

TECHNICAL ATTACHMENT
NEW LPFM FOR OMAHA, NE

SPACING

REFERENCE
41 15 38.00 N.
95 53 17.00 W.
12-13-23

CLASS = L1
Current Spacings to 2nd Adj.

DISPLAY DATES
DATA 10-16-23
SEARCH

----- Channel 216 - 91.1 MHz -----

Call		Channel	Location		Azi	Dist	FCC	Margin
KIOS-FM	LIC	218C1	Omaha	NE	288.7	9.35	72.5	-63.2
KVNO	LIC	214C2	Omaha	NE	295.0	12.75	52.5	-39.8
KUCV	LIC-D	216C1	Lincoln	NE	222.2	110.91	110.5	0.41
KLOX	CP	215C1	Creston	IA	98.3	133.20	99.5	33.7
KCVA	CP -D	217C3	College Springs	MO	140.4	101.65	66.5	35.2
KPNO	LIC	215C1	Norfolk	NE	308.4	152.75	99.5	53.3
DK06QG-D/LI	06 --		Sioux City	IA	349.5	149.87	89.0	60.9
KAYA	LIC	217C3	Hubbard	NE	336.7	132.38	66.5	65.9
KTLX	LIC	217A	Columbus	NE	279.8	124.31	55.5	68.8
KLOX	LIC	215A	Creston	IA	99.7	129.39	55.5	73.9

All separation margins include rounding

SECOND ADJACENT WAIVER REQUEST

Applicant respectfully requests a "second adjacent channel waiver" with regards to Section 47 C.F.R. Section 73.807 of the FCC rules based upon the "Living Way" precedent(Living Way Ministries, Inc., Memorandum Opinion and Order, 17 FCC Red 17054, 17056, ¶ 5 (2002), recon. denied 23 FCC Red 15070 (2008)). This will be accomplished by using Free Space methodology of calculation.

The second adjacent channel is (with signal strength at the proposed site):

KIOS-FM LIC 218C1 Omaha 95.1 dBu

KVNO LIC 214C2 Omaha 82.7 dBu

Using U/D methodology, interference will occur when KVNO-FM's signal strength's interfering signal exceeds the desired signal by 40 dBu. So the area of predicted interference would then be bounded by the 122.7 dBu contour.

The distance to this contour, using free space method:

$$D = (7.01 * P^{1/2}) / E,$$

where P is power (watts), E is field strength (v/m), and D is distance to contour (meters):

$$P = 50 \text{ w}, E = 122.7 \text{ dBu } D = 36.2 \text{ meters}$$

However, the field strength of the proposed LPFM's antenna system falls quickly at depression angles below the horizon. Using elevation pattern data provided by Shively for a 6812 antenna setup (2 bay 0.5 wave spaced) the distance to the 122.7 dBu contour at various depression angles is tabulated below. The data shows that the lowest point at which the signal strength rises to 122.7 dBu is 11.4 meters below the center of radiation of the antenna system, or 4.9 meters above the ground. Therefore, this is sufficient clearance from the population/housing below. The table below shows that the lowest elevation point of the 122.7 F(50,10) interfering contour is 4.9 meters above ground.

Due to zero population within this radiation radius, this meets the "Living Way" Criteria to qualify for a Waiver of 47 C.F.R. Section 73.807.

Thus, the applicant requests a second adjacent waiver based upon evidence no interference is proposed.

