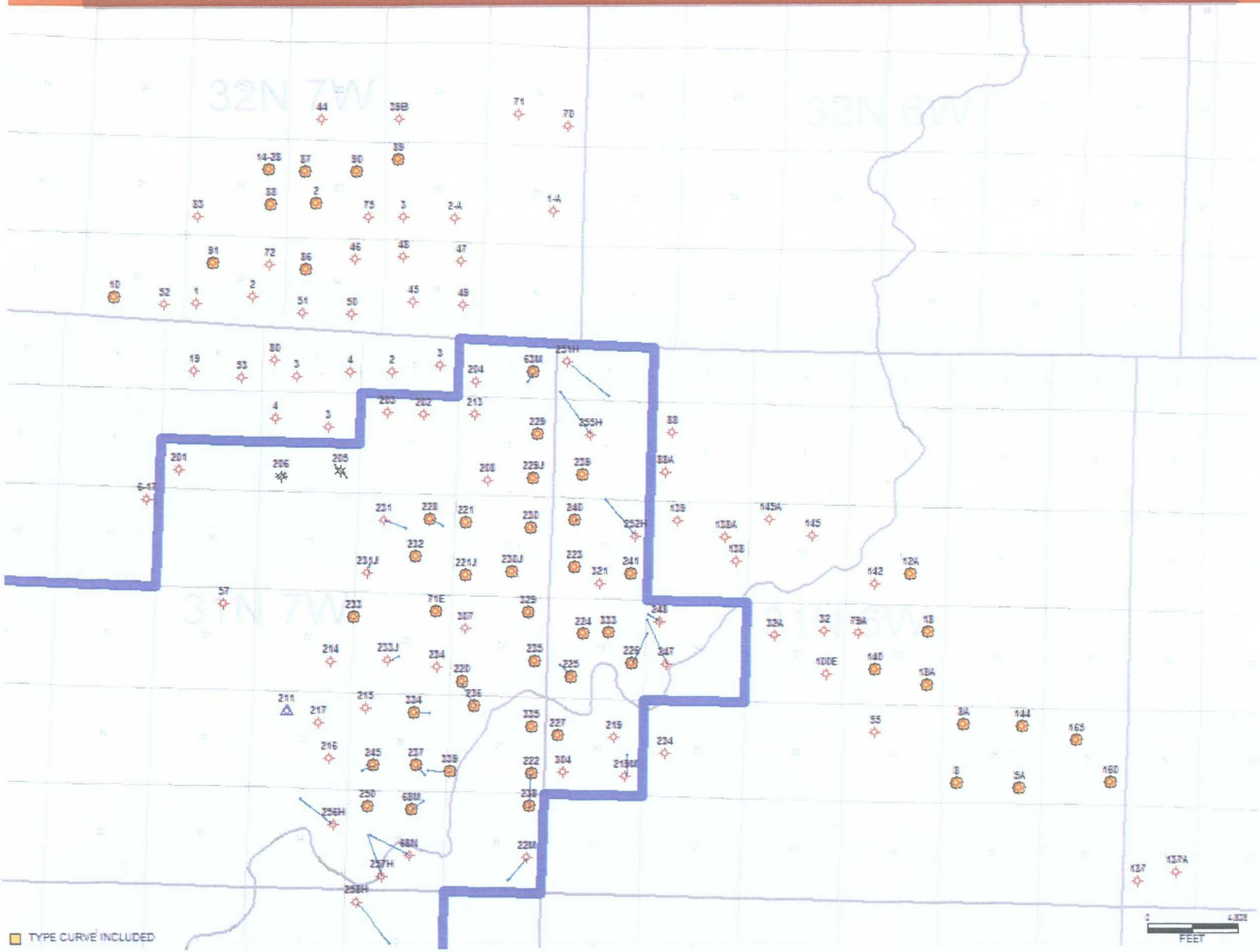
Type Curve Wells



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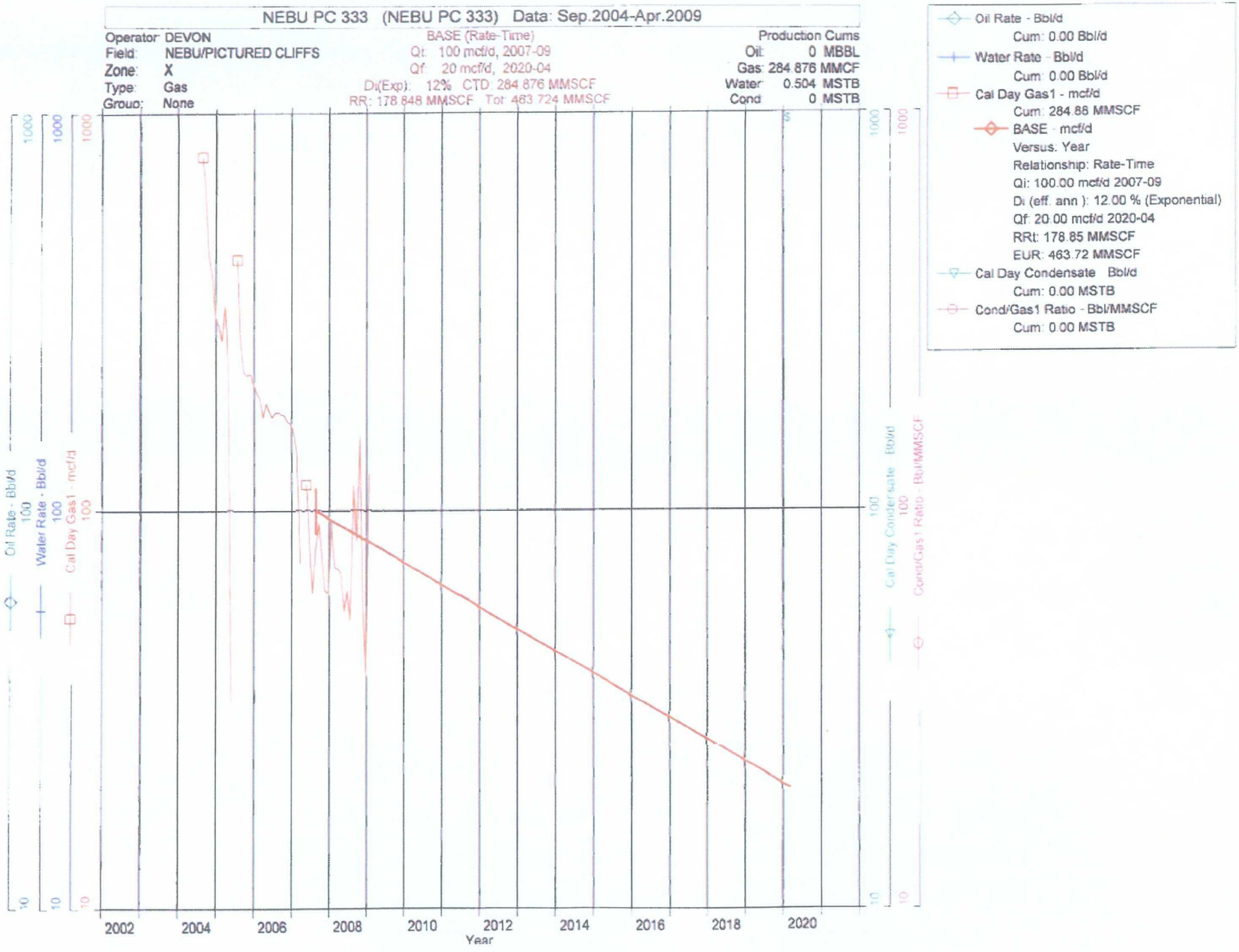
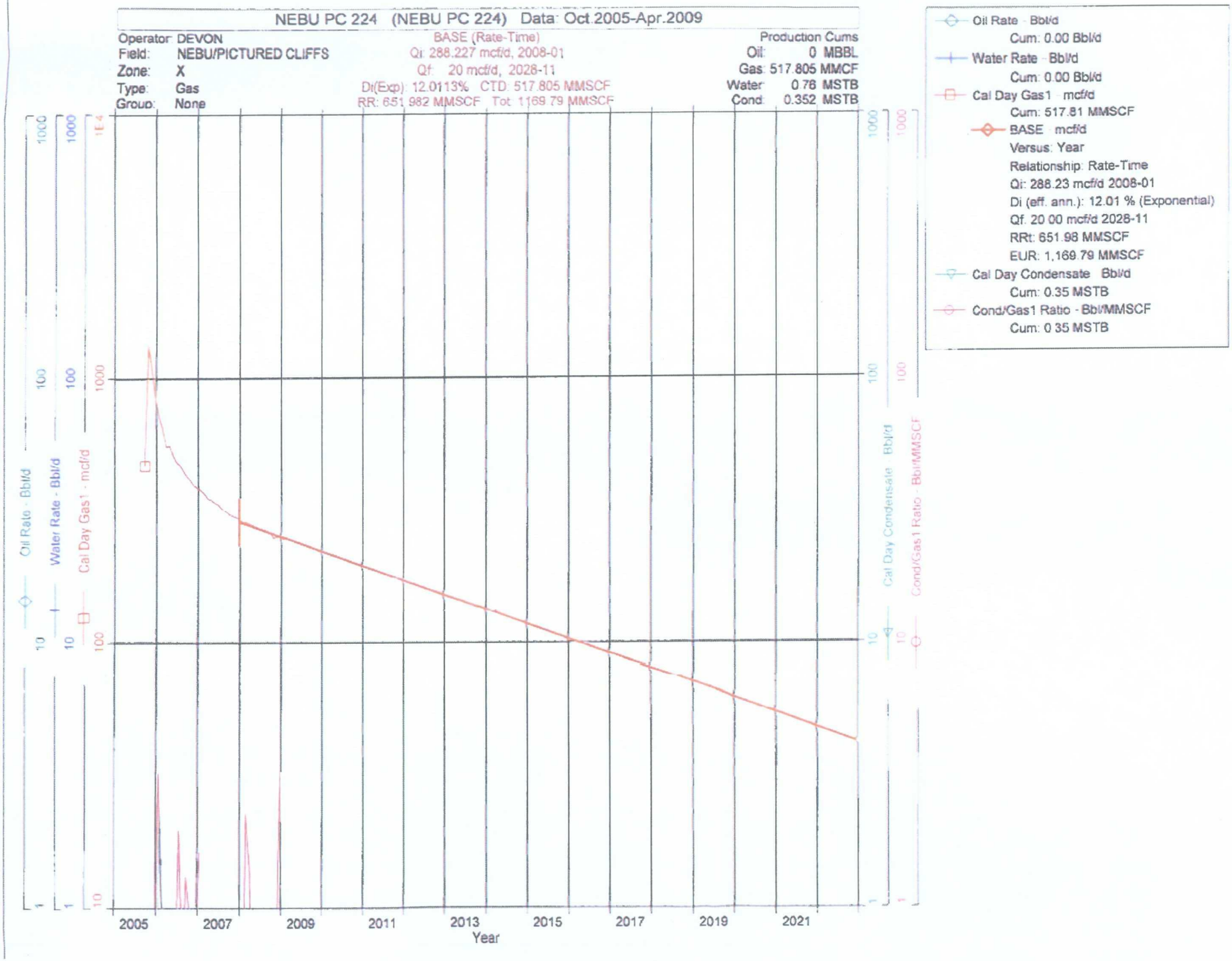
NEBU PC 241 (NEBU PC 241) Data: Sep.2006-May.2009
Operator: DEVON
Field: NEBU/PICTURED CLIFFS
Zone: PICTURED CLIFFS
Type: Gas
Group: None
BASE (Rate-Time)
Qi: 730 mcf/d, 2006-10
Qf: 20 mcf/d, 2022-11
Di(Hyp): 77% CTD: 181.566 MMSCF
RR: 268.916 MMSCF Tot: 450.482 MMSCF
Production Cums
Oil: 0 MBBL
Gas: 181.566 MMCF
Water: 0.254 MSTB
Cond: 0.432 MSTB
Oil Rate - Bbl/d
Cum: 0.00 Bbl/d
Water Rate - Bbl/d
Cum: 0.00 Bbl/d
Cal Day Gas1 - mcf/d
Cum: 181.57 MMSCF
BASE - mcf/d
Versus: Year
Relationship: Rate-Time
Qi: 730.00 mcf/d 2006-10
Di (eff. ann.): 76.98 % (Hyperbolic)
Qf: 20.00 mcf/d 2022-11
RRt: 268.92 MMSCF
EUR: 450.48 MMSCF
Cal Day Condensate - Bbl/d
Cum: 0.43 MSTB
Cond/Gas1 Ratio - Bbl/MMSCF
Cum: 0.43 MSTB
Oil Rate - Bbl/d
Water Rate - Bbl/d
Cal Day Gas1 - mcf/d
Cal Day Condensate - Bbl/d
Cond/Gas1 Ratio - Bbl/MMSCF
1000
100
10
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Year


