PETROLEUM DEVELOPMENT CORP DJ Basin

Well Name: **Elbert 8N**

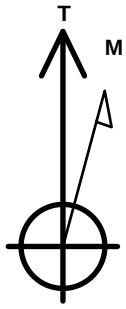
Surface Location: Elbert 1-12 Pad Sec.21-T5N-R65W
North American Datum 1983 , US State Plane 1983, Colorado Northern Zone
Ground Elevation: 4638.0

+N/-S	+E/-W	Northing	Easting	Latittude	Longitude	Slot
0.0	0.0	1383497.73	3229755.13	40.383170	-104.675250	

Original Well Elev WELL @ 4661.0ft (Original Well Elev)

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Shape
SHL 2104'FSL, 710'FWL, SEC.21	1.0	0.0	0.0	Point
BHL 2045'FSL, 500'FEL, SEC.22	6800.0	-19.7	9348.1	Point
WP #2 (8N)	6825.1	35.1	6350.5	Point
WP #1 (8N)	6833.0	35.1	5250.9	Point
LPL 2085'FSL, 819'FWL, SEC.21	6870.0	-14.6	108.7	Point



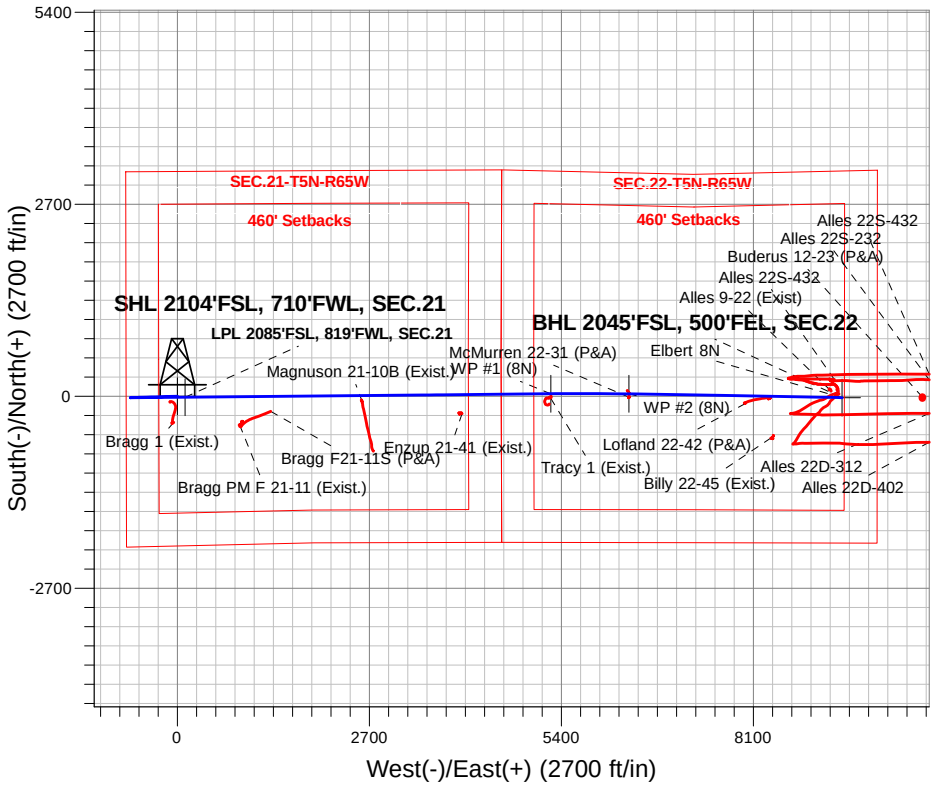
Azimuths to True North
Magnetic North: 8.06°

Magnetic Field
Strength: 52547.7snT
Dip Angle: 66.86°
Date: 1/5/2017
Model: IGRF2010

Elbert 1-12 Pad Sec.21-T5N-R65W
Elbert 8N
Plan #4 (1-12-17)
12:58, January 16 2017

