

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	High K Estimator Spreadsheet				Test Well Specs - "d" not used in confined case																		
2	English Units																						
3					Depth to Bottom of Screen (from toc): 71 ft																		
4	General Test Data				Screen Length (b): 2 ft																		
5	Site Location: Hendry Co.				Depth to Static Water Level (from toc): 5.44 ft																		
6	Date: 10/28/2009				Top of Screen to Water Table (d): 63.56 ft																		
7	Time:				Radius of Well Screen (r _w): 0.083 ft																		
8	Test Designation: HES-22D				Nominal Radius of Well Casing (r _{nc}): 0.500 ft																		
9	Static Level: 5.44 ft				Radius of Transducer Cable (r _{tc}): 0.009 ft																		
10	Initial Water Level				Effective Casing Radius (r _c = (r _{nc} ² -r _{tc} ²) ^{0.5}): 0.500 ft																		
11	Change (H ₀): 0.25 ft				Modified Screen Radius (r _w [*]): 0.055 ft																		
12	Start Time for Test: 1.32 sec				Aspect Ratio (b/r _w [*]): 36.563																		
13					Formation Thickness (B): 150 ft																		
14					Modulation Factor = 3.000																		
15					Unconfined - High-K Bouwer and Rice Model																		
16	Time		Pressure		K _r = t _d ² r _c ² ln[R _d /r _w [*]]																		
17	in		Head		Test		Deviation		Test		Normalized		Dimensionless		C _D =		Adjusted		t [*] 2bC _D				
18	seconds		in feet		Time		From Static		Time		Head		Time		4		Time		ln(R _d /r _w [*]) = 3.365				
19	0.66		5.440		-0.66		0.000		-0.66		0.000		0		1		0		A = 2.661				
20	1.32		5.685		0		0.245		0		1.000		0.1		0.995609		0.3000		B = 0.422				
21	1.98		5.383		0.66		-0.057		0.66		-0.233		0.2		0.984466		0.6000		first term 1.1/(ln((d+b)/r _w [*]))				
22	2.64		5.179		1.32		-0.261		1.32		-1.065		0.3		0.96889		0.9000		0.155				
23	3.3		5.062		1.98		-0.378		1.98		-1.543		0.4		0.950469		1.2000		second term (A+B*(ln((B-(d+b))/r _w [*])))/(b/r _w [*])				
24	3.96		5.100		2.64		-0.340		2.64		-1.388		0.5		0.930295		1.5000		0.142				
25	4.62		5.093		3.3		-0.347		3.3		-1.416		0.6		0.90911		1.8000		ln((B-(d+b))/r _w [*])				
26	5.28		5.086		3.96		-0.354		3.96		-1.445		0.7		0.887423		2.1000		Cannot exceed 6.				
27	5.94		5.080		4.62		-0.360		4.62		-1.469		0.8		0.865578		2.4000		See Butler (1997) - p.108.				
28	6.6		5.073		5.28		-0.367		5.28		-1.498		0.9		0.843806		2.7000						
29	7.26		5.064		5.94		-0.376		5.94		-1.535		1		0.822263		3.0000						
30	7.92		5.058		6.6		-0.382		6.6		-1.559		1.1		0.801051		3.3000						
31	8.58		5.051		7.26		-0.389		7.26		-1.588		1.2		0.780236		3.6000						
32	9.24		5.042		7.92		-0.398		7.92		-1.624		1.3		0.759857		3.9000						
33	9.9		5.035		8.58		-0.405		8.58		-1.653		1.4		0.73994		4.2000		1513.6158				

