

Spreadsheet Formulas for the Wilcoxon Rank Sum Test and Power Calculation

Wilcoxon Rank Sum Test, per NUREG-1506

13.3 (For this calculation, LBGR = 3w for 2002 Igloo Alpha Background)
LBGR (Reference Dataset - 2002 Igloo Alpha Phoswich)

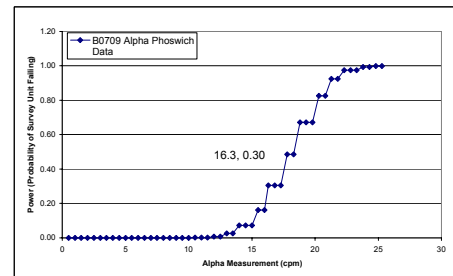
DATA	AREA	ADJUSTED DATA	RANKS	SURVEY AREA RANKS
13	R	13	167.5	0
17	R	17	178	0
12	R	12	165	0
4	R	4	134	0
18	R	18	177	0
9	R	9	160	0
8	R	8	157	0
16	R	16	174.5	0
4	R	4	134	0
7	R	7	154.5	0
4	R	4	134	0
9	R	9	160	0
14	R	14	169.5	0
5	R	5	144.5	0
14	R	14	169.5	0
12	R	12	165	0
16	R	16	174.5	0
11	R	11	162.5	0
15	R	15	172	0
6	R	6	152	0
5	R	5	144.5	0
4	R	4	134	0
1	R	1	60.5	0
9	R	9	160	0
12	R	12	165	0
15	R	15	172	0
15	R	15	172	0
6	R	6	152	0
111	R	111	180	0
8	R	8	157	0
3	R	3	115.5	0
3	R	3	115.5	0
3	R	3	115.5	0
4	R	4	134	0
6	R	6	152	0
11	R	11	162.5	0
5	R	5	144.5	0
5	R	5	144.5	0
3	R	3	115.5	0
2	R	2	87	0
3	R	3	115.5	0
4	R	4	134	0
4	R	4	134	0
5	R	5	144.5	0
3	R	3	115.5	0
5	R	5	144.5	0
2	R	2	87	0
2	R	2	87	0
5	R	5	144.5	0
5	R	5	144.5	0
5	R	5	144.5	0
3	R	3	115.5	0
2	R	2	87	0
5	R	5	144.5	0
8	R	8	157	0
2	R	2	87	0
3	R	3	115.5	0
86	R	86	179	0
2	R	2	87	0
1	R	1	60.5	0
5	R	5	144.5	0
3	R	3	115.5	0
1	R	1	60.5	0
2	R	2	87	0
0	R	0	39.5	0
0	R	0	39.5	0
2	R	2	87	0
1	R	1	60.5	0
0	R	0	39.5	0
0	R	0	39.5	0
0	R	0	39.5	0
1	R	1	60.5	0
0	R	0	39.5	0
0	R	0	39.5	0
0	R	0	39.5	0
3	R	3	115.5	0
1	R	1	60.5	0
2	R	2	87	0
1	R	1	60.5	0
3	R	3	115.5	0
13	R	13	167.5	0
3	R	3	115.5	0
2	R	2	87	0
1	R	1	60.5	0
2	R	2	87	0

