From: Merrill, Robert C
Sent: Mon Jul 26 14:25:11 2010
To: Thurmond, Benjamin F; Edwards, Michael L
Cc: Tooms, Paul J; Yeilding, Cindy; Baker, Kate H (Swift)
Subject: Bob_Match_25July-ML review Final.ppt
Importance: Normal
Attachments: Bob_Match_25July-ML review Final.ZIP

Michael:
We're going to include the following this morning.
Bob

<<...>>

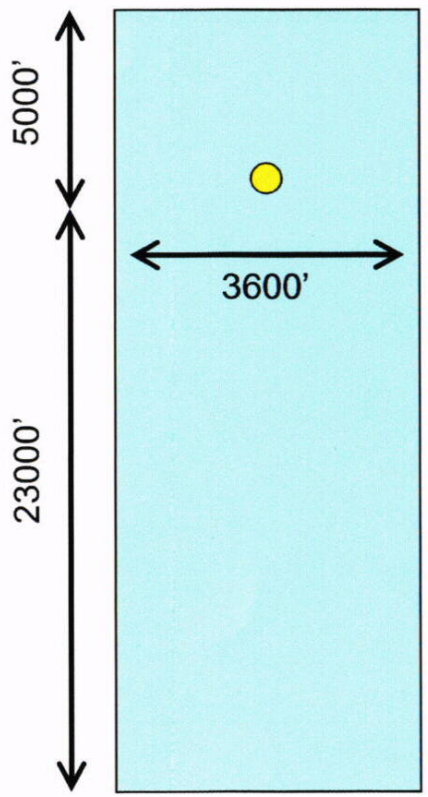
CONFIDENTIAL

Draft: PIE Matches of 25-July

MC252

Rectangular Model – No Aquifer; 45 mbd

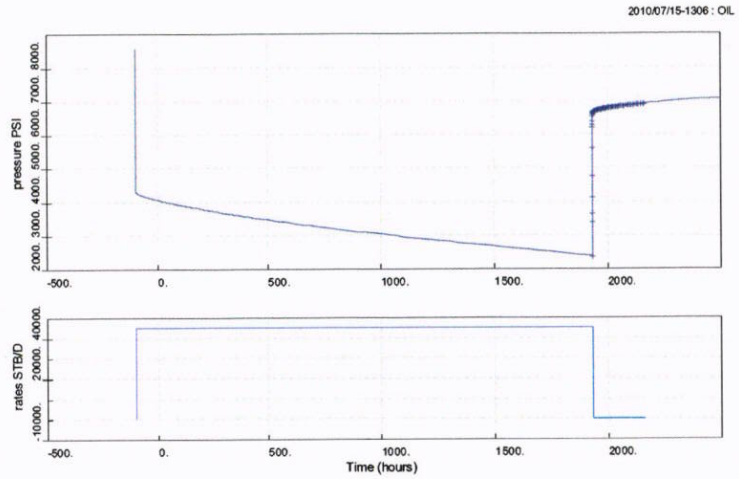
- Simplest model to capture key observations