K_r = 1.87E-02 ft/sec
1.62E+03 ft/day 4.94E+02 m/day
5.71E-01 cm/sec

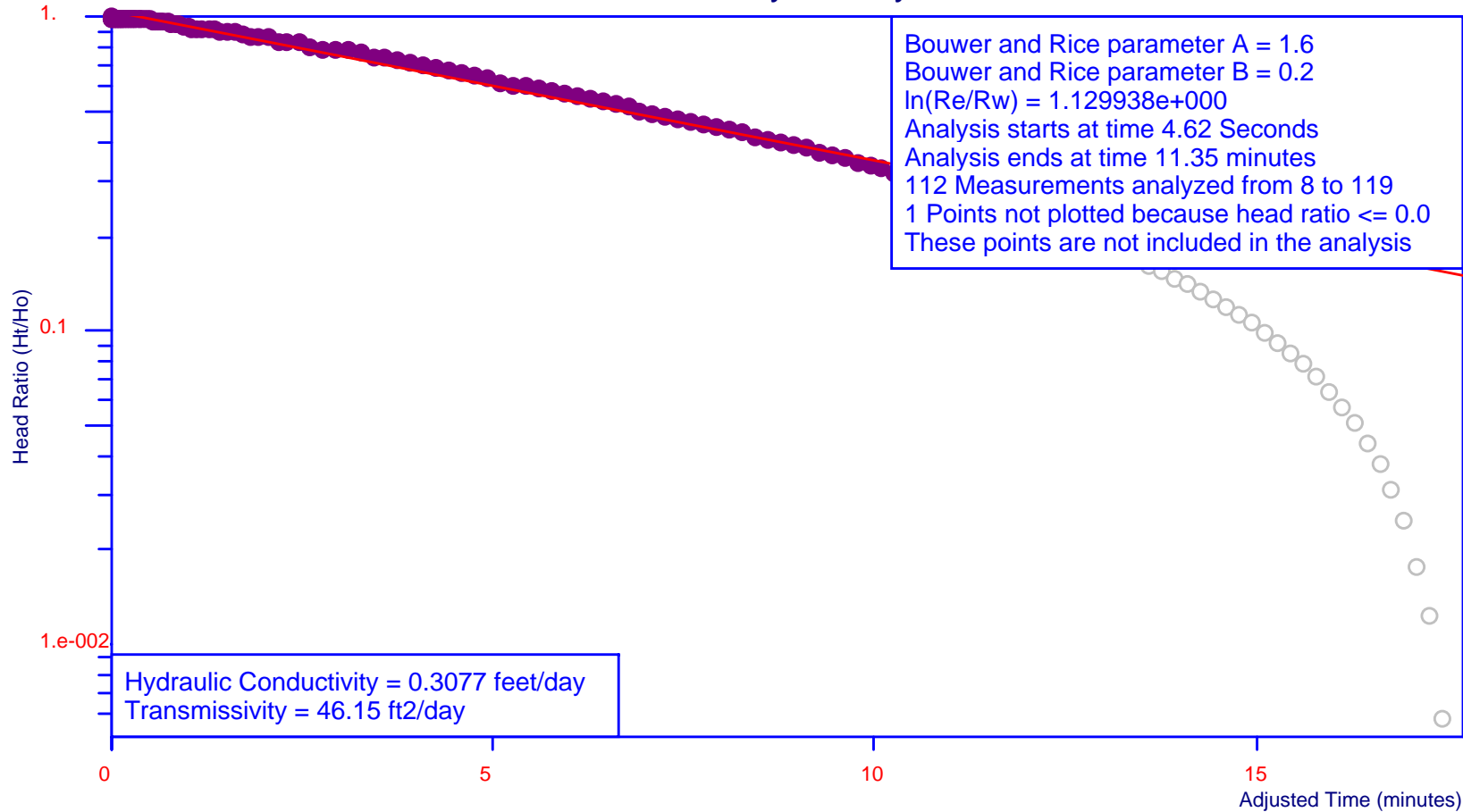
K_r = 1.75E-02 ft/sec
1.51E+03 ft/day 4.61E+02 m/day
5.35E-01 cm/sec