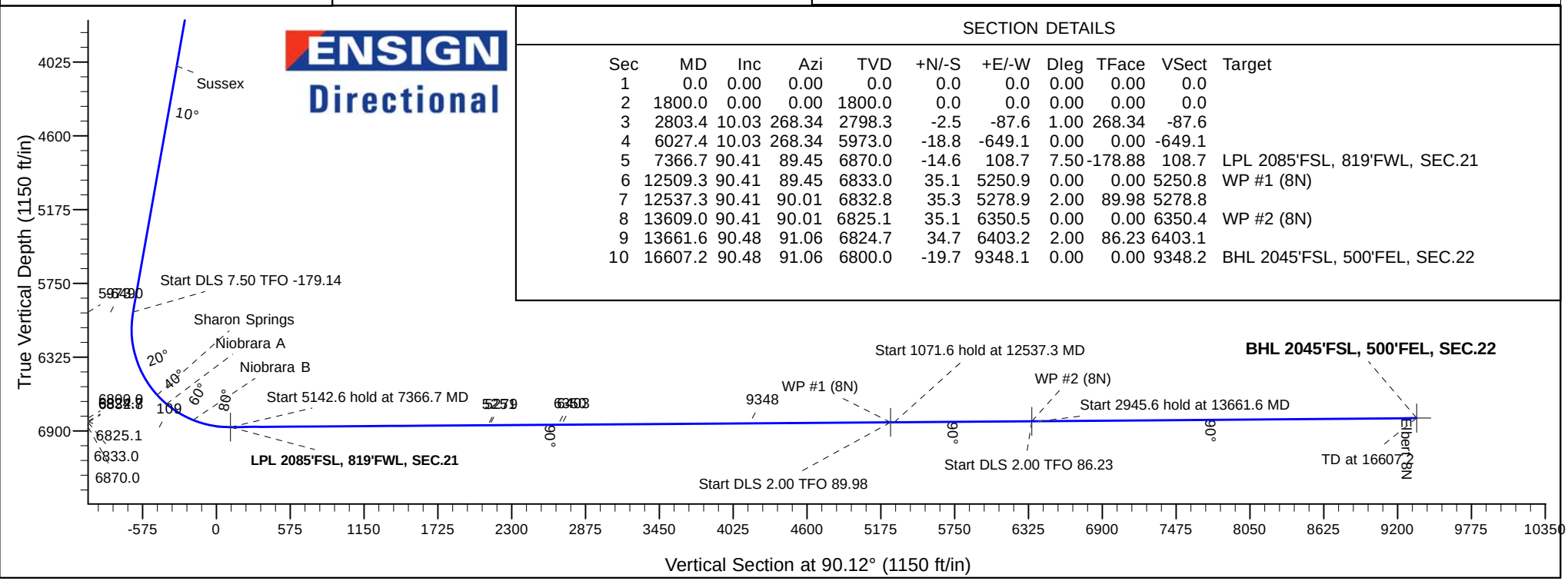
ANNOTATIONS

TVD	MD	Annotation
1800.0	1800.0	KOP - Start Build 1.00
2798.1	2803.3	Start 3224.2 hold at 2803.3 MD
5973.0	6027.4	Start DLS 7.50 TFO -179.14
6870.0	7366.7	Start 5142.6 hold at 7366.7 MD
6833.0	12509.3	Start DLS 2.00 TFO 89.98
6832.8	12537.3	Start 1071.6 hold at 12537.3 MD
6825.1	13609.0	Start DLS 2.00 TFO 86.23
6824.7	13661.6	Start 2945.6 hold at 13661.6 MD
6800.0	16607.2	TD at 16607.2



SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	1800.0	0.00	0.00	1800.0	0.0	0.0	0.00	0.00	0.0	
3	2803.4	10.03	268.34	2798.3	-2.5	-87.6	1.00	268.34	-87.6	
4	6027.4	10.03	268.34	5973.0	-18.8	-649.1	0.00	0.00	-649.1	
5	7366.7	90.41	89.45	6870.0	-14.6	108.7	7.50	-178.88	108.7	LPL 2085'FSL, 819'FWL, SEC.21
6	12509.3	90.41	89.45	6833.0	35.1	5250.9	0.00	0.00	5250.8	WP #1 (8N)
7	12537.3	90.41	90.01	6832.8	35.3	5278.9	2.00	89.98	5278.8	
8	13609.0	90.41	90.01	6825.1	35.1	6350.5	0.00	0.00	6350.4	WP #2 (8N)
9	13661.6	90.48	91.06	6824.7	34.7	6403.2	2.00	86.23	6403.1	
10	16607.2	90.48	91.06	6800.0	-19.7	9348.1	0.00	0.00	9348.2	BHL 2045'FSL, 500'FEL, SEC.22



