
VF Petroleum Inc
Lea County Production Review

- *Conclusions*
- *Methodology*

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V- F Petroleum Inc.

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Overview and Preliminary Conclusions

VF LP

Overview and Preliminary Conclusions

An independent consulting firm has performed a technical review of production uplift seen between 1mi and 2mi laterals drilled in Lea County, NM for review by VF Petroleum, LP ("VF").

- **Project Scope** – VF Petroleum engaged an independent consulting firm to review production performance from modern Bone Springs horizontal wells as it pertains to Completed Lateral Length ("CLL") in Lea county, NM. The consultant reviewed 1mi, 1.5mi, and 2mi laterals to determine the proper scaling factor observed as operators drill longer laterals.
- **Preliminary Review** – The work to date has focused on a high level review of production uplift seen in long laterals and should be considered preliminary. Further in-depth analysis of geology, log analysis, depletion from offsets, and completion design is warranted to finalize the conclusions.
- **Methodology** – The consultant used 3 different methods to review production uplift seen in 2mi laterals
 - **I) Aggregation Method** - The consultant aggregated all horizontal wells by lateral length, and compared the average uplift seen in the average of all of the 2mi laterals as it compares to the average of all of the 1mi laterals, organized by landing zone
 - **II) Township Aggregation Method** – The consultant looked at individual townships and compared the uplift ratio seen between 1 and 2mi laterals drilled by the same operator with similar completion designs
 - **III) Individual Well Method** - The consultant identified several examples of 1 and 2mi laterals drilled by the same operator, with the same completion design and targeting the same formation that were drilled within the same unit, thereby minimizing variability associated with geology. The consultant compared the production of the two wells to calculate the production uplift and a production scaling factor that can be applied when scaling for lateral length
 - **Cumulative Production vs EUR** – Since EUR is a subjective measurement, The consultant looked strictly at the actual cumulative production to date for each well
 - **Data Requirements** – To ensure the dataset was statistically relevant, The consultant filtered the horizontal wells to 1) drilled in Lea county 2) completion date of 2015 or newer 3) completion intensity of 1500#/ft of proppant or larger and 4) minimum CLL of 3,000'
- **Takeaways** – The consultant observed the following:
 - **Bone Springs** – 18 2mi laterals have been drilled in Lea county with modern completion designs. The average uplift of the 2mi vs a 1mi lateral scales to a production ratio of 0.85:1, based on actual production data and comparing the average 1mi vs the average 2mi
 - **Wolfcamp** – The consultant has not identified any 2mi laterals with reported production that have been drilled in Lea county, therefore no analysis was performed for the Wolfcamp
 - **Geology** – Across the entire county, one should assume that the rock quality will vary dramatically, which will obviously have an impact on the production uplift and scaling factors observed. The individual comparisons of offsetting wells should minimize the impact from geology
 - **Risk Factors** – Several reasons can account for the less than 1:1 production scaling, including 1) poor frac treatment at the toe of a 2mi lateral 2) difficulty drilling and staying in zone and 3) production difficulties with effectively lifting fluids out of a 2mi long lateral

County-Wide Analysis

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2nd and 3rd Bone Springs Hz Wells – Lea County

- The consultant created a time vs cum oil plot for all 2nd and 3rd Bone Springs horizontal wells based on the following criteria:
 - 2015 or greater completion date
 - 1500#/ft or greater proppant concentration
 - Minimum 3,000' CLL

