

NEBU Pictured Cliffs Infill Application

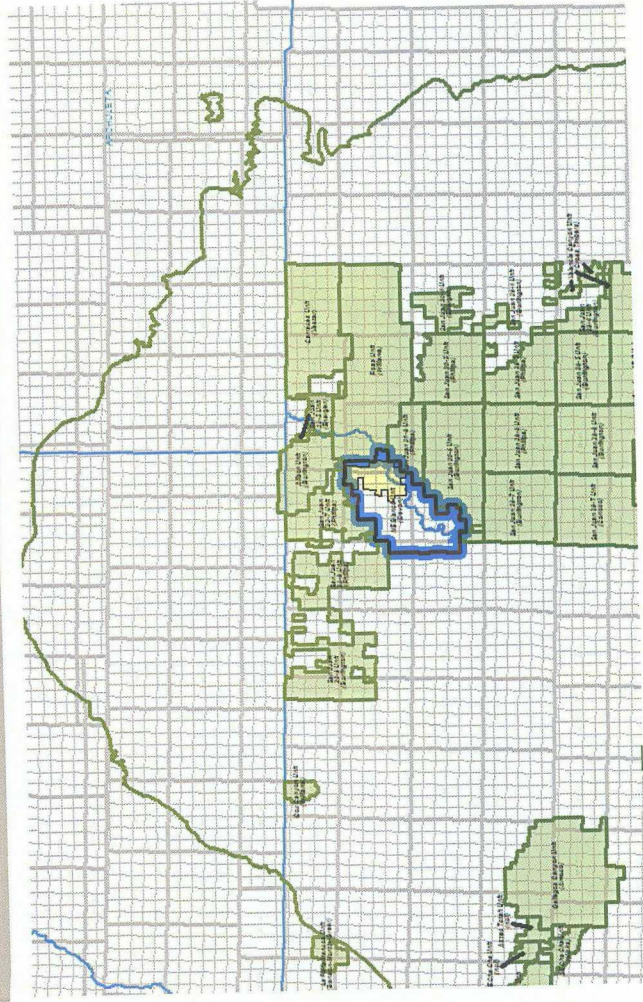
Overview

- ❖ Applying for pilot PC infill project within a portion of NEBU so that PC field rules match existing Mesaverde field rules.
- ❖ Two wells per 160 Acre, 660' from PA boundary, 10' from internal section lines etc.
- ❖ Intent is to commingle with infill MV wells, no additional surface disturbance will occur.
- ❖ Infill Pilot recompletion approved primarily on basis of drainage area calculations. Hearing held 6/2/2009, pilot was approved 7/28/2009.
- ❖ Recompletion Done 9/2009. Well has been producing for 14 months and has produced 207 MMCF. No interference has been seen in offset wells.
- ❖ Pressure tests and production from NEBU 321 will be shown to justify rule change.
- ❖ Received letter of support for this project from the BLM on 8/31/2010.
- ❖ Returned DK/MV intervals in the well to production on 9/2010, PC currently producing up the tubing casing annulus.