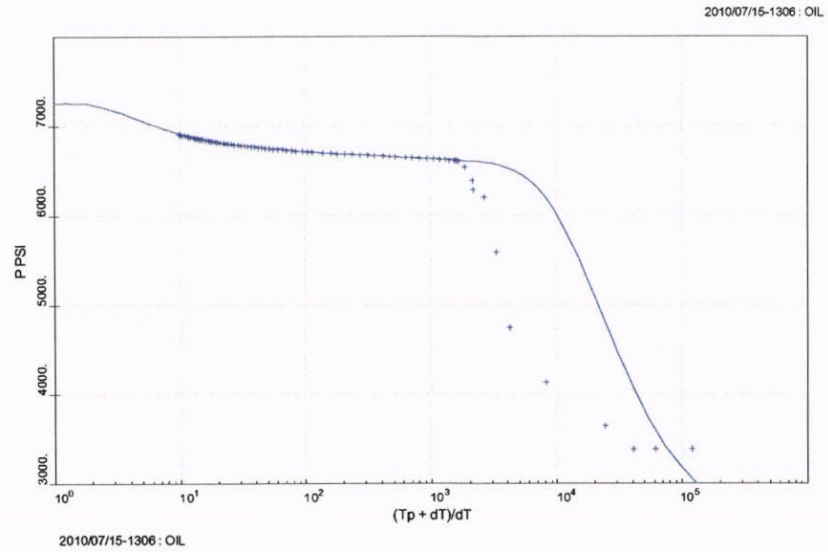


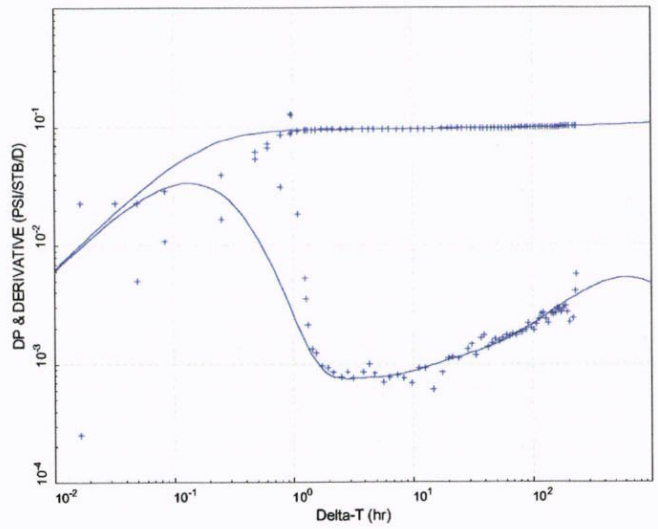
Static Input Data:			
Bo	2.310	rb/stb	
Oil Viscosity	0.210	cP	
Well Bore Radius	0.350	ft	
Gauge Resolution	5.000	psi	
Fluid Compressibility	14	µsips	
Water Compressibility	3	µsips	
Rock Compressibility	6	µsips	
Total	*19*	*µsips*	
Net Thickness	93	ft	Includes M56D, M56E, M56F (v2)
Porosity	21.6%		NetH weighted Average
Water Saturation	12.2%		NetHxPorosity Average
Initial Pressure	11,856	psia	M56E Sand
Initial Pressure (WHP)	8,562		(corrected using 3294 psia)
Model	Linear (homogeneous)		
Wellbore Storage	1.07	bbl/psi	
Permeability	450	mD	
Skin	50.0		
Pi	8,562	psia	
+X	23,000	ft	28,000
-X	5,000	ft	
+Y	1,800	ft	3,600
-Y	1,800	ft	
Pore Volume	2.025E+09	ft3	
H/C Pore Volume	317	mmrb	
Original Oil In Place	137	mmstb	