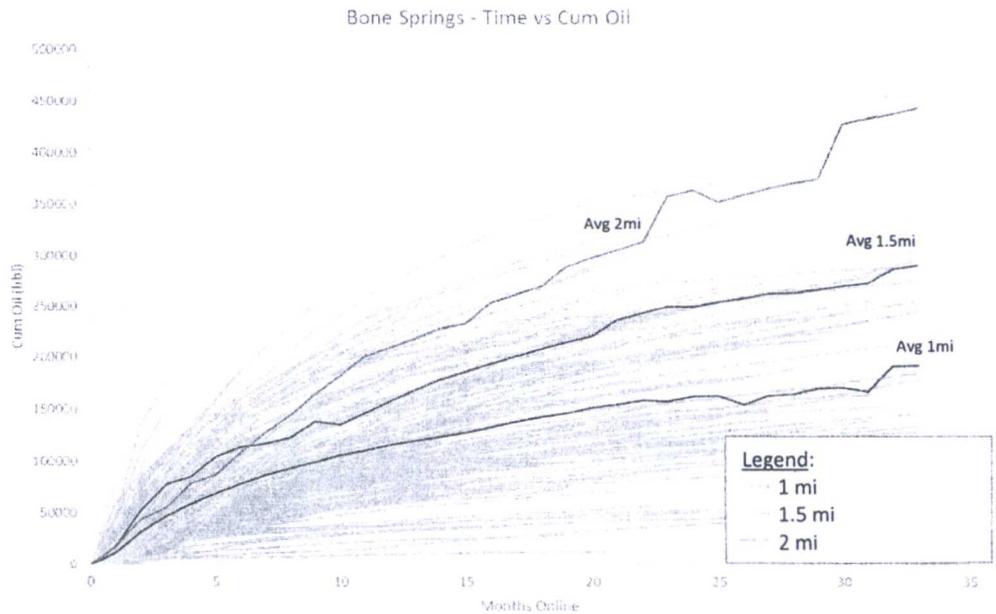
- The wells were color coded for 1mi, 1.5mi, and 2mi laterals in blue, green, and orange, respectively. The darker line is the average for each lateral length grouping

- At month 18 (majority of wells still producing, statistically relevant dataset), performance breaks down as follows when comparing to 1mi:

	Cum Oil	Scaling for Length	Scaling for Production	Scaling Ratio
1mi	143,569	-	-	-
1.5mi	208,447	1.60	1.45	91%
2mi	271,028	2.23	1.89	85%

- The data suggests the that the 2mi laterals scale at 0.85:1 and not 1:1

2nd and 3rd Bone Springs – Time vs Cum Oil



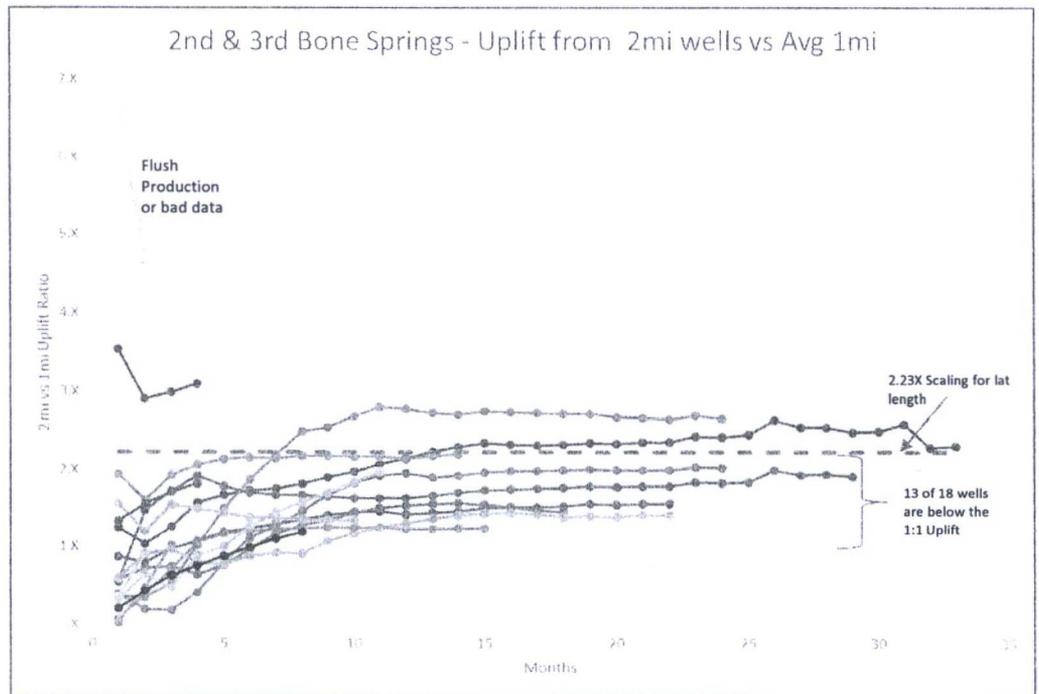
Well counts:

