

KANSAS CORPORATION COMMISSION OIL & GAS CONSERVATION DIVISION

Form ACO-4 Form must be typed March 2009

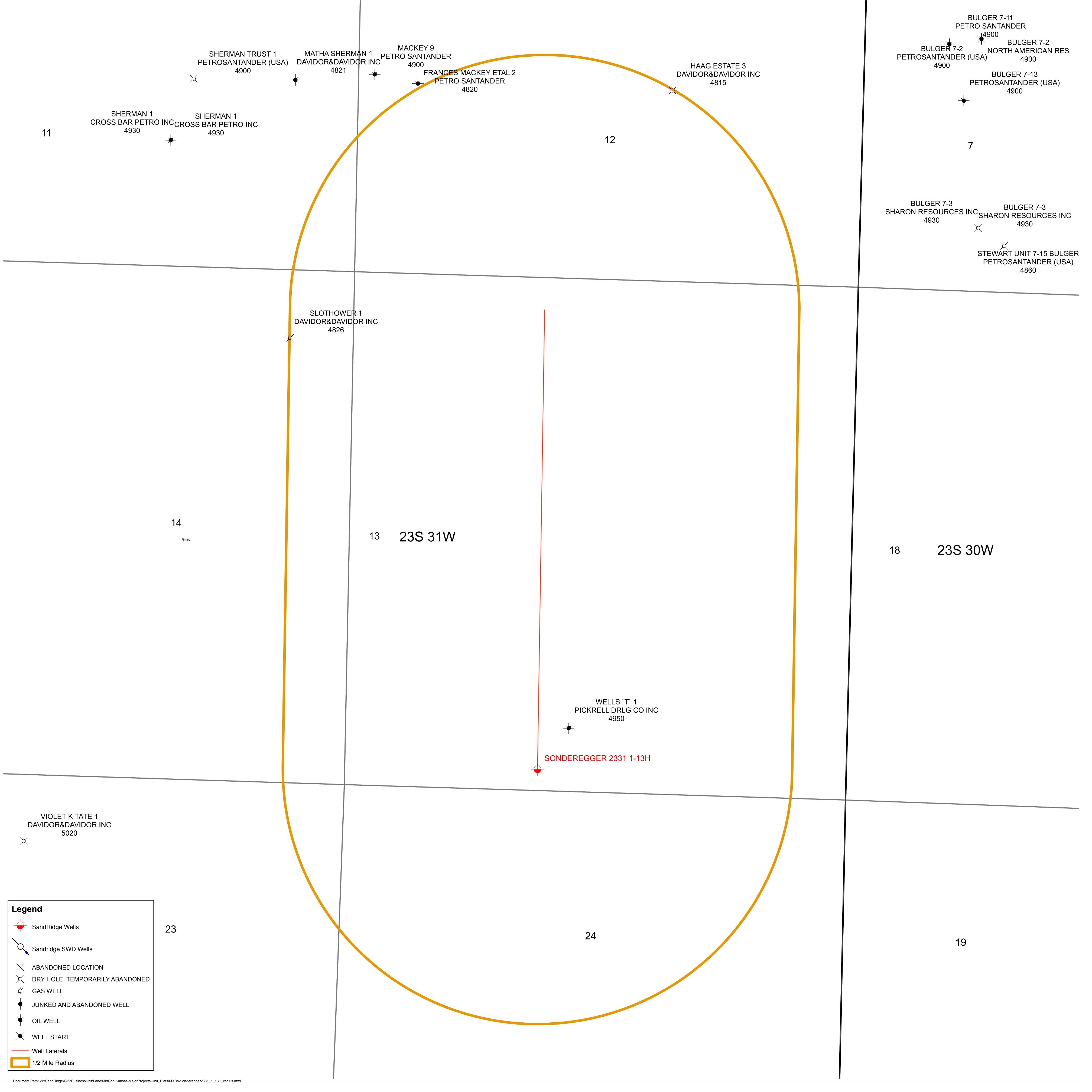
APPLICATION FOR COMMINGLING OF Commingling ID # _ PRODUCTION (K.A.R. 82-3-123) OR FLUIDS (K.A.R. 82-3-123a)

OPERAT	OR: License #	API No. 15					
Name:_		Spot Description:					
Address	1:		Sec Twp	S. R East West			
Address	2:		Feet from No	orth / South Line of Section			
City:	State: Zip:+		Feet from Ea:	st / West Line of Section			
Contact	Person:	County:					
Phone:	()	Lease Name:	Well	l #:			
1.	Name and upper and lower limit of each production interval to	be commingled:					
	Formation:	(Perfs):					
	Formation:	(Perfs):					
	Formation:	(Perfs):					
	Formation:	(Perfs):					
	Formation:	(Perfs):					
2.	Estimated amount of fluid production to be commingled from e						
	Formation:			BWPD:			
	Formation:	BOPD:	MCFPD:	BWPD:			
	Formation:	BOPD:	MCFPD:	BWPD:			
	Formation:	BOPD:	MCFPD:	BWPD:			
	Formation:	BOPD:	MCFPD:	BWPD:			
□ 3.□ 4.	Plat map showing the location of the subject well, all other well the subject well, and for each well the names and addresses of Signed certificate showing service of the application and affidation	of the lessee of record or opera	ator.	ses within a 1/2 mile radius of			
For Con	nmingling of PRODUCTION ONLY, include the following:						
<u> </u>	Wireline log of subject well. Previously Filed with ACO-1:	Yes No					
<u> </u>	Complete Form ACO-1 (Well Completion form) for the subject	well.					
For Con	nmingling of FLUIDS ONLY, include the following:						
7.	Well construction diagram of subject well.						
8.	Any available water chemistry data demonstrating the compati	ibility of the fluids to be commi	ngled.				
current ii mingling	/IT: I am the affiant and hereby certify that to the best of my nformation, knowledge and personal belief, this request for comis true and proper and I have no information or knowledge, which istent with the information supplied in this application.	Suk	omitted Electron	ically			
	C Office Use Only			t in the application. Protests must be a filed wihin 15 days of publication of			

Date: _

Approved By:

15-Day Periods Ends: _



	SOND	SONDEREGGER 2331 1-13H	
Unit Description			
SW/4 14-235-31W, FINNEY COUNTY, KS			
Surface Owner			
Ray & Virginia Sonderegger	1682 S. HWY 25	Eloti, KS 67861-6320	
Well Name	Operator	Address	
Frances Mackey #2	PetroSantander (USA), INC.	6363 Woodway, Suite 350	: 350 Houston, TX 77050
Mackey #9	PetroSantander (USA), INC.	6363 Woodway, Suite 350	
Lessee Name		Address	
Ray & Virginia Sonderegger	All of 13-235-13W	1682 S. HWY 25	Eloti, KS 67861-6320
Eileen & Melvin Rybert	All of 13-235-13W	820 E. Villa Rite Dr.	Phoenix, AZ 85022
Brian Giedt	All of 13-235-13W	2919 N. Camino Lagos	Grande Prairie, TX 75054
Kevin Giedt	All of 13-23S-13W	1612 Winter Pass Trail #1225	Arlington, TX 76002
Laile R. & Ruth Towner	All of 13-235-13W	522 SE 110th	Bellvue, WA 98004
Inlanced Mineral Aumen			
Elaine S. Small. Trustee of the Elaine S. Small Living Trust 11/17/93	NF/4 14-235-31w	OCC# Fd roded SOSV	CCCCA CAN Amountarily
William A. Small, Jr., & Evelvn R. Small	SE/4 14-23S-31W	DO Box 13	Darlos CO 20033
		CT VOC -C	rainer, CO 60154

Certificate of Service

The undersigned hereby certifies that on March 20, 2015 a copy of the KCC Form ACO-4, Application for Commingling of Production was mailed to the following persons entitled to notice of the Application pursuant to §K.A.R. 82-3-135a:

Ray & Virginia Sonderegger 1682 S. Hwy 25 Eloti, KS 67861

PetroSantander (USA) Inc. 6363 Woodway, Suite 350 Houston, TX 77050

Eileen & Melvin Rybert 820 E. Villa Rite Dr. Phoenix, AZ 85022

Brian Giedt 2919 N. Camino Lagos Grand Prairie, TX 75054

Kevin Giedt 1612 Winter Pass Trail #1225 Arlington, TX 76002

Laile R & Ruth Towner 522 SE 110th Bellvue, WA 98004

Elaine S. Small, Trustee 4505 Parker Rd. #209 Florissant, MO 63033

William A. Small Jr., & Evelyn R. Small P.O. Box 13 Parker, CO 80134

Tiffany Holay

Senior Regulatory Technician

THE STATE CORPORATION COMMISSION OF THE STATE OF KANSAS

IN THE MATTER OF THE APPLICATION)	
OF SANDRIDGE EXPLORATION AND)	
PRODUCTION, LLC FOR PERMISSION)	KCC License No. 34192
TO COMMINGLE PRODUCTION FROM)	
THE SONDEREGGER 2331 1-13H WELL)	
IN FINNEY COUNTY, KANSAS,)	
PURSUANT TO K.A.R. § 82-3-123		CONSERVATION DIVISION
	j	

NOTICE OF PENDING APPLICATION FOR PERMISSION TO COMMINGLE PRODUCTION

TO: ALL OIL AND GAS PRODUCERS, UNLEASED MINERAL INTEREST OWNERS, LANDOWNERS, AND ALL PERSONS WHOSOEVER CONCERNED.

You, and each of you, are hereby notified that SANDRIDGE EXPLORATION AND PRODUCTION, LLC has filed an Application with the State Corporation Commission of the State of Kansas (the "Commission"), pursuant to K.A.R. § 82-3-123, seeking permission to commingle production from the Marmaton and Cherokee formations in the following well located in Finney County, Kansas:

Sonderegger 2331 #1-13H well API No. 15-055-22177-01-00

Surface Location: 200' FSL & 1,980' FWL of Section 13-23S-31W

The Application is pending before the Commission and will be granted without hearing unless, within fifteen (15) days from publication of this notice, a written protest is received by the Conservation Division of the Kansas Corporation Commission. Any protest to the Application must be in writing and should clearly state the grounds of objection. The written protest should be mailed to the Kansas Corporation Commission, Conservation Division, 266 North Main, Suite 220, Wichita, Kansas, 67202.