DRAFT

Rectangular Model – No Aquifer; 45 mbd



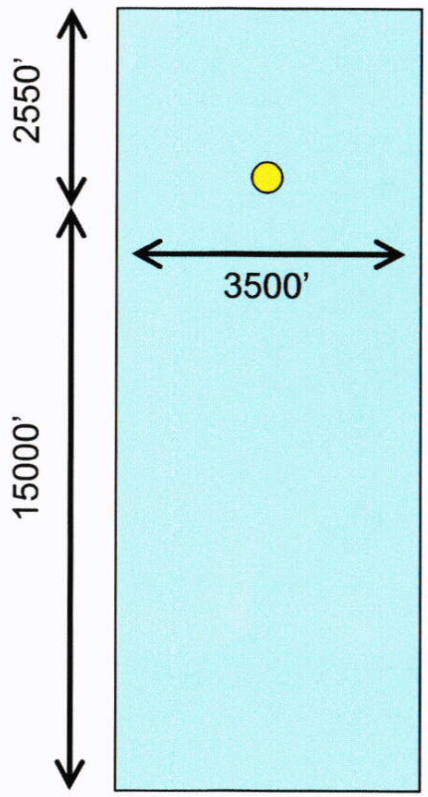




DRAFT

Rectangular Model – No Aquifer; 30 mbd

- Simplest model to capture key observations



Static Input Data:			
Bo	2.310	rb/stb	
Oil Viscosity	0.210	cP	
Well Bore Radius	0.350	ft	
Gauge Resolution	5.000	psi	
Fluid Compressibility	14	µsips	
Water Compressibility	3	µsips	
Rock Compressibility	6	µsips	
Total	*19*	*µsips*	
Net Thickness	93	ft	Includes M56D, M56E, M56F (v2)
Porosity	21.6%		NetH weighted Average
Water Saturation	12.2%		NetHxPorosity Average
Initial Pressure	11,856	psia	M56E Sand
Initial Pressure (WHP)	8,562		(corrected using 3294 psia)
Model	Linear (homogeneous)		
Wellbore Storage	0.51	bbl/psi	
Permeability	280	mD	
Skin	46.0		
Pi	8,562	psia	
+X	15,000	ft	17,550
-X	2,550	ft	
+Y	1,750	ft	3,500
-Y	1,750	ft	
Pore Volume	1.234E+09	ft3	
H/C Pore Volume	193	mmrb	
Original Oil In Place	84	mmstb	

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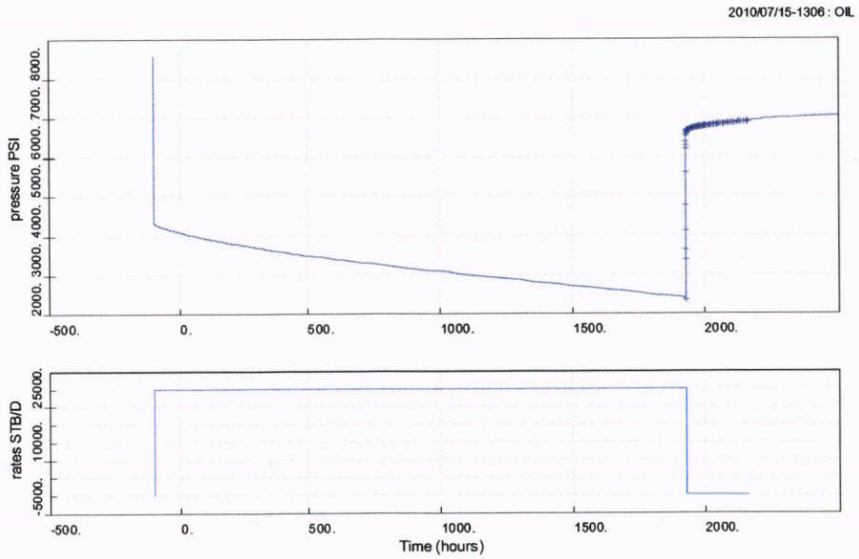
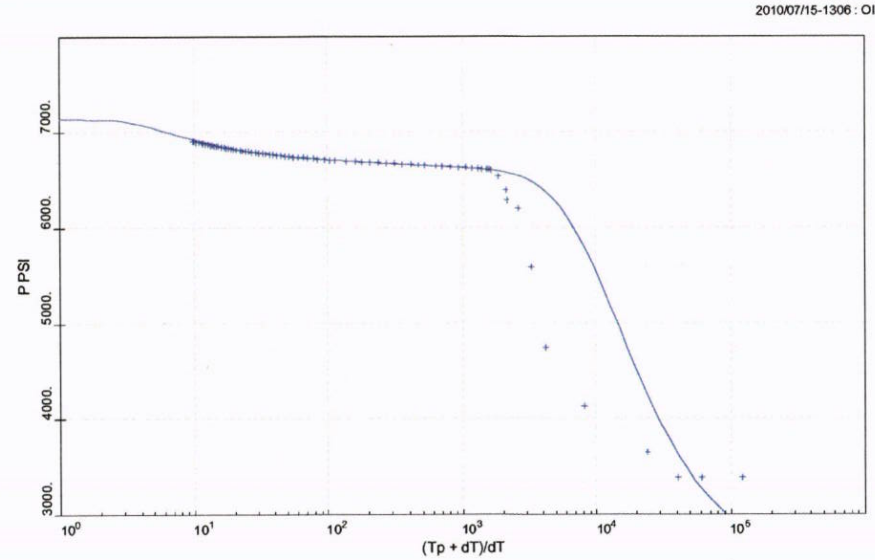
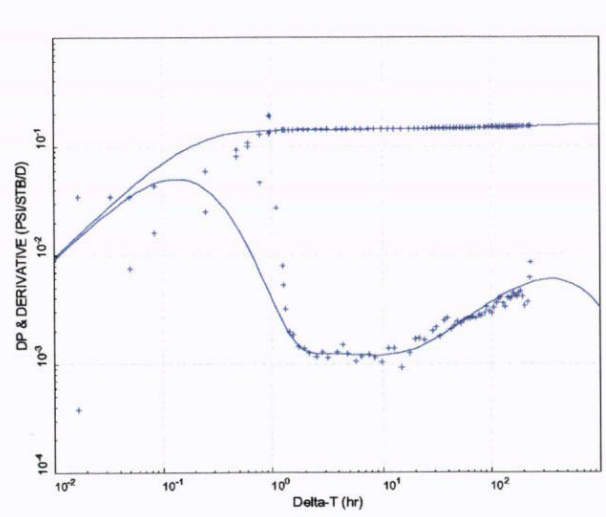
Rectangular Model – No Aquifer; 30 mbd