1mi	145
1.5mi	18
2mi	18

2nd and 3rd Bone Springs Hz Wells – Lea County

Bone Springs – Time vs Cum Oil

- ❑ The consultant then looked at each individual 2mi lateral and compared it to the average 1mi lateral (blue line on previous page)
- ❑ This analysis will show the range of performance for the 2mi dataset instead of just looking at the average
- ❑ The plot displays the uplift seen for each individual 2mi lateral as it compares to the average of all of the 1mi laterals
- ❑ The average lateral length uplift is 2.2X (9660' vs 4230'), displayed on the grey dashed line on the graph. For a 2mi lateral to exhibit 1:1 scaling, it should meet or exceed this line
- ❑ The 3rd Bone Springs dataset is inclusive. Many of the 2mi laterals so no uplift to a 1 mile lateral initially, but the uplift ratio is improving (ie production decline is shallower than a 1 mile lateral). EOG has brought on 2 new wells that are greatly exceeding the 2.2X uplift in production but have only been online for 2 months
- ❑ Additionally, the uplift ratio levels off for all wells after approximately 1 yr suggesting the shape of the decline of a 2mi vs 1mi laterals are identical



Township Level Analysis

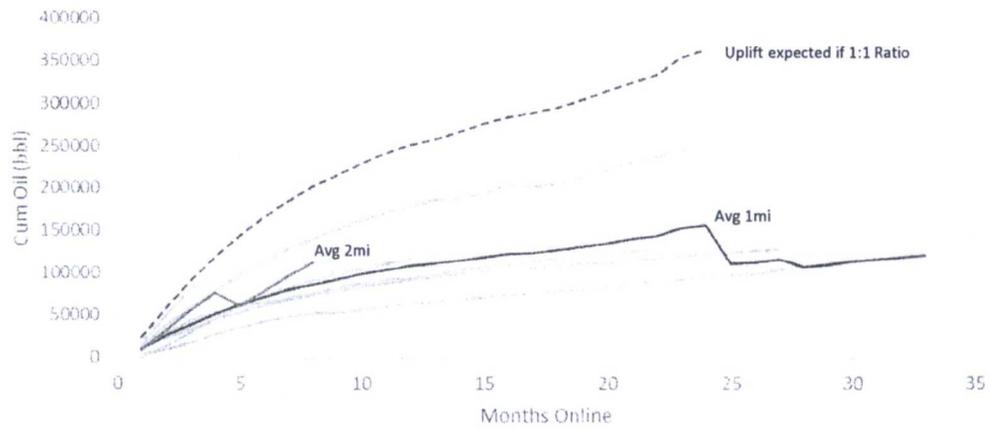
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Township Level Example

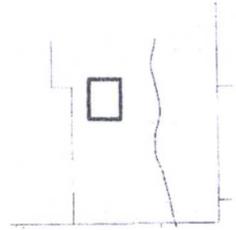
1 vs 2mi – Same Operator Single Township

- The consultant looked at 1mi Bone Springs wells drilled in a township by the same operator, and compared the 2mi actual production to the expected uplift based on scaling 1:1 for lateral length
- Concho has drilled two 2 mile laterals in 21S-33E. One well is slightly below the 1:1 scaling, while the other 2mi lateral is performing in line with the 1mi laterals, with no uplift production seen

Concho 1 vs 2mi Production - 21S 33E



30025420680000 30025429040000 30025409490000 30025410920000
 30025412000000 30025431790100 30025433100000 Avg 1mi
 Avg 2mi 1:1 Uplift