If a proper written protest is filed with the Commission within fifteen (15) days from the date of publication of this notice, this matter will be set for hearing by the Commission. The hearing will be held at the Commission Hearing Room, Kansas Corporation Commission, Conservation Division, 266 North Main, Suite 220, Wichita, Kansas, 67202.

All persons interested or concerned shall take notice of the foregoing and shall govern themselves accordingly.

David E. Bengtson (#12184)
STINSON LEONARD STREET LLP
1625 N. Waterfront Pkwy., Suite 300
Wichita, Kansas 67206-6620
(316) 265-8800
Fax: (316) 265-1349
Attorneys for SandRidge Exploration and Production, LLC

AFFIDAVIT

STATE OF KANSAS

- SS.

County of Sedgwick

Mark Fletchall, of lawful age, being first duly sworn, deposeth and saith: That he is Record Clerk of The Wichita Eagle, a daily newspaper published in the City of Wichita, County of Sedgwick, State of Kansas, and having a general paid circulation on a daily basis in said County, which said newspaper has been continuously and uninterruptedly published in said County for more than one year prior to the first publication of the notice hereinafter mentioned, and which said newspaper has been entered as second class mail matter at the United States Post Office in Wichita, Kansas, and which said newspaper is not a trade, religious or fraternal publication and that a notice of a true copy is hereto attached was published in the regular and entire Morning issue of said The Wichita Eagle for _1_ issues, that the first publication of said notice was

made as aforesaid on the 23^{rd} of

March A.D. 2015, with

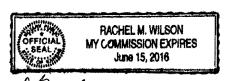
subsequent publications being made on the following dates:

And affiant further says that he has personal knowledge of the statements above set forth and that they are true.

Fletchall

Subscribed and sworn to before me this

23rd day of March, 2015



Notary Public Sedgwick County, Kansas

Printers Fee: \$234.40

LEGAL PUBLICATION

Published in The Wichlta Eagle March 23, 2015 (3342377) THE STATE CORPORATION COMMISSION OF

THE STATE OF KANSAS IN THE MATTER OF THE APPLICATION)

OF SANDRIDGE EXPLORATION AND PRODUCTION, LLC FOR PERMISSION TO COMMINGLE PRODUCTION FROM THE SONDEREGGER 2331 1-13H WELL

) KCC License No.) 34192)

IN FINNEY COUNTY, KANSAS,

PURSUANT TO K.A.R. § 82-3-123

) CONSERVATION

DIVISION

NOTICE OF PENDING APPLICATION
FOR PERMISSION TO COMMINGLE PRODUCTION
TO: ALL OIL AND GAS PRODUCERS,
UNLEASED MINERAL INTEREST OWNERS,
LANDOWNERS, AND ALL PERSONS
WHOSOEVER CONCERNED.

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Sonderegger 2331 #1-13H well API No. 15-055-22177-01-00 Surface Location: 200' FSL & 1,980' FWL of

Section 13-23S-31W

The Application is pending before the Commission and will be granted without hearing unless, within fifteen (15) days from publication of this notice, a written protest is received by the Conservation Division of the Kansas Corporation Commission. Any protest to the Application must be in writing and should clearly state the grounds of objection. The written protest should be mailed to the Kansas Corporation Commission, Conservation Division, 266 North Main, Suite 220, Wichita, Kansas, 67202.

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David E. Bengison (#2184)
STINSON LEONARD STREET LLP
1625 N. Walerfront Pkwy., Suite 300
Wichite, Kansas 67206-6620
(316) 265-8800
Fax: (316) 265-1349
Altorneys for SandRidge
Exploration and
Production, LLC

Parth Da Publication

State Cf Kansas - Finney County

Dena A. Sattler, being first duly sworm, deposes and says that she is publisher of THE GARDEN CITY TELEGRAM, a weekly newspaper printed in the State of Kansas and published in and of general circulation in Finney County, Kansas, on a weekly basis in Finney County, Kansas, and that said newspaper is not a trade, religious, or fraternal publication.

THAT said newspaper is daily published at least weekly fifty (50) times a year; has been so published continuously and uninterruptedly in said county and state for a period of more than five (5) years prior to the first publication of said notice.

THAT the attached notice is a true copy thereof and was

published in the regular and entire issue newspaper for consecutive days/w first (1st) publication thereof being made as aforthe day of	eeks. The resaid on
With subsequent publications being made following dates:	on the
2 nd Publication made on the day of	.20
3rd Publication made on the day of	.20
4th Publication made on the day of	.20
Dublication Fac:	77.56
Publication Fee: \$	
Affidavits (Additional Copies): @ \$5 each \$	
Total Publication Fee: 5	17.66
Sign	
Witness my hand this Bday of More	<u>'</u>
20	1,
SUBSCRIZED AND SWORN before me th	is 73
day of Jacob ,	20
Melinal	

(Published in The Garden City Telegram Saturday, March 23, 2015)

THE STATE CORPORATION COMMISSION OF THE STATE OF KANSAS

IN THE MATTER OF THE APPLICATION
OF SANDRIDGE EXPLORATION AND
PRODUCTION, LLC FOR PERMISSION
TO COMMINGLE PRODUCTION FROM
THE SONDEREGGER 2331 1-13H WELL
IN FINNEY COUNTY, KANSAS
PURSUANT TO K.A.R. § 82-3-123
KCC License No. 34192
CONSERVATION DIVISION)

NOTICE OF PENDING APPLICATION FOR PERMISSION TO COMMINGLE PRODUCTION

TO: ALL OIL AND GAS PRODUCERS, UN-LEASED MINERAL INTEREST OWNERS, LAND-OWNERS, AND ALL PERSONS WHOSOEVER CON-CERNED.

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David E. Bengtson (#12184) STINSON LEONARD STREET LLP 1625 N. Waterfront Pkwy., Suite 300 Wichita, Kansas 67206-6620 (316) 265-8800 Fax: (316) 265-1349 Attorneys for SandRidge Exploration and Production, LLC

239180

11-22-17

Legal Invoice #

(Notary Public)

My commission expires.

	Directional Survey Calculations	Measured Depth	Sub-Sea Incl.	Vertical Azim.	True Vert Depth	Northings (+) Southings (-)	Eastings (+) Westings (-)	Vert Section	DLS deg/100'	E. I.				
	SHL	(ft) 0	(deg) 0.00	(ft) 0.00	(ft) 0.00	(ft) 0.00	(ft) 0.00	(ft) 0.00	(deg)	FNL	FSL	FWL 1001	FEL	
	BHL	9230	92.80	359.80	4879.83	4766.06	82.57	4766.74	0.00	5100 331	200 4969	1981 1964	3242 3269	
	Miss Entry	4986	55.37	359.35	4798.85	545.24	-5.49	545.01	9.38	4555	745	1964	3260	
	Top Perf	5050	62,15	359.08	4832.14	599.82	-6.30	599.56	11.42	4500	800	1962	3262	
	Bottom Perf	9080	91.73	11.92	4886.27	4616.20	82.37	4616.92	2.63	481	4819	1967	3266	
,		12 101 00000000000000000000000000000000		0.00										
	O	LINE O	1010	X	Y		1196					m		
	Survey Points		XY Coord	1371859	514945			X	Y			-0.0342256		
		SW Corner	XY Coord	1371749 1377089	509639			1373732.53	509781.1			0.0229167		
			XY Coord	1376968	514766 509486	-6	550				Line slope	-0.029316 0.0207312		
		or come.	XI Ooolu	10,0000	000400					vvest	rine slobe	0.0207312		
	Г	Measured	Sub-Sea	Vertical	True Vert	Northings (+)	Eastings (+)	Vert	DLS					
		Depth	Incl.	Azim.	Depth	Southings (-)	Westings (-)	Section	deg/100'					
		(ft)	(deg)	(ft)	(ft)	(ft)	(ft)	(ft)	(deg)	FNL	FSL	FWL	FEL	
		0	0.0	0	0.	0	0	0	0	5100	200	1981	3242	
		1821	0.50	355.70	1820.98	8	-1	7.91	0.03	5092	208	1980	3243	
		2044	0,60	21.10	2043.97	10	0	9.98	0.12	5090	210	1980	3243	
		2520	0.50	36.90	2519.95	14	2	14.01	0.04	5086	214	1982	3241	
		2994	0.30	23.40	2993.93	17	4	16.83	0.05	5083	217	1984	3239	
		3470 3903	0.60 0.50	34.10 5.80	3469.92 3902.90	20 24	6	20.08	0.07	5080	220	1986	3237	
		3915	0.50	16.00	3914.90	24	7 7	23.87 23.97	0.07 0.74	5076 5076	224 224	1987 1987	3236 3236	
		3946	0.80	359.80	3945.90	24	7	24.32	1.13	5075	225	1987	3236	
		3978	2.60	356.40	3977.88	25	7	25.26	5.63	5074	226	1987	3236	
		4009	4.80	354.90	4008,81	27	7	27.25	7.10	5072	228	1987	3236	
		4042	7.20	352.60	4041.63	31	6	30.67	7.31	5069	231	1986	3236	
		4073	9.30	355.40	4072.31	35	6	35.08	6.90	5065	235	1986	3237	
		4105	11.40	358.10	4103.79	41	6	40.81	6.73	5059	241	1985	3237	
		4136	13.70 15.90	359.10	4134.04	47	6	47.54	7.45	5052	248	1985	3238	
		4168 4199	17,90	360.00 360.00	4164.98 4194.64	56 65	5 5	55.71	6.91	5044	256	1985	3238	
		4231	20.00	359.50	4224.90	75	5	64.72 75.11	6.45 6.58	5035 5025	265 275	1985 1984	3238 3239	
		4263	22.10	358.70	4254.77	87	5	86.60	6.62	5013	287	1984	3239	
	2.2	4295	23.80	359.30	4284.23	99	5	99.06	5.36	5001	299	1984	3239	
1 . 1	Depth	4327	24.50	359.80	4313.43	112	5	112.15	2.28	4987	313	1983	3240	
Lega	1090	4358	25.70	0.40	4341.50	125	5	125.30	3.96	4974	326	1983	3240	
- J		4390	27.50	0.70	4370.12	140	5	139.62	5.64	4960	(340)	1983	3240	
								177.00						
			28.60	0.60	4397.47	154	5	154.20	3,55	4945	355	1983	3241	
		4453	30.70	358.80	4425.28	170	5	170.02	7.13	4930	370	1982	3241	
		4453 4484	30.70 33.00	358.80 357.50	4425.28 4451.61	170 186	5 5	170.02 186.36	7.13 7.74	4930 4913	370 387	1982 1981	3241 3242	
		4453	30.70	358.80	4425.28	170	5	170.02 186.36 204.19	7.13 7.74 5.94	4930 4913 4895	370 387 405	1982 1981 1980	3241 3242 3243	
		4453 4484 4516 4548 4580	30.70 33.00 34.90	358.80 357.50 357.60	4425.28 4451.61 4478.16	170 186 204	5 5 4	170.02 186.36	7.13 7.74	4930 4913	370 387	1982 1981	3241 3242	
		4453 4484 4516 4548 4580	30.70 33.00 34.90 36.70 39.20 42.40	358.80 357.50 357.60 357.20 357.40 358.10	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56	170 186 204 223 243 263	5 5 4 3 2 1	170.02 186.36 204.19 222.87 242.50 263.37	7.13 7.74 5.94 5.67 7.82 10.10	4930 4913 4895 4877 4857 4836	370 387 405 423 443 464	1982 1981 1980 1979 1978 1976	3241 3242 3243 3244	1
		4453 4484 4516 4548 4580	30.70 33.00 34.90 36.70 39.20 42.40 45.70	358.80 357.50 357.60 357.20 357.40 358.10 358.40	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84	170 186 204 223 243 263 285	5 5 4 3 2 1 1	170.02 186.36 204.19 222.87 242.50 263.37 284.89	7.13 7.74 5.94 5.67 7.82 10.10 10.67	4930 4913 4895 4877 4857 4836 4815	370 387 405 423 443 464 485	1982 1981 1980 1979 1978 1976	3241 3242 3243 3244 3246 3247 3248	<i>(</i>
	top perf	4453 4484 4516 4548 4580 4612 4643 4675	30.70 33.00 34.90 36.70 39.20 42.40 45.70 48.20	358.80 357.50 357.60 357.20 357.40 358.10 358.40 358.60	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4597.68	170 186 204 223 243 263 285 308	5 5 4 3 2 1 1 0	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83	4930 4913 4895 4877 4857 4836 4815	370 387 405 423 443 464 485 509	1982 1981 1980 1979 1978 1976 1975	3241 3242 3243 3244 3246 3247 3248 3249	1
	top perf	4453 4484 4516 4548 4580 4612 • 4643 4675	30.70 33.00 34.90 36.70 39.20 42.40 45.70 48.20	358.80 357.50 357.60 357.20 357.40 358.10 358.40 358.60	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4597.68	170 186 204 223 243 263 285 308	5 5 4 3 2 1 1 0	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83	4930 4913 4895 4877 4857 4836 4815 4791	370 387 405 423 443 464 485 509	1982 1981 1980 1979 1978 1976 1975 1974	3241 3242 3243 3244 3246 3247 3248 3249 3250	
		4453 4484 4516 4548 4580 4612 • 4643 4675 4707 4739	30.70 33.00 34.90 36.70 39.20 42.40 45.70 48.20 49.50	358.80 357.50 357.60 357.20 357.40 358.10 358.40 358.60 359.10 359.00	4425.28 4451.61 4478.16 4504.11 4529.34 4555.56 4575.84 4597.68 4618.74 4639.52	170 186 204 223 243 263 285 308 332 357	5 5 4 3 2 1 1 0 0	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 332.32 356.64	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743	370 387 405 423 443 464 485 509 533 557	1982 1981 1980 1979 1978 1976 1975 1974 1973	3241 3242 3243 3244 3246 3247 3248 3249 3250 3251	
	top perf	4453 4484 4516 4548 4580 4612 • 4643 4675	30.70 33.00 34.90 36.70 39.20 42.40 45.70 48.20	358.80 357.50 357.60 357.20 357.40 358.10 358.40 358.60	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4597.68	170 186 204 223 243 263 285 308	5 5 4 3 2 1 1 0 -1 -1	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 332.32 356.64 380.91	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719	370 387 405 423 443 464 485 509 533 557 581	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972	3241 3242 3243 3244 3246 3247 3248 3249 3250 3251 3252	/
	top perf	4453 4484 4516 4548 4580 4612 4643 4675 4707 4739 4771 4803 4835	30.70 33.00 34.90 36.70 39.20 42.40 45.70 48.20 49.50 49.50 49.30 48.50	358.80 357.50 357.60 357.20 357.40 358.10 358.40 359.10 359.00 358.30 358.30 358.40	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4597.68 4618.74 4639.52 4660.35 4681.38 4702.59	170 186 204 223 243 263 285 308 332 357 381 405 429	5 5 4 3 2 1 1 0 0	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 332.32 356.64	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743	370 387 405 423 443 464 485 509 533 557	1982 1981 1980 1979 1978 1976 1975 1974 1973	3241 3242 3243 3244 3246 3247 3248 3249 3250 3251	/
	Top of Tangent @ 4727'	4453 4484 4516 4548 4580 4612 4643 4675 4707 4739 4771 4803 4835 4867	30.70 33.00 34.90 36.70 39.20 42.40 45.70 48.20 49.50 49.50 49.30 48.50 48.50 48.60	358.80 357.50 357.60 357.20 357.40 358.40 358.60 359.10 359.00 358.30 358.30 358.40 358.40	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4597.68 4618.74 4639.52 4660.35 4681.38 4702.59 4723.77	170 186 204 223 243 263 285 308 332 357 381 405 429 453	5 5 4 3 2 1 1 0 -1 -1 -2 -3 -4	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 356.64 380.91 404.99 426.93 452.88	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719 4695 4671 4647	370 387 405 423 443 464 485 509 533 557 581 605 629 653	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1970 1969 1968	3241 3242 3243 3244 3246 3247 3248 3250 3251 3252 3254 3255 3255 3256	<u>/</u>
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4580 4612 4643 4675 4707 4739 4771 4803 4835 4867	30.70 33.00 34.90 36.70 39.20 42.40 45.70 48.20 49.50 49.50 49.50 48.50 48.50 48.60 48.70	358.80 357.50 357.60 357.20 357.40 358.10 358.40 359.00 358.30 358.00 358.40 358.40 358.40	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4597.68 4613.52 4660.35 4681.38 4702.59 4723.77 4744.91	170 186 204 223 243 263 285 308 332 357 381 405 429 453 477	5 5 4 3 2 1 1 0 -1 -1 -2 -3 -4 -4	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 332.32 356.64 380.91 404.99 428.93 452.88 476.88	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31	4930 4913 4895 4877 4836 4815 4791 4767 4743 4719 4695 4671 4647 4623	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1970 1969 1968 1968	3241 3242 3243 3244 3246 3247 3248 3250 3251 3252 3254 3255 3255 3256 3258	
	Top of Tangent @ 4727'	4453 4484 4516 4548 4580 4612 4643 4675 4707 4739 4771 4803 4835 4867	30.70 33.00 34.90 36.70 39.20 42.40 45.70 48.20 49.50 49.50 49.50 48.50 48.60 48.70 50.10	358.80 357.50 357.60 357.20 357.40 358.10 358.60 359.10 359.00 358.30 358.40 358.40 358.40 358.40 358.40	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4597.68 4618.74 4639.52 4660.35 4681.38 4702.59 4723.77 4744.91 4765.74	170 186 204 223 243 263 285 308 332 357 381 405 429 453 477 501	5 5 4 3 2 1 1 1 0 -1 -1 -2 -3 -4 -4 -5	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 332.32 356.64 380.91 404.99 428.93 452.88 501.15	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 0.24 1.77 2.60 0.94 0.31 0.31	4930 4913 4895 4877 4836 4815 4791 4767 4743 4719 4695 4671 4647 4623 4599	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1970 1969 1968 1966 1965	3241 3242 3243 3244 3246 3247 3248 3250 3251 3252 3254 3255 3255 3256 3258 3258 3259	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4580 4612 4643 4675 4707 4739 4771 4803 4835 4867	30.70 33.00 34.90 36.70 39.20 42.40 45.70 48.20 49.50 49.50 49.50 48.50 48.50 48.60 48.70	358.80 357.50 357.60 357.20 357.40 358.40 358.60 359.10 359.00 358.30 358.40 358.40 358.40 358.80 358.50	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4597.68 4618.74 4639.52 4660.35 4681.38 4702.59 4723.77 4744.91 4765.74	170 186 204 223 243 263 285 308 332 357 381 405 429 453 477 501 524	5 5 4 3 2 1 1 0 -1 -1 -2 -3 -4 -4 -5 -5	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 356.64 380.91 404.99 428.93 452.88 476.88 501.15 523.84	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 4.48 10.18	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1970 1969 1968 1966 1965	3241 3242 3243 3244 3246 3247 3248 3250 3251 3252 3254 3255 3256 3258 3259 3260	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4580 4612 4643 4675 4707 4739 4771 4803 4835 4867 4989 4981	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 49.50 48.50 48.60 48.70 50.10 53.00	358.80 357.50 357.60 357.20 357.40 358.10 358.60 359.10 359.00 358.30 358.40 358.40 358.40 358.40 358.40	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4597.68 4618.74 4639.52 4660.35 4681.38 4702.59 4723.77 4744.91 4765.74	170 186 204 223 243 263 285 308 332 357 381 405 429 453 477 501	5 5 4 3 2 1 1 1 0 -1 -1 -2 -3 -4 -4 -5	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 332.32 356.64 380.91 404.99 428.93 452.88 501.15	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 0.31 4.48 10.18 9.13	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576 4548	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724 752	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1970 1969 1968 1966 1965 1964	3241 3242 3243 3244 3246 3247 3248 3250 3251 3252 3254 3255 3256 3258 3259 3260 3260	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4580 4612 4643 4675 4707 4739 4771 4803 4835 4867 4980 4994 5026 5058	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 49.50 48.50 48.50 48.50 48.50 53.00 56.10	358.80 357.50 357.60 357.20 357.40 358.40 358.60 359.10 358.30 358.30 358.40 358.40 358.40 358.80 359.50	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 469.52 4660.35 4681.38 4702.59 4723.77 4744.91 4765.74 4783.77 4803.48	170 186 204 223 243 263 285 308 332 357 381 405 429 453 477 501 524	5 5 4 3 2 1 1 0 0 -1 -1 -2 -3 -4 -4 -5 -5 -6	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 332.32 356.64 380.91 404.99 426.93 452.88 476.88 501.15 523.84 551.52	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 4.48 10.18	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1970 1969 1968 1966 1965	3241 3242 3243 3244 3246 3247 3248 3250 3251 3252 3254 3255 3256 3258 3259 3260	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4580 4612 4643 4675 4777 4739 47771 4803 4835 4867 4989 4981 4960 4994 5026 5058 5090	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 48.50 48.50 48.50 50.10 53.00 56.10 59.30 63.10 66.80	358.80 357.50 357.60 357.20 357.40 358.40 358.60 359.10 358.30 358.40 358.40 358.40 358.40 358.50 359.50 359.50 359.30	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4597.68 4618.74 4639.52 4660.35 4723.77 4744.91 4765.74 4783.77 4803.48 4820.58 4836.00 4849.54	170 186 204 223 243 263 385 381 405 429 453 477 501 524 552 579 607 636	5 5 4 3 2 1 1 0 -1 -1 -2 -3 -4 -4 -5 -6 -6 -6 -7	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 356.64 380.91 404.99 428.93 452.88 476.88 501.15 523.84 551.52 578.55	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 0.31 4.48 10.18 9.13 10.03	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576 4576 4548 4521	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724 752 779	1982 1981 1980 1979 1978 1976 1975 1974 1972 1971 1970 1969 1968 1965 1964 1964 1964	3241 3242 3243 3244 3246 3247 3248 3250 3251 3252 3254 3255 3256 3258 3259 3260 3260 3260 3261	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4580 4612 4643 4675 4771 4803 4835 4867 4989 4931 4960 4994 5026 5058 5090 5121	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 48.50 48.50 48.50 50.10 53.00 56.10 59.30 63.10 66.80 68.30	358.80 357.50 357.60 357.20 357.40 358.40 358.60 359.10 358.30 358.40 358.40 358.40 358.40 358.50 359.50 359.50 359.50 359.50	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4639.52 4660.35 4681.38 4702.59 4723.77 4744.91 4765.74 4783.77 4820.58 4820.58 4820.58 4849.54 4861.38	170 186 204 223 243 263 385 332 357 381 405 429 453 477 501 524 552 579 607 636 664	5 5 4 3 2 1 1 0 -1 -1 -2 -3 -4 -4 -5 -6 -6 -6 -7 -7	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 332.32 356.64 380.91 404.99 426.93 452.88 476.88 501.15 523.84 551.52 578.55 606.57 635.54 664.18	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 0.31 4.48 10.18 9.13 10.03 11.88 11.73 4.85	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576 4548 4521 4493 4464 4435	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724 752 779 807 836 865	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1970 1969 1968 1966 1965 1964 1964 1963 1962 1961 1961	3241 3242 3243 3244 3246 3247 3248 3250 3251 3252 3254 3255 3256 3258 3259 3260 3261 3261 3263 3264 3264	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4580 4612 4643 4675 4707 4739 4771 4803 4835 4867 4960 4994 5026 5058 5090 5121 5153	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 49.50 48.50 48.50 48.60 48.70 50.10 53.00 63.10 66.80 68.30 71.00	358.80 357.50 357.60 357.20 358.40 358.60 359.10 358.30 358.40 358.40 358.40 358.40 358.90 359.50 359.50 359.50	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 469.52 4660.35 4681.38 4702.59 4723.77 4744.91 4765.74 4783.77 4803.48 4820.58 4836.00 4849.54 4861.38 4872.51	170 186 204 223 243 263 285 308 332 357 381 405 429 453 477 501 524 552 579 607 636 664 694	5 5 4 3 2 1 1 0 0 -1 -1 -2 -3 -4 -4 -5 -6 -6 -6 -7 -7 -7	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 332.32 356.64 380.91 404.99 428.93 452.88 476.88 501.15 523.84 551.52 578.55 606.57 635.41 694.18	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 0.31 4.48 10.18 9.13 10.03 11.88 11.73 4.85 8.62	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576 4548 4521 4493 4464 4435 4405	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724 752 779 807 836 865 895	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1970 1969 1968 1965 1964 1964 1964 1963 1962 1961 1960 1960	3241 3242 3243 3244 3246 3247 3248 3250 3251 3252 3254 3255 3256 3258 3259 3260 3261 3263 3264 3264 3264 3264	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4580 4612 4643 4675 4707 4739 4771 4803 4835 4867 4960 4991 5026 5058 5090 5121 5153 5185	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 49.50 48.50 48.50 48.60 48.70 50.10 53.00 66.80 68.30 71.00 74.10	358.80 357.50 357.60 357.20 358.40 358.40 358.60 359.10 358.30 358.40 358.40 358.40 358.40 358.40 358.40 358.50 359.50 359.50 359.50 359.50	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 469.52 4660.35 4681.38 4702.59 4723.77 4744.91 4765.74 4783.77 4803.48 4820.58 4836.00 4849.54 4861.38	170 186 204 223 243 263 285 308 332 357 381 405 429 453 477 501 524 552 579 607 636 664 694 725	5 5 4 3 2 1 1 0 -1 -1 -2 -3 -4 -4 -5 -6 -6 -7 -7 -7 -6	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 332.32 356.64 380.91 404.99 428.93 452.88 476.88 501.15 533.84 551.52 578.55 606.57 635.54 664.18 724.70	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 0.31 4.48 10.18 9.13 10.03 11.88 11.73 4.85 8.62 9.85	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719 4695 4671 4623 4599 4576 4548 4521 4493 4464 4435 4405 4375	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724 752 779 807 836 865 895 925	1982 1981 1980 1979 1978 1976 1975 1974 1972 1971 1970 1969 1968 1965 1964 1964 1963 1962 1961 1960 1960 1960	3241 3242 3243 3244 3246 3247 3248 3250 3251 3252 3254 3255 3256 3258 3259 3260 3261 3261 3263 3264 3264 3264 3265 3265	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4580 4612 4643 4675 4771 4803 4835 4867 4989 4981 4960 4994 5026 5058 5090 5121 5153 5185 5217	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 48.50 48.50 48.50 50.10 53.00 56.10 59.30 68.30 71.00 74.10 78.10	358.80 357.50 357.60 357.40 358.10 358.40 358.60 359.10 358.30 358.40 358.40 358.40 358.40 358.90 359.50 359.50 359.50 359.50	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4597.68 4681.38 4702.59 4723.77 4744.91 4765.74 4783.77 4803.48 4820.58 4836.00 4849.54 4861.38 4872.51 4882.10 4889.79	170 186 204 223 243 263 385 387 381 405 429 453 477 501 524 552 579 607 636 664 694 725 756	5 5 4 3 2 1 1 0 -1 -1 -2 -3 -4 -4 -5 -6 -6 -7 -7 -7 -6 -6	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 356.64 380.91 404.99 428.93 452.88 476.88 501.15 523.84 551.52 578.55 606.57 635.54 664.18 694.18	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 4.48 10.18 9.13 10.03 11.88 11.73 4.85 8.62 9.85 12.56	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576 4548 4521 4493 4405 4375 4375 4344	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724 752 779 807 836 865 895 925 956	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1969 1968 1966 1965 1964 1964 1964 1964 1963 1960 1960 1960	3241 3242 3243 3244 3246 3247 3248 3250 3251 3252 3254 3255 3256 3258 3259 3260 3261 3263 3264 3265 3265 3265	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4580 4612 4643 4675 4707 4739 4771 4803 4835 4867 4960 4991 5026 5058 5090 5121 5153 5185	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 49.50 48.50 48.50 48.60 48.70 50.10 53.00 66.80 68.30 71.00 74.10	358.80 357.50 357.60 357.20 358.40 358.40 358.60 359.10 358.30 358.40 358.40 358.40 358.40 358.40 358.40 358.50 359.50 359.50 359.50 359.50	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 469.52 4660.35 4681.38 4702.59 4723.77 4744.91 4765.74 4783.77 4803.48 4820.58 4836.00 4849.54 4861.38	170 186 204 223 243 263 285 308 332 357 381 405 429 453 477 501 524 552 579 607 636 664 694 725	5 5 4 3 2 1 1 0 -1 -1 -2 -3 -4 -4 -5 -6 -6 -7 -7 -7 -6	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 332.32 356.64 380.91 404.99 428.93 452.88 476.88 501.15 533.84 551.52 578.55 606.57 635.54 664.18 724.70	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 0.31 4.48 10.18 9.13 10.03 11.88 11.73 4.85 8.62 9.85	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719 4695 4671 4623 4599 4576 4548 4521 4493 4464 4435 4405 4375	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724 752 779 807 836 865 895 925 956 988	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1969 1968 1966 1965 1964 1964 1963 1964 1963 1960 1959 1959	3241 3242 3243 3244 3246 3247 3250 3251 3252 3254 3255 3256 3258 3259 3260 3261 3261 3262 3264 3265 3265 3265 3265 3265	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4580 4612 4643 4675 4707 4739 4771 4803 4835 4867 4980 4994 5026 5058 5090 5121 5153 5185 5217 5249 5281 5355	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 49.50 48.50 48.50 48.50 50.10 53.00 56.10 59.30 63.10 66.80 71.00 74.10 78.10 81.20 84.40 89.50	358.80 357.50 357.60 357.20 357.40 358.40 358.60 359.10 358.30 358.40 358.40 358.40 358.40 358.90 359.50 359.50 359.50 359.10 359.10 359.10	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4689.52 4660.35 4681.38 4702.59 4723.77 4744.91 4765.74 4783.77 4820.58 4836.00 4849.54 4861.38 4872.51 4882.10 4889.79	170 186 204 223 243 263 385 387 381 405 429 453 477 501 524 552 579 607 636 664 694 725 756 787	5 5 4 3 2 1 1 0 -1 -1 -2 -3 -4 -4 -5 -6 -6 -7 -7 -7 -6 -6 -5 -5	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 356.64 380.91 404.99 428.93 452.88 476.88 501.15 523.84 551.52 578.55 666.57 635.54 664.18 694.18 724.70 755.75	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 0.31 4.48 10.18 9.13 10.03 11.88 11.73 4.85 8.62 9.85 12.56 9.86	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576 4548 4521 4493 4464 4435 4405 4375 4344 4312	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724 752 779 807 836 865 895 925 956	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1969 1968 1966 1965 1964 1964 1964 1964 1963 1960 1960 1960	3241 3242 3243 3244 3246 3247 3248 3250 3251 3252 3254 3255 3256 3258 3259 3260 3261 3263 3264 3265 3265 3265	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4580 4612 4643 4675 4771 4803 4835 4867 4989 4981 4960 4994 5026 5058 5090 5121 5153 5185 5217 