APPENDIX A: METHODS AND MATERIALS, CONTINUED

All taxa were identified to the lowest taxonomic level possible given the degree of preservation. Both foraminifera and ostracodes were identified to species, although ostracode genera were monospecific. Samples were taken at varying degrees of resolution from 13 m of sediment centered at the horizon defined as the PETM within Hole 690B. The two faunal data sets were collected at different times, and logistic constraints resulted in differing resolution within the data sets. The within-sample abundance of the ostracode data set is considerably smaller than that of the foraminifera, thus necessitating different sampling strategies. Benthic foraminifera were sampled at ~0.5 meter scale, except for a 30 cm section centered around the PETM horizon, which was sampled at a centimeter scale (Thomas, 2003). Each foraminiferal sample was picked until the abundance neared 300 individuals (Thomas, 2003). Ostracodes were sampled on a decimeter scale within a 5 m interval around the PETM; each sample was exhaustively picked for ostracodes. As ostracodes are much less abundant than benthic foraminifera, two samples were excluded from statistical analysis in this study because fewer than five individuals were present; RACs generated for such small samples would be meaningless. Both samples are located within the CIE interval. All other samples had >30 individuals (mean = 136, maximum sample size = 294). Each valve was counted as an individual, as per the findings of Gilinsky and Bennington (1994) who showed through simulation that when the sample size is much smaller than the actual size of the population from which the sample is taken, then each valve of a bivalved organism most likely represents a unique individual. Fragments of valves were only included if >1/3 of the valve was present, and then were represented as either 1/3, 1/2, or 2/3 of an individual, such that if there were three fragments that each consisted of 1/3 of a valve, these fragments would be added together to count as one individual.

Kurtosis is a measure of the degree to which a population distribution is peaked or flat. This basic metric is usually used in statistics to determine if a data set departs from Gaussian normality, but can also be used to represent the shape of a RAC which is simply the distribution of abundance across taxa. Distributions that are more peaked than a normal distribution have kurtosis values greater than 3, while distributions that are flatter than a normal distribution have values less than 3. A convex-down curve (a stressed community) has a peaked distribution, while a convex-up curve (a less stressed community) has a flatter distribution. Kurtosis is sensitive to the strength of the peak, as well as the length of the tail. Increasing values for kurtosis (more peaked, convex-down) indicate increasing stress or disturbance in communities. Kurtosis is especially useful because it is independent of sample size, allowing it to be applied to communities with different taxonomic richness and specimen abundances.

Buzas and Gibson Evenness was chosen to measure the evenness within a community because of the intuitiveness and simplicity of this metric. The evenness value is a proportion between 0 and 1, representing the proportion of ecologically equivalent taxa in the community (in terms of abundance). This is calculated using Shannon's H for each community as the exponent of the natural log (e), which is an estimate of the number of taxa that are ecologically equivalent within the community. When this number (e^H) is divided by the number of taxa in the community, the resulting proportion is Buzas and Gibson Evenness, which can then be compared to other communities that have different abundances and raw taxonomic richnesses (Hayek and Buzas, 1997).

Gilinsky, N.L., and Bennington, J.B., 1994, Estimating numbers of whole individuals from collections of body parts; a taphonomic limitation of the paleontological record: Paleobiology, v. 20, p. 245–258.

Table DR1 Benthic foraminifera

MBSF	Age (Ma)	Total	Richness	Evenness	Kurtosis
160.61	54.476	342	54	0.48	2.48
162.12	54.591	342	47	0.41	4.94
163.61	54.705	335	40	0.34	2.95
165.11	54.788	344	30	0.43	3.78
166.65	54.858	289	30	0.51	2.18
167.31	54.877	318	25	0.42	2.67
167.65	54.881	335	31	0.42	2.04
168.07	54.884	303	30	0.45	3.25
168.81	54.890	335	37	0.33	3.88
169.16	54.895	323	34	0.33	5.78
169.58	54.905	322	34	0.40	3.58
170.31	54.953	305	33	0.36	4.01
170.42	54.964	317	34	0.45	3.03
170.43	54.965	311	41	0.42	2.00
170.44	54.966	327	42	0.39	3.76
170.46	54.968	328	38	0.41	4.37
170.48	54.972	335	36	0.33	6.58
170.50	54.975	321	37	0.33	5.94
170.51	54.975	313	33	0.50	3.07
170.52	54.976	267	31	0.33	4.74
170.54	54.979	315	49	0.35	3.64
170.56	54.981	325	38	0.34	3.89
170.57	54.983	334	37	0.44	2.62
170.58	54.984	308	37	0.36	4.74
170.60	54.988	315	41	0.41	4.48
170.61	54.989	299	51	0.43	2.47
170.62	54.990	320	56	0.48	1.63
170.63	54.991	402	58	0.40	3.42
170.63	54.991	320	66	0.58	1.10
170.64	54.992	347	68	0.51	1.99
170.65	54.993	404	58	0.55	1.98
170.65	54.994	322	63	0.53	1.51
170.66	54.995	319	64	0.54	1.66
170.67	54.996	313	67	0.50	1.80
170.68	54.997	321	71	0.50	1.81
170.69	55.000	313	65	0.59	1.20
170.71	55.002	328	62	0.46	2.70
170.72	55.003	311	69	0.46	2.32
170.73	55.005	325	73	0.49	1.62
170.74	55.006	339	71	0.54	1.70
170.75	55.007	335	60	0.50	2.09
171.02	55.032	304	71	0.49	1.62
171.85	55.065	324	65	0.47	2.76
172.16	55.079	312	77	0.53	1.43
173.31	55.157	302	68	0.42	1.44

Table DR2 Ostracodes

MBSF	Age	Total	Richness	Evenness	Kurtosis
167.35	54.878	148	12	0.40	4.00
167.63	54.880	100	12	0.51	0.88
168.06	54.884	120	12	0.39	2.25
168.16	54.885	92	10	0.42	1.84
168.46	54.887	51	10	0.53	1.49
168.85	54.891	151	16	0.56	1.14
169.26	54.897	185	14	0.81	-0.38
169.65	54.909	70	14	0.68	0.72
169.77	54.913	171	16	0.75	-0.35
169.85	54.916	142	14	0.66	0.21
169.95	54.921	92	16	0.59	1.36
170.06	54.931	90	16	0.61	1.11
170.17	54.941	52	14	0.64	0.81
170.46	54.969	34	13	0.53	1.40
170.77	55.010	234	20	0.53	3.99
171.06	55.034	173	18	0.69	1.39
171.27	55.044	180	20	0.53	1.26
171.58	55.056	294	22	0.39	3.96
171.88	55.066	153	19	0.50	2.00
172.28	55.085	192	16	0.51	2.25