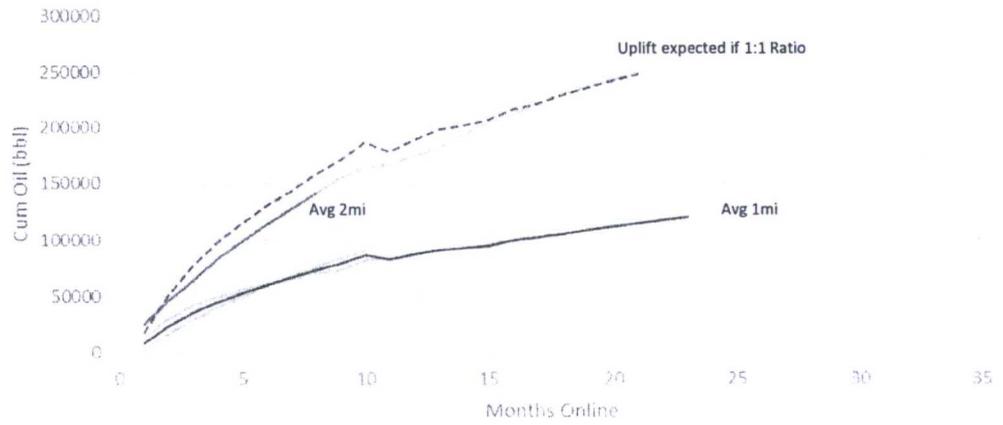


Township Level Example

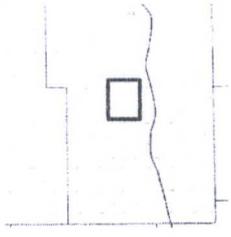
1 vs 2mi – Same Operator Single Township

Concho 1 vs 2mi Production - 21S 34E

- Concho has drilled one 2 mile laterals in 21S-34E. The 2mi lateral eventually matches the 1:1 scaling



30025420610000 30025405560000 10089 Avg 1mi
 Avg 2mi 1:1 Uplift

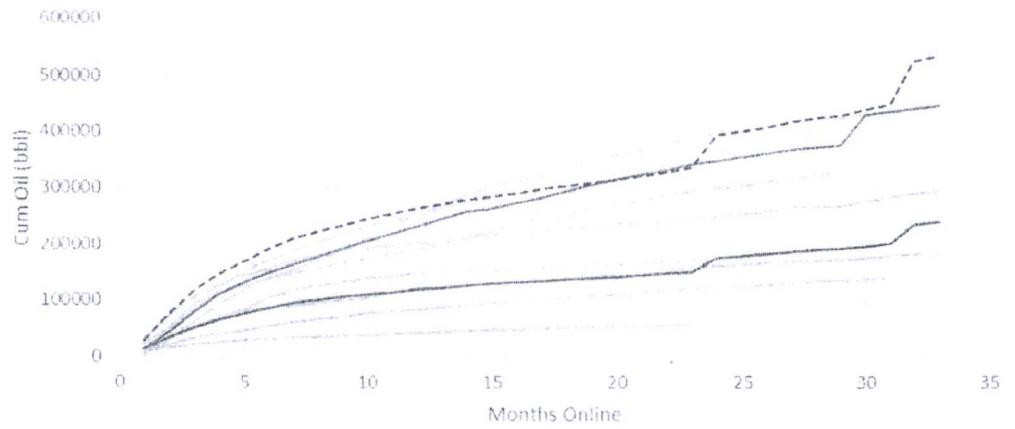


Township Level Example

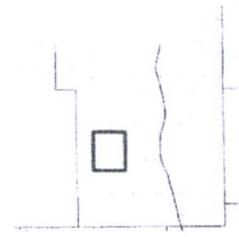
1 vs 2mi – Same Operator Single Township

Concho 1 vs 2mi Production - 24S 32E

- Concho has drilled two 2 mile laterals in 24S-32E. The 2mi lateral starts off below, but eventually reaches a 1:1 scaling factor



30025414140000 30025422910000 30025415350000 30025415340000
 30025417770100 30025414120000 30025414130000 30025418130000
 ——— Avg 1mi ——— Avg 2mi - - - - 1:1 Uplift