NEBU PC 333 (NEBU PC 333) Data: Sep.2004-Apr.2009
Operator: DEVON
Field: NEBU/PICTURED CLIFFS
Zone: X
Type: Gas
Group: None
BASE (Rate-Time)
Qi: 100 mcf/d, 2007-09
Qf: 20 mcf/d, 2020-04
Di(Exp): 12% CTD: 284.876 MMSCF
RR: 178.848 MMSCF Tot: 463.724 MMSCF
Production Cums
Oil: 0 MBBL
Gas: 284.876 MMCF
Water: 0.504 MSTB
Cond: 0 MSTB
Oil Rate - Bbl/d
Cum: 0.00 Bbl/d
Water Rate - Bbl/d
Cum: 0.00 Bbl/d
Cal Day Gas1 - mcf/d
Cum: 284.86 MMSCF
BASE - mcf/d
Versus: Year
Relationship: Rate-Time
Qi: 100.00 mcf/d 2007-09
Di (eff. ann.): 12.00 % (Exponential)
Qf: 20.00 mcf/d 2020-04
RRt: 178.85 MMSCF
EUR: 463.72 MMSCF
Cal Day Condensate Bbl/d
Cum: 0.00 MSTB
Cond/Gas1 Ratio - Bbl/MMSCF
Cum: 0.00 MSTB
Oil Rate - Bbl/d
Water Rate - Bbl/d
Cal Day Gas1 - mcf/d
Cal Day Condensate Bbl/d
Cond/Gas1 Ratio - Bbl/MMSCF
1000
100
10
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
Year