MAX ERP	DEPRESSI ON ANGLE	RELATIV E FIELD	dB FROM RELATIVE	ERP	ANGULAR DISTANCE TO 122.7 dBu CONTOUR	VERTICAL DISTANCE (below antenna)	HORIZONT AL DISTANCE TO 122.7	CLEARAN CE OF CONTOUR ABOVE GROUND
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							dBu CONTOUR	
50	-90	0.00	-100.000	0.00	0	0	0	16
50	-89	0.00	-100.000	0.00	0	0	0	16
50	-88	0.00	-100.000	0.00	0	0	0	16
50	-87	0.00	-100.000	0.00	0	0	0	16
50	-86	0.001	-60.000	0.00	0	0	0	16
50	-85	0.001	-60.000	0.00	0	0	0	16
50	-84	0.001	-60.000	0.00	0	0	0	16
50	-83	0.002	-53.979	0.00	0	0	0	16
50	-82	0.003	-50.458	0.00	0.1	0	0	16
50	-81	0.004	-47.959	0.00	0.1	0	0	16
50	-80	0.005	-46.021	0.00	0.1	0	0	16
50	-79	0.007	-43.098	0.00	0.2	0.1	0	15.9
50	-78	0.008	-41.938	0.00	0.2	0.1	0	15.9
50	-77	0.011	-39.172	0.01	0.3	0.2	0	15.8
50	-76	0.013	-37.721	0.01	0.4	0.3	0	15.7
50	-75	0.016	-35.918	0.01	0.5	0.4	0.1	15.6
50	-74	0.019	-34.425	0.02	0.6	0.5	0.1	15.5
50	-73	0.022	-33.152	0.02	0.7	0.6	0.2	15.4
50	-72	0.026	-31.701	0.03	0.9	0.8	0.2	15.2
50	-71	0.03	-30.458	0.05	1	0.9	0.3	15.1
50	-70	0.035	-29.119	0.06	1.2	1.1	0.4	14.9
50	-69	0.04	-27.959	0.08	1.4	1.3	0.5	14.7
50	-68	0.046	-26.745	0.11	1.6	1.4	0.6	14.6
50	-67	0.052	-25.680	0.14	1.8	1.6	0.7	14.4
50	-66	0.059	-24.583	0.17	2.1	1.9	0.8	14.1
50	-65	0.066	-23.609	0.22	2.3	2	0.9	14
50	-64	0.073	-22.734	0.27	2.6	2.3	1.1	13.7
50	-63	0.082	-21.724	0.34	2.9	2.5	1.3	13.5
50	-62	0.09	-20.915	0.41	3.2	2.8	1.5	13.2
50	-61	0.099	-20.087	0.49	3.5	3	1.6	13
50	-60	0.109	-19.251	0.59	3.9	3.3	1.9	12.7
50	-59	0.119	-18.489	0.71	4.3	3.6	2.2	12.4
50	-58	0.13	-17.721	0.85	4.7	3.9	2.4	12.1

50	-57	0.142	-16.954	1.01	5.1	4.2	2.7	11.8
50	-56	0.154	-16.250	1.19	5.5	4.5	3	11.5
50	-55	0.166	-15.598	1.38	6	4.9	3.4	11.1
50	-54	0.179	-14.943	1.60	6.5	5.2	3.8	10.8
50	-53	0.193	-14.289	1.86	7	5.5	4.2	10.5
50	-52	0.207	-13.681	2.14	7.5	5.9	4.6	10.1
50	-51	0.222	-13.073	2.46	8	6.2	5	9.8
50	-50	0.237	-12.505	2.81	8.6	6.5	5.5	9.5
50	-49	0.253	-11.938	3.20	9.1	6.8	5.9	9.2
50	-48	0.269	-11.405	3.62	9.7	7.2	6.4	8.8
50	-47	0.286	-10.873	4.09	10.3	7.5	7	8.5
50	-46	0.303	-10.371	4.59	11	7.9	7.6	8.1
50	-45	0.32	-9.897	5.12	11.6	8.1	8.2	7.9
50	-44	0.338	-9.422	5.71	12.2	8.4	8.7	7.6
50	-43	0.357	-8.947	6.37	12.9	8.7	9.4	7.3
50	-42	0.375	-8.519	7.03	13.6	9	10.1	7
50	-41	0.394	-8.090	7.76	14.3	9.3	10.7	6.7
50	-40	0.414	-7.660	8.57	15	9.6	11.4	6.4
50	-39	0.433	-7.270	9.37	15.7	9.8	12.2	6.2
50	-38	0.453	-6.878	10.26	16.4	10	12.9	6
50	-37	0.473	-6.503	11.19	17.1	10.2	13.6	5.8
50	-36	0.494	-6.125	12.20	17.9	10.5	14.4	5.5
50	-35	0.514	-5.781	13.21	18.6	10.6	15.2	5.4
50	-34	0.535	-5.433	14.31	19.4	10.8	16	5.2
50	-33	0.555	-5.114	15.40	20.1	10.9	16.8	5.1
50	-32	0.576	-4.792	16.59	20.9	11	17.7	5
50	-31	0.597	-4.481	17.82	21.6	11.1	18.5	4.9
50	-30	0.617	-4.194	19.03	22.4	11.1	19.4	4.9
50	-29	0.638	-3.904	20.35	23.1	11.1	20.2	4.9
50	-28	0.658	-3.635	21.65	23.9	11.2	21.1	4.8
50	-27	0.678	-3.375	22.98	24.6	11.1	21.9	4.9
50	-26	0.698	-3.123	24.36	25.3	11	22.7	5
50	-25	0.718	-2.878	25.78	26	10.9	23.5	5.1
50	-24	0.737	-2.651	27.16	26.7	10.8	24.3	5.2
50	-23	0.756	-2.430	28.58	27.4	10.7	25.2	5.3