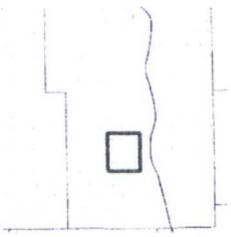
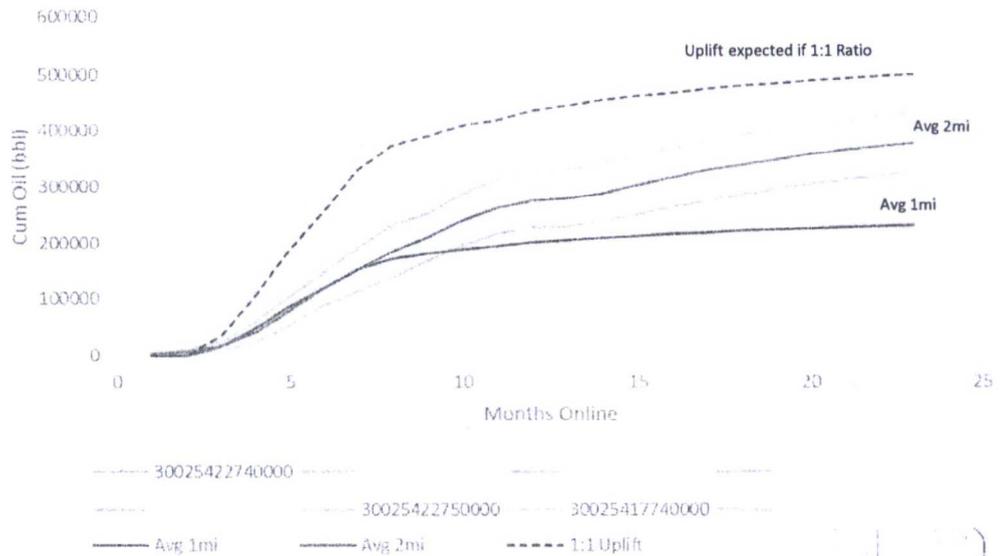


Township Level Example

1 vs 2mi – Same Operator Single Township

Concho 1 vs 2mi Production - 24S 33E

- Concho has drilled two 2 mile laterals in 24S-33E. The 2mi lateral are significantly below the expected 1:1 scaling ratio

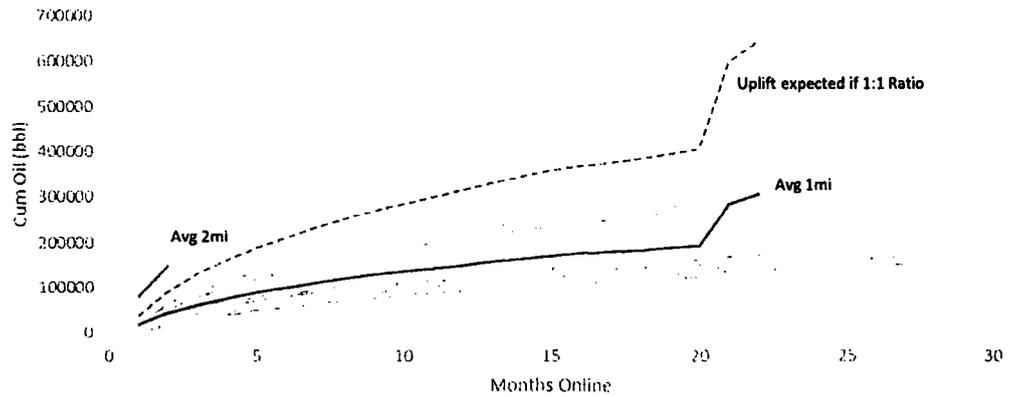


Township Level Example

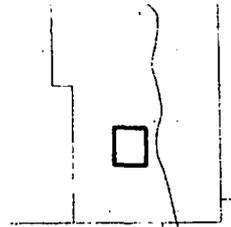
1 vs 2mi – Same Operator Single Township

- EOG has drilled two 2 mile laterals in 24S-33E. The 2mi laterals only have 2 months of production data but currently exceed the 1:1 uplift ratio

EOG 1 vs 2mi Production - 24S 33E



---	300254238860000	300254238700000	300254238600000	---	300254232200000
- -	300254232300000	300254250100000	300254208500000	- -	300254250000000
- -	300254203900000	300254203800000	300254345400000	- -	300254345400000
---		Avg 1mi	Avg 2mi	---	1:1 Uplift