Oil Conservation Division
Case No. 6
Exhibit No. 6

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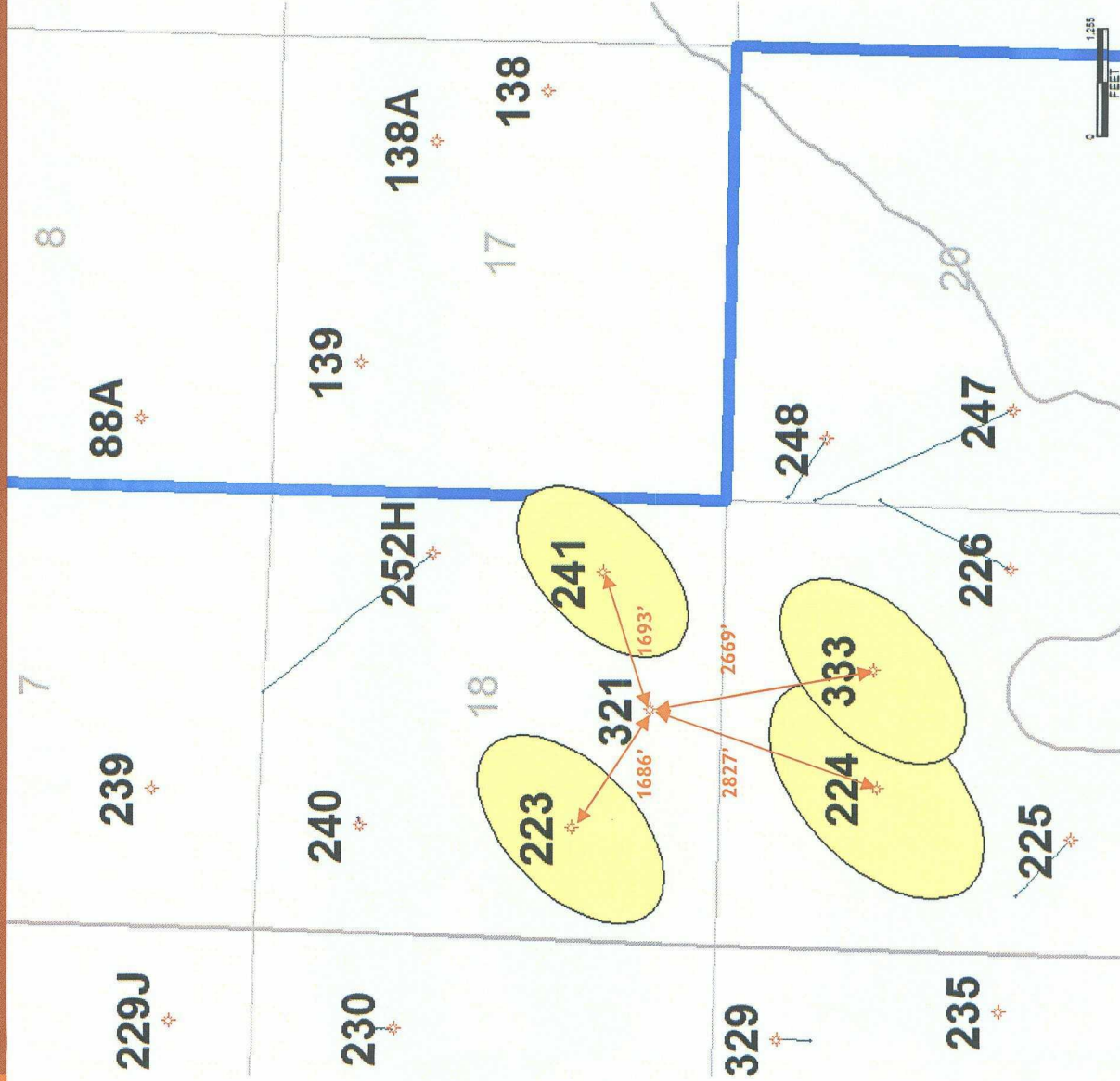
Geology Overview



- ❖ 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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Pilot Location/Selection Criteria



❖ Existing well is approximately centered among 4 commercial PC producers

❖ Recompletion would allow for cheap production/pressure test to determine if infill is justified with no new surface impact.

❖ Very few DK/MV wells drilled off pattern with PC.

❖ NEBU 321 well had a lower rate than the other location (344M) where infill recompletion was possible

NEBU 321 PC Infill Recompletion

Drainage Area Calculation Review

- ❖ Decline Curve EUR vs volumetric OGIP calculations were made for 13 wells in the area where openhole logs were available
- ❖ These calculations resulted in an average drainage area of 100 Acres and an average Recovery Factor of 50%
- ❖ Decline Curve EUR vs volumetric OGIP calculation showed only 40% of GIP would be recovered from the wells offsetting the NEBU 321.
- ❖ Specific examples and details on the methods used to make these calculations were given in the NEBU 321 pilot presentation.
- ❖ Production and pressure test results from the NEBU 321 recompletion give us more confidence in the drainage calculations and justify a larger pilot area.