Retrospective Power Curve Calculator

From Example in Section 10.5 of NUREG-1505

p1 and p2 pull data from Table 10-3 sheet

	C	Measurement	(C-LBGR)/SD	Rounded	p1	p2	E(Wmw)	Var(Wmw)	SD(Wmw)	z	Power
Count	Survey Unit Stats	0.5	-1.071	-1.100	0.198072	0.089944	891.324	38971.48	197.412	9.460557	0.00
SD		1	-1.029	-1.000	0.218338	0.098892	982.521	42717.6	206.6824	8.607077	0.00
Median	Reference Stats	1.0	-0.9872	-1.000	0.218338	0.098892	982.521	42717.6	206.6824	8.607077	0.00
		2	-0.9454	-0.900	0.23975	0.113202	1078.875	46456.48	215.5377	7.80031	0.00
Count		150 n	-0.9036	-0.900	0.23975	0.113202	1078.875	46456.48	215.5377	7.80031	0.00
SD		12.0	-0.8617	-0.900	0.23975	0.113202	1078.875	46456.48	215.5377	7.80031	0.00
Median		3.0	-0.8199	-0.800	0.262259	0.12892	1180.166	50125.49	223.8872	7.05699	0.00
		4	-0.7781	-0.800	0.262259	0.12892	1180.166	50125.49	223.8872	7.05699	0.00
		4.5	-0.7362	-0.700	0.310309	0.164691	1396.391	56982.12	238.7093	5.712995	0.00
		5	-0.6944	-0.700	0.310309	0.164691	1396.391	56982.12	238.7093	5.712995	0.00
		5.5	-0.6526	-0.700	0.310309	0.164691	1396.391	56982.12	238.7093	5.712995	0.00
Critical Value	3225.6	6	-0.6107	-0.600	0.335687	0.18476	1510.592	60032.31	245.0149	5.099869	0.00
		6.5	-0.5689	-0.600	0.335687	0.18476	1510.592	60032.31	245.0149	5.099869	0.00
Bkgd Median plus LBGR	16.3	7	-0.5271	-0.500	0.361837	0.206266	1628.267	62742.55	250.4846	4.518716	0.00
		7.5	-0.4852	-0.500	0.361837	0.206266	1628.267	62742.55	250.4846	4.518716	0.00
		8	-0.4434	-0.400	0.388649	0.229172	1748.921	65052.72	255.0544	3.964704	0.00
		8.5	-0.4016	-0.400	0.388649	0.229172	1748.921	65052.72	255.0544	3.964704	0.00
		9	-0.3598	-0.400	0.388649	0.229172	1748.921	65052.72	255.0544	3.964704	0.00
		9.5	-0.3179	-0.300	0.416002	0.253419	1872.009	66909.18	258.6681	3.43346	0.00
		10	-0.2761	-0.300	0.416002	0.253419	1872.009	66909.18	258.6681	3.43346	0.00
		10.5	-0.2343	-0.200	0.443769	0.27893	1996.961	68268.01	261.2815	2.920892	0.00
		11	-0.1924	-0.200	0.443769	0.27893	1996.961	68268.01	261.2815	2.920892	0.00
		11.5	-0.1506	-0.200	0.443769	0.27893	1996.961	68268.01	261.2815	2.920892	0.00
		12	-0.1088	-0.100	0.471814	0.305606	2123.163	69096.42	262.862	2.42322	0.01
		12.5	-0.0669	-0.100	0.471814	0.305606	2123.163	69096.42	262.862	2.42322	0.01
		13	-0.0251	0.000	0.5	0.333333	2250	69374.73	263.908	1.936801	0.03
		13.5	0.0167	0.000	0.5	0.333333	2250	69374.73	263.908	1.936801	0.03
		14	0.0586	0.100	0.528186	0.361978	2376.837	69096.42	262.862	1.458174	0.07
		14.5	0.1004	0.100	0.528186	0.361978	2376.837	69096.42	262.862	1.458174	0.07
		15	0.1422	0.100	0.528186	0.361978	2376.837	69096.42	262.862	1.458174	0.07
		15.5	0.1841	0.200	0.556231	0.391392	2503.04	68268.01	261.2815	0.983981	0.16
		16	0.2259	0.200	0.556231	0.391392	2503.04	68268.01	261.2815	0.983981	0.16
		16.3	0.2510	0.300	0.583998	0.421415	2627.991	66909.18	258.6681	0.510865	0.30
		16.8	0.2928	0.300	0.583998	0.421415	2627.991	66909.18	258.6681	0.510865	0.30
		17.3	0.3347	0.300	0.583998	0.421415	2627.991	66909.18	258.6681	0.510865	0.30
		17.8	0.3765	0.400	0.611351	0.451875	2751.08	65053.54	255.0544	0.035506	0.49
		18.3	0.4183	0.400	0.611351	0.451875	2751.08	65053.54	255.0544	0.035506	0.49
		18.8	0.4601	0.500	0.638163	0.482593	2871.734	62743.37	250.4863	-0.44553	0.67
		19.3	0.5020	0.500	0.638163	0.482593	2871.734	62743.37	250.4863	-0.44553	0.67
		19.8	0.5438	0.500	0.638163	0.482593	2871.734	62743.37	250.4863	-0.44553	0.67
		20.3	0.5856	0.600	0.664313	0.513387	2989.409	60033.13	245.0166	-0.93574	0.83
		20.8	0.6275	0.600	0.664313	0.513387	2989.409	60033.13	245.0166	-0.93574	0.83
		21.3	0.6693	0.700	0.689691	0.544073	3103.61	56982.12	238.7093	-1.43888	0.92
		21.8	0.7111	0.700	0.689691	0.544073	3103.61	56982.12	238.7093	-1.43888	0.92
		22.3	0.7530	0.800	0.714196	0.574469	3213.882	53656.47	231.6387	-1.95885	0.97
		22.8	0.7948	0.800	0.714196	0.574469	3213.882	53656.47	231.6387	-1.95885	0.97
		23.3	0.8366	0.800	0.714196	0.574469	3213.882	53656.47	231.6387	-1.95885	0.97
		23.8	0.8785	0.900	0.737741	0.604402	3319.835	50125.49	223.8872	-2.49991	0.99
		24.3	0.9203	0.900	0.737741	0.604402	3319.835	50125.49	223.8872	-2.49991	0.99
		24.8	0.9621	1.000	0.76025	0.633702	3421.125	46456.48	215.5377	-3.0667	1.00
		25.3	1.0040	1.000	0.76025	0.633702	3421.125	46456.48	215.5377	-3.0667	1.00