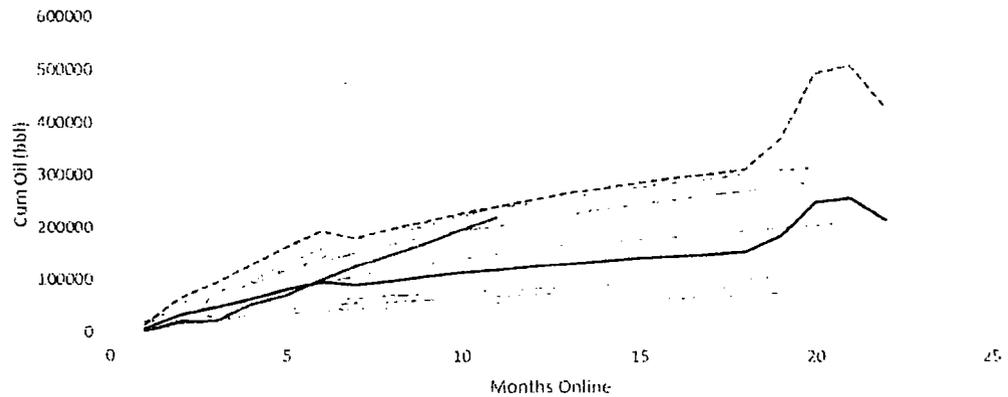


Township Level Example

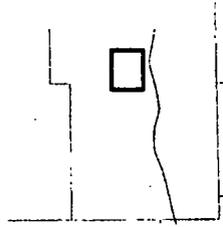
1 vs 2mi – Same Operator Single Township

COG 1 vs 2mi Production - 20S 34E

- Concho has drilled one 2 mile lateral in 20S-34E. The 2mi lateral is below the 1:1 uplift ratio but trending toward it



- - - 30025420350000 30025420340000 - - - 30025420360000 30025420370000
 - - - 30025422950000 30025422930000 - - - 30025420360000 - - -
 - - - 30025412010000
 - - - Avg 2mi - - - Avg 2mi - - - 1:1 Uplift



Individual Well Analysis

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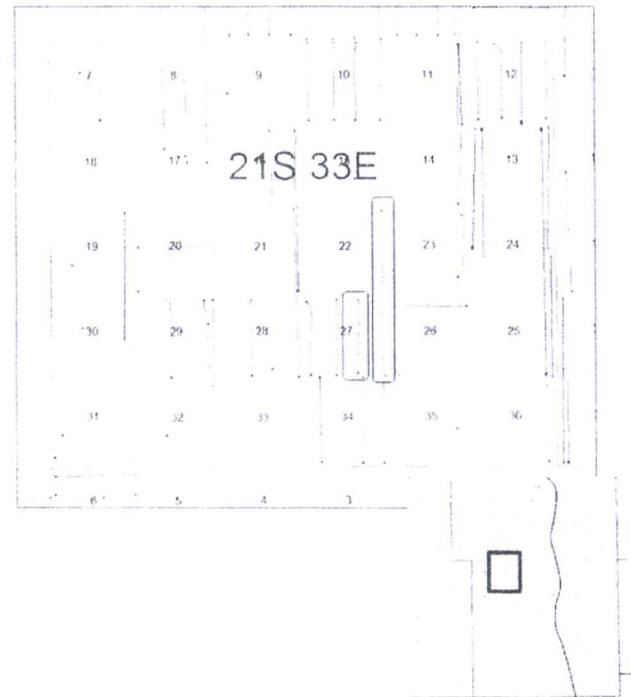
3rd Bone Springs Example

- The consultant then looked at side by side comparisons of individual wells where a modern 1 mile lateral was offset by a 2 mile lateral in the 3rd Bone Springs, and compared the uplift seen
- The resulting dataset is very small. Many times a 2 mile wellbore has a 1 mile offset, but the 1 mile offset is an older vintage well, completed with half as much proppant, making any sort of uplift analysis impossible
- The consultant found 3 examples in the 3rd Bone Springs where:
 - Comparison wells are within 1 mi of each other (similar geology)
 - Same operator
 - Similar completion design and propp/ft
 - Same landing zone
- In this example, Concho drilled the 2 wells 1500' apart in the 3rd Bone Springs.
- The consultant plotted the cumulative oil production for each well. The lateral length uplift of the 2mi lateral is 2.36X, however the cumulative production uplift seen to date is 1.37. This suggests a production scaling factor of only 0.27:1.