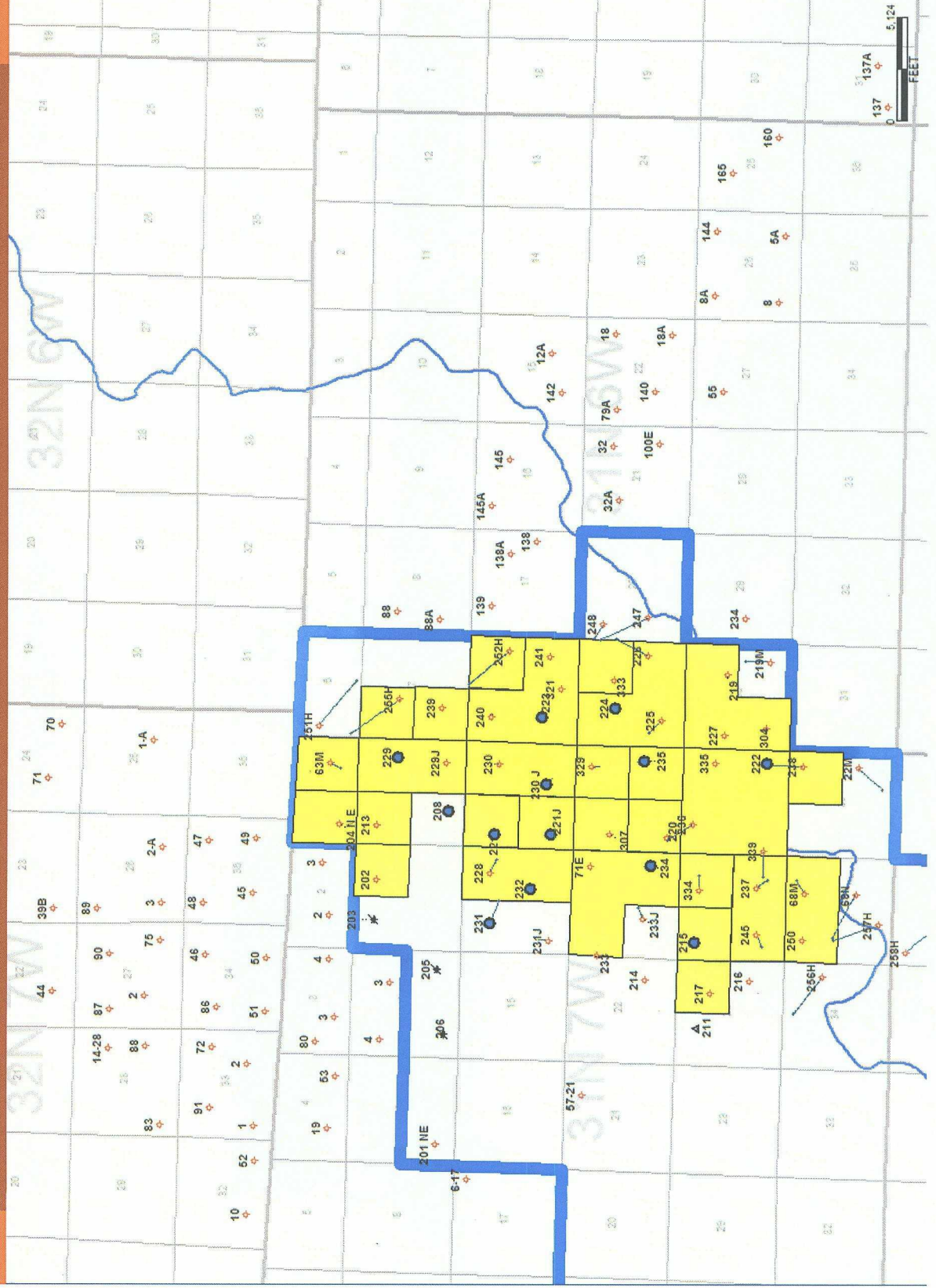
NEBU 321 PC Infill Recompletion

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%