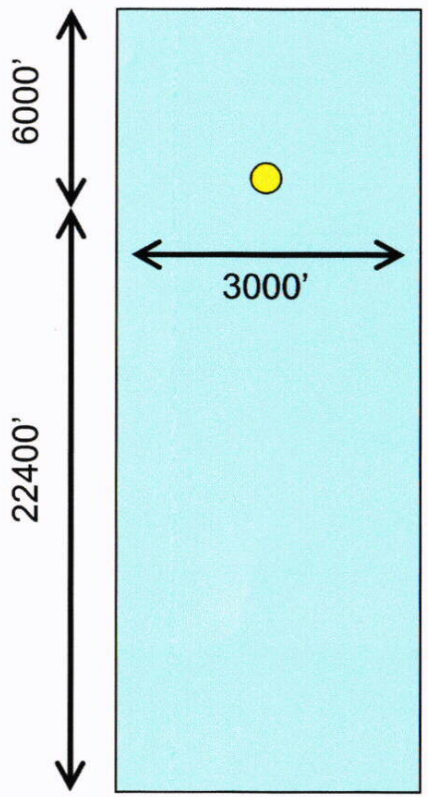




DRAFT

USGS Parameters – Increased C_r, 50 mbd

- Simplest model to capture key observations



Static Input Data:			
Bo	2.350	rb/stb	
Oil Viscosity	0.168	cP	
Well Bore Radius	0.350	ft	
Gauge Resolution	5.000	psi	
Fluid Compressibility	14.6	µsips	
Water Compressibility	3.0	µsips	
Rock Compressibility	14.0	µsips	
Total	*27*	*µsips*	
Net Thickness	90	ft	Includes M56D, M56E, M56F (v2)
Porosity	21.0%		NetH weighted Average
Water Saturation	10.0%		NetHxPorosity Average
Initial Pressure	11,856	psia	M56E Sand
Initial Pressure (WHP)	8,562		(corrected using 3294 psia)
Model	Linear (homogeneous)		
+X	22,400		28,400
-X	6,000		
+Y	1,500		3,000
-Y	1,500		
Pore Volume	1.610E+09	ft3	
H/C Pore Volume	258	mmrb	
Original Oil In Place	110	mmstb	