Based on the number of measurements and the observed standard deviation, a survey unit with a median measurement equal to the background median plus the LBGR (16.3) will have a 0.30 probability that the survey unit will correctly fail (i.e., the null hypothesis that the difference between the survey unit median and the background median is less than the LBGR [i.e., the survey unit is indistinguishable from background] is rejected).

3	R	3	115.5	0
3	R	3	115.5	0
3	R	3	115.5	0
3	R	3	115.5	0
2	R	2	87	0
0	R	0	39.5	0
2	R	2	87	0
2	R	2	87	0
1	R	1	60.5	0
0	R	0	39.5	0
3	R	3	115.5	0
1	R	1	60.5	0
1	R	1	60.5	0
0	R	0	39.5	0
1	R	1	60.5	0
2	R	2	87	0
3	R	3	115.5	0
2	R	2	87	0
1	R	1	60.5	0
2	R	2	87	0
3	R	3	115.5	0
4	R	4	134	0
3	R	3	115.5	0
1	R	1	60.5	0
3	R	3	115.5	0
5	R	5	144.5	0
3	R	3	115.5	0
3	R	3	115.5	0
1	R	1	60.5	0
2	R	2	87	0
2	R	2	87	0
3	R	3	115.5	0
1	R	1	60.5	0
2	R	2	87	0
4	R	4	134	0
2	R	2	87	0
2	R	2	87	0
2	R	2	87	0
1	R	1	60.5	0
0	R	0	39.5	0
1	R	1	60.5	0
3	R	3	115.5	0
1	R	1	60.5	0
7	R	7	194.5	0
0	R	0	39.5	0
2	R	2	87	0
1	R	1	60.5	0
2	R	2	87	0
0	R	0	39.5	0
0	R	0	39.5	0
1	R	1	60.5	0
2	R	2	87	0
1	R	1	60.5	0
0	R	0	39.5	0
0	R	0	39.5	0
34	R	34	178	0
3	R	3	115.5	0
2	S	-11.3	25	25
0	S	-13.3	7	7
2	S	-11.3	25	25
2	S	-11.3	25	25
2	S	-11.3	25	25
1	S	-12.3	17.5	17.5
0	S	-13.3	7	7
0	S	-13.3	7	7
0	S	-13.3	7	7
1	S	-12.3	17.5	17.5
1	S	-12.3	17.5	17.5
2	S	-11.3	25	25
2	S	-11.3	25	25
0	S	-13.3	7	7
1	S	-12.3	17.5	17.5
2	S	-11.3	25	25
1	S	-12.3	17.5	17.5
0	S	-13.3	7	7
0	S	-13.3	7	7
0	S	-13.3	7	7
1	S	-12.3	17.5	17.5
0	S	-13.3	7	7
0	S	-13.3	7	7
1	S	-12.3	17.5	17.5
5	S	-8.3	29	29
1	S	-12.3	17.5	17.5
0	S	-13.3	7	7
0	S	-13.3	7	7
9	S	-4.3	30	30
0	S	-13.3	7	7
Sum =			16290	485