NEBU PC 224 (NEBU PC 224) Data: Oct.2005-Apr.2009
Operator: DEVON
Field: NEBU/PICTURED CLIFFS
Zone: X
Type: Gas
Group: None
BASE (Rate-Time)
Qi: 288.227 mcf/d, 2008-01
Qf: 20 mcf/d, 2028-11
Di(Exp): 12.0113% CTD: 517.805 MMSCF
RR: 651.982 MMSCF Tot: 1169.79 MMSCF
Production Cums
Oil: 0 MBBL
Gas: 517.805 MMCF
Water: 0.78 MSTB
Cond: 0.352 MSTB
Oil Rate - Bbl/d
Cum: 0.00 Bbl/d
Water Rate - Bbl/d
Cum: 0.00 Bbl/d
Cal Day Gas1 - mcf/d
Cum: 517.81 MMSCF
BASE - mcf/d
Versus: Year
Relationship: Rate-Time
Qi: 288.23 mcf/d 2008-01
Di (eff. ann.): 12.01 % (Exponential)
Qf: 20.00 mcf/d 2028-11
RRt: 651.98 MMSCF
EUR: 1,169.79 MMSCF
Cal Day Condensate - Bbl/d
Cum: 0.35 MSTB
Cond/Gas1 Ratio - Bbl/MMSCF
Cum: 0.35 MSTB
Oil Rate - Bbl/d
Water Rate - Bbl/d
Cal Day Gas1 - mcf/d
Cal Day Condensate - Bbl/d
Cond/Gas1 Ratio - Bbl/MMSCF
2005
2007
2009
2011
2013
2015
2017
2019
2021
Year

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OGIP - Recovery Factor

	Cum Prod (MMCF)	Decline Curve EUR (MMCF)	OGIP Volumetric (MMCF)	% Recovery
NEBU 223	334	712	1863	38%
NEBU 241	178	450	1342	34%
NEBU 333	285	464	1382	34%
NEBU 224	518	1170	2332	50%
TOTAL	1315	2796	6919	40%

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Volumetric Calculation Support

- Log analysis for volumetric calculation properties (Sw, net pay, etc.) was done using PC openhole logs from DK wells on the same location for the 223 and 224. Digital logs were available for the 223. The Sw and net/gross numbers calculated from these two wells were applied to the 241 and 333. The 241 has a cased hole pulsed nuetron log through the PC. The 333 has a Cased hole neutron log only.

- Initial Reservoir pressure data calculated (from average gradient) from area wells that had initial bottom hole pressure measurements taken.

- Gas sample data taken from 241,224 wells and average properties applied.

- The shaly sand log analysis method that was applied uses Simandoux (1963) Sw equation for shaly sands. An example of this method in practice is shown for the Pictured Cliffs in the 2nd edition of the AAPG publication "Basic Well Log Analysis" by George Asquith and Daniel Krygowski.

- Rw values used were based on Pictured Cliffs water samples taken in NEBU. The Rw values are variable so an average value was used (Rw = 0.65 at 120 F)

$$GIP = 43560 \cdot A \cdot h \cdot \phi \cdot \left(1 - S_w\right) \cdot B_g$$

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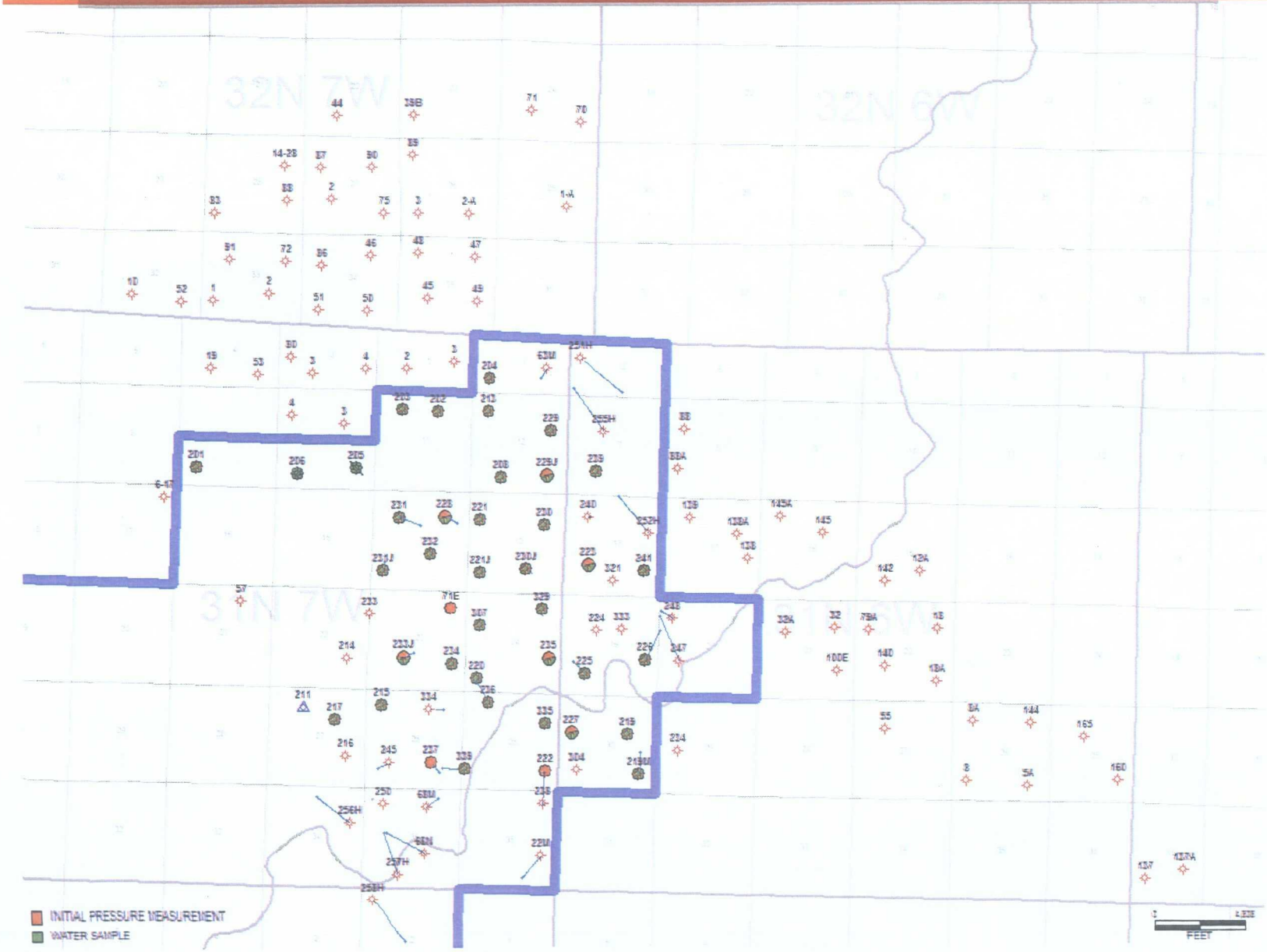
Volumetric Calculation Support



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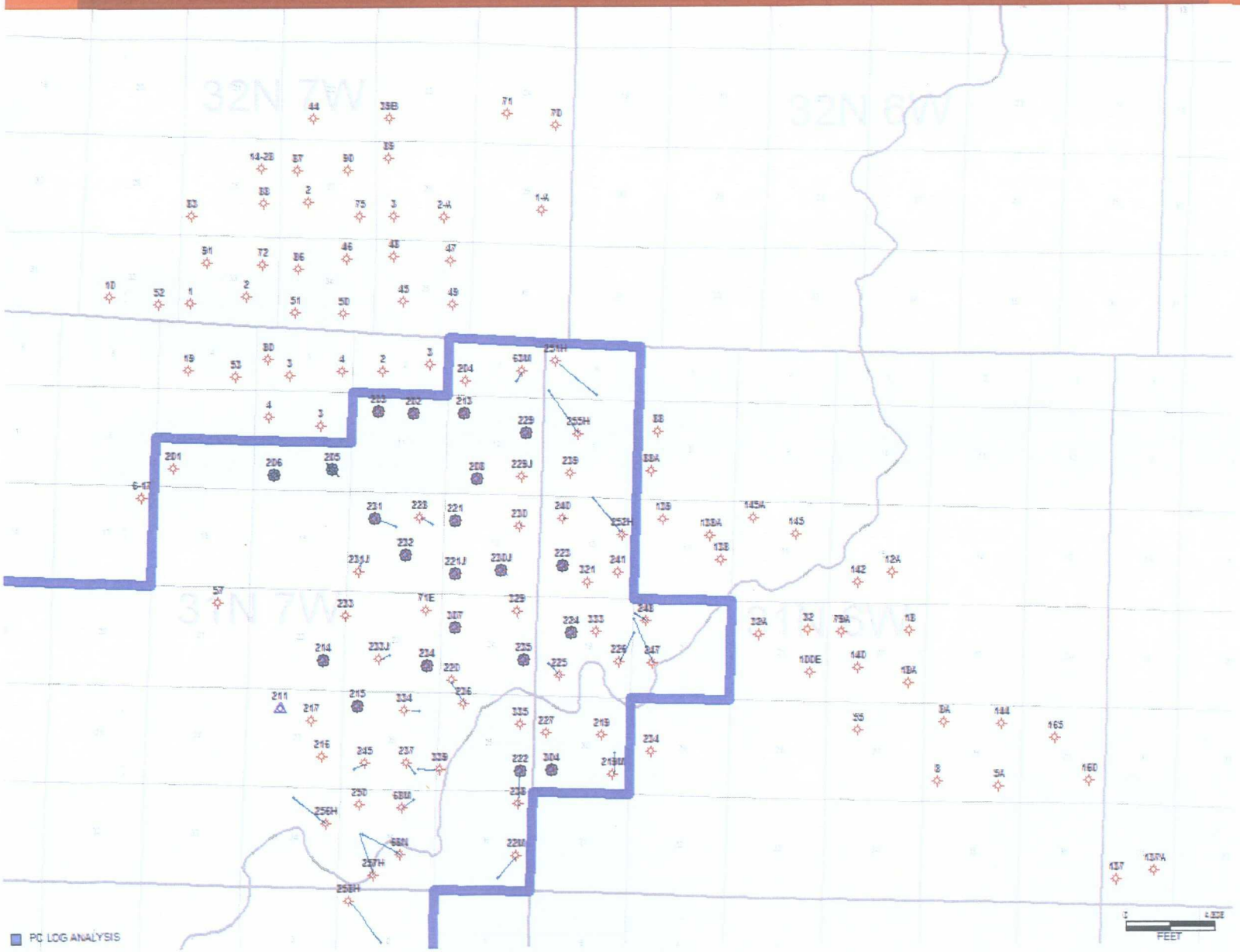
Volumetric Calculation Support



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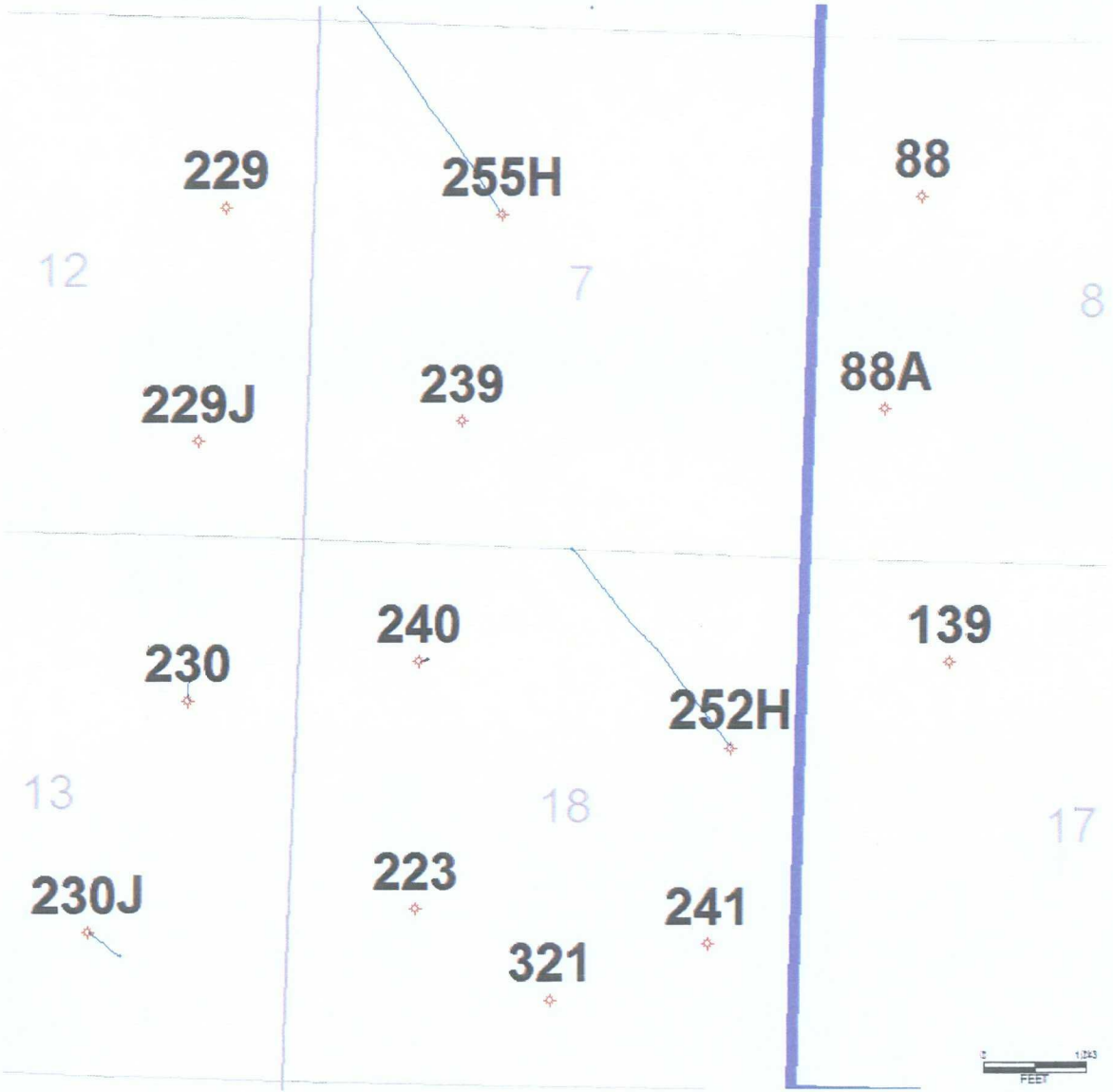
NEBU Horizontal PC Review



- 252H Has lateral length of 1594' and was completed with 3 fracs. Has EUR 1.7x average vertical offset

- 255H Has lateral length of 1467' and was completed with 3 fracs. Has EUR 2.8x average vertical offset

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