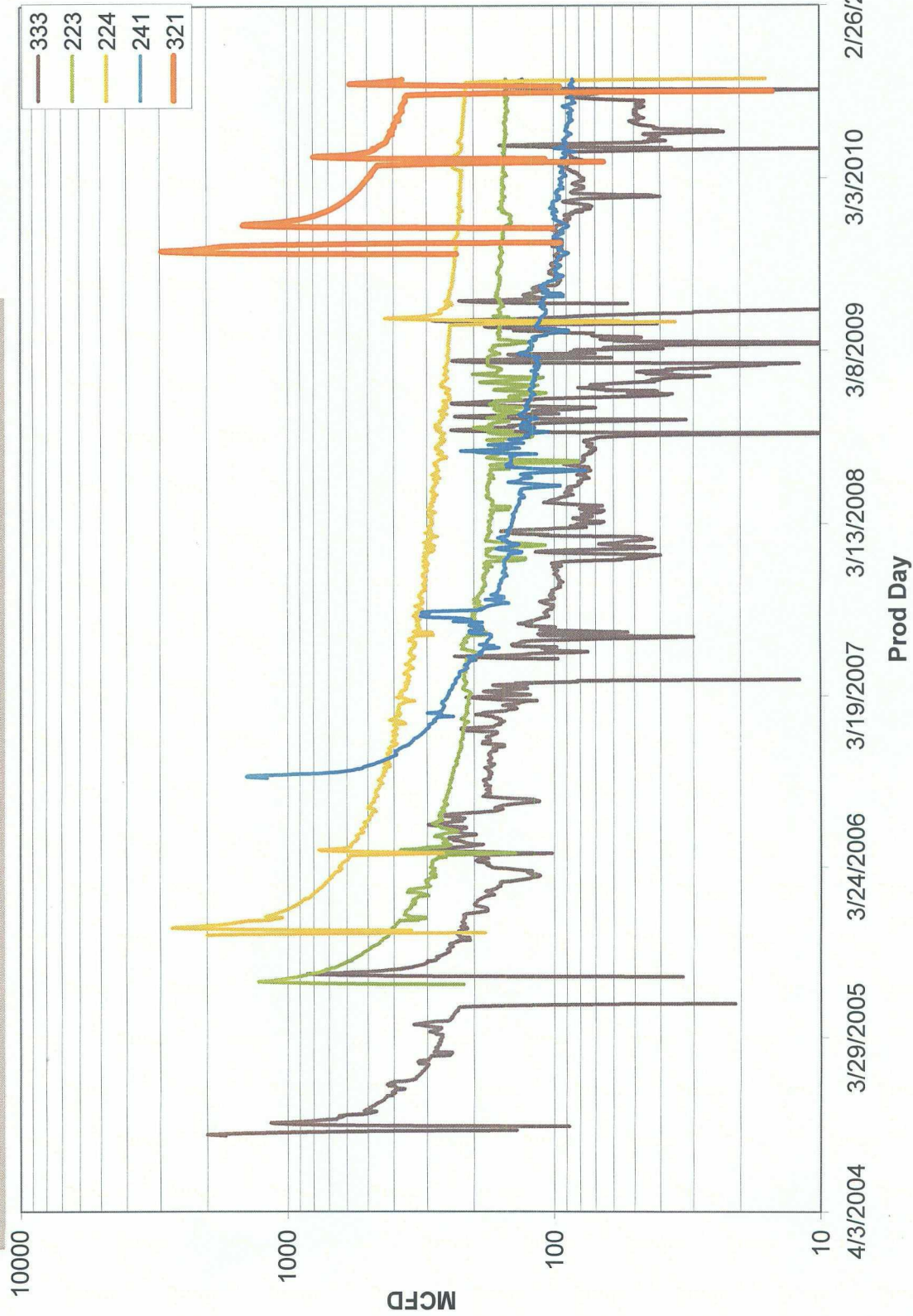
NEBU 321 PC Infill Recompletion

Volumetric Calculation Support