* This spreadsheet is originally designed to work with a set of twenty measurements, 10 from the survey unit (S) and 10 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to modify the spreadsheet to account for the change in the number of measurements.

of R: 150 *n*
of S: 30 *m*
Avg Rank R: 106
Avg Rank S: 16

For m or n greater than 20, the critical value (k) can be calculated for Scenario B from

$$\frac{m(n+m+1)}{2} + z \sqrt{\frac{nm(n+m+1)}{12}}$$

z = 97.5% percentile of standard normal distribution = 1.960

$k = 3225.6$

Since the sum of survey unit ranks is less than the critical value, the null hypothesis that the difference between the survey unit median and the background median is less than the LSGR (i.e., the survey unit is indistinguishable from background) is accepted and the survey unit passes Scenario B

Spreadsheet Formulas for the Wilcoxon Rank Sum Test and Power Calculation

Wilcoxon Rank Sum Test, per NUREG-1508

LBGR 40.5 (For this calculation, LBGR = 3w for 2002 Igloo Background)
(Reference Dataset - 2002 Igloo Beta Phoswich)

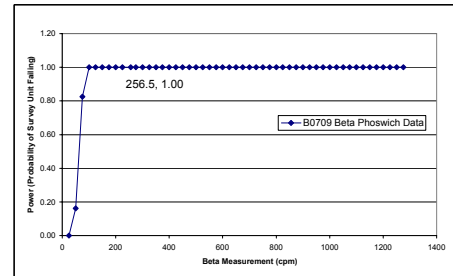
DATA	AREA	ADJUSTED DATA	RANKS	SURVEY AREA RANKS
234	R	234	131.5	0
255	R	255	154	0
272	R	272	163.5	0
206	R	206	89	0
283	R	283	170	0
199	R	199	72.5	0
235	R	235	133	0
202	R	202	78	0
220	R	220	107.5	0
215	R	215	99.5	0
183	R	183	51.5	0
225	R	225	115	0
213	R	213	96	0
243	R	243	141	0
203	R	203	80	0
252	R	252	151	0
197	R	197	68	0
226	R	226	116.5	0
220	R	220	107.5	0
181	R	181	48.5	0
222	R	222	110	0
231	R	231	125.5	0
241	R	241	139	0
228	R	228	119	0
277	R	277	167	0
260	R	260	160	0
387	R	387	178	0
216	R	216	102	0
596	R	596	180	0
163	R	163	28	0
155	R	155	21	0
171	R	171	40.5	0
228	R	228	119	0
196	R	196	65.5	0
237	R	237	135	0
172	R	172	42.5	0
253	R	253	152.5	0
216	R	216	102	0
191	R	191	64	0
231	R	231	125.5	0
204	R	204	83	0
231	R	231	125.5	0
162	R	162	25.5	0
171	R	171	40.5	0
197	R	197	68	0
246	R	246	144	0
166	R	166	31	0
198	R	198	70	0
169	R	169	36.5	0
162	R	162	25.5	0
256	R	256	155	0
233	R	233	129.5	0
179	R	179	45.5	0
260	R	260	160	0
248	R	248	146.5	0
212	R	212	95	0
211	R	211	94	0
229	R	229	121.5	0
430	R	430	179	0
134	R	134	13	0
334	R	334	175	0
168	R	168	33	0
205	R	205	86	0
170	R	170	38	0
210	R	210	93	0
274	R	274	165	0
243	R	243	141	0
229	R	229	121.5	0
159	R	159	24	0
187	R	187	56.5	0
202	R	202	78	0
224	R	224	114	0
168	R	168	33	0
185	R	185	54	0
173	R	173	44	0
233	R	233	129.5	0
169	R	169	36.5	0
182	R	182	50	0
200	R	200	75.5	0
168	R	168	33	0
240	R	240	138	0
215	R	215	99.5	0
181	R	181	48.5	0
197	R	197	68	0
214	R	214	97.5	0
216	R	216	102	0
199	R	199	72.5	0
249	R	249	148	0
209	R	209	92	0
138	R	138	14	0
199	R	199	72.5	0
189	R	189	61	0
246	R	246	146.5	0