Note: +/- X split assumed

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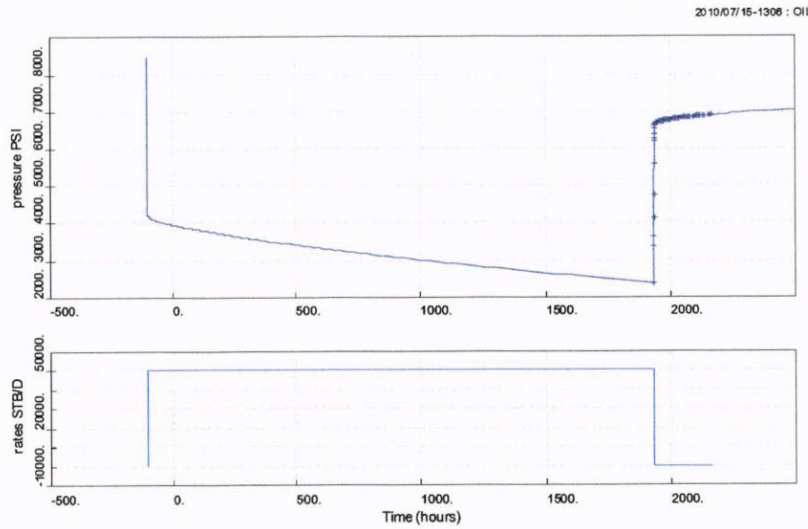
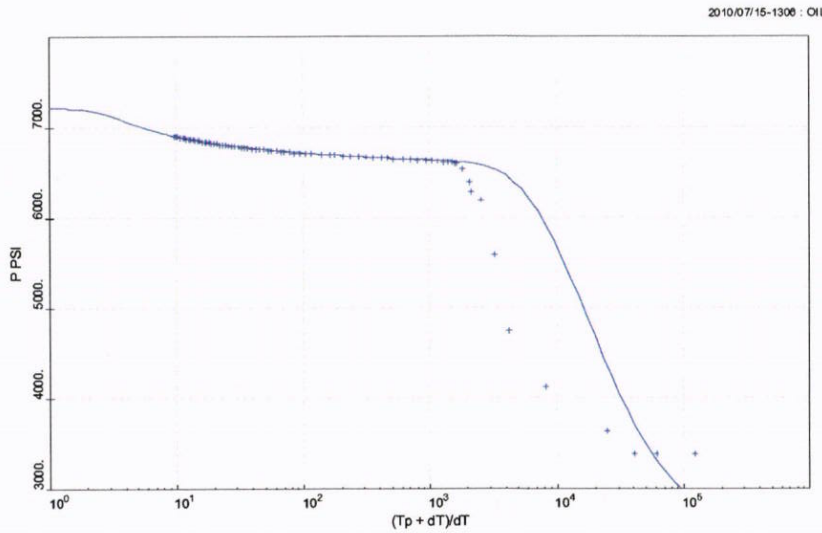
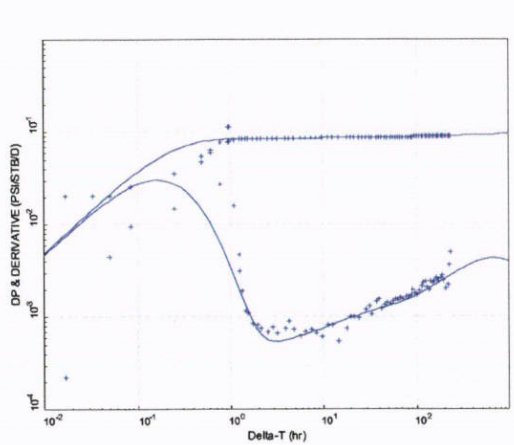
USGS Parameters – Increased C_r, 50 mbd







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Conclusions

- Observed pressure behaviour consistent with "normal" well behaviour:
  - Elongated reservoir
  - Limited support
- Numerous subsurface realisations can match the data reasonably well, considering:
  - Uncertainty in flow rate
  - Uncertainty in connected volume
  - Uncertainty in static parameters (C_r, channel size)
  - Uncertainty in flowing bottom hole pressure
  - Uncertainty in final static bottom hole pressure
- These analyses do not change the previous conclusion that leaks greater than 5mbd would be detectable through the wellhead pressure response.