50	-22	0.774	-2.225	29.95	28.1	10.5	26	5.5
50	-21	0.792	-2.025	31.36	28.7	10.2	26.7	5.8
50	-20	0.81	-1.830	32.81	29.4	10	27.6	6
50	-19	0.827	-1.650	34.20	30	9.7	28.3	6.3
50	-18	0.843	-1.483	35.53	30.6	9.4	29.1	6.6
50	-17	0.859	-1.320	36.89	31.2	9.1	29.8	6.9
50	-16	0.874	-1.170	38.19	31.7	8.7	30.4	7.3
50	-15	0.889	-1.022	39.52	32.2	8.3	31.1	7.7
50	-14	0.903	-0.886	40.77	32.8	7.9	31.8	8.1
50	-13	0.915	-0.772	41.86	33.2	7.4	32.3	8.6
50	-12	0.928	-0.649	43.06	33.7	7	32.9	9
50	-11	0.939	-0.547	44.09	34.1	6.5	33.4	9.5
50	-10	0.949	-0.455	45.03	34.4	5.9	33.8	10.1
50	-9	0.959	-0.364	45.98	34.8	5.4	34.3	10.6
50	-8	0.967	-0.291	46.75	35.1	4.8	34.7	11.2
50	-7	0.975	-0.220	47.53	35.4	4.3	35.1	11.7
50	-6	0.981	-0.167	48.12	35.6	3.7	35.4	12.3
50	-5	0.987	-0.114	48.71	35.8	3.1	35.6	12.9
50	-4	0.992	-0.070	49.20	36	2.5	35.9	13.5
50	-3	0.995	-0.044	49.50	36.1	1.8	36	14.2
50	-2	0.998	-0.017	49.80	36.2	1.2	36.1	14.8
50	-1	0.999	-0.009	49.90	36.2	0.6	36.1	15.4
50	0	1	0.000	50.00	36.3	0	36.3	16
50	1	0.999	-0.009	49.90	36.2	0.6	36.1	15.4
50	2	0.998	-0.017	49.80	36.2	1.2	36.1	14.8
50	3	0.995	-0.044	49.50	36.1	1.8	36	14.2
50	4	0.992	-0.070	49.20	36	2.5	35.9	13.5
50	5	0.987	-0.114	48.71	35.8	3.1	35.6	12.9
50	6	0.981	-0.167	48.12	35.6	3.7	35.4	12.3
50	7	0.975	-0.220	47.53	35.4	4.3	35.1	11.7
50	8	0.967	-0.291	46.75	35.1	4.8	34.7	11.2
50	9	0.959	-0.364	45.98	34.8	5.4	34.3	10.6
50	10	0.949	-0.455	45.03	34.4	5.9	33.8	10.1
50	11	0.939	-0.547	44.09	34.1	6.5	33.4	9.5
50	12	0.928	-0.649	43.06	33.7	7	32.9	9

50	13	0.915	-0.772	41.86	33.2	7.4	32.3	8.6
50	14	0.903	-0.886	40.77	32.8	7.9	31.8	8.1
50	15	0.889	-1.022	39.52	32.2	8.3	31.1	7.7
50	16	0.874	-1.170	38.19	31.7	8.7	30.4	7.3
50	17	0.859	-1.320	36.89	31.2	9.1	29.8	6.9
50	18	0.843	-1.483	35.53	30.6	9.4	29.1	6.6
50	19	0.827	-1.650	34.20	30	9.7	28.3	6.3
50	20	0.81	-1.830	32.81	29.4	10	27.6	6
50	21	0.792	-2.025	31.36	28.7	10.2	26.7	5.8
50	22	0.774	-2.225	29.95	28.1	10.5	26	5.5
50	23	0.756	-2.430	28.58	27.4	10.7	25.2	5.3
50	24	0.737	-2.651	27.16	26.7	10.8	24.3	5.2
50	25	0.718	-2.878	25.78	26	10.9	23.5	5.1
50	26	0.698	-3.123	24.36	25.3	11	22.7	5
50	27	0.678	-3.375	22.98	24.6	11.1	21.9	4.9
50	28	0.658	-3.635	21.65	23.9	11.2	21.1	4.8
50	29	0.638	-3.904	20.35	23.1	11.1	20.2	4.9
50	30	0.617	-4.194	19.03	22.4	11.1	19.4	4.9
50	31	0.597	-4.481	17.82	21.6	11.1	18.5	4.9
50	32	0.576	-4.792	16.59	20.9	11	17.7	5
50	33	0.555	-5.114	15.40	20.1	10.9	16.8	5.1
50	34	0.535	-5.433	14.31	19.4	10.8	16	5.2
50	35	0.514	-5.781	13.21	18.6	10.6	15.2	5.4
50	36	0.494	-6.125	12.20	17.9	10.5	14.4	5.5
50	37	0.473	-6.503	11.19	17.1	10.2	13.6	5.8
50	38	0.453	-6.878	10.26	16.4	10	12.9	6
50	39	0.433	-7.270	9.37	15.7	9.8	12.2	6.2
50	40	0.414	-7.660	8.57	15	9.6	11.4	6.4
50	41	0.394	-8.090	7.76	14.3	9.3	10.7	6.7
50	42	0.375	-8.519	7.03	13.6	9	10.1	7
50	43	0.357	-8.947	6.37	12.9	8.7	9.4	7.3
50	44	0.338	-9.422	5.71	12.2	8.4	8.7	7.6
50	45	0.32	-9.897	5.12	11.6	8.1	8.2	7.9
50	46	0.303	-10.371	4.59	11	7.9	7.6	8.1
50	47	0.286	-10.873	4.09	10.3	7.5	7	8.5

50	48	0.269	-11.405	3.62	9.7	7.2	6.4	8.8
50	49	0.253	-11.938	3.20	9.1	6.8	5.9	9.2
50	50	0.237	-12.505	2.81	8.6	6.5	5.5	9.5
50	51	0.222	-13.073	2.46	8	6.2	5	9.8
50	52	0.207	-13.681	2.14	7.5	5.9	4.6	10.1
50	53	0.193	-14.289	1.86	7	5.5	4.2	10.5
50	54	0.179	-14.943	1.60	6.5	5.2	3.8	10.8
50	55	0.166	-15.598	1.38	6	4.9	3.4	11.1
50	56	0.154	-16.250	1.19	5.5	4.5	3	11.5
50	57	0.142	-16.954	1.01	5.1	4.2	2.7	11.8
50	58	0.13	-17.721	0.85	4.7	3.9	2.4	12.1
50	59	0.119	-18.489	0.71	4.3	3.6	2.2	12.4
50	60	0.109	-19.251	0.59	3.9	3.3	1.9	12.7
50	61	0.099	-20.087	0.49	3.5	3	1.6	13
50	62	0.09	-20.915	0.41	3.2	2.8	1.5	13.2
50	63	0.082	-21.724	0.34	2.9	2.5	1.3	13.5
50	64	0.073	-22.734	0.27	2.6	2.3	1.1	13.7
50	65	0.066	-23.609	0.22	2.3	2	0.9	14
50	66	0.059	-24.583	0.17	2.1	1.9	0.8	14.1
50	67	0.052	-25.680	0.14	1.8	1.6	0.7	14.4
50	68	0.046	-26.745	0.11	1.6	1.4	0.6	14.6
50	69	0.04	-27.959	0.08	1.4	1.3	0.5	14.7
50	70	0.035	-29.119	0.06	1.2	1.1	0.4	14.9
50	71	0.03	-30.458	0.05	1	0.9	0.3	15.1
50	72	0.026	-31.701	0.03	0.9	0.8	0.2	15.2
50	73	0.022	-33.152	0.02	0.7	0.6	0.2	15.4
50	74	0.019	-34.425	0.02	0.6	0.5	0.1	15.5
50	75	0.016	-35.918	0.01	0.5	0.4	0.1	15.6
50	76	0.013	-37.721	0.01	0.4	0.3	0	15.7
50	77	0.011	-39.172	0.01	0.3	0.2	0	15.8
50	78	0.008	-41.938	0.00	0.2	0.1	0	15.9
50	79	0.007	-43.098	0.00	0.2	0.1	0	15.9
50	80	0.005	-46.021	0.00	0.1	0	0	16
50	81	0.004	-47.959	0.00	0.1	0	0	16
50	82	0.003	-50.458	0.00	0.1	0	0	16

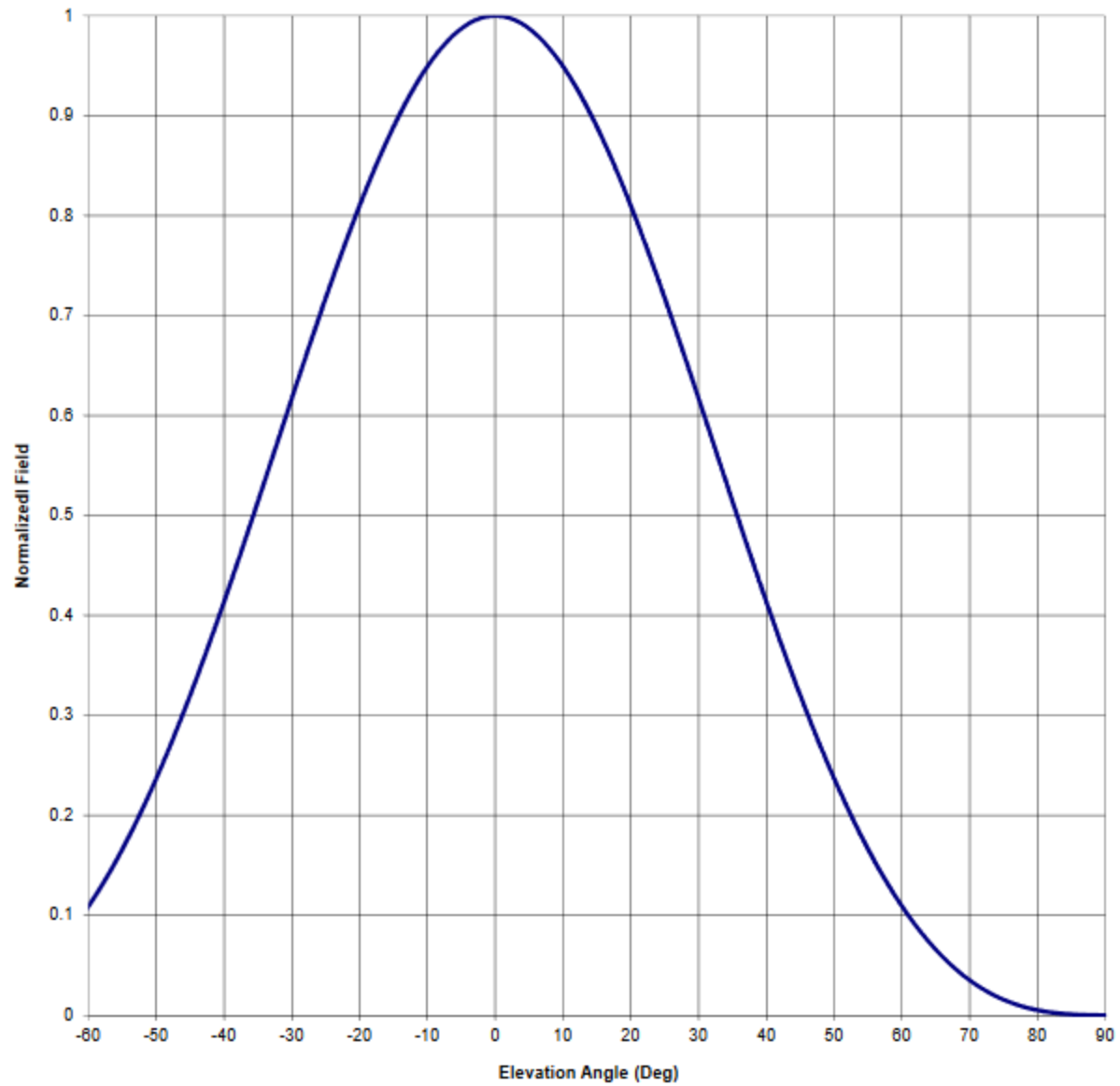
50	83	0.002	-53.979	0.00	0	0	0	16
50	84	0.001	-60.000	0.00	0	0	0	16
50	85	0.001	-60.000	0.00	0	0	0	16
50	86	0.001	-60.000	0.00	0	0	0	16
50	87	0.00	-100.000	0.00	0	0	0	16
50	88	0.00	-100.000	0.00	0	0	0	16
50	89	0.00	-100.000	0.00	0	0	0	16
50	90	0.00	-100.000	0.00	0	0	0	16

Antenna Mfg.: Shively Labs
Antenna Type: 6812B-HW-2

Date: 11/3/2020

Station: 0
Frequency: 98.1
Channel #: 251
Figure: Figure 3

Beam Tilt	0	
Gain (Max)	0.707	-1.507 dB
Gain (Horizon)	0.707	-1.507 dB



Antenna Mfg.: Shively Labs

Antenna Type: 6812B-HW-2

Station: 0

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Channel #: 251

Beam Tilt 0

Gain (Max) 0.707

Gain (Horizon) 0.707

Date: 11/3/2020

-1.507 dB

-1.507 dB

Figure: Figure 3

Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field	Angle of Depression (Deg)	Relative Field
-90	0.000	-44	0.338	0	1.000	46	0.303
-89	0.000	-43	0.357	1	0.999	47	0.286
-88	0.000	-42	0.375	2	0.998	48	0.269
-87	0.000	-41	0.394	3	0.995	49	0.253
-86	0.001	-40	0.414	4	0.992	50	0.237
-85	0.001	-39	0.433	5	0.987	51	0.222
-84	0.001	-38	0.453	6	0.981	52	0.207
-83	0.002	-37	0.473	7	0.975	53	0.193
-82	0.003	-36	0.494	8	0.967	54	0.179
-81	0.004	-35	0.514	9	0.959	55	0.166
-80	0.005	-34	0.535	10	0.949	56	0.154
-79	0.007	-33	0.555	11	0.939	57	0.142
-78	0.008	-32	0.576	12	0.928	58	0.130
-77	0.011	-31	0.597	13	0.915	59	0.119
-76	0.013	-30	0.617	14	0.903	60	0.109
-75	0.016	-29	0.638	15	0.889	61	0.099
-74	0.019	-28	0.658	16	0.874	62	0.090
-73	0.022	-27	0.678	17	0.859	63	0.082
-72	0.026	-26	0.698	18	0.843	64	0.073
-71	0.030	-25	0.718	19	0.827	65	0.066
-70	0.035	-24	0.737	20	0.810	66	0.059
-69	0.040	-23	0.756	21	0.792	67	0.052
-68	0.046	-22	0.774	22	0.774	68	0.046
-67	0.052	-21	0.792	23	0.756	69	0.040
-66	0.059	-20	0.810	24	0.737	70	0.035
-65	0.066	-19	0.827	25	0.718	71	0.030
-64	0.073	-18	0.843	26	0.698	72	0.026
-63	0.082	-17	0.859	27	0.678	73	0.022
-62	0.090	-16	0.874	28	0.658	74	0.019
-61	0.099	-15	0.889	29	0.638	75	0.016
-60	0.109	-14	0.903	30	0.617	76	0.013
-59	0.119	-13	0.915	31	0.597	77	0.011
-58	0.130	-12	0.928	32	0.576	78	0.008
-57	0.142	-11	0.939	33	0.555	79	0.007
-56	0.154	-10	0.949	34	0.535	80	0.005
-55	0.166	-9	0.959	35	0.514	81	0.004
-54	0.179	-8	0.967	36	0.494	82	0.003
-53	0.193	-7	0.975	37	0.473	83	0.002
-52	0.207	-6	0.981	38	0.453	84	0.001
-51	0.222	-5	0.987	39	0.433	85	0.001
-50	0.237	-4	0.992	40	0.414	86	0.001
-49	0.253	-3	0.995	41	0.394	87	0.000
-48	0.269	-2	0.998	42	0.375	88	0.000
-47	0.286	-1	0.999	43	0.357	89	0.000
-46	0.303	0	1.000	44	0.338	90	0.000
-45	0.320			45	0.320		