Retrospective Power Curve Calculator

From Example in Section 10.5 of NUREG-1505

p1 and p2 pull data from Table 10-3 sheet

	C	Measurement	(C-LBGR)/SD	Rounded	p1	p2	E(Wmw)	Var(Wmw)	SD(Wmw)	z	Power
Count	Survey Unit Stats	25	-0.279	-0.300	0.416002	0.253419	1872.009	66909.18	258.6681	3.43346	0.00
SD		50	0.171	0.200	0.556231	0.391392	2503.04	68268.01	261.2815	0.983981	0.16
Median		75	0.6213	0.600	0.664313	0.513387	2989.409	60033.13	245.0166	-0.93574	0.83
Reference Stats		100	1.0716	1.100	0.781662	0.662216	3517.479	42717.6	206.6824	-3.06429	1.00
Count		125	1.5218	1.500	0.838901	0.741698	3775.055	31683.57	177.9988	-5.70183	1.00
SD		150	1.9721	2.000	0.910445	0.848608	4097.003	16497.03	128.4408	-10.4084	1.00
Median		175	2.4223	2.400	0.945062	0.908982	4266.279	8542.986	92.42827	-16.2953	1.00
		200	2.8725	2.900	0.976143	0.956616	4392.644	3184.926	56.43515	-28.9271	1.00
		225	3.3228	3.300	0.988174	0.977981	4446.783	1275.474	35.71378	-47.2268	1.00
		250	3.8901	3.900	0.993336	0.98741	4470.012	597.8393	24.46075	-69.9314	1.00
		275	4.2233	4.200	0.997861	0.995497	4489.475	149.3452	12.22069	-141.509	1.00
		300	4.6735	4.700	0.997661	0.995497	4489.475	149.3452	12.22069	-141.509	1.00
		325	5.1238	5.100	0.999796	0.999599	4499.082	6.616729	2.5723	-676.028	1.00
		350	5.5740	5.600	0.999796	0.999599	4499.082	6.616729	2.5723	-676.028	1.00
		375	6.0242	6.000	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		400	6.4745	6.500	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		425	6.9247	6.900	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		450	7.3750	7.400	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		475	7.8252	7.800	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		500	8.2755	8.300	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		525	8.7257	8.700	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		550	9.1759	9.200	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		575	9.6262	9.600	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		600	10.0764	10.100	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		625	10.5267	10.500	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		650	10.9769	11.000	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		675	11.4272	11.400	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		700	11.8774	11.900	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		725	12.3276	12.300	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		750	12.7779	12.800	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		775	13.2281	13.200	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		800	13.6784	13.700	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		825	14.1286	14.100	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		850	14.5789	14.600	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		875	15.0291	15.000	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		900	15.4793	15.500	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		925	15.9296	15.900	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		950	16.3798	16.400	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		975	16.8301	16.800	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		1000	17.2803	17.300	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		1025	17.7306	17.700	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		1050	18.1808	18.200	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		1075	18.6310	18.600	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		1100	19.0813	19.100	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		1125	19.5315	19.500	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		1150	19.9818	20.000	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		1175	20.4320	20.400	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		1200	20.8823	20.900	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		1225	21.3325	21.300	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		1250	21.7827	21.800	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00
		1275	22.2330	22.200	0.999989	0.999978	4499.951	0.0494	0.222262	-7827.77	1.00



Based on the number of measurements and the observed standard deviation, a survey unit with a median measurement equal to the background median plus the LBGR (256.5) will have a 1.0 probability that the survey unit will correctly fail (i.e., the null hypothesis that the difference between the survey unit median and the background median is less than the LBGR [i.e., the survey unit is indistinguishable from background] is rejected).