C-139 Basin Study 4/13/10

Bower and Rice Graph

CR 833 ROW- South of Hill Grade Road, Hendry County

HES-23D



Project Number: 38617509 for SFWMD
Analysis by Starpoint Software

Ho is 8.617 feet at 4.62 Seconds

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	High K Estimator Spreadsheet				Test Well Specs - "d" not used in confined case																		
2	English Units																						
3					Depth to Bottom of Screen (from toc): 90 ft																		
4	General Test Data				Screen Length (b): 2 ft																		
5	Site Location: Hendry Co.				Depth to Static Water Level (from toc): 3.5 ft																		
6	Date: 10/22/2010				Top of Screen to Water Table (d): 84.06 ft																		
7	Time:				Radius of Well Screen (r _w): 0.083 ft																		
8	Test Designation: HES-24D				Nominal Radius of Well Casing (r _{nc}): 0.500 ft																		
9	Static Level: 3.50 ft				Radius of Transducer Cable (r _{tc}): 0.009 ft																		
10	Initial Water Level				Effective Casing Radius (r _c = (r _{nc} ² -r _{tc} ²) ^{0.5}): 0.500 ft																		
11	Change (H ₀): 0.74 ft				Modified Screen Radius (r _w [*]): 0.055 ft																		
12	Start Time for Test: 0.66 sec				Aspect Ratio (b/r _w [*]): 36.563																		
13					Formation Thickness (B): 150 ft																		
14					Modulation Factor = 7.100																		
15					Unconfined - High-K Bouwer and Rice Model																		
16					K _r = t _d ² r _c ² ln[R _d /r _w [*]] t ² 2bC _D																		
17					C _D = 0.9																		
18					Adjusted Time																		
19					ln(R _d /r _w [*]) = 3.431																		
20					A = 2.661																		
21					B = 0.422																		
22					first term 1.1/(ln((d+b)/r _w [*]))																		
23					second term (A+B*(ln[(B-(d+b))/r _w [*]]))/(b/r _w [*])																		
24					0.149																		
25					0.142																		
26					6.000																		
27					Cannot exceed 6.																		
28					See Butler (1997) - p.108.																		
29					K _r = 3.35E-02 ft/sec																		
30					2.90E+03 ft/day																		
31					1.02E+00 cm/sec																		
32					2898.407																		

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W																								
1	High K Estimator Spreadsheet				Test Well Specs - "d" not used in confined case																																										
2	English Units				Depth to Bottom of Screen (from toc):										92	ft		Best Fit		Confined - High-K Hvorslev Model																											
3					Screen Length (b):										2	ft		Time		Type Curve																											
4	General Test Data				Depth to Static Water Level (from toc):										5.71	ft		Correlation Ratio		C _D		K _v = $t_d^* r_c^2 \ln[b/(2r_w^*) + (1 + b/(2r_w^*)^2)^{0.5}]$																									
5	Site Location:				Hendry Co.										Top of Screen to Water Table (d):										84.29	ft		t [*] /t [*]		1.2		t [*] 2bC _D															
6	Date:				10/28/2009										Radius of Well Screen (r _w):										0.083	ft		0.100																			
7	Time:														Nominal Radius of Well Casing (r _{nc}):										0.500	ft				Bracketted quantity		36.590															
8	Test Designation:				HES-25D										Radius of Transducer Cable (r _{tc}):										0.009	ft		computed from ratio		Le = 3220.00		ft															
9	Static Level:				5.71										Effective Casing Radius (r _c = (r _{nc} ² - r _{tc} ²) ^{0.5}):										0.500	ft		nominal		Le = 120.29		ft		K _v = 1.87E-02 ft/sec 1.62E+03 ft/day 4.94E+02 m/day 5.71E-01 cm/sec													
10	Initial Water Level														Modified Screen Radius (r _w [*]):										0.055	ft		% difference		2577%																	
11	Change (H ₀):				0.02										Aspect Ratio (b/r _w [*]):										36.563																						
12	Start Time for Test:				7.92										sec										Formation Thickness (B):										150	ft		Modulation Factor =		10.000		Unconfined - High-K Bouwer and Rice Model					
13																																							K _v = $t_d^* r_c^2 \ln[R_e/r_w^*]$								
14					Time										Pressure																t [*] 2bC _D																
15					in										Head																																
16					seconds										in feet										Test Time		Deviation From Static		Test Time		Normalized Head		Dimensionless Time		C _D = 1.2		Adjusted Time										
17					0.66										5.712										-7.26		0.002		-7.26		0.100		0		1		0		ln(R _e /r _w [*]) = 3.432								
18					1.32										5.712										-6.6		0.002		-6.6		0.100		0.1		0.995198		1.0000		A = 2.661								
19					1.98										5.725										-5.94		0.015		-5.94		0.750		0.2		0.981569		2.0000		B = 0.422								
20					2.64										5.701										-5.28		-0.009		-5.28		-0.450		0.3		0.960239		3.0000		first term 1.1/(ln((d+b)/r _w [*])) = 0.149								
21					3.3										5.728										-4.62		0.018		-4.62		0.900		0.4		0.93228		4.0000		second term (A+B*(ln((B-(d+b))/r _w [*])))/(b/r _w [*]) = 0.142								
22					3.96										5.690										-3.96		-0.020		-3.96		-1.000		0.5		0.898705		5.0000		6.000								
23					4.62										5.619										-3.3		-0.091		-3.3		-4.550		0.6		0.860465		6.0000		ln((B-(d+b))/r _w [*]) = 6.000								
24					5.28										3.785										-2.64		-1.925		-2.64		-96.250		0.7		0.818447		7.0000		Cannot exceed 6.								
25					5.94										4.325										-1.98		-1.385		-1.98		-69.250		0.8		0.773474		8.0000		See Butler (1997) - p.108.								
26					6.6										5.078										-1.32		-0.632		-1.32		-31.600		0.9		0.726305		9.0000										
27					7.26										5.233										-0.66		-0.477		-0.66		-23.850		1		0.677631		10.0000		K _v = 1.79E-02 ft/sec 1.54E+03 ft/day 4.70E+02 m/day 5.46E-01 cm/sec								
28					7.92										5.659										0		-0.051		0		-2.550		1.1		0.62808		11.0000										
29					8.58										5.922										0.66		0.212		0.66		10.600		1.2		0.57822		12.0000										
30					9.24										6.099										1.32		0.389		1.32		19.450		1.3		0.528553		13.0000										
31					9.9										6.181										1.98		0.471		1.98		23.550		1.4		0.479526		14.0000		1543.6888								

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W			
1	High K Estimator Spreadsheet				Test Well Specs - "d" not used in confined case																					
2	English Units				Depth to Bottom of Screen (from toc):										90	ft		Best Fit		Confined - High-K Hvorslev Model						
3					Screen Length (b):										2	ft		Time								
4	General Test Data				Depth to Static Water Level (from toc):										14.95	ft		Correlation Ratio		$K_r = t_d^* r_c^2 \ln[b/(2r_w^*) + (1 + b/(2r_w^*))^2]^{0.5}$						
5	Site Location:		Hendry Co.		Top of Screen to Water Table (d):										73.05	ft		t_d^*/t^*		0.8						
6	Date:		10/28/2009		Radius of Well Screen (r_w):										0.083	ft		0.111								
7	Time:				Nominal Radius of Well Casing (r_{nc}):										0.500	ft				Bracketted quantity						
8	Test Designation:		HES-26D		Radius of Transducer Cable (r_t):										0.009	ft		computed from ratio		Le =		2608.20 ft				
9	Static Level:		14.95		Effective Casing Radius ($r_c = (r_{nc}^2 - r_t^2)^{0.5}$):										0.500	ft		nominal		Le =		109.05 ft				
10	Initial Water Level				Modified Screen Radius (r_w^*):										0.055	ft		% difference		2292%		<div style="border: 1px solid black; padding: 2px;"> $K_r =$ 3.12E-02 ft/sec 2.70E+03 ft/day 9.52E-01 cm/sec 8.23E+02 m/day </div>				
11	Change (H_g):		0.81		Aspect Ratio (b/r_w^*):										36.563											
12	Start Time for Test:		2.64		Formation Thickness (B):										150	ft										
13																	Modulation Factor :		9.000		Unconfined - High-K Bouwer and Rice Modt					
14																					$K_r = t_d^* r_c^2 \ln[R_d/r_w^*]$					
15	Time		Pressure																		$t^* \quad 2bC_D$					
16	in		Head		Test		Deviation		Test		Normalized		Dimensionless		$C_D =$		Adjusted									
17	seconds		in feet		Time		From Static		Time		Head		Time		0.8		Time									
18	0.66		14.033		-1.98		-0.917		-1.98		-1.132		0		1		0		$\ln(R_d/r_w^*) =$ 3.398 $A =$ 2.661							
19	1.32		13.922		-1.32		-1.028		-1.32		-1.269		0.1		0.995135		0.9000		$B =$ 0.422							
20	1.98		14.596		-0.66		-0.354		-0.66		-0.437		0.2		0.981088		1.8000		first term $1.1/(\ln((d+b)/r_w^*))$							
21	2.64		15.054		0		0.104		0		0.128		0.3		0.9587		2.7000		0.152							
22	3.3		15.514		0.66		0.564		0.66		0.696		0.4		0.928828		3.6000		second term $(A+B*(\ln[(B-(d+b))/r_w^*])/(b/r_w^*))$							
23	3.96		15.757		1.32		0.807		1.32		0.996		0.5		0.892333		4.5000		0.142							
24	4.62		15.735		1.98		0.785		1.98		0.969		0.6		0.850075		5.4000		$\ln[(B-(d+b))/r_w^*]$ 6.000							
25	5.28		15.487		2.64		0.537		2.64		0.663		0.7		0.802904		6.3000		Cannot exceed 6.							
26	5.94		15.131		3.3		0.181		3.3		0.223		0.8		0.75165		7.2000		See Butler (1997) - p.108.							
27	6.6		14.778		3.96		-0.172		3.96		-0.212		0.9		0.697118		8.1000									
28	7.26		14.528		4.62		-0.422		4.62		-0.521		1		0.640085		9.0000		<div style="border: 1px solid black; padding: 2px;"> $K_r =$ 2.95E-02 ft/sec 2.55E+03 ft/day 9.01E-01 cm/sec 7.76E+02 m/day </div>							
29	7.92		14.426		5.28		-0.524		5.28		-0.647		1.1		0.58129		9.9000									
30	8.58		14.484		5.94		-0.466		5.94		-0.575		1.2		0.521434		10.8000									
31	9.24		14.658		6.6		-0.292		6.6		-0.360		1.3		0.461173		11.7000									
32	9.9		14.897		7.26		-0.053		7.26		-0.065		1.4		0.401117		12.6000		2547.5851							

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	High K Estimator Spreadsheet				Test Well Specs - "d" not used in confined case																		
2	English Units																						
3					Depth to Bottom of Screen (from toc): 80 ft																		
4	General Test Data				Screen Length (b): 2 ft																		
5	Site Location: Hendry Co.				Depth to Static Water Level (from toc): 2.42 ft																		
6	Date: 4/13/2010				Top of Screen to Water Table (d): 76.2 ft																		
7	Time:				Radius of Well Screen (r _w): 0.083 ft																		
8	Test Designation: HES-27D				Nominal Radius of Well Casing (r _{nc}): 0.500 ft																		
9	Static Level: 2.42 ft				Radius of Transducer Cable (r _{tc}): 0.009 ft																		
10	Initial Water Level				Effective Casing Radius (r _c = (r _{nc} ² -r _{tc} ²) ^{0.5}): 0.500 ft																		
11	Change (H ₀): 0.36 ft				Modified Screen Radius (r _w [*]): 0.055 ft																		
12	Start Time for Test: 1.98 sec				Aspect Ratio (b/r _w [*]): 36.563																		
13					Formation Thickness (B): 150 ft																		
14					Modulation Factor = 2.000																		
15					Best Fit Type Curve C _D = 1																		
16					Confined - High-K Hvorslev Model																		
17					K _r = t _d [*] r _c ² ln[b/(2r _w [*])+(1+(b/(2r _w [*]) ²) ^{0.5}]																		
18					t* 2bC _D																		
19					Bracketted quantity 36.590																		
20					computed from ratio Le = 128.80 ft																		
21					nominal Le = 111.58 ft																		
22					% difference 15%																		
23					K _r = 1.12E-01 ft/sec																		
24					9.72E+03 ft/day 2.96E+03 m/day																		
25					3.43E+00 cm/sec																		
26					Unconfined - High-K Bouwer and Rice Mode																		
27					K _r = t _d [*] r _c ² ln[R _e /r _w [*]]																		
28					t* 2bC _D																		
29					ln(R _e /r _w [*])= 3.408 A = 2.661																		
30					B = 0.422																		
31					first term 1.1/(ln((d+b)/r _w [*]))																		
32					0.151																		
33					second term (A+B*(ln[(B-(d+b))/r _w [*]]))/(b/r _w [*])																		
34					0.142																		
35					6.000																		
36					Cannot exceed 6.																		
37					See Butler (1997) - p.108.																		
38					K _r = 1.06E-01 ft/sec																		
39					9.20E+03 ft/day 2.80E+03 m/day																		
40					3.25E+00 cm/sec																		
41					Time Pressure																		
42					in Head																		
43					seconds in feet																		
44					Test Deviation																		
45					Time From Static																		
46					Test Normalized																		
47					Time Head																		
48					Dimensionless C _D = 1																		
49					Adjusted																		
50					Time																		
51					0 1 0																		
52					0.1 0.995167 0.2000																		
53					0.2 0.981331 0.4000																		
54					0.3 0.959481 0.6000																		
55					0.4 0.930587 0.8000																		
56					0.5 0.895595 1.0000																		
57					0.6 0.855416 1.2000																		
58					0.7 0.810928 1.4000																		
59					0.8 0.762963 1.6000																		
60					0.9 0.712308 1.8000																		
61					1 0.6597 2.0000																		
62					1.1 0.605826 2.2000																		
63					1.2 0.551319 2.4000																		
64					1.3 0.496756 2.6000																		

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	High K Estimator Spreadsheet				Test Well Specs - "d" not used in confined case																		
2	English Units																						
3					Depth to Bottom of Screen (from toc): 66 ft																		
4	General Test Data				Screen Length (b): 2 ft																		
5	Site Location: Hendry Co.				Depth to Static Water Level (from toc): 6.25 ft																		
6	Date: 10/28/2009				Top of Screen to Water Table (d): 57.75 ft																		
7	Time:				Radius of Well Screen (r _w): 0.083 ft																		
8	Test Designation: HES-28D				Nominal Radius of Well Casing (r _{nc}): 0.500 ft																		
9	Static Level: 6.25 ft				Radius of Transducer Cable (r _{tc}): 0.009 ft																		
10	Initial Water Level				Effective Casing Radius (r _c = (r _{nc} ² -r _{tc} ²) ^{0.5}): 0.500 ft																		
11	Change (H ₀): 0.41 ft				Modified Screen Radius (r _w [*]): 0.055 ft																		
12	Start Time for Test: 3.96 sec				Aspect Ratio (b/r _w [*]): 36.563																		
13					Formation Thickness (B): 150 ft																		
14					Modulation Factor = 1.500																		
15					Unconfined - High-K Bouwer and Rice Model																		
16					K _r = t _d ² r _c ² ln[R ₀ /r _w [*]]																		
17					t [*] 2bC _D																		
18					ln(R ₀ /r _w [*]) = 3.342																		
19					A = 2.661																		
20					B = 0.422																		
21					first term 1.1/(ln((d+b)/r _w [*]))																		
22					second term (A+B*(ln[(B-(d+b))/r _w [*]]))/(b/r _w [*])																		
23					0.157																		
24					0.142																		
25					6.000																		
26					ln[(B-(d+b))/r _w [*]]																		
27					Cannot exceed 6.																		
28					See Butler (1997) - p.108.																		
29					K _r = 1.55E-01 ft/sec																		
30					1.34E+04 ft/day																		
31					4.72E+00 cm/sec																		
32					13361.826																		

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	High K Estimator Spreadsheet				Test Well Specs - "d" not used in confined case																		
2	English Units																						
3					Depth to Bottom of Screen (from toc): 100 ft																		
4	General Test Data				Screen Length (b): 2 ft																		
5	Site Location: Hendry Co.				Depth to Static Water Level (from toc): 3.17 ft																		
6	Date: 10/28/2009				Top of Screen to Water Table (d): 94.83 ft																		
7	Time:				Radius of Well Screen (r _w): 0.083 ft																		
8	Test Designation: HES-29D				Nominal Radius of Well Casing (r _{nc}): 0.500 ft																		
9	Static Level: 3.17 ft				Radius of Transducer Cable (r _{tc}): 0.009 ft																		
10	Initial Water Level				Effective Casing Radius (r _c = (r _{nc} ² -r _{tc} ²) ^{0.5}): 0.500 ft																		
11	Change (H ₀): 2.32 ft				Modified Screen Radius (r _w [*]): 0.055 ft																		
12	Start Time for Test: 3.3 sec				Aspect Ratio (b/r _w [*]): 36.563																		
13					Formation Thickness (B): 150 ft																		
14					Modulation Factor = 6.000																		
15					Unconfined - High-K Bouwer and Rice Model																		
16					K _r = t _d ² r _c ² ln[R _e /r _w [*]]																		
17					t [*] 2bC _D																		
18					ln(R _e /r _w [*]) = 3.459																		
19					A = 2.661																		
20					B = 0.422																		
21					first term 1.1/(ln((d+b)/r _w [*]))																		
22					0.147																		
23					second term (A+B*(ln[(B-(d+b))/r _w [*]]))/(b/r _w [*])																		
24					0.142																		
25					ln[(B-(d+b))/r _w [*]]																		
26					6.000																		
27					Cannot exceed 6.																		
28					See Butler (1997) - p.108.																		
29					K _r = 1.80E-02 ft/sec																		
30					1.56E+03 ft/day																		
31					5.50E-01 cm/sec																		
32					1555.9798																		

	Time	Pressure	Test	Deviation	Test	Normalized	Dimensionless	C _D =	Adjusted
	in	Head	Time	From Static	Time	Head	Time	2	Time
	seconds	in feet	Time	From Static	Time	Head	Time	2	Time
18	0.66	4.292	-2.64	1.122	-2.64	0.484	0	1	0
19	1.32	4.018	-1.98	0.848	-1.98	0.366	0.1	0.995321	0.6000
20	1.98	4.502	-1.32	1.332	-1.32	0.574	0.2	0.982477	1.2000
21	2.64	5.200	-0.66	2.030	-0.66	0.875	0.3	0.963064	1.8000
22	3.3	5.343	0	2.173	0	0.937	0.4	0.938448	2.4000
23	3.96	5.410	0.66	2.240	0.66	0.966	0.5	0.909796	3.0000
24	4.62	5.410	1.32	2.240	1.32	0.966	0.6	0.878099	3.6000
25	5.28	5.419	1.98	2.249	1.98	0.969	0.7	0.844195	4.2000
26	5.94	5.365	2.64	2.195	2.64	0.946	0.8	0.808792	4.8000
27	6.6	5.270	3.3	2.100	3.3	0.905	0.9	0.772482	5.4000
28	7.26	5.146	3.96	1.976	3.96	0.852	1	0.735759	6.0000
29	7.92	5.016	4.62	1.846	4.62	0.796	1.1	0.699029	6.6000
30	8.58	4.901	5.28	1.731	5.28	0.746	1.2	0.662627	7.2000
31	9.24	4.803	5.94	1.633	5.94	0.704	1.3	0.626823	7.8000
32	9.9	4.739	6.6	1.569	6.6	0.676	1.4	0.591833	8.4000