5249 5281 5355 5386	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 48.50 48.50 48.60 48.70 50.10 53.00 63.10 66.80 68.30 71.00 74.10 78.10 81.20 84.40 89.50	358.80 357.50 357.60 357.40 358.10 358.40 358.60 359.10 358.40 358.40 358.40 358.40 358.40 358.90 0.50 1.10 1.50 2.10 2.50	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4597.68 4681.38 4702.59 4723.77 4744.91 4765.74 4783.77 4803.48 4820.58 4861.38 4872.51 4861.38 4872.51 4861.38 4872.51 4889.79 4895.54 4899.55	170 186 204 223 243 263 385 381 405 429 453 477 501 524 552 579 607 636 664 694 725 756 787 819 893	5 5 4 3 2 1 1 0 -1 -1 -2 -3 -4 -4 -5 -6 -6 -7 -7 -7 -7 -6 -6 -5 -3 0 1	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 356.64 380.91 404.99 428.93 452.88 476.88 501.15 523.84 551.52 578.55 606.57 635.54 664.18 694.18 724.70 755.75 787.23 818.97 82.82 923.82	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 4.48 10.18 9.13 10.03 11.88 11.73 4.85 8.62 9.86 10.08 9.86 10.08 11.29	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576 4548 4521 4493 4464 4435 4405 4375 4312 4312 4281 4207 4176	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724 752 779 807 836 865 895 925 988 1019 1093 1124	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1969 1968 1966 1965 1964 1964 1964 1964 1963 1960 1960 1960 1959 1960 1960 1960	3241 3242 3243 3244 3246 3247 3248 3250 3251 3252 3254 3255 3256 3258 3259 3260 3261 3263 3264 3265 3265 3265 3265 3265 3265 3265 3265	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4580 4612 4643 4675 4771 4803 4835 4867 4994 5026 5058 5090 5121 5153 5185 5217 5249 5281 5355 5386 5449	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 49.50 48.50 48.50 48.50 56.10 59.30 66.80 68.30 71.00 74.10 78.10 81.20 84.40 89.50 89.50	358.80 357.50 357.60 357.20 357.40 358.40 358.60 359.10 358.30 358.40 358.40 358.40 358.40 358.90 359.50 359.50 359.10 359.10 2.10 2.50 2.10	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4689.52 4660.35 4681.38 4702.59 4723.77 4744.91 4765.74 4783.77 4803.48 4820.58 4836.00 4849.54 4861.38 4872.51 4882.10 4889.55 4903.48 4890.55 4903.48	170 186 204 223 243 263 385 387 381 405 429 453 477 501 524 552 579 607 636 664 694 725 756 787 819 893 924 987	5 5 4 3 2 1 1 0 -1 -1 -2 -3 -4 -4 -5 -5 -6 -6 -7 -7 -7 -6 -6 -5 -3 0 1 3 1 3	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 356.64 380.91 404.99 428.93 452.88 476.88 501.15 523.84 551.52 578.55 606.57 635.54 664.18 694.18 724.70 755.75 787.23 818.97 892.82 923.82 986.81	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 0.31 4.48 10.18 9.13 10.03 11.88 8.62 9.85 12.56 9.86 10.08 6.91 1.29 0.57	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576 4548 4521 4493 4464 4435 4405 4375 4375 4344 4312 4281 4207 4176 4113	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724 752 779 807 836 865 895 925 926 988 1019 1093 1124 1187	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1969 1968 1966 1965 1964 1964 1963 1960 1960 1959 1959 1959 1960 1960 1960 1962 1962 1962	3241 3242 3243 3244 3246 3247 3250 3251 3252 3254 3255 3256 3258 3259 3260 3261 3261 3263 3264 3265 3265 3265 3264 3265 3265 3265 3265 3265 3265 3265 3265	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4548 4642 4643 4675 4771 4803 4835 4867 4980 4994 5026 5058 5090 5121 5153 5185 5217 5249 5281 5355 5386 5449 5511	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 48.50 48.50 48.50 53.00 56.10 59.30 63.10 66.80 68.30 71.00 74.10 81.20 84.40 89.50 89.50 89.50	358.80 357.50 357.60 357.20 358.40 358.60 359.10 358.30 358.40 358.40 358.40 358.40 358.40 359.50 359.50 359.50 359.50 1.10 1.50 2.10 2.50 2.10 1.90	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4680.35 4681.38 4702.59 4723.77 4744.91 4765.74 4783.77 4882.10 4882.10 4882.10 4882.10 4882.10 4889.79 4899.55 4903.48 4903.75	170 186 204 223 243 263 285 308 332 357 381 405 429 453 477 501 524 552 579 607 636 664 694 725 756 787 819 893 924 987	5 5 4 3 2 1 1 0 -1 -1 -2 3 -4 -4 -5 -5 -6 -6 -6 -7 -7 -7 -6 -6 -5 -3 0 1 3 5 3 0 1 3 5 3 0 1 3 5 3 0 1 3 5 3 0 1 3 5 3 5 3 5 3 5 3 5 3 5 3 5 3 5 3 5 3	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 356.64 380.91 404.99 428.93 452.88 476.88 501.15 523.84 551.52 578.55 606.57 635.54 664.18 694.18 724.70 755.75 787.23 818.97 892.82 936.81 1048.80	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 0.31 4.48 10.18 9.13 10.03 11.88 8.62 9.85 12.56 9.85 12.56 9.85 12.56 9.85 12.56 9.86 10.08 6.91 1.29 0.57 0.81	4930 4913 4895 4877 4836 4815 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576 4548 4521 4493 4405 4375 4375 4375 4374 4312 4281 4207 4176 4113 4051	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724 752 779 807 836 895 925 956 988 1019 1093 1124 1187 1249	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1969 1968 1966 1965 1964 1963 1962 1960 1960 1960 1960 1960 1960 1962 1962	3241 3242 3243 3244 3246 3247 3250 3251 3252 3254 3255 3256 3258 3259 3260 3261 3263 3264 3265 3265 3265 3265 3265 3265 3265 3263 3264 3263 3264 3263 3264 3263 3263	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4518 4612 4643 4675 4707 4739 4771 4803 4835 4867 4990 4994 5026 5058 5090 5121 5153 5185 5217 5249 5281 5355 5386 5449 5511 5574	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 49.50 48.50 48.50 48.50 68.10 68.30 71.00 74.10 78.10 89.50 89.50 89.50 89.50	358.80 357.50 357.60 357.20 358.40 358.60 359.10 359.00 358.30 358.40 358.40 358.40 358.40 358.40 358.80 359.50 359.50 359.50 359.10 359.80 1.10 1.50 2.10 2.50 2.10 1.70 1.50 1.30	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 469.52 4660.35 4681.38 4702.59 4723.77 4744.91 4765.74 4783.77 4803.48 4820.58 4836.00 4849.54 4861.38 4872.51 4882.10 4889.79 4895.55 4903.48 4903.75 4905.17 4905.17	170 186 204 223 243 263 285 308 332 357 381 405 429 453 477 501 524 552 579 607 636 664 694 725 756 787 819 893 924 987 1049 1112	5 5 4 3 2 1 1 0 0 -1 1 -1 2 -3 4 4 -4 5 -5 6 6 6 -7 7 -7 7 6 -6 5 -3 0 1 3 5 6	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 332.32 356.64 380.91 404.99 428.88 476.88 501.15 523.84 465.152 578.55 606.57 635.41 694.18 724.70 755.75 787.23 818.97 892.82 923.82 926.81 1048.80 1111.80	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 0.31 4.48 10.18 9.13 10.03 11.88 8.62 9.85 12.56 9.85 12.56 9.86 10.08 6.91 1.29 0.57 0.81 0.85	4930 4913 4895 4877 4857 4836 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576 4548 4521 4493 4464 4435 4405 4375 4374 4312 4281 4207 4176 4113 4051 3988	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724 752 779 807 836 895 925 956 988 1019 1093 1124 1187 1249 1312	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1970 1969 1968 1965 1964 1964 1963 1961 1960 1960 1969 1969 1969 1960 1969 1962 1962 1963 1963 1963 1963 1963	3241 3242 3243 3244 3246 3247 3248 3250 3251 3252 3254 3255 3256 3258 3259 3260 3261 3263 3264 3265 3265 3265 3265 3265 3265 3265 3265	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4516 4612 4643 4675 4777 4739 4777 4803 4835 4867 4981 4960 4994 5026 5058 5090 5121 5153 5185 5217 5249 5281 5355 5386 5449 5511 5574 5636	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 49.50 48.50 48.50 48.50 68.30 750.10 59.30 68.30 71.00 68.30 74.10 89.50 89.50 89.50 89.50 89.50 90.00 90.50	358.80 357.50 357.60 357.60 357.40 358.40 358.60 359.10 358.40 358.40 358.40 358.40 358.90 359.50 359.50 359.10 359.80 359.10 359.10 359.10 359.10 359.10 359.10 359.10 359.10 359.10 359.10 359.10 359.10 359.10 359.10 359.10	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4597.68 4681.38 4702.59 4723.77 4744.91 4765.74 4783.77 4803.48 4820.58 4861.38 4872.51 4861.38 4872.51 4889.79 4895.54 4899.55 4903.48 4903.75 4904.47 4905.45 4905.18	170 186 204 223 243 263 385 387 381 405 429 453 477 501 524 552 579 607 636 664 694 725 756 787 819 893 924 987 1049 1112	5 5 4 3 2 1 1 0 0 -1 -1 2 -3 -4 -4 5 -5 -6 6 -7 -7 -7 6 -6 5 -3 0 1 3 5 6 7	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 356.64 380.91 404.99 428.93 452.88 476.88 501.15 523.84 551.52 578.55 606.57 635.54 664.18 694.18 724.70 755.75 787.23 818.97 82.82 923.82 986.81 1048.80 1111.80	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 4.48 10.18 9.13 10.03 11.88 11.73 4.85 8.62 9.86 10.08 11.29 0.57 0.81 0.85	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576 4548 4521 4493 4464 4435 4405 4375 4312 4281 4207 4113 4051 3988 3926	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724 752 779 807 836 865 895 925 988 1019 1093 1124 1187 1249 1312 1374	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1969 1968 1966 1965 1964 1964 1964 1960 1960 1960 1960 1960 1962 1962 1963 1963 1963 1964 1964 1964	3241 3242 3243 3244 3246 3247 3248 3250 3251 3252 3254 3255 3256 3258 3259 3260 3261 3263 3264 3265 3265 3265 3265 3265 3265 3265 3265	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4580 4612 4643 4675 4771 4803 4835 4867 4994 5026 5058 5090 5121 5153 5185 5217 5249 5281 5355 5386 5449 5511 5574 5636 5698	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 49.50 48.50 48.50 48.50 56.10 53.00 56.10 59.30 68.30 71.00 74.10 78.10 81.20 84.40 89.50 89.50 89.50 90.50 90.50	358.80 357.50 357.60 357.60 357.40 358.40 358.60 359.10 358.30 358.40 358.40 358.40 358.40 358.90 0.50 1.10 1.50 2.10 2.50 1.70 1.90 1.30 1.30 1.30	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4689.52 4660.35 4681.38 4702.59 4723.77 4744.91 4765.74 4783.77 4803.48 4820.58 4836.00 4849.54 4861.38 4872.51 4882.10 4889.55 4903.48 4903.75 4905.17 4905.17 4905.17	170 186 204 223 243 263 385 387 381 405 429 453 477 501 524 552 579 607 636 664 694 725 756 787 819 893 924 987 1049 1112 1174 1236	5 5 4 3 2 1 1 0 0 -1 -1 2 -3 -4 4 -4 5 -5 -6 6 6 -7 -7 -7 6 6 -5 -3 0 1 3 5 6 7 9	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 356.64 380.91 404.99 426.93 452.88 476.88 501.15 501.15 606.57 635.54 664.18 694.18 724.70 755.75 787.23 818.97 82.82 923.82 923.82 966.81 1048.80 1111.80 1125.80	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 0.31 4.48 10.18 9.13 10.03 11.88 11.73 4.85 8.62 9.85 12.56 9.86 10.08 6.91 1.29 0.57 0.81 0.85 0.85 0.81	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576 4548 4521 4493 4464 4435 4405 4375 4375 4344 4312 4281 4207 4113 4051 3988 3926 3864	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724 752 779 807 836 865 895 925 988 1019 1093 1124 1187 1249 1312 1374 1436	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1970 1969 1968 1968 1964 1964 1963 1960 1960 1960 1960 1960 1960 1960 1960	3241 3242 3243 3244 3246 3247 3250 3251 3252 3254 3255 3256 3258 3259 3260 3261 3261 3263 3264 3265 3265 3264 3265 3265 3264 3265 3265 3265 3264 3265 3265 3262 3262 3262 3262 3262 3262	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4516 4612 4643 4675 4777 4739 4777 4803 4835 4867 4981 4960 4994 5026 5058 5090 5121 5153 5185 5217 5249 5281 5355 5386 5449 5511 5574 5636	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 49.50 48.50 48.50 48.50 68.30 750.10 59.30 68.30 71.00 68.30 74.10 89.50 89.50 89.50 89.50 89.50 90.00 90.50	358.80 357.50 357.60 357.60 357.40 358.40 358.60 359.10 358.40 358.40 358.40 358.40 358.90 359.50 359.50 359.10 359.80 359.10 359.10 359.10 359.10 359.10 359.10 359.10 359.10 359.10 359.10 359.10 359.10 359.10 359.10 359.10	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4597.68 4681.38 4702.59 4723.77 4744.91 4765.74 4783.77 4803.48 4820.58 4861.38 4872.51 4861.38 4872.51 4889.79 4895.54 4899.55 4903.48 4903.75 4904.47 4905.45 4905.18	170 186 204 223 243 263 385 387 381 405 429 453 477 501 524 552 579 607 636 664 694 725 756 787 819 893 924 987 1049 1112	5 5 4 3 2 1 1 0 0 -1 -1 2 -3 -4 -4 5 -5 -6 6 -7 -7 -7 6 -6 5 -3 0 1 3 5 6 7	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 356.64 380.91 404.99 428.93 452.88 476.88 501.15 523.84 551.52 578.55 606.57 635.54 664.18 694.18 724.70 755.75 787.23 818.97 82.82 923.82 986.81 1048.80 1111.80	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 0.31 4.48 10.18 9.13 10.03 11.88 8.62 9.85 12.56 9.85 12.56 9.85 12.56 9.85 12.56 9.85 12.56 9.85 10.08 6.91 1.29 0.57 0.81 0.81 0.82 0.85 0.81	4930 4913 4895 4877 4857 4836 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576 4548 4521 4493 4464 4435 4405 4375 4375 4374 4431 4207 4176 4113 4051 3988 3926 3864 3802	370 387 405 423 443 464 509 533 557 581 605 629 653 677 702 724 752 779 807 836 895 925 956 988 1019 1093 1124 1187 1249 1312 1374 1436 1498	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1969 1968 1966 1965 1964 1964 1960 1960 1960 1960 1960 1960 1960 1960	3241 3242 3243 3244 3246 3247 3250 3251 3252 3254 3255 3256 3258 3259 3260 3261 3263 3264 3265 3265 3265 3265 3265 3265 3265 3263 3264 3263 3263 3263 3263 3263 3263	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4516 4612 4643 4675 4777 4739 47771 4803 4835 4867 4980 4981 4960 4994 5026 5058 5090 5121 5153 5185 5217 5249 5281 5355 5386 5449 5511 5574 5636 5698 5760 5854 5916	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 48.50 48.50 48.50 53.00 56.10 59.30 63.10 66.80 68.30 71.00 74.10 89.50 89.50 89.50 89.50 90.50 90.50 90.50	358.80 357.50 357.60 357.20 358.40 358.60 359.10 358.30 358.30 358.40 358.40 358.40 358.40 359.50 359.50 359.50 359.50 359.10 1.10 1.50 2.10 2.50 2.10 1.30 1.30 1.30 1.30	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4639.52 4660.35 4681.38 4702.59 4723.77 4744.91 4765.74 4783.77 4820.58 4836.00 4849.54 4861.38 4872.51 4882.10 4889.79 4895.54 4903.48 4903.48 4903.48 4903.48 4904.26	170 186 204 223 243 263 285 308 332 357 381 405 429 453 477 501 524 552 579 607 636 664 694 725 756 787 819 893 924 987 1049 1112 1174 1236 1298	5 4 3 2 1 1 0 -1 -1 -2 -3 -4 -4 -5 -5 -6 -6 -6 -7 -7 -7 -6 -6 -6 -5 -7 -7 -7 -6 -6 -6 -7 -7 -7 -7 -7 -7 -7 -7 -7 -7 -7 -7 -7	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 356.64 380.91 404.99 428.93 452.88 476.88 501.15 523.84 551.52 578.55 606.57 635.54 664.18 694.18 724.70 755.75 787.23 818.97 892.82 923.82 986.81 1048.80 11173.80 1235.80 1295.80	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 0.31 4.48 10.18 9.13 10.03 11.88 11.73 4.85 8.62 9.85 12.56 9.86 10.08 6.91 1.29 0.57 0.81 0.85 0.85 0.81	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576 4548 4521 4493 4464 4435 4405 4375 4375 4344 4312 4281 4207 4113 4051 3988 3926 3864	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724 752 779 807 836 865 895 925 988 1019 1093 1124 1187 1249 1312 1374 1436	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1970 1969 1968 1968 1964 1964 1963 1960 1960 1960 1960 1960 1960 1960 1960	3241 3242 3243 3244 3246 3247 3250 3251 3252 3254 3255 3256 3258 3259 3260 3261 3261 3263 3264 3265 3265 3264 3265 3265 3264 3265 3265 3265 3264 3265 3265 3262 3262 3262 3262 3262 3262	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4548 4675 4707 4739 47771 4803 4835 4867 4994 5026 5058 5090 5121 5153 5185 5217 5249 5281 5355 5355 5355 5366 5449 5511 5574 5636 5698 5760 5854 5916 5977	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 49.50 48.50 48.50 48.50 68.30 71.00 56.10 59.30 68.30 71.00 78.10 84.40 89.50 89.50 89.50 90.50 90.50 90.50 90.20 90.00 89.70	358.80 357.50 357.60 357.60 357.40 358.40 358.60 359.10 358.30 358.40 358.40 358.40 358.40 358.40 358.40 359.50 359.30 359.50 359.10 359.80 359.10 1.10 1.50 2.10 2.50 1.170 1.70 1.30 1.30 1.30 1.30 1.30 1.30 1.30 1.3	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4699.52 4660.35 4681.38 4702.59 4723.77 4744.91 4765.74 4783.77 4803.48 4820.58 4836.00 4849.54 4861.38 4872.51 4882.10 4889.55 4903.48 4903.75 4904.47 4905.17 4905.18 4904.63 4904.63 4904.26 4903.93	170 186 204 223 243 263 385 387 381 405 429 453 477 501 524 552 579 607 636 664 694 725 756 787 819 893 924 987 1049 1112 1174 1236 1298 1392 1454 1515	5 5 4 3 2 1 1 0 0 -1 -1 2 -3 -4 4 -4 5 -5 -6 6 -6 -7 -7 -7 -6 6 -5 -3 0 1 3 5 6 7 9 10 11 13 14	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 356.64 380.91 404.99 426.93 452.88 476.88 501.15 523.84 551.52 578.55 606.57 635.54 664.18 694.18 724.70 7755.75 787.23 818.97 82.82 923.82 923.82 926.81 1048.80 11173.80 1297.80 1391.80 1453.80 1453.80 1514.80	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 0.31 4.48 10.18 9.13 10.03 11.73 4.85 8.62 9.86 10.08 6.91 1.29 0.57 0.81 0.32 0.51 0.81 0.32 0.51	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576 4548 4521 4493 4464 4435 4405 4375 4375 4344 4312 4281 4281 4207 4176 4113 4051 3988 3926 3864 3802 3707 3645 3584	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724 752 779 807 836 865 895 925 988 1019 1093 1124 1187 1249 1312 1374 1436 1498 1592 1655 1716	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1970 1969 1968 1965 1964 1964 1963 1960 1960 1960 1960 1960 1962 1962 1962 1963 1964 1964 1964 1964 1964 1964 1964 1964	3241 3242 3243 3244 3246 3247 3248 3250 3251 3252 3254 3255 3256 3258 3259 3260 3261 3263 3264 3265 3265 3265 3265 3265 3264 3265 3262 3262 3262 3262 3262 3262 3262 3262 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3262 3262 3262 3262 3262 3263 3262 3262 3262 3262 3262 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3262 3262 3262 3262 3262 3262 3263 3263 3263 3263 3263 3264	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4580 4612 4643 4675 4771 4803 4835 4867 4931 4931 4960 4994 5026 5058 5090 5121 5183 5185 5217 5221 5281 5355 5386 5449 5511 5574 5636 5698 5760 5854 5916 5977 6008	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 48.50 48.50 48.50 53.00 56.10 59.30 63.10 66.80 68.30 71.00 74.10 89.50 89.50 89.50 89.50 90.50 90.50 90.50 90.20 90.20 90.00 89.70 89.60	358.80 357.50 357.60 357.40 358.40 358.60 359.10 358.80 358.40 358.40 358.40 358.40 358.90 0.50 1.10 1.50 2.10 2.50 2.10 1.70 1.90 1.30 1.30 1.30	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4689.52 4660.35 4681.38 4702.59 4723.77 4744.91 4765.74 4783.77 4820.58 4836.00 4849.54 4861.38 4872.51 4882.10 4889.79 4895.54 4903.48 4903.48 4903.48 4904.47 4905.45 4903.93 4904.26 4903.93 4904.26	170 186 204 223 243 263 385 387 381 405 429 453 477 501 524 552 579 607 636 664 694 725 756 787 819 893 924 987 1049 1112 1174 1236 1298 1392 1454 1515 1546	5 5 4 3 2 1 1 0 0 -1 1 -1 2 -3 -4 4 -5 5 -6 6 -6 7 -7 7 -6 6 -5 -3 0 1 3 5 6 7 9 10 11 13 14 15	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 356.64 380.91 404.99 428.93 452.88 476.88 501.15 523.84 551.52 578.55 606.57 635.54 664.18 694.18 724.70 755.75 787.23 818.97 82.82 923.82 923.82 923.82 923.82 936.81 1048.80 1171.80 1295.80 1297.80 1391.80 1453.80 1544.80 1545.80	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 0.31 4.48 10.18 9.13 10.03 11.88 11.73 4.85 8.62 9.85 12.56 9.86 10.08 6.91 1.29 0.57 0.81 0.32 0.51 0.11 0.72 0.52 0.46	4930 4913 4895 4877 4857 4815 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576 4548 4521 4493 4464 4435 4405 4375 4375 4375 4312 4281 4207 4176 4113 4051 3988 3926 3864 3802 3707 3645 3584 3553	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 7724 752 779 807 836 895 925 956 988 1019 1093 1124 1187 1249 1312 1374 1436 1498 1592 1655 1716 1747	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1969 1968 1966 1965 1964 1964 1963 1960 1960 1960 1960 1960 1962 1963 1963 1964 1964 1964 1964 1964 1964 1964 1964	3241 3242 3243 3244 3246 3247 3248 3250 3251 3252 3254 3255 3256 3258 3259 3260 3261 3263 3264 3265 3265 3265 3265 3264 3263 3262 3262 3262 3262 3262 3262 3263 3263 3263 3263 3263 3263 3263	
	Top purf Top of Tangent @ 4727' But of Tangent	4453 4484 4516 4548 4548 4675 4707 4739 47771 4803 4835 4867 4994 5026 5058 5090 5121 5153 5185 5217 5249 5281 5355 5355 5355 5366 5449 5511 5574 5636 5698 5760 5854 5916 5977	30.70 33.00 34.90 36.70 39.20 42.40 45.70 49.50 49.50 49.50 48.50 48.50 48.50 68.30 71.00 56.10 59.30 68.30 71.00 78.10 84.40 89.50 89.50 89.50 90.50 90.50 90.50 90.20 90.00 89.70	358.80 357.50 357.60 357.60 357.40 358.40 358.60 359.10 358.30 358.40 358.40 358.40 358.40 358.40 358.40 359.50 359.30 359.50 359.10 359.80 359.10 1.10 1.50 2.10 2.50 1.170 1.70 1.30 1.30 1.30 1.30 1.30 1.30 1.30 1.3	4425.28 4451.61 4478.16 4504.11 4529.34 4553.56 4575.84 4699.52 4660.35 4681.38 4702.59 4723.77 4744.91 4765.74 4783.77 4803.48 4820.58 4836.00 4849.54 4861.38 4872.51 4882.10 4889.55 4903.48 4903.75 4904.47 4905.17 4905.18 4904.63 4904.63 4904.26 4903.93	170 186 204 223 243 263 385 387 381 405 429 453 477 501 524 552 579 607 636 664 694 725 756 787 819 893 924 987 1049 1112 1174 1236 1298 1392 1454 1515	5 5 4 3 2 1 1 0 0 -1 -1 2 -3 -4 4 -4 5 -5 -6 6 -6 -7 -7 -7 -6 6 -5 -3 0 1 3 5 6 7 9 10 11 13 14	170.02 186.36 204.19 222.87 242.50 263.37 284.89 308.25 356.64 380.91 404.99 426.93 452.88 476.88 501.15 523.84 551.52 578.55 606.57 635.54 664.18 694.18 724.70 7755.75 787.23 818.97 82.82 923.82 923.82 926.81 1048.80 11173.80 1297.80 1391.80 1453.80 1453.80 1514.80	7.13 7.74 5.94 5.67 7.82 10.10 10.67 7.83 4.23 0.24 1.77 2.60 0.94 0.31 0.31 4.48 10.18 9.13 10.03 11.73 4.85 8.62 9.86 10.08 6.91 1.29 0.57 0.81 0.32 0.51 0.81 0.32 0.51	4930 4913 4895 4877 4857 4836 4815 4791 4767 4743 4719 4695 4671 4647 4623 4599 4576 4548 4521 4493 4464 4435 4405 4375 4375 4344 4312 4281 4281 4207 4176 4113 4051 3988 3926 3864 3802 3707 3645 3584	370 387 405 423 443 464 485 509 533 557 581 605 629 653 677 702 724 752 779 807 836 865 895 925 988 1019 1093 1124 1187 1249 1312 1374 1436 1498 1592 1655 1716	1982 1981 1980 1979 1978 1976 1975 1974 1973 1972 1971 1970 1969 1968 1968 1964 1964 1963 1960 1960 1960 1960 1960 1960 1960 1962 1963 1964 1964 1964 1964 1964 1964 1964 1964	3241 3242 3243 3244 3246 3247 3248 3250 3251 3252 3254 3255 3256 3258 3259 3260 3261 3263 3264 3265 3265 3265 3265 3265 3264 3265 3262 3262 3262 3262 3262 3262 3262 3262 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3262 3262 3262 3262 3262 3263 3262 3262 3262 3262 3262 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3263 3262 3262 3262 3262 3262 3262 3263 3263 3263 3263 3263 3264	

Г	Measured	Sub-Sea	Vertical	True Vert	Northings (+)	Eastings (+)	Vert	DLS				
	Depth	Incl.	Azim.	Depth	Southings (-)	Westings (-)	Section	deg/100'				
L	(ft)	(deg)	(ft)	(ft)	(ft)	(ft)	(ft)	(deg)	FNL	FSL	FWL	FEL
	6162	92.20	2.40	4902.15	1700	20	1699.74	1.33	3399	1901	1966	3261
	6224	92.70	2.00	4899.50	1762	23	1761.68	1.03	3337	1963	1967	3260
	6287	93.00	2.00	4896.36	1824	25	1824.59	0.48	3274	2025	1968	3259
	6348	92.40	1.70	4893.49	1885	27	1885.52	1.10	3213	2086	1969	3258
	6410	92.50	1.60	4890.84	1947	29	1947.46	0.23	3151	2148	1969	3258
	6472	92.20	1.40	4888.30	2009	30	2009.41	0.58	3089	2210	1969	3258
	6534	91.50	0.60	4886.30	2071	32	2071.38	1.71	3027	2272	1969	3258
	6597	91.00	0.90	4884.92	2134	32	2134.36	0.93	2964	2335	1969	3259
	6689	91.30	0.20	4883.08	2226	33	2226.33	0.83	2872	2427	1968	3260
	6782	90.40	0.50	4881.70	2319	34	2319.31	1.02	2779	2520	1966	3262
	6878	90.90	359.50	4880.61	2415	34	2415.28	1.16	2683	2616	1964	3264
	6942	89.90	359.50	4880.16	2479	33	2479.25	1.56	2619	2680	1962	3266
	6974	89.90	359.50	4880.22	2511	33	2511.24	0.00	2588	2712	1961	3267
	7038	89.60	0.20	4880.50	2575	33	2575.22	1.19	2524	2776	1960	3268
	7101	89.60	0.80	4880.94	2638	33	2638.21	0.95	2460	2839	1959	3269
	7165	89.80	1.40	4881.27	2702	35	2702.21	0.99	2396	2903	1959	3270
	7229	89.90	2.20	4881.44	2766	37	2766.21	1.26	2332	2967	1960	3269
	7292	90.20	2.50	4881.38	2829	39	2829.20	0.67	2269	3030	1961	3268
	7356	90.20	2.80	4881.16	2893	42	2893.17	0.47	2205	3094	1963	3266
	7420	89.30	2.10	4881.44	2957	45	2957.16	1.78	2141	3158	1964	3265
	7484	89.50	2.70	4882.11	3021	48	3021.14	0.99	2077	3222	1965	3264
	7548	89.90	3.00	4882.44	3085	51	3085.11	0.78	2013	3287	1967	3262
	7612	90.00	2.60	4882.50	3149	54	3149.09	0.64	1949	3351	1969	3261
	7675	89.60	1.00	4882.72	3212	56	3212.08	2.62	1886	3414	1970	3260
	7739	89.60	1.20	4883.17	3276	57	3276.08	0.31	1822	3478	1970	3260
	7802	89.60	0.30	4883.61	3339	58	3339.07	1.43	1759	3541	1969	3261
	7866	89.00	1.10	4884.39	3403	59	3403.07	1.56	1695	3605	1969	3262
	7929	89.00	0.40	4885.49	3466	59	3466.05	1.11	1632	3668	1968	3262
	7993	89.10	1.40	4886.55	3530	60	3530.04	1.57	1568	3732	1968	3263
	8057	89.80	1.10	4887.16	3594	62	3594.04	1.19	1504	3796	1968	3263
	8121	90.90	0.40	4886.77	3658	63	3658.04	2.04	1440	3860	1967	3263
	8184	91.30	1.20	4885.56	3721	64	3721.02	1.42	1377	3923	1967	3264
	8216	91.50	1.40	4884.78	3752	64	3753.01	0.88	1345	3955	1967	3264
	8280	91.40	1.70	4883.16	3816	66	3816.99	0.49	1281	4019	1968	3264
	8344	90.10	1.70	4882.32	3880	68	3880.98	2.03	1217	4083	1968	3263
	8408	89.60	1.40	4882.49	3944	70	3944.98	0.91	1153	4147	1968	3263
	8471	89.50	1.80	4882.99	4007	71	4007.98	0.65	1090	4210	1969	3263
	8535	89.20	1.20	4883.71	4071	73	4071.97	1.05	1026	4274	1969	3262
	8599	88.90	0.90	4884.77	4135	74	4135.96	0.66	962	4338	1969	3263
	8663	89.50	1.60	4885.67	4199	76	4199.95	1.44	898	4402	1969	3263
	8726	90.00	0.80	4885.94	4262	77	4262.95	1.50	835	4465	1969	3263
	8790	89.90	1.10	4886.00	4326	78	4326.95	0.49	771	4529	1969	3263
	8853	89.70	1.90	4886.22	4389	80	4389.95	1.31	708	4592	1969	3263
	8917	89.80	0.60	4886.50	4453	81	4453.95	2.04	644	4656	1969	3263
	8981	89.10	359.90	4887.11	4517	81	4517.94	1.55	580	4720	1968	3264
	9045	90.90	1.00	4887.11	4581	82	4581.93	3.30	516	4784	1967	3265
	9077	91.70	0.70	4886.39	4613	82	4613.92	2.67	484	4816	1967	3266
	9173	92.80	359.80	4882.62	4709	83	4709.83	1.48	388	4912	1966	3267
	9230	92.80	359.80	4879.83	4766	83	4766.74	0.00	331	4969	1964	3269

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Current

Wellbore Schematic

Original Completion () X
Current X Workover

15-055-22177 API No.

Sonderegger 2331 1-13H SEC 13, TWP 23S, RNG 31W 2899' KB; 2879' GL

SH Location Elevations

Stewart South Finney

Š

Field County State Well

22

MD

Well Bore Data

41 tie 9.58° 308 1.455 csg @ 258 4.55; 0,500 On 10.025° 10-8.021° Drift-8.765° Collapse="2020 Internal Yield=5520 CmtVal 4.25 are Extendence @ 124 pag (Yield=2,12), informed by 150 axs Swiftcom @ 156 pag (Yield=1.2)

The Detail

Tangent from 4727" to 4914" Top of Liner 49.4 ° inclination

124 ftr 77 268 P-110; Cpg QD =7,6567 ID=6,2767 Drift=6,151* Collapse* 6210 Internal Yield=9990

PBTD @

101 [is 4-127 11.68 N-80 css @ 9.237 11.68 N-80: Cpg OD ~5.000* 10=4.000* Didfe-3.875* Collapse= 6350 Internal Yield=7780 Ont w/500 svs Econocem mixed at 13.6 pg (Yield=1.54); BP @ 1800#, FR, FH

6-1/8" Hote MW: 8.4-8.6 ppg

TD: 9230' MD / 4880' TVD

Spud: 9/16/2012

SANDRIDGE THE POWER OF US.

Sonderegger 2331 1-13H SEC 13, TWP 235, RNG 31W 2899 KB; 2879 GL Stewart South Finney KS

Field County State Well SH Location Elevations

Wellbore Schematic

15-055-22177 API No.

TVD

MD

Well Bore Data

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Original Completion ()	Current	Workover	Proposed

Ddd ryser (MW): B3-01-7-01.		TOG 7 Est @ 2631 @ 2631 calculusd RAY: 64.51 ppg G-109 Hote	OEP 24 COLD 24 COLD 24 COLD 25			
		4 JI			2	
1,798	LENGTH TOD		Tangent @ -50° 4,915 4,759 -1/4"X 10" L lieback extension	5,333 4,502 1" Collapse = 6210 Internal Yield=5050	Cmt w/ 2000 sas Econocem miked at 13.6 ppg (Yield=1,54), followed by 100 sas Haltem @ 15.6 (Yield=1,19), FR Set @ 88. * 9.142* 4,884* 99.142* 4,884*	9,230 4,880 15° Collapse= 6350 Internal Yield=7780 4=1,54); BP @ 1800k, FR, FH
41 h 6.56° 364 J.55 csg @ 364 J.55; Cpg OD =10.675° TD-6.521° Drift-6,765° Collapse= 2020 Internal Yield-6520 Omfd witchs sos Extendesenn @ 12.4 ppg (Yield-2.12), followed by 190 sxs Swiftenn @ 15.6 ppg (Yield=1,2)	De Debi		Tengent from 4727 to 4914 Top of Liner 49.4* Inclination Baher 2XPN vvi RH profile (4.276* TD) & 5.947*55-1/4"X TO L Beback extension	124 jp 7" 268 P-110 c <u>ng @</u> 288 P-110: Cpg OD =7.656" (D=6.276" Dritt=6.151" Colapse= 6210 Internal Yield=6060	Cmt w/ 200 sxs Econocem mixed at 13.6 ppg (Yale) Set @ 88. *	9.23 11.58 N-BO: Colo On S-5.000° (D-4.000° Colorus-635° Colorus-635° Internal Yodd-7700 Cmt vV 500 sse Econocem mixed at 13.5 pg (Yadd-1.54); BP @ 1600#, FR, PH

Conservation Division 266 N. Main St., Ste. 220 Wichita, KS 67202-1513



Phone: 316-337-6200 Fax: 316-337-6211 http://kcc.ks.gov/

Sam Brownback, Governor

Shari Feist Albrecht, Chair Jay Scott Emler, Commissioner Pat Apple, Commissioner

April 7, 2015

Tiffany Golay SandRidge Exploration & Production LLC 123 Robert S. Kerr Ave Oklahoma City, OK 73102-6406

RE: Approved Commingling CO031515 Sonderegger 2331 1-13H API No. 15-055-22177-01-00

Dear Ms. Golay:

Your Application for Commingling (ACO-4) for the above described well has been reviewed and approved by the Kansas Corporation Commission (KCC) per K.A.R. 82-3-123. Notice was examined and found to be proper per K.A.R. 82-3-135a. No protest had been filed within the 15-day protest period.

Based upon the depth of the Cherokee formation perforations, total oil production shall not exceed 200 BOPD and total gas production shall not exceed 50% of the absolute open flow (AOF).

File Form ACO-1 upon completion of the well to commingle.

Sincerely,

Rick Hestermann Production Department