ENSIGN Directional

PETROLEUM DEVELOPMENT CORP DJ Basin

SEC.21-T5N-R65W
Elbert 1-12 Pad Sec.21-T5N-R65W
Elbert 8N

Wellbore #1
Plan #4 (1-12-17)

Anticollision Report

16 January, 2017

PDC ENERGY
Growing E&P Value

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Elbert 8N
Project:	SEC.21-T5N-R65W	**TVD Reference:**	WELL @ 4661.0ft (Original Well Elev)
Reference Site:	Elbert 1-12 Pad Sec.21-T5N-R65W	**MD Reference:**	WELL @ 4661.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Elbert 8N	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.45 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #4 (1-12-17)	**Offset TVD Reference:**	Offset Datum

Reference Plan #4 (1-12-17)

Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.0ft	**Error Model:**	ISCWSA
Depth Range:	Unlimited	**Scan Method:**	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 1,200.0 ft	**Error Surface:**	Elliptical Conic
Warning Levels Evaluated at:	2.45 **Sigma**	**Casing Method:**	Not applied

Survey Tool Program **Date** 1/16/2017

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	16,607.2	Plan #4 (1-12-17) (Wellbore #1)	MWD	MWD - Standard

Summary

Site Name / Offset Well - Wellbore - Design	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Alles 22S-HZ Pad Sec.22-T5N-R65W						
Alles 22D-312 - Wellbore #1 - Wellbore #1	16,257.5	6,977.3	247.4	-96.5	0.719	Level 1, CC
Alles 22D-312 - Wellbore #1 - Wellbore #1	16,300.0	7,018.1	248.0	-97.1	0.719	Level 1, ES, SF
Alles 22D-402 - Wellbore #1 - Wellbore #1	16,230.8	7,010.3	648.3	305.3	1.890	CC
Alles 22D-402 - Wellbore #1 - Wellbore #1	16,300.0	7,066.4	649.7	305.2	1.886	ES, SF
Alles 22S-232 - Wellbore #1 - Wellbore #1	16,607.2	6,741.2	326.4	29.1	1.098	Level 2, CC, ES, SF
Alles 22S-432 - Wellbore #1 - Wellbore #1	16,167.4	6,951.3	253.8	-87.1	0.745	Level 1, CC, ES, SF
Alles 22S-432 - Wellbore #2 - Wellbore #2	16,159.7	6,904.5	304.4	-32.3	0.904	Level 1, CC
Alles 22S-432 - Wellbore #2 - Wellbore #2	16,200.0	6,938.7	305.5	-34.9	0.898	Level 1, ES, SF
Elbert 1-12 Pad Sec.21-T5N-R65W						
Elbert 10N - Wellbore #1 - Plan #5 (1-12-17)	1,400.0	1,400.0	29.1	21.7	3.919	CC
Elbert 10N - Wellbore #1 - Plan #5 (1-12-17)	16,607.2	16,624.2	513.8	-156.6	0.766	Level 1, ES, SF
Elbert 11N - Wellbore #1 - Plan #4 (1-12-17)	400.0	400.0	43.7	41.8	22.676	CC, ES
Elbert 11N - Wellbore #1 - Plan #4 (1-12-17)	16,607.2	16,715.3	772.0	104.5	1.156	Level 2, SF
Elbert 12N - Wellbore #1 - Plan #6 (1-13-17)	200.0	200.0	58.3	57.5	70.553	CC, ES
Elbert 12N - Wellbore #1 - Plan #6 (1-13-17)	16,607.2	16,653.6	1,002.0	331.9	1.495	Level 3, SF
Elbert 1N - Wellbore #1 - Plan #3 (1-12-17)	200.0	200.0	105.7	104.9	127.958	CC, ES
Elbert 1N - Wellbore #1 - Plan #3 (1-12-17)	1,800.0	1,726.2	387.1	374.6	30.908	SF
Elbert 2N - Wellbore #1 - Plan #3 (1-12-17)	400.0	400.0	91.1	89.2	47.279	CC, ES
Elbert 2N - Wellbore #1 - Plan #3 (1-12-17)	1,100.0	1,078.2	149.4	143.4	24.988	SF
Elbert 3N - Wellbore #1 - Plan #4 (1-12-17)	600.0	600.0	76.6	73.5	25.279	CC, ES
Elbert 3N - Wellbore #1 - Plan #4 (1-12-17)	1,000.0	991.8	94.9	89.7	18.172	SF
Elbert 4N - Wellbore #1 - Plan #3 (1-12-17)	800.0	800.0	62.0	57.9	15.014	CC, ES
Elbert 4N - Wellbore #1 - Plan #3 (1-12-17)	16,607.2	16,677.9	1,003.3	332.9	1.497	Level 3, SF
Elbert 5N - Wellbore #1 - Plan #3 (1-12-17)	1,000.0	1,000.0	47.5	42.2	9.071	CC, ES
Elbert 5N - Wellbore #1 - Plan #3 (1-12-17)	16,607.2	16,730.1	752.8	85.6	1.128	Level 2, SF
Elbert 6N - Wellbore #1 - Plan #3 (1-12-17)	1,200.0	1,200.0	29.3	23.0	4.624	CC
Elbert 6N - Wellbore #1 - Plan #3 (1-12-17)	16,607.2	16,618.6	484.7	-185.7	0.723	Level 1, ES, SF
Elbert 7N - Wellbore #1 - Plan #4 (1-12-17)	1,400.0	1,400.0	14.6	7.1	1.961	CC
Elbert 7N - Wellbore #1 - Plan #4 (1-12-17)	16,607.2	16,684.7	257.3	-388.1	0.399	Level 1, ES, SF
Elbert 9N - Wellbore #1 - Plan #4 (1-12-17)	1,600.0	1,600.0	14.6	6.0	1.707	CC
Elbert 9N - Wellbore #1 - Plan #4 (1-12-17)	16,607.2	16,689.2	268.1	-379.9	0.414	Level 1, ES, SF
Existing Wells Sec.22-T5N-R65W						
Alles 9-22 (Exist) - Wellbore #1 - Wellbore #1	16,449.1	6,787.3	90.4	-254.2	0.262	Level 1, CC, ES, SF
Buderus 12-23 (P&A) - Wellbore #1 - Wellbore #1	16,607.2	6,797.0	1,126.9	650.1	2.364	CC, ES, SF