317	R	317	174	0
337	R	337	176	0
281	R	281	169	0
222	R	222	110	0
199	R	199	72.5	0
187	R	187	56.5	0
232	R	232	128	0
188	R	188	58.5	0
246	R	246	144	0
204	R	204	83	0
286	R	286	171.5	0
199	R	189	61	0
264	R	264	162	0
206	R	206	89	0
204	R	204	83	0
202	R	202	78	0
188	R	188	58.5	0
280	R	280	168	0
226	R	226	116.5	0
196	R	196	65.5	0
259	R	259	157	0
234	R	234	131.5	0
183	R	183	51.5	0
272	R	272	163.5	0
369	R	369	177	0
286	R	286	171.5	0
223	R	223	112.5	0
206	R	206	89	0
206	R	206	89	0
251	R	251	150	0
111	R	111	5	0
253	R	253	152.5	0
222	R	222	110	0
230	R	230	123	0
276	R	276	166	0
246	R	246	144	0
260	R	260	160	0
228	R	228	119	0
236	R	236	134	0
164	R	164	29	0
223	R	223	112.5	0
179	R	179	45.5	0
218	R	218	105	0
189	R	189	61	0
200	R	200	75.5	0
172	R	172	42.5	0
156	R	156	22	0
243	R	243	141	0
257	R	257	156	0
214	R	214	97.5	0
250	R	250	149	0
231	R	231	125.5	0
219	R	219	106	0
206	R	206	89	0
180	R	180	47	0
299	R	299	173	0
129	R	129	10	0
161	S	120.5	9	0
140	S	99.5	3	3
280	S	239.5	136.5	136.5
171	S	130.5	12	12
245	S	204.5	85	85
191	S	150.5	20	20
203	S	162.5	27	27
185	S	144.5	17	17
180	S	139.5	15.5	15.5
258	S	217.5	104	104
138	S	97.5	2	2
244	S	203.5	81	81
157	S	116.5	8	8
211	S	170.5	39	39
156	S	115.5	7	7
209	S	168.5	35	35
148	S	107.5	4	4
189	S	148.5	19	19
180	S	139.5	15.5	15.5
199	S	158.5	23	23
231	S	190.5	63	63
225	S	184.5	53	53
170	S	129.5	11	11
227	S	186.5	55	55
280	S	239.5	136.5	136.5
155	S	114.5	6	6
300	S	259.5	158	158
186	S	145.5	18	18
206	S	165.5	30	30
99	S	58.5	1	1
Sum =		16290	1194	

* This spreadsheet is originally designed to work with a set of twenty measurements, 10 from the survey unit (S) and 10 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to modify the spreadsheet to account for the change in the number of measurements.

of R: 150 n
of S: 30 m
Avg Rank R: 101
Avg Rank S: 40

For m or n greater than 20, the critical value (k) can be calculated for Scenario B from

$$\frac{m(n+m+1)}{2} + z\sqrt{\frac{nm(n+m+1)}{12}}$$

z = 97.5% percentile of standard normal distribution = 1.960

$k = 3225.6$

Since the sum of survey unit ranks is less than the critical value, the null hypothesis that the difference between the survey unit median and the background median is less than the LSGR (i.e., the survey unit is indistinguishable from background) is accepted and the survey unit passes Scenario B

B0709 Alpha-Beta Ph Quantile

60.5	R	58.5	R
60.5	R	58.5	R
60.5	R	61	R
60.5	R	61	R
60.5	R	61	R
60.5	R	63	S
60.5	R	64	R
60.5	R	65.5	R
60.5	R	65.5	R
60.5	R	68	R
60.5	R	68	R
60.5	R	68	R
60.5	R	70	R
60.5	R	72.5	R
60.5	R	72.5	R
87	R	72.5	R
87	R	72.5	R
87	R	75.5	R
87	R	75.5	R
87	R	78	R
87	R	78	R
87	R	78	R
87	R	80	R
87	R	81	S
87	R	83	R
87	R	83	R
87	R	83	R
87	R	85	S
87	R	86	R
87	R	89	R
87	R	89	R
87	R	89	R
87	R	89	R
87	R	89	R
87	R	92	R
87	R	93	R
87	R	94	R
87	R	95	R
87	R	96	R
87	R	97.5	R
87	R	97.5	R
87	R	99.5	R
87	R	99.5	R
87	R	102	R
115.5	R	102	R
115.5	R	102	R
115.5	R	104	S
115.5	R	105	R
115.5	R	106	R
115.5	R	107.5	R
115.5	R	107.5	R
115.5	R	110	R
115.5	R	110	R
115.5	R	110	R
115.5	R	112.5	R
115.5	R	112.5	R
115.5	R	114	R
115.5	R	115	R
115.5	R	116.5	R
115.5	R	116.5	R
115.5	R	119	R
115.5	R	119	R
115.5	R	119	R
115.5	R	121.5	R