Cum Production Comparison

Operator	COG	COG	Lat Length Uplift:
CLL	4129	9739	2.36
Propp/ft	1937	1956	
API	30025420680000	30025437790100	
	1mi	2mi	
Month	PYGMY 27 STATE 3H	RASPBERRY STATE COM 3H	Production Uplift
1	11759	15644	1.33
2	39118	49394	1.26
3	58790	81026	1.38
4	78579	107705	1.37
5	97124	132582	1.37
6	113388		
7	128262		
8	139235		
9	151023		
10	160713		
11	170088		
12	177943		
13	184542		
14	187107		
15	194002		
16	200527		
17	201125		
18	204449		
19	211730		
20	220493		
21	229532		
22	236850		
23	244048		
24	250502		
25	256969		

Well Locator



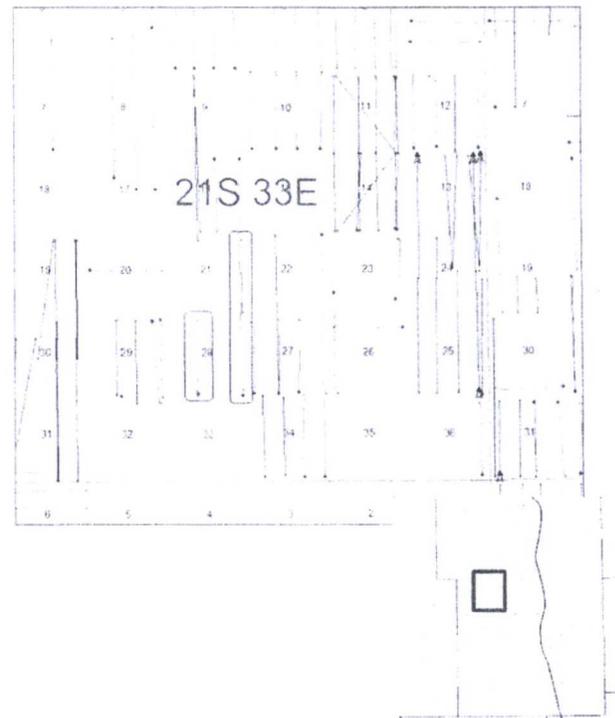
3rd Bone Springs Example

- In this example, Concho drilled 2 wells 2900' apart in the 3rd Bone Springs.
- The consultant plotted the cumulative oil production for each well. The lateral length uplift of the 2mi lateral is 2.37X, however the cumulative production uplift seen to date is 1.38. This suggests a production scaling factor of only 0.28:1.

Cum Production Comparison

Operator	COG	COG	Let Length Uplift:
CLL	4143	9828	2.37
Prop:ft	1936	1936	
AF:	30025429040000	30025433100000	
	1m	2m	
Month	WARBLER STATE COM 2Y	WARBLER STATE COM 4H	Uplift
1	13811	11596	0.84
2	27222	27437	1.01
3	42322	42302	1.00
4	51298	58826	1.15
5	62594	76263	1.22
6	73465	94166	1.28
7	82728	109851	1.33
8	91032	125545	1.38
9	98376		
10	104451		
11	110601		
12	115851		
13	121498		
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Well Locator



3rd Bone Springs Example

- In this example, EOG drilled 2 wells 1400' apart in the 3rd Bone Springs.
- The consultant plotted the cumulative oil production for each well. The lateral length uplift of the 2mi lateral is 2.12X, however the cumulative production uplift seen to date is 2.2. This suggests a production scaling factor of only essentially 1:1 scaling.
- With such a small dataset, we have not found a conclusive answer as to why some operator's wells look to maintain the 1:1 scaling ratio, but other operator's wells are significantly less than 1:1.

Cum Production Comparison

Operator	EOG	EOG	Lat Length Uplift:
CLL	4945	9652	2.12
Propp/ft	2556	2681	
API	30025423230000	30025434550000	

Month	HEPTUNE 10 STATE COM 502H	HEPTUNE 10 STATE COM 504H	Uplift
1	40698	77772	1.91
2	66352	146799	2.21
3	88198		
4	106944		
5	122656		
6	138259		
7	151700		
8	164712		
9	175651		
10	186647		
11	196795		
12	205415		
13	214277		
14	222500		
15	230655		
16	237465		
17	244417		
18	251304		
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Well Locator