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Elbert 8N
Project:	SEC.21-T5N-R65W	**TVD Reference:**	WELL @ 4661.0ft (Original Well Elev)
Reference Site:	Elbert 1-12 Pad Sec.21-T5N-R65W	**MD Reference:**	WELL @ 4661.0ft (Original Well Elev)
Site Error:	0.0 ft	**North Reference:**	True
Reference Well:	Elbert 8N	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 ft	**Output errors are at**	2.45 sigma
Reference Wellbore	Wellbore #1	**Database:**	US_EDM
Reference Design:	Plan #4 (1-12-17)	**Offset TVD Reference:**	Offset Datum

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Existing Wells Sec.25-T5N-R65W						
Bragg 1 (Exist.) - Wellbore #1 - Wellbore #1	1,550.5	1,528.9	104.5	96.0	12.255	CC, ES
Bragg 1 (Exist.) - Wellbore #1 - Wellbore #1	7,300.0	6,869.4	368.4	325.2	8.525	SF
Bragg F21-11S (P&A) - Wellbore #1 - Wellbore #1	100.0	68.4	975.7	975.4	4,190.079	CC
Bragg F21-11S (P&A) - Wellbore #1 - Wellbore #1	200.0	166.1	975.9	975.3	1,515.877	ES
Bragg F21-11S (P&A) - Wellbore #1 - Wellbore #1	3,300.0	3,146.2	1,195.9	1,179.6	73.340	SF
Tracy 1 (Exist.) - Wellbore #1 - Wellbore #1	12,515.0	6,809.8	51.4	-159.3	0.244	Level 1, CC, ES, SF
Lorenz F22-67-1HN Pad Sec.22-T5N-R65W						
Billy 22-45 (Exist.) - Wellbore #1 - Wellbore #1	15,616.2	6,782.0	586.2	268.7	1.846	CC, ES, SF
Bragg PM F 21-11 (Exist.) - Wellbore #1 - Wellbore #1	8,127.7	6,838.1	394.2	330.9	6.231	CC, ES
Bragg PM F 21-11 (Exist.) - Wellbore #1 - Wellbore #1	8,200.0	6,837.6	400.8	335.3	6.123	SF
Lofland 22-42 (P&A) - Wellbore #1 - Wellbore #1	15,243.7	6,838.6	107.2	-196.8	0.353	Level 1, CC, ES, SF
McMurren 22-31 (P&A) - Wellbore #1 - Wellbore #1	13,609.2	6,792.9	53.8	-197.3	0.214	Level 1, CC, ES, SF
Lorenz PC F22-33D Pad Sec.21-T5N-R65W						
Enzup 21-41 (Exist.) - Wellbore #1 - Wellbore #1	11,258.8	6,828.4	268.0	100.3	1.598	CC, ES, SF
Magnuson Pad Sec.21-T5N-R65W						
Magnuson 21-10B (Exist.) - Magnuson 21-10B - Magnus	9,852.5	6,975.8	78.1	-42.7	0.647	Level 1, CC, ES, SF