B0709 Alpha-Beta Ph Quantile

115.5	R	121.5	R
115.5	R	123	R
115.5	R	125.5	R
115.5	R	125.5	R
115.5	R	125.5	R
115.5	R	125.5	R
115.5	R	128	R
115.5	R	129.5	R
134	R	129.5	R
134	R	131.5	R
134	R	131.5	R
134	R	133	R
134	R	134	R
134	R	135	R
134	R	136.5	S
134	R	136.5	S
134	R	138	R
144.5	R	139	R
144.5	R	141	R
144.5	R	141	R
144.5	R	141	R
144.5	R	144	R
144.5	R	144	R
144.5	R	144	R
144.5	R	146.5	R
144.5	R	146.5	R
144.5	R	148	R
144.5	R	149	R
144.5	R	150	R
152	R	151	R
152	R	152.5	R
152	R	152.5	R
154.5	R	154	R
154.5	R	155	R
157	R	156	R
157	R	157	R
157	R	158	S
160	R	160	R
160	R	160	R
160	R	160	R
162.5	R	162	R
162.5	R	163.5	R
165	R	163.5	R
165	R	165	R
165	R	166	R
167.5	R	167	R
167.5	R	168	R
169.5	R	169	R
169.5	R	170	R
172	R	171.5	R
172	R	171.5	R
172	R	173	R
174.5	R	174	R
174.5	R	175	R
176	R	176	R
177	R	177	R
178	R	178	R
179	R	179	R
180	R	180	R

0 of top 6 from S

0 of top 6 from S

If the r -th largest measurement is among a group of tied (equal-in-value) measurements, increase r to include the tied measurements. Also increase k by the same amount (EPA 230-R-94-004).

$r=7$

$k=5$

0 of top 7 from S

thesis is rejected.

Reproduction of Table 10-3 from NUREG-1505

(C-LBGR)/SD	p1	p2
-6.0	0.00001	0
-5.0	0.000204	0.00001
-4.0	0.002339	0.000174
-3.5	0.006664	0.000738
-3.0	0.016947	0.00269
-2.5	0.03855	0.008465
-2.0	0.07865	0.023066
-1.9	0.089555	0.027714
-1.8	0.101546	0.033114
-1.7	0.114666	0.039348
-1.6	0.12895	0.046501
-1.5	0.144422	0.054656
-1.4	0.161099	0.063897
-1.3	0.178985	0.074301
-1.2	0.198072	0.085944
-1.1	0.218338	0.098892
-1.0	0.23975	0.113202
-0.9	0.262259	0.12892
-0.8	0.285804	0.146077
-0.7	0.310309	0.164691
-0.6	0.335687	0.18476
-0.5	0.361837	0.206266
-0.4	0.388649	0.229172
-0.3	0.416002	0.253419
-0.2	0.443769	0.27893
-0.1	0.471814	0.305606
0.0	0.5	0.333333
0.1	0.528186	0.361978
0.2	0.556231	0.391392
0.3	0.583998	0.421415
0.4	0.611351	0.451875
0.5	0.638163	0.482593
0.6	0.664313	0.513387
0.7	0.689691	0.544073
0.8	0.714196	0.574469
0.9	0.737741	0.604402
1.0	0.76025	0.633702
1.1	0.781662	0.662216
1.2	0.801928	0.6898
1.3	0.821015	0.716331
1.4	0.838901	0.741698
1.5	0.855578	0.765812
1.6	0.87105	0.788602
1.7	0.885334	0.810016
1.8	0.898454	0.830022
1.9	0.910445	0.848605
2.0	0.92135	0.865767
2.1	0.931218	0.881527
2.2	0.940103	0.895917
2.3	0.948062	0.908982
2.4	0.955157	0.920777
2.5	0.96145	0.931365
2.6	0.967004	0.940817
2.7	0.971881	0.949208
2.8	0.976143	0.956616
2.9	0.979848	0.963118
3.0	0.983053	0.968795
3.1	0.985811	0.973725
3.2	0.988174	0.977981
3.3	0.990188	0.981636
3.4	0.991895	0.984758
3.5	0.993336	0.98741
4.0	0.997661	0.995497
5.0	0.999796	0.999599
6.0	0.999989	0.999978