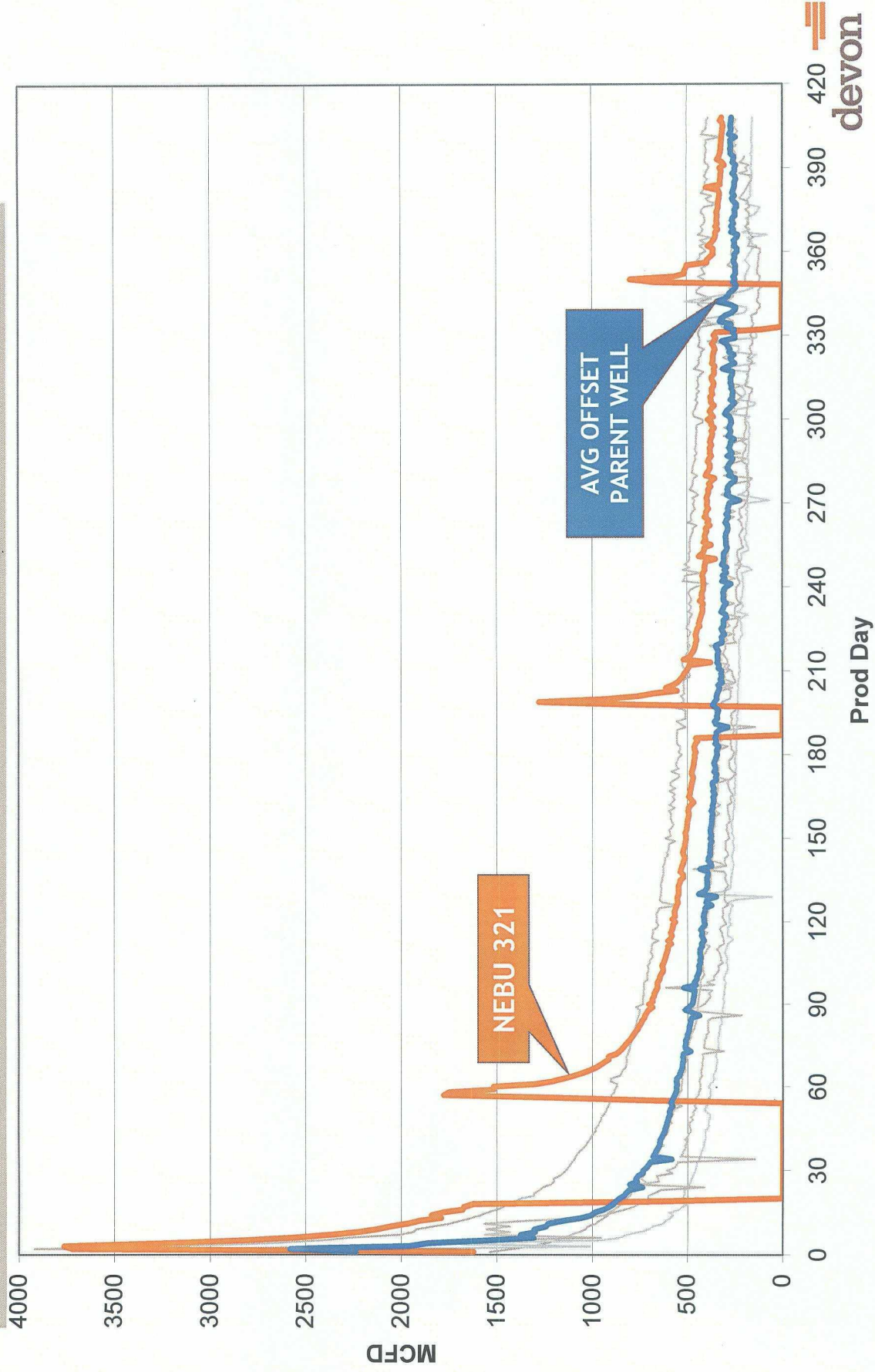
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NEBU 321 PC Production Results



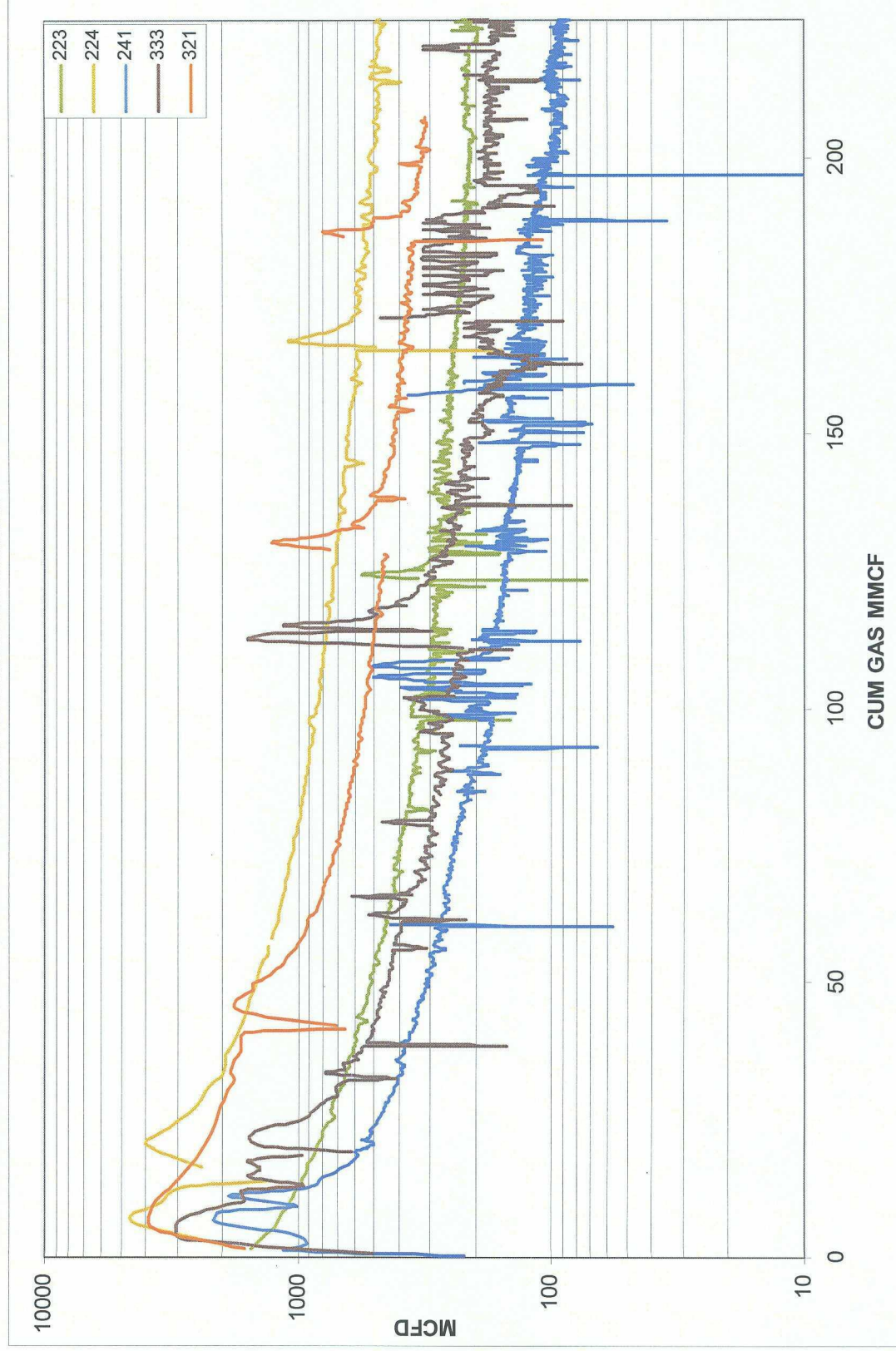
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NEBU 321 PC Production Results



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NEBU 321 PC Production Results



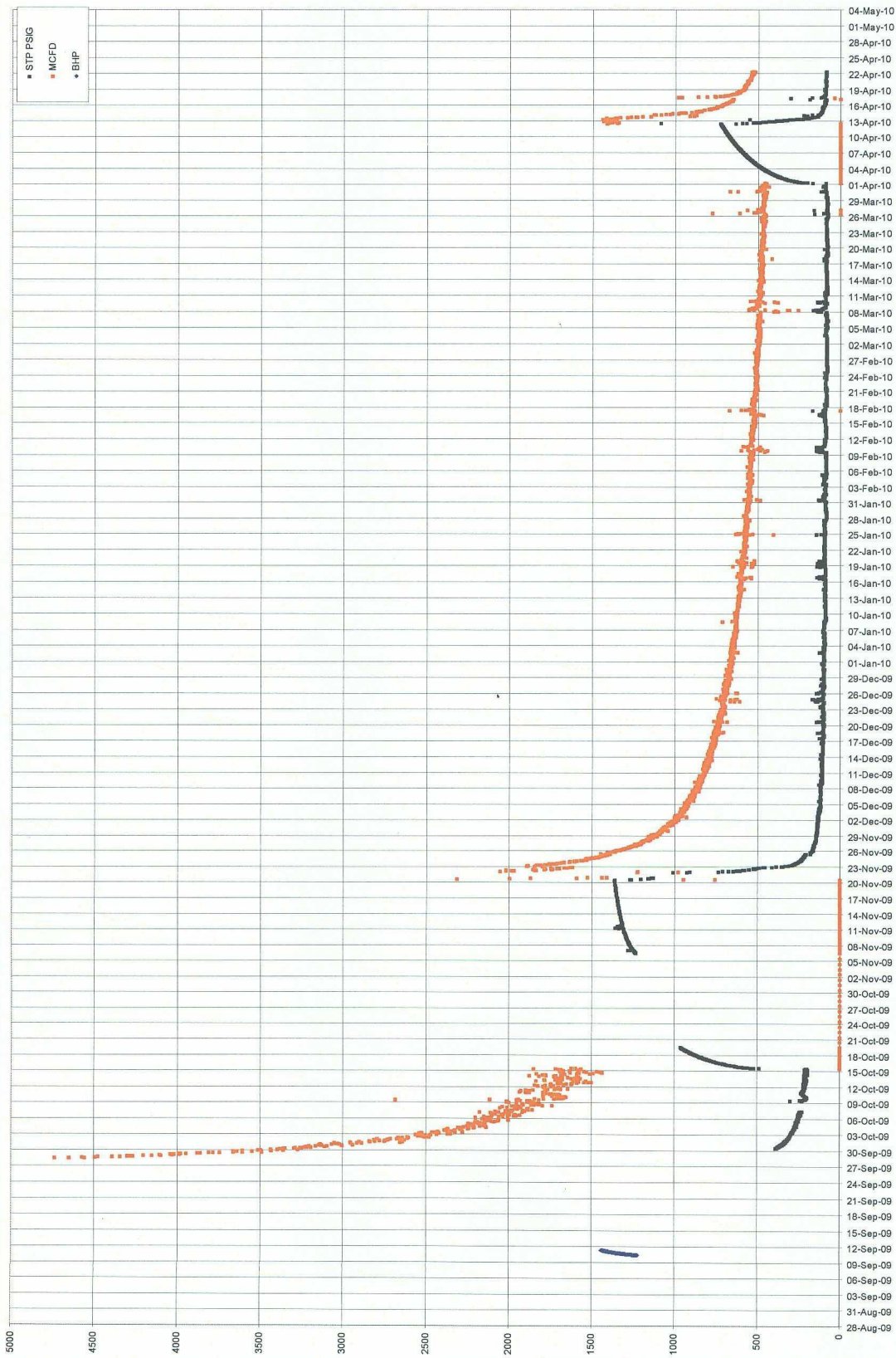
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NEBU 321 PC - Pressure Test Summary

- ❖ 9/9/2009 - Checked initial pressure after perforating (before frac). Ran BHP gauges and monitored for 1 day buildup - final pressure of 1420 psig. Pressure was still building at 5 psi/hr.
- ❖ 10/15/2009 - Well shut in for casing squeeze and compressor moves. Monitored surface pressure during shut in until put back online on 11/20/2009. Pressure built up to 1360 psig (1428 psig BHP) after cumulative production of 41 MMCF.
- ❖ 3/31/2010 - Ran BHP gauges for 11 day pressure buildup test, some uncertainty in Well Test Analysis match. Reservoir pressure somewhere between 1390 - 1900 psig.
- ❖ Made comparison to 8 day pressure buildup done at NEBU 224 in 5/2009 to illustrate lack of communication.

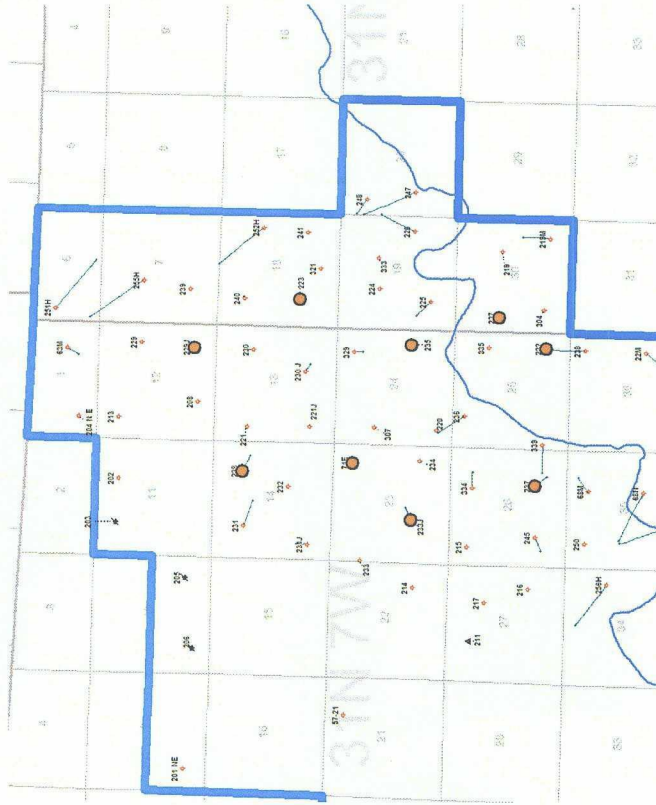
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NEBU 321 PC - Pressure Test Summary



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NEBU 321 PC - Initial Pressure Check



NEBU PICTURED CLIFFS BHP / GRADIENT EVALUATION				
WELL	PRESSURE	MID-PERF	GRADIENT	
	psi	ft		psi/ft
NEBU 222	1485	3221		0.46
NEBU 335	1369	3268		0.42
NEBU 71E	1687	3639		0.46
NEBU 229J	1614	3526		0.46
NEBU 223	1519	3460		0.44
NEBU 237	1384	3322		0.42
NEBU 233J	1529	3413		0.45
NEBU 228	1464	3447		0.42
NEBU 227	1430	3378		0.42
NEBU 235	1548	3460		0.45
AVERAGE	1503			0.44
NEBU 321	1440	3364		0.43

RED = MEASURED BHP

BLACK = SURFACE SIP CORRECTED TO BHP

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NEBU 321 PC - Buildup Comparison