Offset Design Alles 22S-HZ Pad Sec.22-T5N-R65W - Alles 22D-312 - Wellbore #1 - Wellbore #1

Offset Site Error: 0.0 ft

Survey Program: 60-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
14,900.0	6,814.3	6,455.0	6,390.1	276.7	22.3	30.25	-249.2	8,678.4	1,150.2	983.8	166.38	6.913	
15,000.0	6,813.5	6,476.0	6,409.5	280.1	22.3	31.48	-249.4	8,686.4	1,059.7	886.8	172.91	6.129	
15,100.0	6,812.7	6,495.1	6,427.0	283.6	22.2	32.65	-249.5	8,694.0	970.3	791.1	179.28	5.412	
15,200.0	6,811.8	6,518.0	6,447.8	287.0	22.1	34.13	-249.5	8,703.7	882.4	695.4	186.91	4.721	
15,300.0	6,811.0	6,543.3	6,470.4	290.4	22.1	35.88	-249.5	8,714.8	795.9	600.3	195.67	4.068	
15,400.0	6,810.1	6,568.2	6,492.6	293.9	22.0	37.78	-249.8	8,726.3	711.5	506.5	205.00	3.471	
15,500.0	6,809.3	6,594.3	6,515.5	297.3	21.9	39.97	-250.4	8,738.9	629.7	414.2	215.47	2.922	
15,600.0	6,808.5	6,626.3	6,542.9	300.8	21.8	42.89	-251.3	8,755.3	551.4	322.9	228.55	2.413	
15,700.0	6,807.6	6,674.8	6,583.6	304.2	21.7	47.75	-251.7	8,781.6	477.0	228.9	248.14	1.922	
15,800.0	6,806.8	6,714.6	6,616.3	307.6	21.5	52.26	-251.5	8,804.2	407.4	141.8	265.60	1.534	
15,900.0	6,805.9	6,755.1	6,648.7	311.1	21.4	57.39	-251.9	8,828.7	346.0	62.2	283.79	1.219	Level 2
16,000.0	6,805.1	6,803.0	6,684.6	314.5	21.3	63.97	-253.2	8,860.2	297.2	-6.6	303.80	0.978	Level 1
16,100.0	6,804.3	6,860.3	6,724.5	317.9	21.2	72.23	-255.5	8,901.3	264.4	-59.1	323.55	0.817	Level 1
16,200.0	6,803.4	6,925.2	6,765.9	321.4	21.2	81.58	-258.1	8,951.2	248.8	-89.7	338.48	0.735	Level 1
16,257.5	6,802.9	6,977.3	6,795.6	323.3	21.2	88.54	-260.6	8,993.9	247.4	-96.5	343.89	0.719	Level 1, CC
16,300.0	6,802.6	7,018.1	6,816.3	324.8	21.3	93.38	-261.3	9,029.1	248.0	-97.1	345.08	0.719	Level 1, ES, SF
16,400.0	6,801.7	7,109.2	6,855.2	328.2	21.8	102.36	-263.0	9,111.3	254.8	-87.5	342.28	0.744	Level 1
16,500.0	6,800.9	7,222.6	6,892.4	331.7	23.0	110.49	-264.4	9,218.4	264.4	-69.5	333.90	0.792	Level 1
16,600.0	6,800.1	7,350.4	6,913.7	335.1	25.2	115.48	-260.4	9,344.1	266.7	-61.2	327.94	0.813	Level 1
16,607.2	6,800.0	7,359.1	6,914.2	335.4	25.3	115.63	-260.0	9,352.7	266.5	-61.4	327.96	0.813	Level 1

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation